PERIODIC REVIEW

Newcastle Coal Creek Landfill
Facility Site ID#: 2044
Cleanup Site ID#: 4812

15500 Six Penny Lane
Newcastle, WA 98059

Northwest Regional Office
Toxics Cleanup Program

December 2019

1.0 INTRODUCTION

This document is a review by the Washington State Department of Ecology (Ecology) of post-cleanup site conditions and monitoring data at the Newcastle Coal Creek Landfill site (Site). Cleanup at this Site was implemented under the Model Toxic Control Act (MTCA) regulations, Chapter 173-340 Washington Administrative Code (WAC), and a Prospective Purchaser Consent Decree (PPCD) No. 95-2-26414-0SEA between Ecology and Newcastle Golf, L.L.C. (Newcastle Golf) in 1995.

WAC 173-340-420 (2) requires that Ecology conduct a periodic review of a site every five years under the following conditions:

(a) Whenever the department conducts a cleanup action
(b) Whenever the department approves a cleanup action under an order, agreed order or consent decree
(c) Or, as resources permit, whenever the department issues a no further action opinion;
(d) and one of the following conditions exists:
    1. Institutional controls or financial assurance are required as part of the cleanup
    2. Where the cleanup level is based on a practical quantitation limit
    3. Where, in the department's judgment, modifications to the default equations or assumptions using site-specific information would significantly increase the concentration of hazardous substances remaining at the site after cleanup or the uncertainty in the ecological evaluation or the reliability of the cleanup action is such that additional review is necessary to assure long-term protection of human health and the environment.

Item 1 above applies for this Site because institutional controls are required as part of the cleanup actions, which include containment of contaminants in the landfill. Institutional controls have been implemented through a Restrictive Covenant on the Property.

When evaluating whether human health and the environment are being protected, the factors the department shall consider include [WAC 173-340-420(4)]:

(a) The effectiveness of ongoing or completed cleanup actions, including the effectiveness of engineered controls and institutional controls in limiting exposure to hazardous substances remaining at the Site;
(b) New scientific information for individual hazardous substances or mixtures present at the Site;
(c) New applicable state and federal laws for hazardous substances present at the Site;
(d) Current and projected Site and resource uses;
(e) The availability and practicability of more permanent remedies; and
(f) The availability of improved analytical techniques to evaluate compliance with cleanup levels.

The Department shall publish a notice of all periodic reviews in the Site Register and provide an opportunity for public comment.

2.0 SUMMARY OF SITE CONDITIONS

2.1 Site Description and History

The Newcastle Coal Creek Landfill is a closed landfill located within the Newcastle Golf Club property (the Property) in the City of Newcastle in east central of King County, Washington. The Property consists of approximately 350 acres. Among it, 70 acres were permitted for demolition landfill and 137 acres were permitted for grading and clean earth disposal.

The Property is located approximately three miles south and two miles east of the intersection of Interstates 405 and 90, in Sections 26 and 27, Township 24 North, Range 5 East, W.M. The Property is bounded on the north by Newcastle-Coal Creek Road, on the south and west by residential development, and on the east by Cougar Mountain Regional Wildland Park. A vicinity map is available in Appendix 6.1.

The Property and its surrounding area were historically mined for coal from the late 19th century. Landfilling began in the old mine pits left vacant after mine closure. Palmer Coking Coal Company operated the landfill as a permitted demolition waste disposal site from 1970 until it was purchased by Coal Creek Development Corporation (CCDC) in 1985. The landfill stopped receiving demolition waste in 1992 and it was formally closed in June 1993.

Newcastle Golf purchased the Property in 1994. Since then, the Property has been developed and operated as a golf course, and its surrounding vicinity has been developed for residential use, including new roads and stormwater infrastructure. Site and vicinity maps are available in Appendices 6.1 through 6.5.

2.2 Site Geology and Hydrogeology

The underlying geology of the Site and its surrounding areas consists of a thick sequence of inclined interbedded coal, sandstone, and shale beds of the Eocene Renton Formation, which is underlain by interbedded volcanic and sedimentary rocks of the Tukwila Formation (Paramatrix 1991).

Regional ground water flow beneath the Site is generally in a westerly direction parallel to the strike of the sedimentary units and the flow direction is likely to be controlled by a complex network of coal mine workings. Seven coal seams were extensively mined beneath the landfill. A regional geologic map of the landfill area is available in Appendix 6.3. Most seams appear to discharge water either directly or indirectly to Richmond Tunnel, from which the water flows to Coal Creek. However, it appears that Jones Working has no connection with other mine workings to the north. Ground water recharge to this seam appears to be more from the east and southeast from rainfall infiltration.

2.3 Site Investigations

As summarized in Section III of the 1995 PPCD, several studies of environmental conditions identified environmental impacts associated with the historical operations of the landfill, which include:

Ground Water Impact

Ground water from the landfill daylights at the Richmond Tunnel. Water samples taken at the Richmond Tunnel have shown specific conductivity, iron, and manganese levels at or above state and federal secondary maximum contaminant levels (SMCLs).

Surface Water Impact

Runoff from the Property naturally drains into two separate watersheds: Coal Creek and China Creek. There is a potential for leachate and/or surface water runoff to reach these two creeks. Among other contaminants, chlorinated compounds, including acetone, chlorobenzene, benzene, toluene, xylene, and ethyl benzene, have been detected in the leachate.

Landfill Gases

Landfill gases have been detected at various times from monitoring wells on the landfill. During a gaseous emissions survey conducted in 1988, low levels of chlorinated hydrocarbons were detected in areas associated with mine openings. The compounds detected were: trichlorofluoromethane, methylene chloride, 1,1,1- trichloroethane, tetrachloroethane, and chlorobenzene. Methane gas has also been detected in concentrations of between 5 and 10 percent at mine entrances and on the Muldoon coal seam, at the western side of the landfill. Mine shafts have all been sealed to prevent access.

2.4 Cleanup Standards

Cleanup standards consist of cleanup levels and points of compliance, which must be established for each site. Cleanup levels determine at what concentration a particular hazardous substance does not threaten human health or the environment. Points of compliance designate the location on the Site where the cleanup levels must be met. Per the 1995 PPCD, cleanup standards for compliance at this Site were adopted under RCW 70.105D.030(2)(d).

Surface Water Cleanup Levels and Point of Compliance

Per the Post-Closure Plan, surface water compliance has been assessed using the State Water Quality Standards for Surface Waters (WAC 173-201).

MTCA requires that the point of compliance for surface water be the point at which hazardous substances are released to surface waters of the state (WAC 173-340-730 (6)). The surface water

stations used to collect samples to assess compliance have been identified in the Post-Closure Plan as shown on Appendix 6.2. It was approved by Public Health – Seattle & King County (PHSKC) and concurred with by Ecology in the 1995 PPCD.

Groundwater Cleanup Levels and Point of Compliance

Per the Post-Closure Plan, ground water compliance has been assessed using the State Ground Water Quality Standards (GWQS, WAC 173-200).

MTCA requires that the standard point of compliance for ground water shall be established throughout the site from the uppermost level of the saturated zone extending vertically to the lowest depth which could potentially be affected by the site (WAC 173-340-720 (8)). The points of compliance for this Site are defined in accordance with WAC 173-304-100 as part of ground water that lies beneath the perimeter of a solid waste facility's active area as that active area would exist at closure of the facility. All the sampling locations used for ground water compliance monitoring were approved by PHSKC and concurred with by Ecology. Those sampling locations include ground water wells and surface water stations as shown on Figure 6.1 and 6.4. The two surface water stations were selected because they are more likely to be representative of ground water conditions as described in Section 2.8.

2.5 Landfill Closure and Remedial Actions

The landfill was closed in June 1993. Remedial actions were conducted under the PPCD during construction of those portions of the golf club overlying the closed landfill. A minimum of 1 foot of soil cover was provided according to the site closure plan. Areas with slopes less than 6 percent were lined with synthetic liner. All unlined areas were sloped to greater than 6% to promote runoff and reduce infiltration. Fairways, greens and tees were constructed to collect runoff. The golf course has been operated according to the King County Golf Course Design and Operations Best Management Practices Manual. Irrigation is based on computer assisted decision making. Routine inspections have been conducted by the golf club, including checking for seeps following significant rainfall events. If seeps are detected, corrective actions are taken.

Leachate from the landfill is directed to a manhole located in the parking lot next to the golf course entrance. Leachate is treated with chlorine and discharged to the King County Metro sewer system (industrial waste discharge permit number 7607).

2.6 Regulatory History

Ecology performed a Site Hazard Assessment of the landfill in 1992. No release of contaminants from the landfill to ground water or to surface waters was confirmed. However, since hazardous materials were documented to have been disposed of at the Site in the 1960s, the landfill was ranked 5 out of 5 on its priority list for cleanup. Rank 5 sites have the lowest priority for Ecology action.

Ecology and Newcastle Golf entered into a Prospective Purchaser Consent Decree (PPCD) 95-2-26414-0SEA in 1995. The purpose was to resolve the potential liability of Newcastle Golf for any historical contamination associated with the landfill, to promote the public interest by expediting cleanup activities at the landfill, and to facilitate the reuse of a closed demolition waste landfill.

