



**FOURTH PERIODIC REVIEW
2009 - 2013**

**Kent Highlands Landfill
Facility Site ID#: 2042**

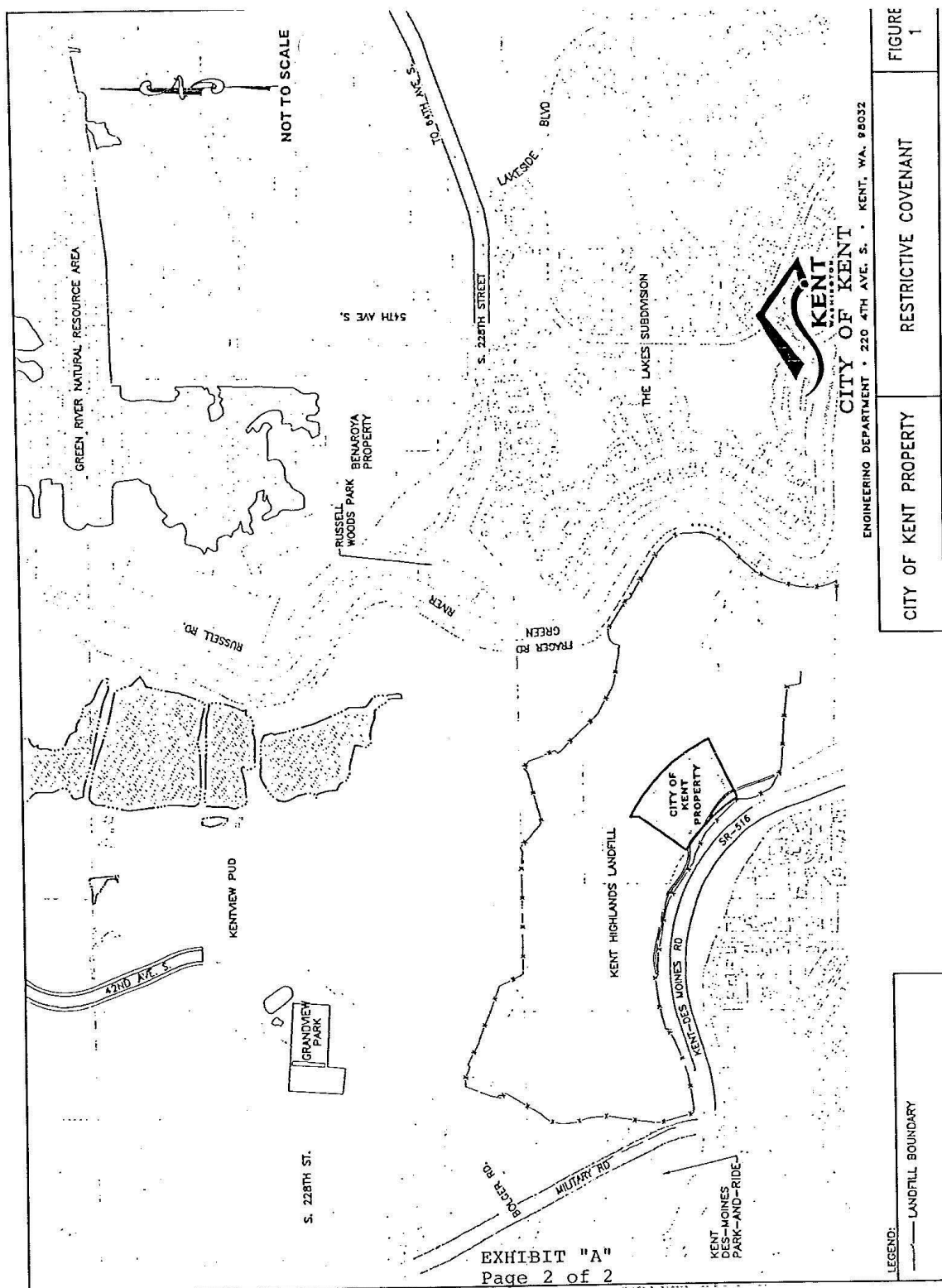
**23076 Military Road South,
Kent, Washington 98032**

Northwest Region Office

TOXICS CLEANUP PROGRAM

September 2014

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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 Kent Highlands Landfill (Site or Kent Highlands). The Site was placed on the Federal National Priorities List (NPL) on August 30, 1990 for cleanup under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLA sites are known as Superfund sites. The Washington State Department of Ecology (Ecology) is the lead agency for cleanup of Kent Highlands as stipulated by an agreement with Region 10 of the Environmental Protection Agency (EPA). Accordingly, cleanup at this Site was implemented under the Model Toxics Control Act (MTCA) regulations, Chapter 173-340 Washington Administrative Code (WAC)

The purpose of this fourth periodic review is to determine whether the cleanup remedy at the City of Seattle's Kent Highlands Landfill Superfund Site (Kent Highlands) continues to be protective of human health and the environment. This periodic review is the latest in an ongoing series, the last of which was completed in 2009 (the third periodic review). This periodic review focuses on three areas: (1) activities undertaken by the City of Seattle in response to the previous periodic review (see Section 2.2), (2) three specific questions and answers required by EPA (see Section 3.1), and (3) a protectiveness statement (see Section 4.0).