Ecology issued a Certificate of Completion of Remedial Actions on August 29, 2000 to certify that all remedial actions required under the PPCD were completed. However, all activities required to operate and maintain the integrity of the remedial actions are to continue. A Post-closure monitoring program was initiated in July 1993 under the oversight of PHSKC. Per the solid waste permit issued by PHSKC, the post-closure plan shall be implemented for a minimum of 30 years after the completion of final closure and may be extended as necessary. Monitoring includes surface water, ground water, landfill gas and landfill seeps.

2.7 Current Surface Water Conditions

Surface Water Sampling

Routine surface water monitoring has been conducted since 1989 in Coal Creek, China Creek, and their tributaries both upgradient and downgradient from the landfill. Monitoring continued at a frequency of three or four events per year through 1993. From May 1994 through 2006, monitoring was conducted twice yearly. Since 2007, the monitoring frequency has reduced to once per year. Surface sampling locations are shown on Appendix 6.2. Parameters tested include field parameters of temperature, dissolved oxygen, pH and conductivity. Laboratory analysis includes fecal coliform, hardness, and sulfide. An expanded list of parameters will be tested if field observations indicate any contamination of Coal Creek and China Creek. The expanded parameter list includes:

- temperature
- pH
- conductivity
- dissolved oxygen (DO)
- turbidity
- hardness
- fecal coliform
- total suspended solids (TSS)
- total dissolved solids (TDS)
- ammonia
- nitrate and nitrite
- sulfate
- sulfide
- chloride
- chemical oxygen demand (COD)
- total organic carbon (TOC)
- oil and grease
- semi-volatile
- iron
- manganese
- cadmium
- copper
- chromium
- lead
- zinc

It should be noted that the selection of parameters was based on detection of toxic substance concentrations in leachate exceeding the State water quality standards (WAC 173-201).

Summary of Surface Water Sampling Results

Results from surface monitoring to date indicate that Coal Creek and China Creek are generally within the State surface water quality standards. Elevated fecal counts were noted during some past sampling events, which appeared to be related with runoff from residential development. It should be noted that fecal coliform is not regulated under MTCA. No evidence of surface water quality impacts associated with the landfill were found. Appendix 6.6 shows the most recent surface water monitoring results conducted in May 2012.

2.8 Current Ground Water Conditions

Ground Water Sampling

Post-closure ground water monitoring has been conducted from four wells (MW-1, MW-2, MW-3, and MW-4/MW-5) and two off-site surface water stations (SW-6 and SW-7) semiannually or annually. SW-6 and SW-7 were selected as indicators of ground water quality and its impact on Coal Creek as described below. Samples were analyzed for parameters listed below as specified for municipal landfills in the Minimum Functional Standards for Solid Waste Handling (WAC 173-304-490). Since 2007, the monitoring frequency has been reduced to once per year. Analyses of volatile organic compounds, semi-volatile organic compounds, and metals (except for arsenic) were discontinued since historical data collected following landfill closure have not indicated any detections of those parameters associated with impacts from the landfill.

Groundwater monitoring parameters.

Biannual Parameters (First and Second Event)	Additional Annual Parameters (First Event)
pH	Volatile Organic Compounds (EPA Method 8240)
Conductivity	Semivolatile Organic Compounds (EPA Method 8270)
Temperature	Dissolved Priority Pollutant Metals (Sb, As, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Tl, Zn)
Chloride	
Ammonia	
Nitrate	
Nitrite	
Sulfate	
Hardness	
Dissolved Fe, Mn, and Zn	
Chemical Oxygen Demand (COD)	
Total Organic Carbon (TOC)	
Total Dissolved Solids (TDS)	

The ground water monitoring network consists of monitoring wells screened within the intervening rock between the coal mine workings. It includes one well (MW-1) upgradient of the landfill, and three wells (MW-2, MW-3, and MW-4/MW-5) downgradient of the landfill. It

should be noted that MW-5 was constructed in 2001 to replace MW-4, which was damaged during the golf course construction. MW-5 is located approximately 500 feet northwest of MW-4 beyond the Property boundary. Surface water station SW-6 is located at the Richmond Tunnel mine discharge, and is believed to be representative of ground water intercepted by a network of mine workings beneath the Site that discharges into Coal Creek. Surface water station SW-7 is located further downstream along Coal Creek and was selected as an indicator of ground water impact on Coal Creek. The monitoring well locations are shown in Appendix 6.4, and the surface water station locations are shown in Appendix 6.1.

Summary of Ground Water Conditions

Results from ground water monitoring do not indicate that the ground water has been impacted by the landfill. Although parameters of specific conductivity, TDS, sulfate, dissolved iron, and dissolved manganese exceeded secondary GWQSs during some monitoring events, the exceedences occurred in both upgradient and downgradient wells. It appears that the differences in ground water chemistry are likely affected by localized geochemical conditions rather than from the landfill. Additionally, since secondary groundwater standards are for cosmetic and aesthetic effects (such as staining of fixtures and taste), these exceedances are not considered a risk to human health. Time-series plots for specific conductivity, dissolved arsenic, dissolved iron, and dissolved manganese in ground water are shown in Appendix 6.8 through 6.11.

Concentrations of dissolved arsenic were above the state ground water quality standards in most sampling events from both upgradient and downgradient wells. However, all the arsenic concentrations were below the state Maximum Contaminant Level (MCL) for drinking water (10 µg/L), except in MW-5 with concentrations ranging from 10 to 50 µg/L over time. The arsenic concentrations in MW-5 have ranged from 11 to 16 µg/L since 2011, so appear to be decreasing. A time-series plot for dissolved arsenic in ground water is shown on Appendix 6.11.

It should be noted that MW-5 is located downgradient of the landfill and outside of the Property boundary. Besides dissolved arsenic, manganese and iron are typically high in this well relative to the other wells located within the Property.

Appendix 6.7 shows the most recent ground water monitoring results from March 2019.

2.9 Landfill Gas

Landfill gas is generally undetectable based on data collected from 2002 to 2012. The locations of the gas probes are shown in Appendix 6.5. Methane is generally much lower than 5% in all the probe locations except for Probe G-16. Methane concentration was greater than 50% at the time G-16 was installed in 2004. As a result, a blower was installed and the concentration of methane fell below 5%. However, it was noted that the methane concentration went up to more than 5% in summer 2012. In addition to notification of PHSKC, mitigation procedures were implemented by the golf club and this probe is being monitored at an increased frequency.

2.10 Leachate Seeps

As described in Section 2.5, Newcastle Golf routinely inspects their facility as part of normal golf course operations, including checking for seeps following significant rainfall events. If seeps are detected at the surface of the side slopes of the landfill, corrective actions are taken to ensure those seeps will be controlled at the source.

The most recent leachate analysis report available to Ecology at this time was from July 2009 (Parametrix 2009). Leachate samples were collected in December 2008 and March 2009 to evaluate potential impacts of an overflow event. Low levels of chloroethane and chlorobenzene were detected. Analytical results also showed high concentrations of dissolved iron and manganese, which are consistent with high levels of those constituents in ground water samples collected in the landfill. Other than that, the data does not indicate any potential impact from the landfill.

A seep interceptor trench was constructed in 2018 in the southeast corner of the landfill where orange-stained seeps have historically been observed. The leachate from the seeps is directed to the interceptor trench and into the leachate pump station. The system has been operating since November 2018, with maintenance being performed as-needed.

2.11 Environmental Covenant

A Restrictive Covenant (also known as an Environmental Covenant) was recorded for the Property in 1996. It was determined that impacts to human health and the environment associated with the contamination at the Site could be mitigated by the use of institutional controls in the form of an environmental covenant. The Restrictive Covenant imposes the following limitations:

Section 1	No ground water may be taken for domestic purposes from any well within 1,000 feet of the Landfill boundary.
Section 2	No wells of any sort may be constructed on the Landfill.
Section 3	No enclosed structures shall be constructed on the Landfill.
Section 4	No water hazard, pond, or water storage facility of any kind may be constructed over the Landfill.
Section 5	Any activity on the Property that may interfere with the Remedial Action is prohibited.
Section 6	Owner must give written notice to the Department of Ecology ("Ecology"), or to a successor agency, of Owner's intent to convey any interest in the Property. No conveyance of title, easement, lease or other interest in the Property shall be consummated by Owner without adequate and complete provision for continued compliance with all provisions of the above-referenced Consent Decree.

Section 7	Owner must notify and obtain approval from Ecology, or from a successor agency, prior to any use of the Landfill that is inconsistent with the terms of this Restrictive Covenant. Ecology, or its successor agency, may approve such a use only after public notice and comment.
Section 8	Owner and Owner's assigns and successors in interest reserve the right under WAC 173-340-440 (1991 ed.) to record an instrument which provides that this Restrictive Covenant shall no longer limit use of the Property or be of any further force or effect. However, such an instrument may be recorded only with the consent of Ecology, or of a successor agency. Ecology, or a successor agency, may consent to the recording of such an instrument only after public notice and comment.

The Restrictive Covenant is available as Appendix 6.12.

3.0 PERIODIC REVIEW

3.1 Effectiveness of completed cleanup actions

The landfill cover appeared to be in good condition during the Site visit on May 11, 2017. No visible disturbances, odors, or seep discharges were observed. No repair, maintenance or contingency actions are required at this time.

Orange staining (likely iron oxidizing bacteria) was observed at the Richmond Tunnel mine discharge, which is in the vicinity of sampling location SW-6 in Coal Creek. This type of condition can occur at former landfills and mines, but can also be naturally occurring based on the iron content in the soil and oxygen content in the groundwater. Elevated dissolved iron has been detected in groundwater and appears to be associated with local geochemistry rather than the landfill (see Section 2.8).

A photo log is available as Appendix 6.13.

Institutional controls in the form of a Restrictive Covenant were implemented at the site in 1996. The covenant was recorded, remains active, and is discoverable through the King County Auditor's Office. There is no evidence a new instrument has been recorded which limits the effectiveness or applicability of the covenant. The covenant prohibits activities that will result in the release of contaminants contained as part of the cleanup without Ecology's approval, and prohibits any use of the property that is inconsistent with the covenant. The covenant serves to assure the long term integrity of the surface cover and the remedial action.

The covenant restricts ground water for any domestic purposes from any well within 1,000 feet of the landfill boundary. Based on an online search on Ecology's Well Report Viewer, there is at least one domestic well within 1,000 feet of the landfill boundary. A Water Well Report for Ernest Swanson at 7331 Lakemont Boulevard SE was identified. The Water Well Report indicates that a domestic well was installed in 1983 to a depth of 113 feet. The property appears

to be approximately 800 feet east of the landfill boundary. The current status of the well is unknown.

A more thorough search by the property owner (i.e. their environmental consultant) is needed to identify all potential domestic wells within 1,000 feet of the landfill boundary. Property owners with domestic wells within 1,000 feet of the landfill boundary will need to be contacted by the landfill property owner to determine the status of the well and to evaluate potential drinking water quality issues.

Quarterly progress reports are required to be submitted to Ecology per the PPCD, but Ecology has not been provided progress reports consistently in recent years. The progress reports should include descriptions of on-site activities that have taken place during the reporting period, any deviations from required tasks, monitoring for seeps following significant rainfall events, the condition of the cap, etc. (refer to the PPCD and Post-Closure Plan for additional information). However, Ecology will accept an annual progress report in lieu of a quarterly progress report, which can be incorporated in to the annual groundwater monitoring report submittal or added as an appendix.

It should be noted that Ecology received a report in 2019 regarding landfill upgrades that occurred in 2018 (the construction of a seep interceptor trench, as discussed in Section 2.10). This is an example of the type of information that should be included in the annual progress reports.

3.2 New scientific information for individual hazardous substances or mixtures present at the Site

There is no new scientific information for the contaminants related to the Site.

3.3 New applicable state and federal laws for hazardous substances present at the Site

Cleanup levels at the Site are based on state surface water and ground water quality standards as proposed in the Post-Closure Plan. WAC 173-340-702(12) (c) [2001 ed.] provides that,

“A release cleaned up under the cleanup levels determined in (a) or (b) of this subsection shall not be subject to further cleanup action due solely to subsequent amendments to the provision in this chapter on cleanup levels, unless the department determines, on a case-by-case basis, that the previous cleanup action is no longer sufficiently protective of human health and the environment.”

Cleanup levels changed as a result of modifications to MTCA in 2001 and contamination remains at the site above MTCA Method A cleanup levels; however, the cleanup action is still protective of human health and the environment.

3.4 Current and projected site or resource use

The Site is currently used as a golf course. There have been no changes in current or projected Site or resource use.

3.5 Availability and practicability of more permanent remedies

The remedy implemented included containment of hazardous substances, and it continues to be protective of human health and the environment. While more permanent remedies may be available, they are still not practicable at this Site.

3.6 Availability of improved analytical techniques to evaluate compliance with cleanup levels

The analytical methods used at the time of the remedial action were capable of detection below selected Site cleanup levels. The presence of improved analytical techniques would not affect decisions or recommendations made for the Site.

4.0 CONCLUSIONS

The following conclusions have been made as a result of this periodic review:

- Soil and groundwater cleanup levels have not been met at the Site; however, under WAC 173-340-740(6)(f), the cleanup action was determined to comply with cleanup standards since the long-term integrity of the containment system is ensured and the requirements for containment technologies are being met.

- The Environmental Covenant restricts ground water for any domestic purposes from any well within 1,000 feet of the landfill boundary. At least one domestic well within 1,000 feet of the landfill boundary was identified by Ecology. A more thorough search by the property owner (i.e. their environmental consultant) is needed to identify all potential domestic wells within 1,000 feet of the landfill boundary. Property owners with domestic wells within 1,000 feet of the landfill boundary will need to be contacted by the landfill property owner to determine the status of the well and to evaluate potential drinking water quality issues. A domestic well inventory report should be submitted to Ecology prior to the next periodic review to determine if the remedy is still protective of human health and the environment.

- The Environmental Covenant for the property is in place and is discoverable through the King County Auditor's Office. It continues to be effective in protecting the integrity of the remedial action. However, as previously noted, at least one of the requirements of the Environmental Covenant is not being met. While it is unknown whether there are any actual human exposures to contaminants of concern via domestic wells, it is a possibility. Therefore, the remedy cannot be considered protective of human health until more

information is provided regarding the domestic wells. In other words, this periodic review fails at this time, but will be re-evaluated during the next periodic review when more information is available.

- Quarterly progress reports are required to be submitted to Ecology per the Prospective Purchaser Consent Decree (PPCD), but Ecology has not been provided progress reports consistently in recent years. The progress reports should include descriptions of on-site activities that have taken place during the reporting period, any deviations from required tasks, monitoring for seeps following significant rainfall events, the condition of the cap, etc. (refer to the PPCD and Post-Closure Plan for additional information). However, Ecology will accept an annual progress report in lieu of a quarterly progress report, to be incorporated in to the annual groundwater monitoring report submittal.

No additional cleanup actions are required by the property owner at this time. It is the property owner's responsibility to continue to inspect the Site to assure that the integrity of the remedy is maintained.

The next review for the Site will be scheduled five years from the date of this periodic review. In the event that additional cleanup actions or institutional controls are required, the next periodic review will be scheduled five years from the completion of those activities.

5.0 REFERENCES

Ecology. Prospective Purchaser Consent Decree No. 95-2-26414-0SEA. October 1995.

Ecology. Site Visit. May 11, 2017.

Landmarc Technologies, Inc. Letter to Public Health Seattle & King County. Re: Closed Newcastle Demolition Landfill 2006 Annual Report. September 7, 2006.

Parametrix, Inc. Newcastle Landfill Closure Plan. Prepared for Coal Creek Development Corporation. May 1991.

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Parametrix, Inc. Second 2006 Semi-Annual Groundwater Sampling Event, Newcastle Demolition Landfill. July 21, 2006.

Parametrix, Inc. December 2008 and March 2009 Leachate Sampling Results, Newcastle Demolition Landfill. July 24, 2009.

Parametrix, Inc. March 2011 Groundwater Sampling Event, Newcastle Demolition Landfill. May 4, 2011.

Parametrix, Inc. May 2011 Surface Water Monitoring Results for Newcastle Landfill. June 28, 2011.

Parametrix, Inc. March 2012 Groundwater Sampling Event, Newcastle Demolition Landfill. June 6, 2012.

Parametrix, Inc. May 2012 Surface Water Monitoring Results for Newcastle Landfill. June 6, 2012.

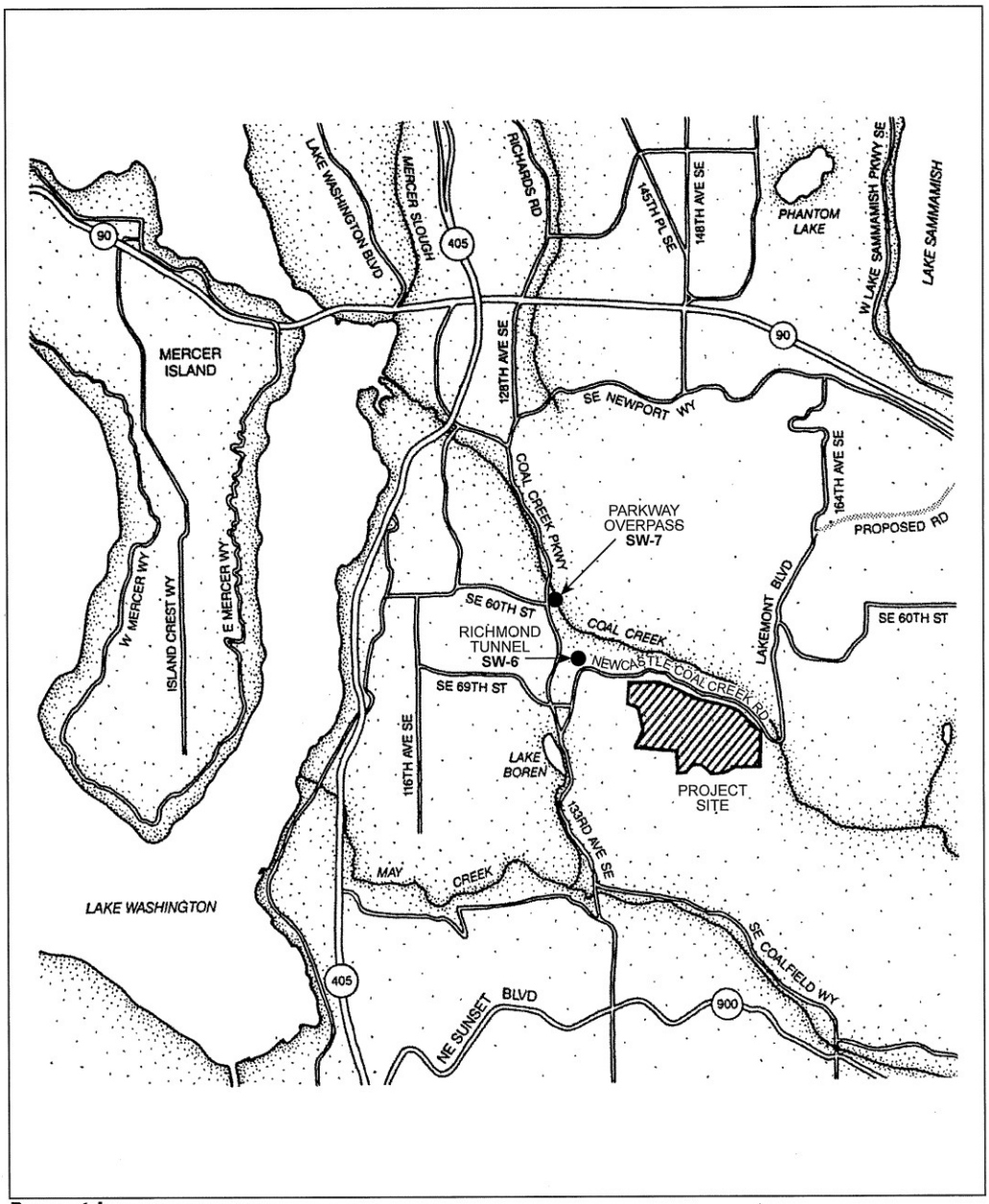
Parametrix, Inc. March 2015 Groundwater Sampling Event for Newcastle Demolition Landfill. June 9, 2015.