Cleanup activities at this Site were conducted under a Consent Order between Ecology and the City of Seattle, as executed on May 26, 1987. The cleanup actions were necessary because of high concentrations of landfill decomposition gas, and leachate with high specific conductance, high chemical oxygen demand, and high concentrations of ammonia and iron. Major metals detected were iron, zinc, and manganese. Volatile organic compounds detected were primarily ketones, aromatic hydrocarbons, and chlorinated hydrocarbons. The primary semivolatile organic compounds were low molecular weight polycyclic aromatic hydrocarbons, alkyl phenols, benzoic acid, and chlorinated benzene. The presence of the volatile and semivolatile organic compounds was consistent with the disposal of household products in the landfill. Contaminants remaining at the Site exceed MTCA cleanup levels. The MTCA cleanup levels for soil are established under WAC 173-340-740. The MTCA cleanup levels for groundwater are established under WAC 173-340-720.

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.

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 use;
- (e) Availability and practicability of higher preference technologies; 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 SITE CONDITIONS

2.1 History of Landfilling, Contamination, and Cleanup (Closure)

The Site is situated on the eastern flank of the Des Moines upland, where it adjoins the Green River valley. The landfill occupies a former natural ravine that extended about 2,500 feet from near the top of the upland down to the valley floor. The current fill surface slopes downward from a top elevation of 260 feet MSL to a base elevation of 35 feet MSL at the eastern toe of the landfill.

The Seattle Solid Waste Utility started landfilling operations at the Site in 1968. The landfill received mostly municipal garbage until 1983. After 1983 the landfill also took in industrial wastes and construction debris. Disposal operations were terminated on December 31, 1986. The City of Seattle was in the process of completing a closure plan at that time.

The Landfill has been subject to federal, state, and local agency regulation since its inception. It initially operated under a “Nonconforming Permit” from the Seattle-King County Department of Public Health, and Ecology imposed leachate collection and treatment requirements in 1974. No specific regulatory actions were taken with regard to landfill gas in the early years, although there were complaints of odors coming from the landfill. Gas migration was first measured directly in 1984 in gas probes installed west of the landfill. A gas monitoring program was finally initiated in 1988 at the request of the Washington State Department of Health.

Ecology conducted a Potential Hazardous Waste Site Preliminary Assessment in 1984. Based on this assessment, the Site was proposed for listing as a Superfund site. The EPA performed a preliminary assessment under its hazard ranking system, and performed a subsequent evaluation in 1990. The site was placed on the NPL on August 30, 1990, because of the presence of an unknown quantity of hazardous waste at the site. Recognizing their responsibility to conduct the investigations necessary to close the landfill, the City of Seattle entered into a Consent Order with Ecology that called for the City to conduct a remedial response program in a manner consistent with the National Contingency Plan, beginning with a remedial investigation.

The remedial investigation found that offsite gas migration had occurred, primarily on the north and west sides of the landfill. Gas migration toward the south was prevented by subsurface hydrogeologic conditions. Gas migration to the east was prevented by a shallow water table. Air dispersion modeling indicated that estimated concentrations of trace gas compounds at the landfill boundaries did not exceed Acceptable Source Impact Levels. The remedial investigation found that about 35% of the leachate within the landfill was not collected in the leachate collection system and migrated downward into the ground water and thence eastward to the Green River. The leachate had high specific conductance, high chemical oxygen demand, high concentrations of ammonia and iron, a neutral pH, and low concentrations of sulfate and trace metals. Major metals detected were iron, zinc, and manganese. Volatile organic compounds detected were primarily ketones, aromatic hydrocarbons, and chlorinated hydrocarbons. The primary semi-volatile organic compounds were low molecular weight polycyclic aromatic hydrocarbons, alkyl phenols, benzoic acid, and chlorinated benzene. The remedial investigation

report concluded that the presence of the volatile and semivolatile organic compounds was consistent with the disposal of household products in the landfill.

Contamination was found in the Sand Aquifer and in the Recent Alluvium Aquifer. Leachate in the landfill discharges primarily to the Sand Aquifer, which in turn discharges to the Recent Alluvium Aquifer. The Recent Alluvium Aquifer is in hydraulic connection with the Green River. Surface water in Midway Creek was found to be degraded by the landfill; no effects of the landfill on the water quality of the Green River were observed. Based on the results of the remedial investigation and further work, ground water monitoring at the site is being done for field parameters, conventional chemical parameters, dissolved metals, volatile organic compounds, herbicides, and pesticides.

Proposed remedies were evaluated in the *Closure Action Report* (Seattle, 1992) and the remedy to be implemented selected in the *Cleanup Action Plan* (Ecology, 1993). The remedy consisted of the following components (see Ecology, 1993, p. 8 ff.), and was implemented in 1995:

- Access Controls – a 6-foot-high chain link fence provides primary access control.
- Site Grading – The site was graded to achieve adequate drainage slopes.
- Landfill Cover – A geomembrane cover was placed on top of the existing cap, with a prepared soil base. A drainage layer was placed on top of the geomembrane to direct water away from the landfill. Topsoil was placed as the final layer and vegetated.
- Surface Water – A surface water conveyance system was installed, consisting of a perimeter ditch system with runoff control berms and ditches used to intercept sheet flow runoff on the landfill itself and divert it to the perimeter system. Storm water detention facilities were upgraded.
- Leachate Collection System – The existing leachate collection system was completely rebuilt during remedial construction. A subcover seep collection system was constructed as part of the final system design. Much of the water intercepted by the existing leachate collection system was ground water from a series of springs on the north slope of the ravine in which the landfill was built. Although the cleanup action plan concluded that construction of a separate spring drain treatment and discharge system would not be cost-effective, the two were later separated.
- Landfill Gas – The gas collection system was upgraded and connected to a thermal incinerator which uses enclosed flares. The initial upgrade of the gas collection system was completed as part of the remedial construction. Subsequent monitoring data indicated exceedances of compliance standards at the property boundary at the southeast corner of the landfill. The gas collection system was extended farther into this area in 2000, bringing the landfill into compliance.