Parametrix, Inc. March 2019 Groundwater Sampling Event for Newcastle Demolition Landfill. June 4, 2019.

Landmarc Technologies, Inc. Report of Completion of Newcastle Surface Water Interception Trench. December 16, 2019.

6.0 APPENDICES

6.1 Vicinity Map and Surface Water Monitoring Locations



Parametrix 555-3747-001/01(01) 5/09 (B)

Figure 3
Off-site Monitoring Locations
Newcastle Demolition Landfill

6.2 Site Plan and Surface Water Monitoring Locations

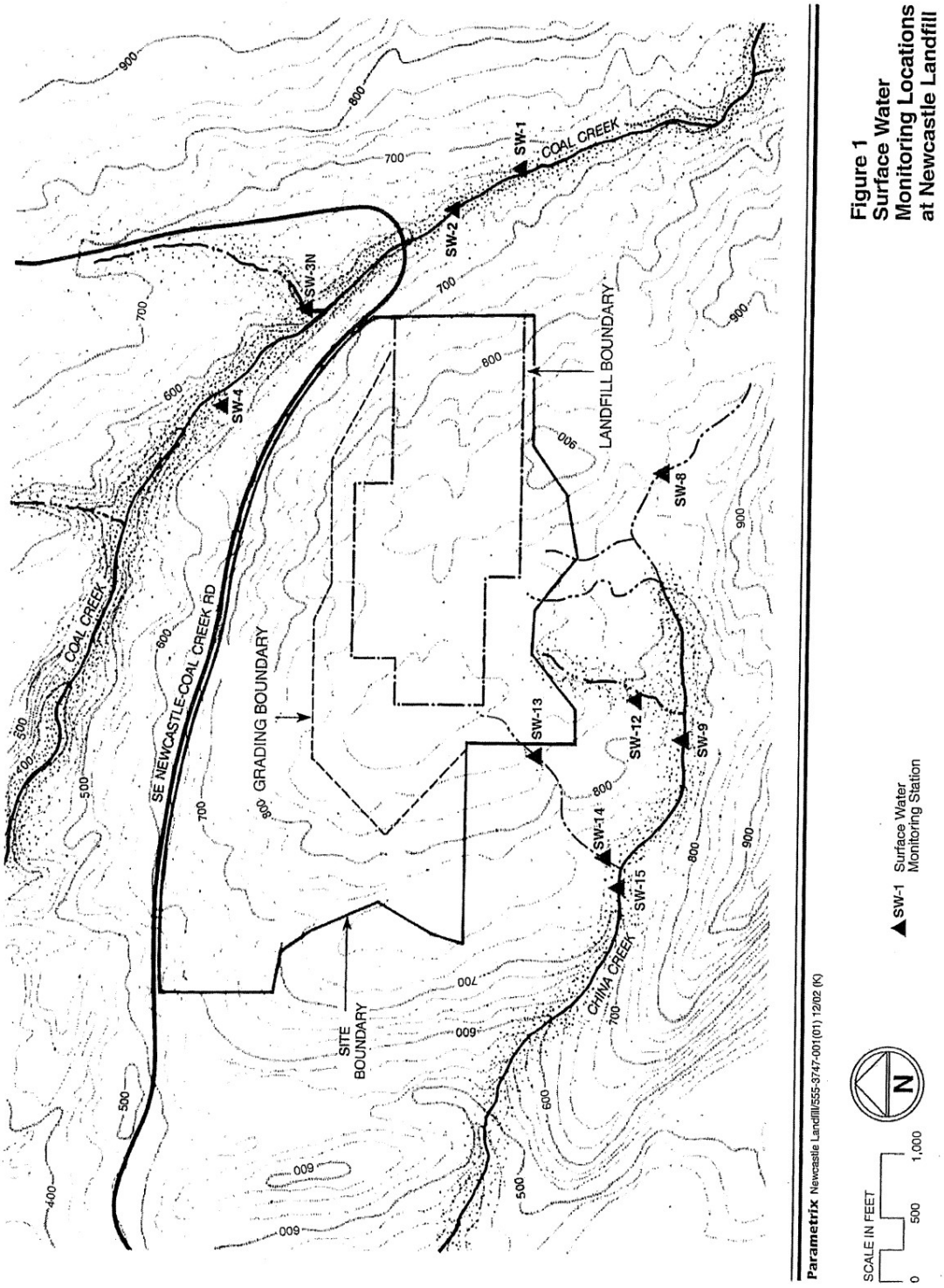
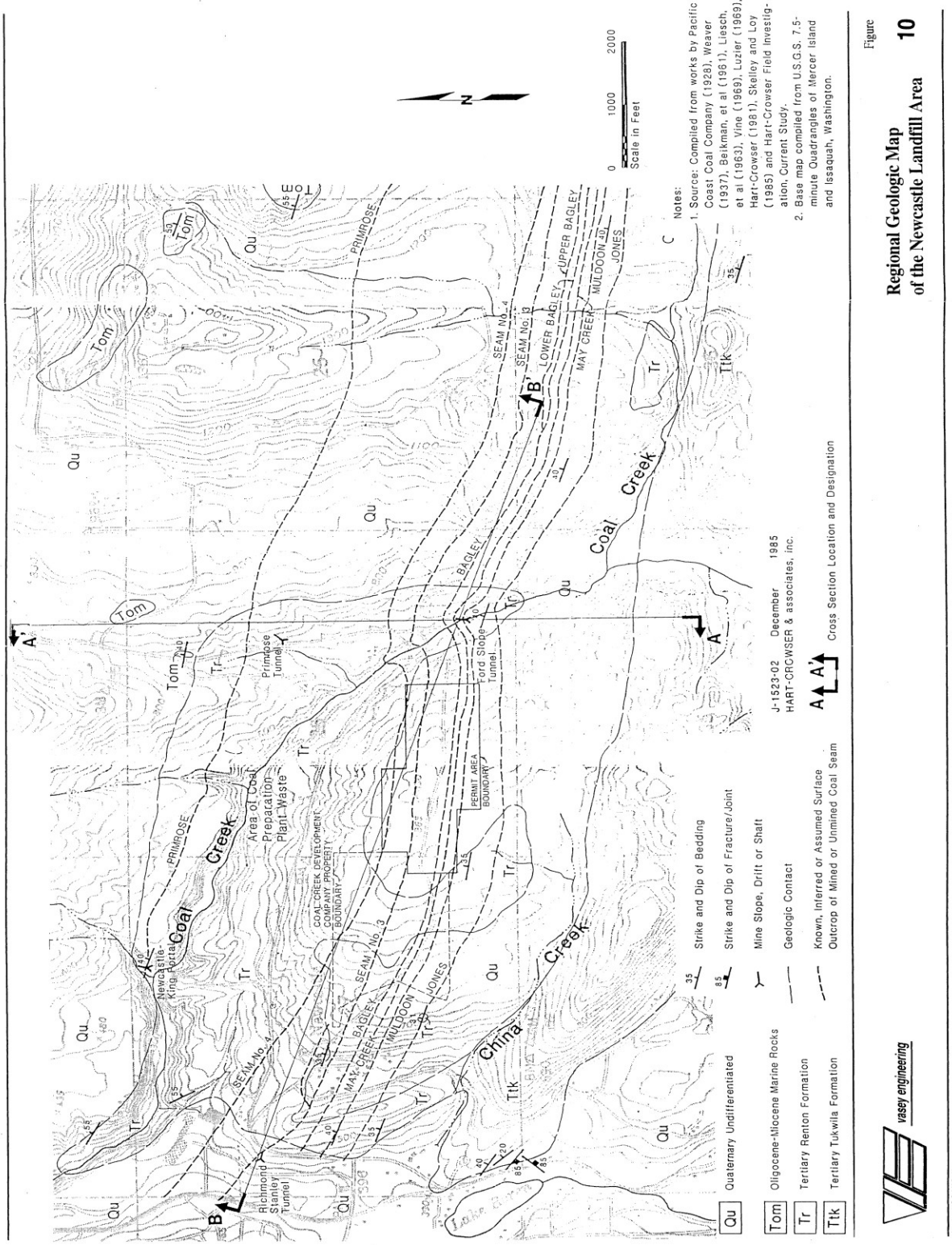


Figure 1
Surface Water Monitoring Locations at Newcastle Landfill

6.3 Regional Geologist Map of the Newcastle Landfill Area



6.4 Ground Water Monitoring Locations

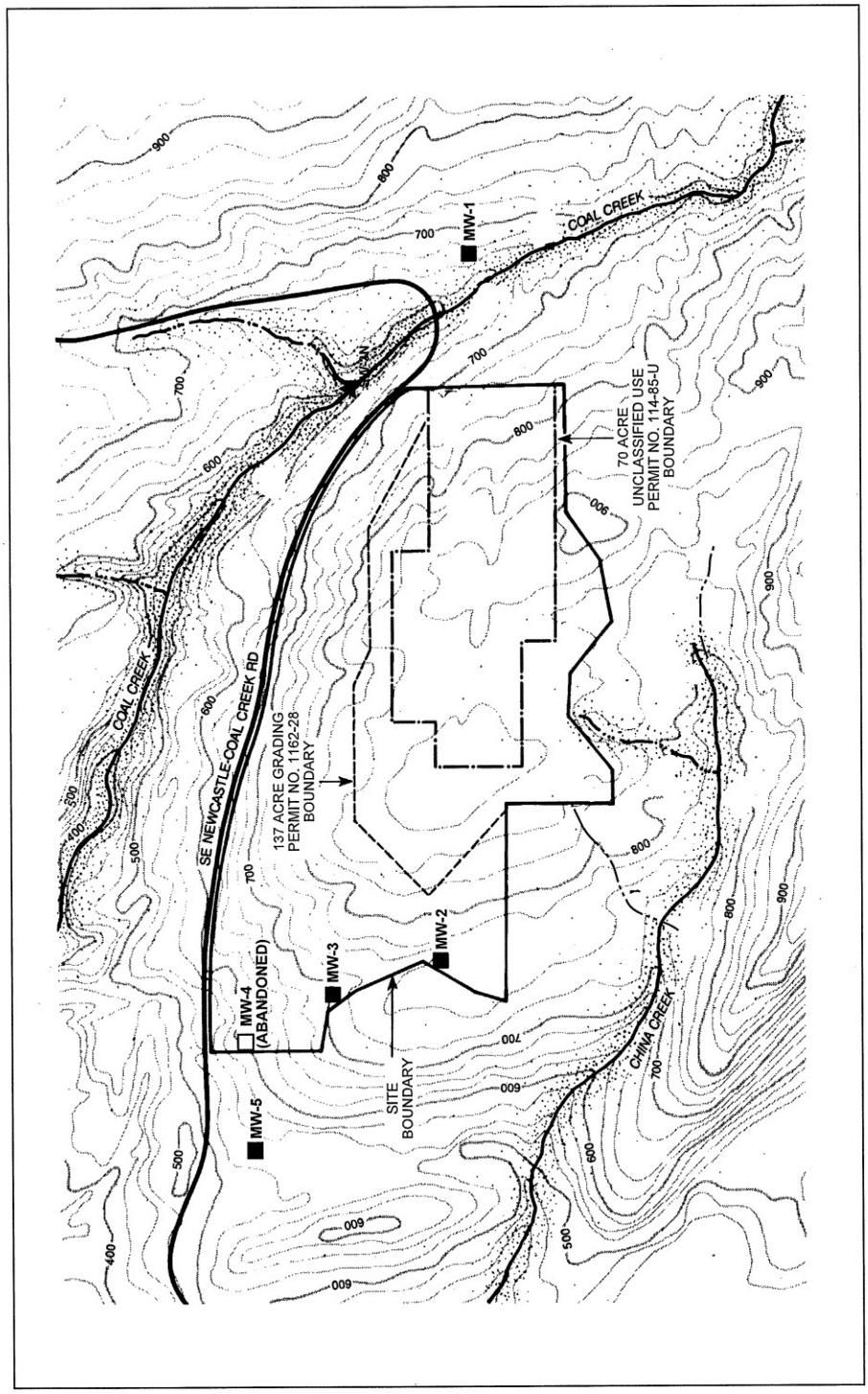
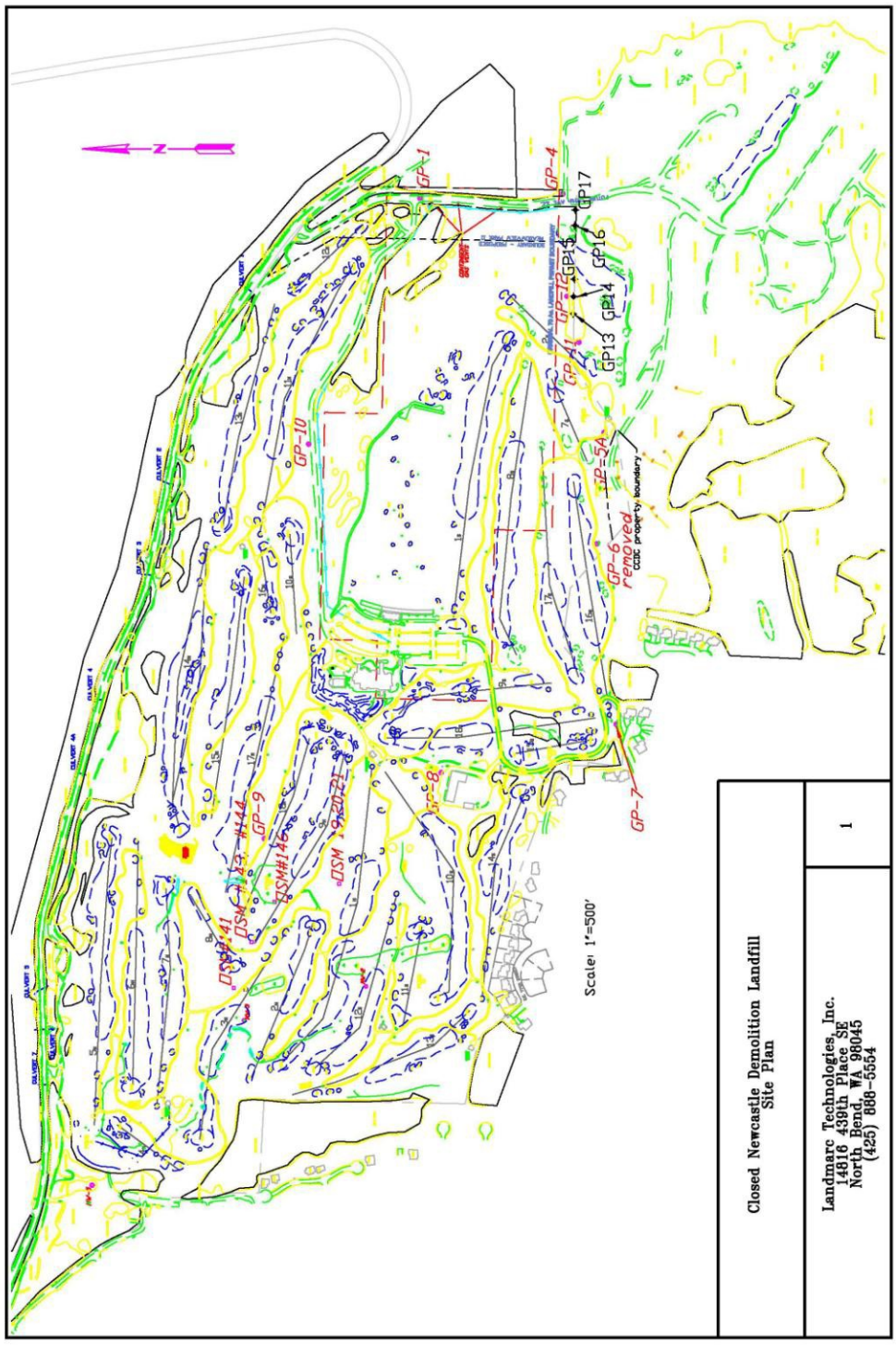


Figure 1
Groundwater Monitoring
Locations in Site Vicinity
Newcastle Demolition Landfill

6.5 Gas Probe Locations



6.6 Surface Water Monitoring Results – May 2012

Station	Temperature (°C)	Dissolved Oxygen (mg/L)	pH	Conductivity (umhos/cm)	Turbidity (NTU)	Hardness (mg/L)	Fecal Coliform (#/100	Sulfide (mg/L)
Coal Creek								
SW-1 (background)	10.6	**9.2**	7.3	102	4.6	42.0	36	0.26
SW-2	10.4	11.3	7.5	105	3.6	39.9	**750**	0.18
SW-3N	11.3	11.1	7.4	182	**280**	61.0	**1,400**	0.20
SW-4	10.8	10.9	7.4	188	**19**	67.8	**100**	0.20
China Creek								
SW-8 (background)	11.3	**8.3**	7.2	103	6.4	42.0	**220**	0.20
SW-9	11.6	**7.3**	7.2	159	0.25	70	**423**	0.20
SW-12	--	--	--	--	--	--	--	--
SW-13	--	--	--	--	--	--	--	--
SW-14	13.7	9.5	7.4	89	3.6	39.3	**350**	0.20
SW-15	12.9	9.8	7.4	92	3.9	39.1	**2,100**	0.22
SW-16 (SW-15 duplicate)	--	--	--	--	0.66	39.5	**2,500**	0.20
Water Quality Standards (WAC 173-201A)	16°C	9.5 mg/L minimum	6.5 - 8.5	N/A	5 NTU over background	N/A	50/100 ml	N/A