2.2 Site Condition and Reporting Changes Since The Third Periodic Review

Reporting Changes

The following changes in reporting have been made:

- The schedule for obtaining and reporting ground water monitoring data was changed from each year to every five years, with the last annual report issued in 2009. The next report was issued in draft in 2014 (and finalized in 2015). Following reports are to be issued in 2018 and at five-year intervals thereafter.
- In the third periodic review, Ecology requested that fluid level monitoring within and near the toe of the landfill be added to the ground water monitoring program, and that a landfill stability analysis be conducted every five years coincident with the five-year periodic review. These activities were added because of concerns about potential slope instability.
- In the third periodic review, the vinyl chloride MTCA cleanup level was reduced from 0.029 ug/L to 0.025 µg/L, a Federal chronic water quality criterion for fresh water, Clean Water Act. This change took effect in 2009.
- In the third periodic review, the manganese cleanup level was reduced from 747 ug/L to 0.050 mg/L, a secondary Maximum Contaminant Limit under state law, WAC 246-290-310. This change took effect in 2009.
- In the third periodic review, Ecology agreed to change the method for determining ground water compliance for vinyl chloride (and other carcinogenic substances) to be in accord with MTCA, WAC 173-340-720 (9)(c)(iii)(A), provided that the provisions of -720(9)(e) were also being met. The change applied to evaluations conducted from 2009 onward.
- In the third periodic review, Ecology agreed to change the location for determining storm water compliance with surface water standards from the point of discharge into the Green River to the storm water pond outfall. The winter and summer ammonia discharge limits were also modified slightly. These changes took effect in late 2009.

Facility Activities or Modifications

Landfill facilities and activities continue to be modified as the landfill ages and land use changes occur in the vicinity. The following modifications or activities have taken place since the third periodic review was completed in 2009:

- The landfill gas burners were replaced with two smaller burners sized to handle lower gas concentrations and flows. Specific information regarding the burner replacement and performance are not presently available. However, during discussion with City of Seattle

representatives, indications are that the modifications were successful in maintaining burn performance.

- The leachate gravity drain line connecting to the Metro sanitary system was replaced along Frager Road from the property to the new Veterans Drive (S. 228th Street) bridge over the Green River. The line crossing the river was also replaced; it formerly passed beneath the river bed and was replaced with a line under the bridge.

The following new documents have been submitted to Ecology since the third periodic review:

- A Landfill Flood Plan was prepared in October 2009 in response to concern about the increased potential for flooding of lower portions of the site along the Green River. The increased potential related to concerns about excess flows of water being released from the Howard Hansen Dam located upstream of the site on the Green River. The dam had been damaged in a 2008 December flood.
- A draft five-year ground water monitoring report was submitted to Ecology in October 2014.

Environmental Issues

Issue 1: Vinyl chloride and manganese in ground water

Individual sample concentrations of vinyl chloride and manganese continue to exceed applicable standards in compliance wells at the downgradient edge of the property, as illustrated in the following table for vinyl chloride. Of the downgradient wells at the perimeter of the site, KMW-17 has historically had the highest vinyl chloride concentrations.

Vinyl Chloride Regulatory Value (Cleanup Level) – 0.025 ug/L

Recent Alluvium Aquifer

Maximum/Minimum Vinyl Chloride Concentrations 2009-2013

Well Number	Vinyl Chloride (ug/L)
10A (compliance well)	.052/.042
15A (background well)	ND at .02 detection limit
16A	ND at .02 detection limit
17 (compliance well)	1.3/.58
17Z	1.2/.083
19A (compliance well)	ND at .02 detection limit

Sand Aquifer

Well Number	Vinyl Chloride (ug/L)
8A	ND at .02 detection limit
12A	.37/.13
13 (background well)	ND at .02 detection limit
16B	ND at .02 detection limit
18A	.044/ND at .02 detection limit

ND indicates no detection at .02 detection limit

In the Third Periodic Review, Ecology agreed to change the method for determining compliance based on a request from Seattle to modify the procedure to be in accord with MTCA, WAC 173-340-720 (9)(c)(iii)(A). This subsection requires compliance for carcinogenic compounds to be determined through calculation of the true mean concentration. Ecology accepted the proposal, while noting that the provisions of -720(9)(e) must also be met. Also, the true mean must be a running average reflecting the previous four quarters of data. The running averages must themselves meet cleanup levels for at least two years (a total of 8 running averages) in order for the landfill to be considered in compliance.

Issue 2: Landfill Gas Concentrations in Probe 35-S

Concentrations of methane ranging from 0.5 to 3.5% measured as a lower explosive limit (concentrations are explosive when they reach 5%) have been routinely detected in a gas probe located at the edge of a METRO park and ride lot directly across Military Road from the landfill. Although this issue was not addressed in the Third Periodic Review, it has been an ongoing topic of discussions between Ecology and Seattle.

In 2013, Seattle increased extraction rates in nearby gas extraction wells to see if the methane concentrations would decrease at 35-S. The result was more oxygen (atmospheric air) being pulled into the gas system. Seattle also re-examined geologic logs from the area and conducted a visual reconnaissance to evaluate whether a preferential gas transport pathway might exist between the probe location and the landfill. None was apparent.

A plan was then developed for addressing the situation over time. It included an initial survey of underground structures in the area (catch basins, manholes, etc) to check for elevated methane levels. If high levels were detected, remedial measures would be implemented immediately. If they were not elevated, subsequent surveys of underground structures would be conducted whenever gas concentrations reached 3.5% at 35-S. The initial survey has yet to be conducted.

Issue 3: Landfill Stability Analysis

The slope stability of the landfill at the lower, steeper end of the site is evaluated at each periodic review by considering whether the land surface has steepened or whether fluid levels have increased within the toe of the landfill. A steepening of the slope or a buildup of fluid would indicate potential destabilization and the need for further evaluation. If the slope and fluid level exceed the factors of safety used in the original stability analysis, there will likely be the need for immediate remedial action. To provide the necessary data for this evaluation, aerial topographic maps will be prepared of the landfill at 10-year intervals until replaced with a ground-based system. The next map will be prepared in 2016. In addition, fluid levels are measured at four locations within the toe of the landfill once a year near September 1.

For this Periodic Review covering 2009-2013, fluid levels remained about the same or decreased slightly from the previous period, and the slope did not appear to have become steeper, based on visual observations made during a site visit in September 2014. These data and observations suggest the landfill toe is still stable.

2.3 Sample Results

Please see the above “Environmental Issues”.

2.4 Cleanup Levels

In 2013, the EPA issued revised chronic ambient water quality criteria for ammonia in freshwater. The current winter and summer standards for ammonia discharge to the Green River need to be updated to reflect the 2013 EPA revision.

Note that Ecology and the City still disagree as to whether a mixing zone may be applied at the point of discharge. The City cites Federal NPDES regulations in support of a mixing zone. Ecology is relying on MTCA, which does not allow a mixing zone, for cleanup-related actions at a site. Until this issue is resolved, Ecology is determining compliance based on direct comparison with the ammonia standard.

2.5 Restrictive Covenant

The April 1993 Cleanup Action Plan for the Site was approved by Ecology in the form of a Declarative Statement, signed by Ching-Pi Wang, Project Manager and Michael Gallagher, Section Head Northwest Region Toxics Cleanup Program. The Declarative Statement stated in part “...it is determined by Ecology that the selected cleanup actions are protective of human health and the environment, attain Federal and State requirements which are applicable or relevant and appropriate,... and provide for compliance monitoring....Furthermore it is Ecology’s opinion that the selected cleanup actions are consistent with the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300)....”

A Restrictive Covenant was subsequently placed on the City-owned property on March 14, 2002 to ensure the continued integrity of the cleanup action. The Restrictive Covenant explicitly defines the cleanup action as the “work done to clean up the property, described in the Cleanup Action Plan for Kent Highlands Landfill dated April 19, 1993”. A second covenant on City of

Kent owned property was recorded in 2003. The following limitations in both covenants were imposed:

Section 1. Any activity on the Site that may interfere with the Cleanup Action is prohibited.

Any activity on the Site that may result in the release of a hazardous substance that was contained as part of the Cleanup Action is prohibited. Any activity on the Site that may result in endangerment to human health or the environment by hazardous substances contained on site or by gas generated by and emitted from the Site is prohibited.

Section 2. Except for groundwater monitoring, no groundwater may be taken for any purpose from any well on the Site without Department of Ecology (“Ecology”) approval.

Section 3. The owner of the Site must give written notice to Ecology, or to its successor agency, of the owner’s intent to convey any fee interest in the Site. Seattle and all subsequent owners shall provide for the continued operation, maintenance and monitoring of the Cleanup Action.

Section 4. The owner must notify and obtain approval from Ecology, or from its successor agency, prior to any use of the Site 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 5. The owner shall restrict leases to uses and activities consistent with this Restrictive Covenant and notify all lessees of the restrictions on the use of the property.

Section 6. The owner shall allow authorized representatives of Ecology, or its successor agency, the right to enter the Site at reasonable times and with reasonable prior notice for the purpose of evaluating compliance with the Cleanup Action Plan and to inspect records that are related to the Cleanup Action.

Section 7. The owner of the Site reserves the right under WAC 173-340-720 and WAC 173-340-440 (1991 ed.), to record an instrument which provides that this Restrictive Covenant shall no longer limit use of the Site or be of any further force or effect. However, such an instrument may be recorded only with the consent of Ecology, or its successor agency. Ecology or a successor agency may consent to the recording of such an instrument only after public notice and comment.

The Restrictive Covenants are available as Appendix 6.3.

3.0 PERIODIC REVIEW

3.1 Effectiveness of completed cleanup actions

The Restrictive Covenant for the Site was recorded and is in place. This Restrictive Covenant prohibits activities that will result in the release of contaminants at the Site without Ecology's approval, and prohibits any use of the property that is inconsistent with the Covenant. This Restrictive Covenant serves to ensure the long term integrity of the remedy.

Based upon the site visit conducted on September 11, 2014, the remedy at the Site continues to eliminate exposure to contaminated soils by ingestion and contact, and surface water and groundwater is adequately protected. The landfill cover and all controls appear in satisfactory condition and no repair, maintenance, or contingency requirements have been altered. The Site is not operating as a landfill. A photo log is available as Appendix 6.4.

Soils with various landfill related contaminants with concentrations higher than MTCA cleanup levels are still present at the Site. However, the remedy prevents human exposure to this contamination by ingestion and direct contact with soils. The Restrictive Covenant for the property will ensure that the contamination remaining is contained and controlled.