Notes:

- - = no sample or measurement N/A = not applicable, no State

6.7 Ground Water Monitoring Results – March 2019

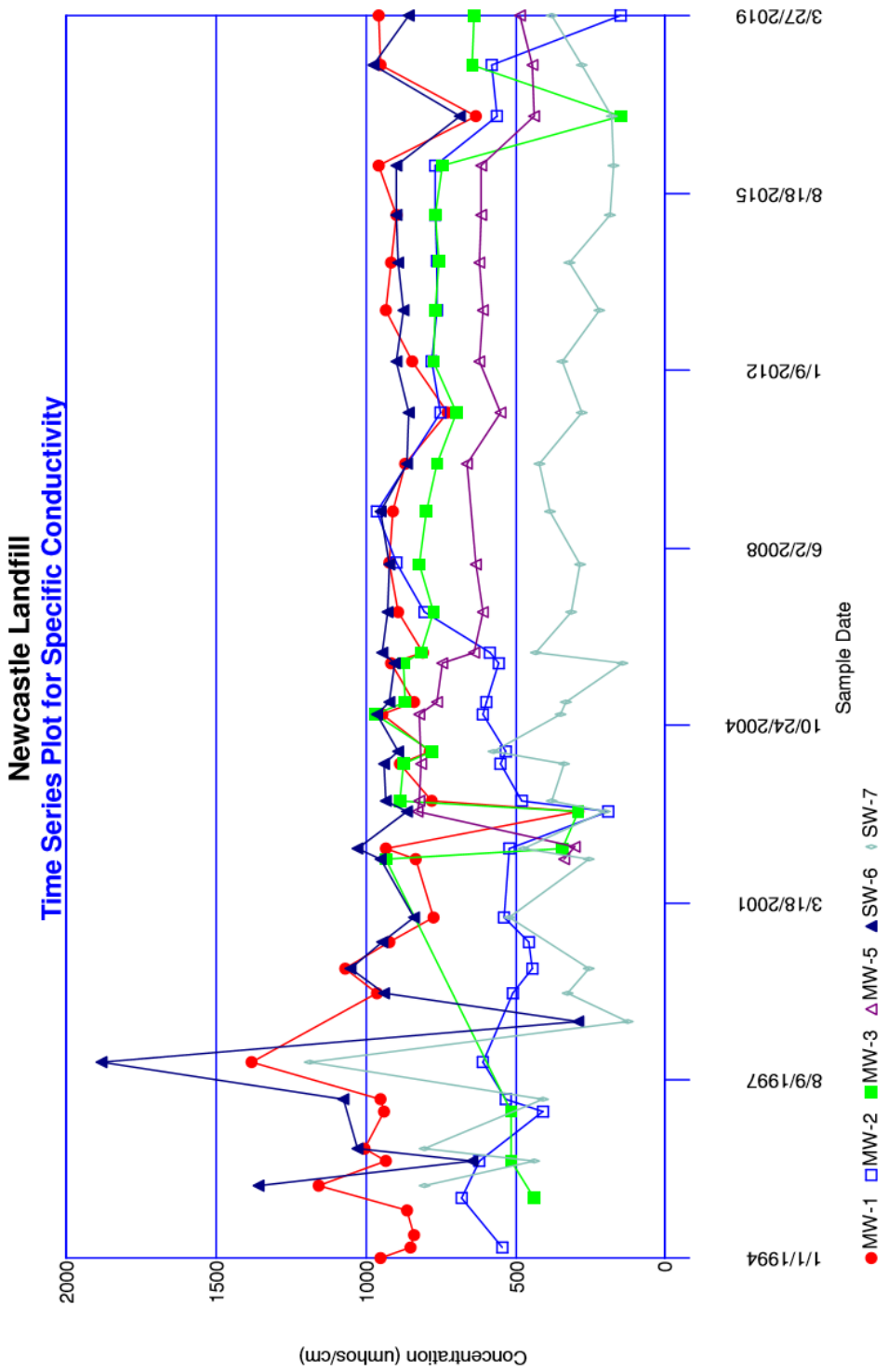
Table 1. Newcastle Groundwater and Surface Water Data

				Groundwater					Surface Water	
Parameter	**Units**	**GWQS**	**MCL**	**MW-1 3/27/2019**	**MW-2 3/27/2019**	**MW-3 3/27/2019**	**MW-6 (MW-3 Dup) 3/27/2019**	**MW-5 3/27/2019**	**SW-6 3/27/2019**	**SW-7 3/27/2019**
Field Data										
Temperature	°C			9.7	11.0	13.1	- -	11.4	12.0	6.9
pH	standard	6.5-8.5 **		7.11	**6.40**	7.63	- -	6.54	7.19	**8.76**
Specific Conductivity	uS/cm		700 **	**950**	142.3	632.8	- -	482.6	**852**	373.5
DO	mg/L			1.28	0.20	0.89	- -	0.25	11.53	13.42
Redox	mV			4.0	18.9	-18.8	- -	29.0	45.7	26.4
Conventionals										
Total Dissolved Solids	mg/L	500 **	500 **	**700**	92	400	384	287	**525**	234
Chloride	mg/L	250 **	250 **	3.68	1.21	6.62	7.04	5.60	7.47	12.4
Ammonia	mg-N/L			0.132	0.571	0.406	0.367	0.040 U	0.136	0.040 U
Nitrate	mg-N/L	10 *	10 *	0.0200 U	0.0200 U	0.0200 U	0.0200 U	0.120 U	0.0240	0.788
Nitrate + Nitrite	mg-N/L			0.012	0.020	0.010 U	0.010 U	0.100 U	0.024	0.788
Nitrite	mg-N/L		1 *	0.010 U	0.013	0.010 U	0.010 U	0.020 U	0.010 U	0.010 U
Sulfate	mg/L	250 **	250 **	**495**	7.54	46.5	36.2	69.1	203	84.1
Chemical Oxygen Demand	mg/L			10.0 U	92.1	17.3	16.8	10.0 U	10.0 U	10.0 U
Total Organic Carbon	mg/L			0.73	24.27	5.21	4.97	1.64	1.29	2.06
Dissolved Hardness	mg/L			596	58.0	64.5	63.2	248	335	138
Dissolved Metals										
Arsenic	mg/L	0.00005 ***	0.01 *	**0.000896**	**0.00152**	**0.00263**	**0.00254**	**0.0161**	**0.00501**	**0.00100**
Calcium	mg/L			158	17.2	13.5	13.2	57.5	66.1	30.4
Iron	mg/L	0.3 **	0.3 **	**0.910**	**1.51**	**1.18**	**1.20**	**4.41**	**2.22**	0.0734
Magnesium	mg/L			49.3	3.66	7.50	7.35	25.3	41.2	15.0
Manganese	mg/L	0.05 **	0.05 **	**0.136**	**5.81**	0.0478	0.0492	0.417	**0.213**	0.0316
Zinc	mg/L	5 **	5 **	0.0062 J	0.112	0.0100 U	0.0024 J	0.0041 J	0.0100 U	0.0139

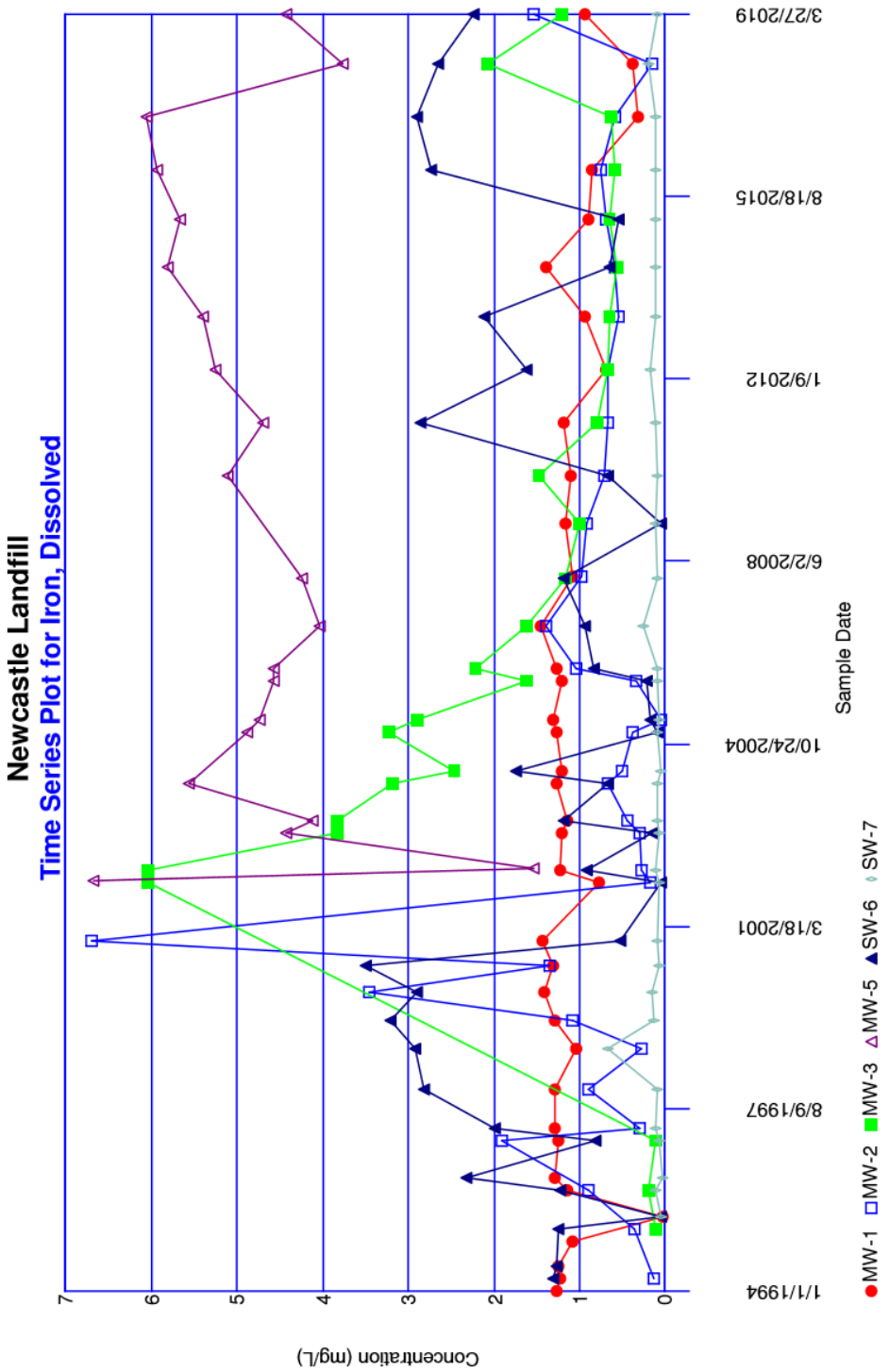
Notes:

GWQS = Water Quality Standards for Ground Waters of the State of Washington (173-200 WAC)
MCL = Maximum Contaminant Level, Washington State Drinking Water Regulations (Chapter 246-290 WAC)
* = Primary contaminant criteria
** = Secondary contaminant criteria
*** = Carcinogenic contaminant criteria
= Exceeds GWQS or MCL
U = Compound undetected at the specified reporting limit
J = Estimated concentration below reporting limit

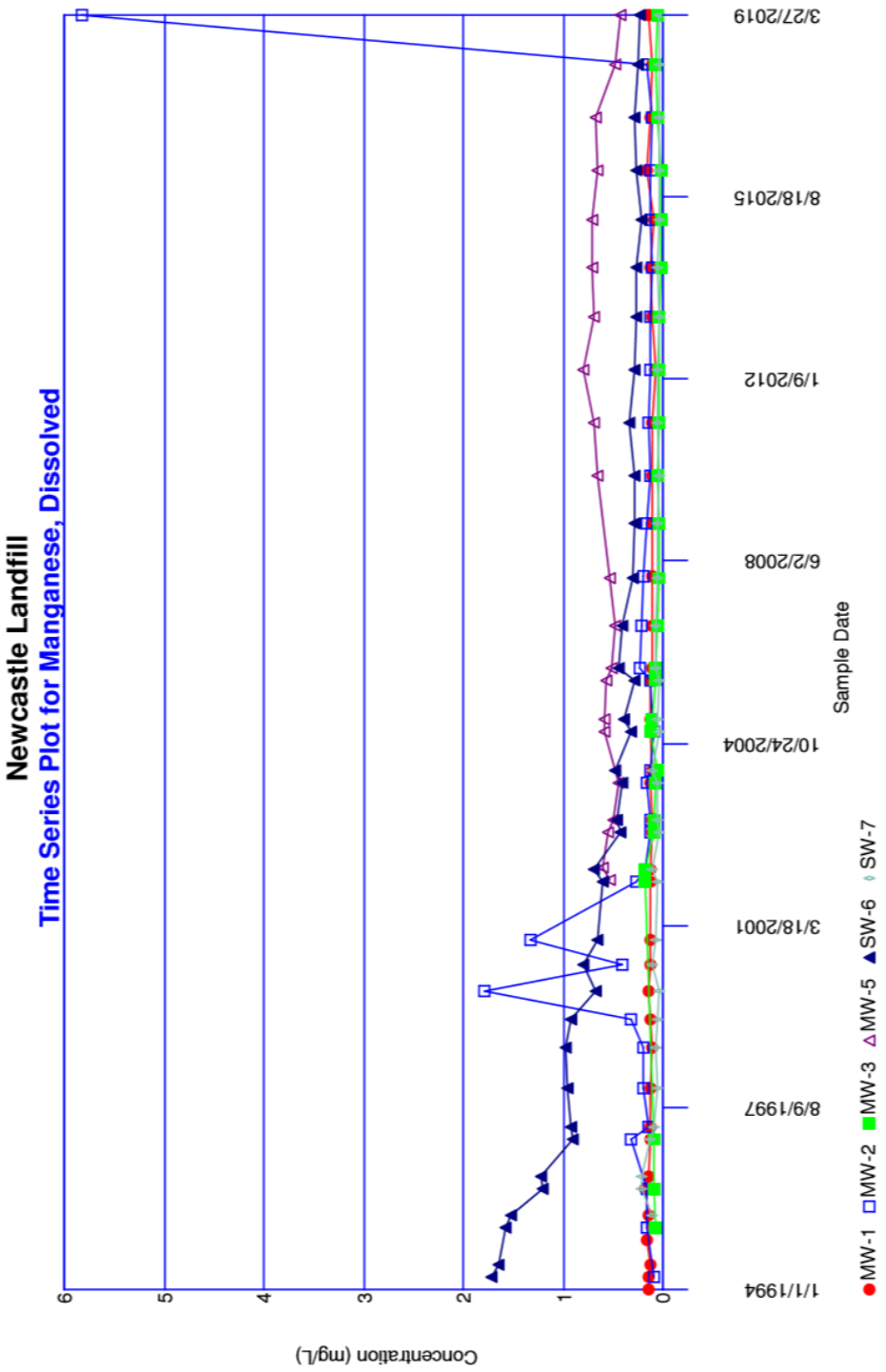
6.8 Time Series Plot for Specific Conductivity in Ground Water



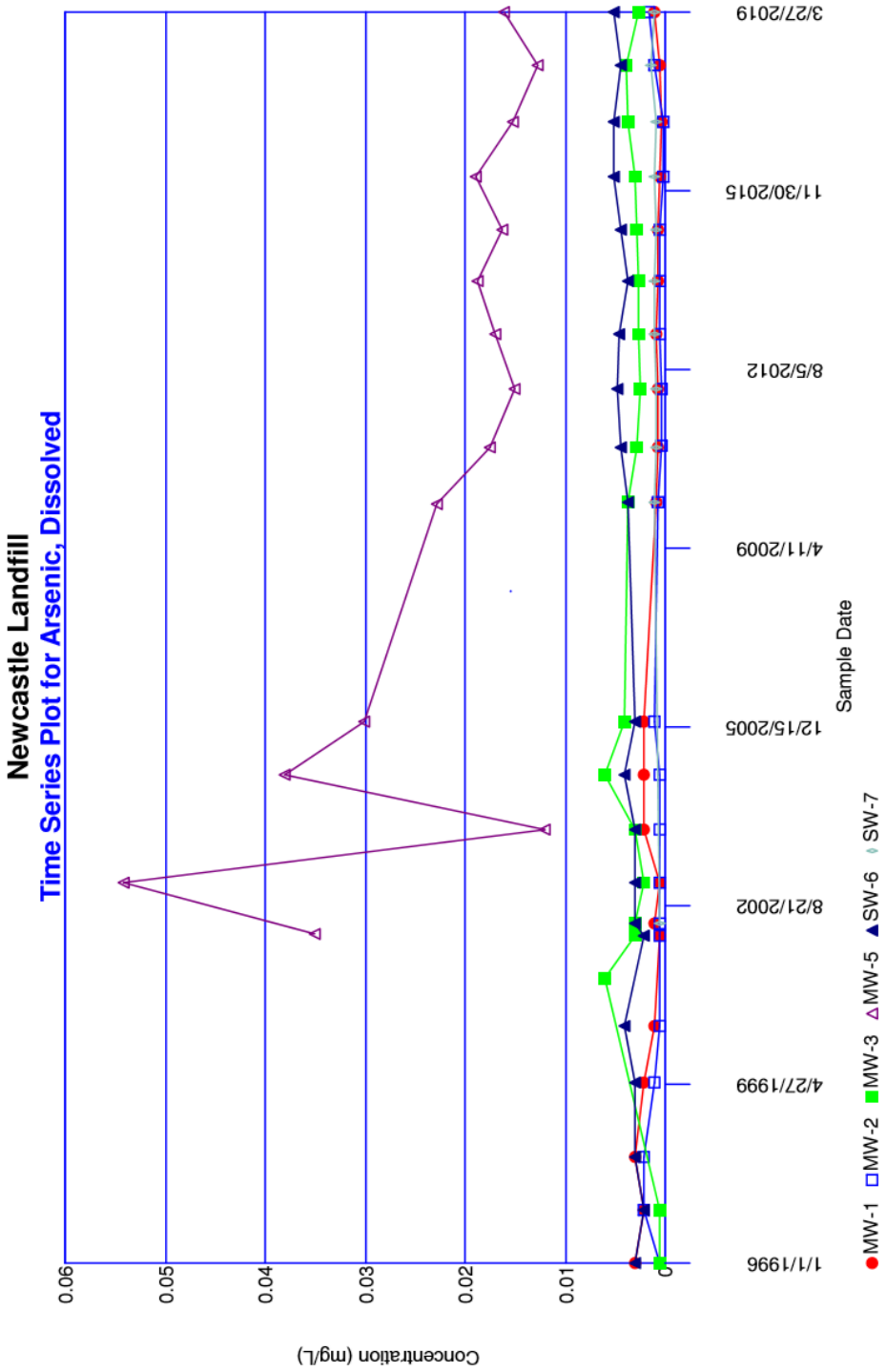
6.9 Time Series Plot for Dissolved Iron in Ground Water