EPA Question A: Is the remedy functioning as intended by the decision documents?

Yes, the remedy is functioning largely as intended:

- Landfill gas is under control, exception for the excursion noted at Probe 35 discussed previously;
- Storm water runoff is being handled appropriately, and its discharge to the Green River meets surface water quality standards;
- The refuse has been encapsulated and is not accessible to the public or to sensitive species;
- Access to the landfill is controlled and restricted;
- The leachate collection and discharge system is operating effectively;
- Ground water impacts have been largely eliminated, except for manganese and vinyl chloride.

EPA Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

The Consent Order governing cleanup at this site was amended in 1996. The amendment provides that the site is being cleaned up pursuant to the Water Pollution Control Act [Ch. 90.48 RCW] and the Model Toxics Control Act [Ch. 70.105D RCW], as well as all other applicable state and federal laws. The exposure assumptions and remedial action objectives used at the time of remedy selection have not been reviewed with respect to the Model Toxics Control Act for this periodic review. However, cleanup levels have been evaluated with respect to MTCA with no changes.

EPA Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Not at this time.

3.2 New scientific information for individual hazardous substances for 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

The cleanup at the site was governed by Chapter 173-340 WAC and all other applicable, relevant, and appropriate requirements. As cleanup standards change requirements at the Site are adjusted accordingly. The ammonia surface water standard requires adjustment and needs to be updated to reflect the 2013 EPA revision.

3.4 Current and projected site use

The site is currently a closed landfill. There have been no changes in current or projected future use of the area underlain by the actual landfill itself. However, rental housing is proposed directly north of the actual landfill in an area formerly containing subsurface landfill gas. The gas extraction system operating at the landfill has removed the subsurface gas in the proposed development area and is maintaining a suction barrier that prevents re-migration.

3.5 Availability and practicability of higher preference technologies

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

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

There have been no changes in analytical techniques that not affect decisions or recommendations made for the site.

3.7 Ecology or City-requested changes during the next reporting period 2014-2018

Modify Future Reporting Format

Ecology is requesting the City replace the existing ground water monitoring and quarterly progress reports with a broader status report issued at 5-year intervals to coincide with Ecology's periodic review. The change is advisable given the long-term care that will be required for this site, and the need to keep track of more than just monitoring data. A proposed annotated outline for the status report is attached. The final outline will be

established in 2015, and used for the next submittal in 2019 (covering the 2014-2018 reporting period).

Conduct Probe 35S Investigation

Ecology is requesting the gas probe investigation described previously be completed in 2015, and the results provided in one of the quarterly reports.

Improve Quarterly Report Formats

Ecology is requesting improved gas distribution maps in the quarterly reports so that it is clear that landfill gas is being retained within the extraction well network and is not migrating off-property. We are recommending this be accomplished through separate 11by17 figures maps showing methane concentrations and gas pressures/contours.

Revise Property Boundary and Ground Water Point of Compliance

The City is requesting that the property boundary along the Green River side of the site be adjusted based on historical research conducted by the City. The effect of the proposed adjustment would be to move the property line closer to the river. If Ecology agrees with the adjustment, based on review by the Attorney General's office, the City requests that well KMW-17Z be substituted for KMW-17 as the compliance well in this part of the site. The proposed replacement well is further downgradient, and typically has lower contaminant concentrations.

Evaluate Additional Cleanup Measures for Ongoing Exceedances of Regulatory Values in Ground Water

Ecology is requesting that further engineering evaluations be conducted to determine ways to reduce ongoing ground water quality exceedances at various downgradient points of compliance. Although there has been some decline in contaminant concentrations with time, it is now clear that the existing leachate collection system is not going to be able to reduce vinyl chloride, manganese, and iron concentrations to applicable cleanup levels (regulatory values) at the point of compliance within a reasonable time frame.

Update Water Well Inventory

Ecology is requesting a well survey be conducted across the river from the landfill to confirm that new water wells have not been installed in this area. We are requesting the scope of work be developed and the work accomplished in 2015. The results can be provided as a memorandum, initially directly to Ecology in 2015 or 2016, and later included as an appendix to the 2018 status report.

Update Stability Analysis

Ecology is requesting a completely redone landfill stability analysis in the 2018 status report, to be based on the new topographic data obtained in 2016, new information on seismic loadings available for the Puget Sound area, and the water level data obtained during the 2014-2018 period.

4.0 CONCLUSIONS

The following conclusions can be made as a result of this periodic review:

- The cleanup actions completed at the Site appear to be protective of human health and the environment, except as noted below;
- Soils cleanup levels have not been met at the standard point of compliance for the Site; however, the cleanup action has been 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 Restrictive Covenant for the property is in place and continues to be effective in protecting public health and the environment from exposure to hazardous substances and protecting the integrity of the cleanup action.

The remedy at the Kent Highlands Landfill can be considered protective of human health and the environment with respect to refuse encapsulation, landfill gas control, surface water quality maintenance, leachate capture, and ground water quality protection, except for vinyl chloride, manganese, and iron which continue to exceed regulatory values in ground water. The vinyl chloride exceedences theoretically pose a risk to those who might use the Green River for consumption of both water and organisms (fish), or who might install shallow water supply wells immediately east of the river. Manganese and iron do not present a human health or ecological risk at the concentrations present in ground water at Kent Highlands, but could cause aesthetic problems such as staining of porcelain fixtures. Essentially, the bulk of the environmental threats posed by the landfill has been and is continuing to be controlled.

Based on this periodic review, the Department of Ecology has determined that the requirements of the Restrictive Covenant continue to be met. However, we are asking for additional action to address several ongoing issues, as described in Section 3.7. It is the property owner's responsibility to continue to inspect and manage the site to assure that the integrity of the remedy is maintained.

4.1 Next Review

The next periodic review for the site will be in 2019 for the years 2014 through 2018. 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

Documents which include detailed information on landfill conditions and cleanup activities include:

- *Final Remedial Investigation Report for the Kent Highlands Landfill*, Seattle, 1991;
- *Closure Action Report for the Kent Highlands Landfill*, Seattle, 1992;
- *Cleanup Action Plan*, Ecology, 1993;
- *Waste Discharge Permit 7115 for City of Seattle, Public Utilities – Kent Highlands Landfill*, King County, 1999;
- *Kent Highlands Spring Drain Separation Technical Memorandum*, CH2MHill, 1995;
- *Ground water Compliance Monitoring Plan for the Kent Highlands Landfill*, Seattle, 1996;
- Ecology, 2002 and 2003, Restrictive Covenants.

Reports Prepared Since 2009 Third Periodic Review

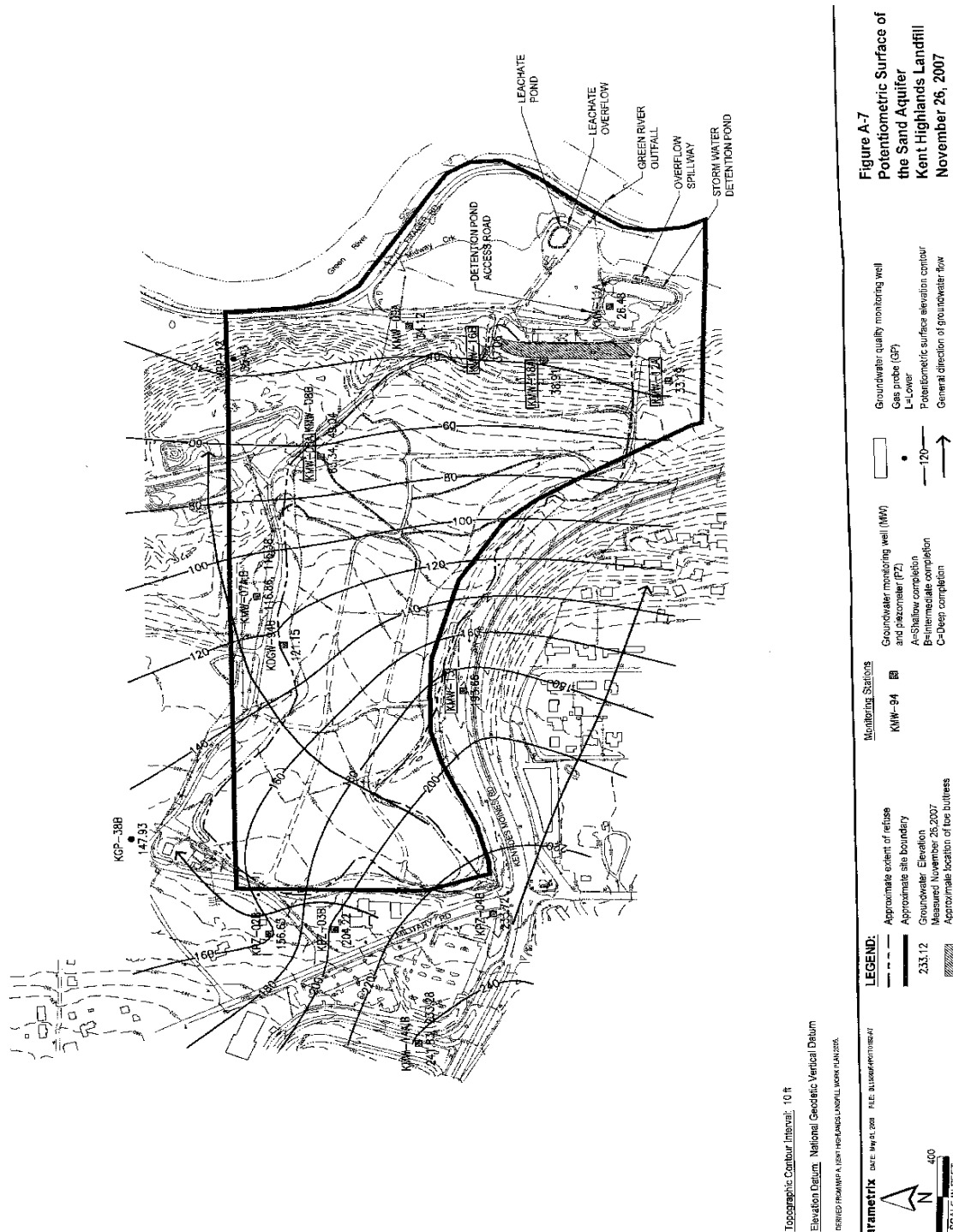
- *Third Periodic Review, Kent Highlands Landfill, Facility Site ID#2042, 23076 Military Road South, Kent, Washington 98032*, June 2009, prepared by Washington Department of Ecology.
- *Kent-Highlands Landfill Flood Plan*, , October 2009, prepared by City of Seattle;
- *Kent Highlands Landfill Groundwater Monitoring 2008 Annual Report*, December 2009, prepared by Parametrix;
- *Kent Highlands Landfill Groundwater Monitoring 2009-2013 Report*, October 2014, prepared by Parametrix;
- Quarterly reports in 2010, 2011, 2012, 2013, and 2014, prepared by City of Seattle

These documents as well as the complete file for the landfill may be reviewed at Central Records, Washington State Department of Ecology, Northwest Regional Office 3190 160th Avenue SE, Bellevue, WA (Call 425-649-7000 to make an appointment for record review).