6.10 Time Series Plot for Dissolved Manganese in Ground Water



6.11 Time Series Plot for Dissolved Arsenic in Ground Water



6.12 Restrictive Covenant

After recording, return to:
Shannon Sperry
2600 Two Union Square/601 Un[illegible] St.
Seattle, Washington 98101-40[illegible]

961030-0282 09:09:00 AM KING COUNTY RECORDS 006 JD 13.00

RESTRICTIVE COVENANT

The property that is the subject of this Restrictive Covenant has been the subject of remedial action under Chapter 70.105D RCW. The work done to clean up the property (herein after "Remedial Action") is described in the Consent Decree entered in *State of Washington, Department of Ecology v. Newcastle Golf, L.L.C.*, King County Superior Court Cause No. 95-2-26414-0SEA and in attachments to the Decree and in documents referenced in the Decree. This Restrictive Covenant is required by Ecology under WAC 173-340-440 (1991 ed.).

The undersigned, Newcastle Golf, L.L.C., ("Owner") is the fee owner of real property in the County of King, State of Washington, hereafter referred to as the "Property." The Property includes the former Newcastle Landfill (the "Landfill"). A legal description of the Landfill, and the Property (which includes the Landfill) is attached.

The Owner makes the following declaration as to limitations, restrictions, and uses to which the Landfill and/or the Property may be put, and specifies that such declarations shall constitute covenants to run with the land, as provided by law, and shall be binding on all parties and all persons claiming under them, including all current and future owners of any portion of or interest in the Property.

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OCT 30 1996
King County

Section 1. No groundwater may be taken for domestic purposes from any well within 1000 feet of the Landfill boundary.

Section 2. No wells of any sort may be constructed on the Landfill.

Section 3. No enclosed structures shall be constructed on the Landfill.

Section 4. No water hazard, pond, or water storage facility of any kind may be constructed over the Landfill.

Section 5. Any activity on the Property that may interfere with the Remedial Action is prohibited.

Section 6. Owner must give written notice to the Department of Ecology ("Ecology"), or to a successor agency, of Owner's intent to convey any interest in the Property. No conveyance of title, easement, lease or other interest in the Property shall be consummated by Owner without adequate and complete provision for continued compliance with all provisions of the above-referenced Consent Decree.

Section 5. Owner must notify and obtain approval from Ecology, or from a successor agency, prior to any use of the Landfill that is inconsistent with the terms of this Restrictive Covenant. Ecology, or its successor agency, may approve such a use only after public notice and comment.

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NOV 05 1996
DEPT. OF ECOLOGY

Section 6. Owner and Owner's assigns and successors in interest reserve the right under WAC 173-340-440 (1991 ed.) to record an instrument which provides that this Restrictive Covenant shall no longer limit use of the Property or be of any further force or effect. However, such an instrument may be recorded only with the consent of Ecology, or of a successor agency. Ecology, or a successor agency, may consent to the recording of such an instrument only after public notice and comment.

Dated: November 9, 1995

Name: BKi Developments, Inc., Member

Title: Scott D. Oki by Sherman Sperry, his attorney in fact as Chairman

For Newcastle Golf, L.L.C.

ATTACHMENT A1
LEGAL DESCRIPTION OF PRIMARY ACREAGE

The subject site is a 269 acre parcel located in Newcastle, Washington, in East Central King County, approximately three miles South and two miles East of the intersection of Interstates 405 and 90, in Sections 26 and 27, Township 24 North, Range 5 East, W.M. The Property is bounded on the North by Newcastle Coal Creek Road; on the South and West by land zoned R-4 that is partially platted and built out as a residential development, and on the East by King County Cougar Mountain Regional Wildlife Park.

Legal Description:

Parcel A:

That portion of Sections 26 and 27, Township 24 North, Range 5 East, Willamette Meridian, in King County, Washington, being more particularly described as follows:

Beginning at the quarter corner common to Sections 26 and 27;

Thence North 01°06'54" East along the East line of said Section 27, a distance of 26.52 feet;

Thence North 88°32'13" West 2668.18 feet to a point on the North/South Center of Section line for said Section 27;

Thence North 01°20'47" East along said line, 803.18 feet to a point on the Southerly margin of Newcastle-Coal Creek Road;

Thence along said margin North 88°14'53" East 863.74 feet to the beginning of a curve, concave to the South, having a radius of 686.20 feet;

Thence along the arc of said curve and margin, passing through a central angle of 16°30'00" a distance of 197.61 feet;

Thence continuing along said margin South 75°15'07" East 1275.06 feet to the beginning of a curve, concave to the South, having a radius of 1402.40 feet;

Thence along the arc of said curve and margin, passing through a central angle of 10°44'00" a distance of 262.71 feet;

Thence continuing along said margin South 64°31'07" East 218.18 feet to the beginning of a curve, concave to the Northeast, having a radius of 1462.40 feet;

Thence along the arc of said curve and margin, passing through a central angle of 14°11'00" a distance of 362.01 feet;
Thence continuing along said margin South 78°42'07" East 852.27 feet to the beginning of a curve, concave to the Southwest, having a radius of 1115.92 feet;
Thence along the arc of said curve and margin, passing through a central angle of 22°39'00" a distance of 441.14 feet;
Thence continuing along said margin South 56°03'07" East 328.71 feet;
Thence continuing along said margin and the Southerly margin of the J.J. Jones Road South 53°12'04" East 540.51 feet to the beginning of a curve, concave to the Southwest, having a radius of 256.48 feet;
Thence along the arc of said curve and margins, passing through a central angle of 20°50'58" a distance of 93.33 feet;
Thence continuing along said margin South 32°21'04" East 312.68 feet to a point on the North/South center of Section line for said Section 26;
Thence along said line South 01°04'35" West 155.20 feet;
Thence North 88°46'45" West 1313.74 feet;
Thence North 01°12'59" East 331.74 feet;
Thence North 88°46'29" West 1312.91 feet to the West line of said Section 26;
Thence along said line North 01°21'25" East 663.65 feet to the point of beginning.

Parcel B:
That portion of Section 27, Township 24 North, Range 5 East, Willamette Meridian, in King County, Washington, more particularly described as follows:
Beginning at the East quarter corner of said Section 27;
Thence South 01°21'25" West along the East line of the Southeast quarter of said Section 995.49 feet;
Thence North 88°29'11" West 333.52 feet;
Thence South 01°21'20" West 574.96 feet;

Thence North 88°28'17" West 1779.11 feet;
Thence North 72°31'45" West 178.15 feet;
Thence North 21°00'00" East 220.00 feet;
Thence North 30°00'00" East 500.00 feet;
Thence North 21°00'00" West 540.00 feet;
Thence North 33°10'41" West 311.14 feet;
Thence North 80°00'00" West 320 feet to the North-South center of Section line;
Thence along said center of Section line, North 01°20'47" East 96.49 feet;
Thence South 88°32'13" East 2668.19 feet to the East line of the Northeast quarter of said Section;
Thence along said East line, South 01°06'54" West 26.52 feet to the point of beginning.

Parcel C:
That portion of Sections 26 and 27, Township 24 North, Range 5 East, Willamette Meridian, in King County, Washington, more particularly described as follows:
Commencing at the East quarter corner of said Section 27;
Thence South 01°21'25" West along the East line thereof a distance of 663.66 feet to the true point of beginning;
Thence South 88°46'29" East a distance of 1312.91 feet;
Thence South 01°12'59" West a distance of 331.74 feet;
Thence South 88°46'44" East a distance of 1313.74 feet;
Thence South 01°04'35" West a distance of 994.96 feet;
Thence North 88°47'25" West a distance of 1974.25 feet;
Thence North 01°17'12" East a distance of 331.79 feet;
Thence North 88°47'13" West a distance of 657.68 feet;
Thence North 88°27'33" West a distance of 333.51 feet;
Thence North 01°21'19" East a distance of 63.49 feet;
Thence South 88°29'11" East a distance of 333.53 feet;
Thence North 01°21'25" East a distance of 331.83 feet to the true point of beginning.

Parcel D:

Tracts F and Q, Meadow View Park, according to the Plat thereof, recorded in Volume 150 of Plats, pages 27 through 36, inclusive, in King County, Washington.

6.13 Photo Log

Photo 1: Driving range in the eastern portion of the property

Photo 2: Vegetated slope in the northern portion of the property

Photo 3: Gas probe

Photo 4: Ground water monitoring well

Photo 5: Ground water monitoring well

Photo 6: Leachate pump station in the southeast corner of the property

Photo 7: Orange staining (likely iron oxidizing bacteria) observed at the Richmond Tunnel mine discharge in the vicinity of sampling location SW-6 in Coal Creek