Also, please note the Ecology September, 2014 Site Visit.

APPENDICES

6.2 Site Plan



6.3 Environmental Covenant

Kent Highl. Landfill/SITB.7

CONFORMED COPY

Return Address:

City of Seattle SPU/Real Prop - SWU
710 Second Avenue 10th Floor
Seattle, WA 98104

20020314002279
146.00
SEATTLE PUBLIC RCOVE
PAGE 001 OF 138
03/14/2002 15:29
KING COUNTY, WA

Document Title(s) (or transactions contained therein): 1. Restrictive Covenant
Reference Number(s) of Documents assigned or released: (on page ___ of document(s))
Grantor(s) (Last name first, then first name and initials) 1. The City of Seattle
Grantee(s) (Last name first, then first name and initials) 1. Washington State Department of Ecology
Legal Description (Abbreviated: i.e. lot, block, plat or section, township, range) Portion of Enos Cooper Donation Claim No. 38 in Section 15, Township 22 North, Range 4 East, W.M. Additional legal is on page <u>4</u> of document
Assessor's Property Tax Parcel/Account Number Tax Parcel/Account Number 000200-0005-03
The Auditor/Recorder will rely on the information provided on the form. The staff will not read the document to verify the accuracy or completeness of the indexing information provided herein.

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DEPT OF ECOLOGY

RESTRICTIVE COVENANT KENT HIGHLANDS LANDFILL

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 (hereinafter the "Cleanup Action") is described in the Cleanup Action Plan for Kent Highlands Landfill dated April 19, 1993. This Restrictive Covenant is required by WAC 173-340-440 to assure the continued integrity of the Cleanup Action .

The undersigned, City of Seattle ("Seattle"), is the fee owner of real property in King County (legal description attached), hereinafter referred to as the "Site." For the purposes of this Restrictive Covenant, the Site refers to the Seattle-owned portions of the former Kent Highlands Landfill, located Northeast of the the intersection of State Route 516 (AKA Kent-DesMoines Road) and Military Road in Kent, Washington. Seattle makes the following declaration as to limitations, restrictions, and uses as to which the Site may be put, and specifies that such declarations shall constitute covenants running with the land, as provided by law, and shall be binding on all parties and all persons claiming under them.

Section 1. Any activity on the Site that may interfere with the Cleanup Action is prohibited. Any activity on the Site that may result in the release of a hazardous substance that was contained as part of the Cleanup Action is prohibited. Any activity on the Site that may result in endangerment to human health or the environment by hazardous substances contained on site or by gas generated by and emitted from the Site is prohibited.

Section 2. Except for groundwater monitoring, no groundwater may be taken for any purpose from any well on the Site without Department of Ecology ("Ecology") approval.

Section 3. The owner of the Site must give written notice to Ecology, or to its successor agency, of the owner's intent to convey any fee interest in the Site. Seattle and all subsequent owners shall provide for the continued operation, maintenance and monitoring of the Cleanup Action.

Section 4. The owner must notify and obtain approval from Ecology, or from its successor agency, prior to any use of the Site 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 5. The owner shall restrict leases to uses and activities consistent with this Restrictive Covenant and notify all lessees of the restrictions on the use of the property.

Section 6. The owner shall allow authorized representatives of Ecology, or its successor agency, the right to enter the Site at reasonable times and with reasonable prior notice for the purpose of evaluating compliance with the Cleanup Action Plan and to inspect records that are related to the Cleanup Action.

Section 7. The owner of the Site reserves the right under WAC 173-340-720 and WAC 173-340-440 (1991 ed.), to record an instrument which provides that this Restrictive Covenant shall no longer limit use of the Site or be of any further force or effect. However, such an instrument may be recorded only with the consent of Ecology, or its successor agency. Ecology or a successor agency may consent to the recording of such an instrument only after public notice and comment.

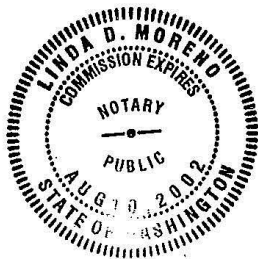
DATED this 14th day of March, 2002.

Chuck Clarke
The City of Seattle
Chuck Clarke, Director, Seattle Public Utilities

STATE OF WASHINGTON)
)SS.
COUNTY OF KING)

I certify that I know or have satisfactory evidence that Chuck Clarke signed this instrument, on oath stated that he was authorized to execute the instrument and acknowledged it as the Director of Seattle Public Utilities of the City of Seattle to be the free and voluntary act of the City of Seattle for the uses and purposes mentioned in the instrument.

Dated: March 14, 2002



Linda D. Moreno
NOTARY PUBLIC in and for the
State of Washington,
My appointment expires 8-10-02

- All of Parcel, tax lot number 000200-0005-03. Said parcel described as:
That portion of the west 400 feet of the north 1436 feet of the south 1944 feet of the Enos Cooper Donation Claim Number 38 lying north of the Kent-Des Moines right-of-way north boundary line, and being more particularly described as Follows:

Beginning at the center of Section 15, T22N, R4E. Thence eastward along a line parallel to the south boundary of said Enos Cooper Claim to a point on the west boundary of said claim; Thence southward along the west boundary of said Enos Cooper Claim 500 feet to the true point of beginning;
thence north $88^{\circ}45'52''$ east 400 feet;
thence south 220 feet along a line parallel to the west boundary line of said Enos Cooper Claim;
thence south $36^{\circ}00'$ west a distance of about 330 feet to the north boundary of the SR-516 right-of-way;
thence northwestward along said north right-of-way line to the west boundary line of said Enos Cooper Claim;
thence north along the west boundary line of Said Enos Cooper Claim to the true point of beginning.

36

City of Kent
Attn. Property Management
220 - 4th Avenue South
Kent, Washington 98032



Reference Number of Related Document. N/A

Grantor(s) City of Kent

Grantee(s) The Public

139/157 PNWT
W 6175

Abbreviated Legal Description. A ptn of Enos Cooper Donation Claim, SE 1/4, Sec 15,
T22N, R4E, W M, King County

Additional Legal Description is contained in Exhibit "A" of Document

Assessor's Property Tax Parcel or Account No.. 152204-9022

PROJECT NAME Kent Highlands Landfill

20030711003046
PACIFIC NW TIT COV
PAGE 001 OF 139
07/11/2003 15:08
KING COUNTY, WA

RESTRICTIVE COVENANT KENT HIGHLANDS LANDFILL

The property that is the subject of this Restrictive Covenant has been the subject of remedial action under Chapter 70.105D RCW. This Restrictive Covenant is required by WAC 173-340-440 to assure the continued integrity of the Cleanup Action.

The undersigned, City of Kent, ("Kent"), is the fee owner of real property in King County (legal description attached as Exhibit "A"), hereinafter referred to as the "Site". For the purposes of this Restrictive Covenant, the Site refers to the Kent-owned portions

KENT HIGHLANDS LANDFILL RESTRICTIVE COVENANT

(July 1, 2003)

RECEIVED
JUL 30 2003
DEPT OF ECOLOGY

of the former Kent Highlands Landfill, located Northeast of the intersection of State Route 516 (aka Kent-DesMoines Road) and Military Road in Kent, Washington. The work done to clean up the property (hereinafter the "Cleanup Action") is described in the Cleanup Action Plan for Kent Highlands Landfill dated April 19, 1993 (attached as Exhibit "B").

Kent makes the following declaration as to limitations, restrictions, and uses as to which the Site may be put, and specifies that such declarations shall constitute covenants running with the land, as provided by law, and shall be binding on all parties and all persons claiming under them.

SECTION 1. Any activity on the Site that may interfere with the Cleanup Action is prohibited. Any activity on the Site that may result in the release of a hazardous substance that was contained as part of the Cleanup Action is prohibited. Any activity on the Site that may result in endangerment to human health or the environment by hazardous substances contained or by gas generated by and emitted from the Site is prohibited.

SECTION 2. Except for groundwater monitoring, no groundwater may be taken for any purpose from any well on the Site without Department of Ecology ("Ecology") approval.

SECTION 3. The owner of the Site must give written notice to Ecology, or to its successor agency, of the owner's intent to convey any fee interest in the Site. Kent and all subsequent owners shall provide for the continued operation, maintenance, and monitoring of the Cleanup Action.

SECTION 4. The owner must notify and obtain approval from Ecology, or from its successor agency, prior to any use of the Site 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 5. The owner shall restrict leases to uses and activities consistent with this Restrictive Covenant and notify all lessees of the restrictions on the use of the property.

SECTION 6. The owner shall allow authorized representatives of Ecology, or its successor agency, the right to enter the Site at reasonable times and with reasonable prior notice for the purpose of evaluating compliance with the Cleanup Action Plan and to inspect records that are related to the Cleanup Action.

SECTION 7. The owner of the Site reserves the right under WAC 173-340-720 and WAC 173-340-440 (1991 ed.), to record an instrument which provides that this Restrictive Covenant shall no longer limit use of the Site or be of any further force or effect. However, such an instrument may be recorded only with the consent of Ecology, or its successor agency. Ecology or a successor agency may consent to the recording of such an instrument only after public notice and comment.

DATED this 8th day of July, 2003.

CITY OF KENT:

By Jim White

Its Mayor

DATE: 7-8-03

STATE OF WASHINGTON)

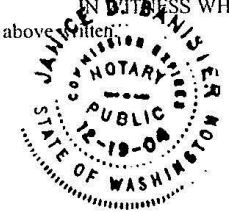
: ss.

COUNTY OF KING)

I hereby certify that on the 8th day of July, 2003, I know or have satisfactory evidence that **JIM WHITE** is the person who appeared before me, and said person acknowledged that he signed this instrument, on oath stated that he is authorized to execute the instrument on behalf of the **CITY OF KENT** as its Mayor, and such execution to be the free and voluntary act of such party for the uses and purposes mentioned in the foregoing instrument.

-Notary Seal Must Appear Within This Box-

IN WITNESS WHEREOF, I have hereunto set my hand and official seal the day and year first above written.



Janice D. Banister
JANICE D. BANISTER
NOTARY PUBLIC, in and for the State of Washington
residing at Trent
My appointment expires 12-19-04

APPROVED AS TO FORM:

Kent City Attorney
Kent City Attorney

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KENT HIGHLANDS LANDFILL RESTRICTIVE COVENANT

(July 1, 2003)

EXHIBIT "A"

THAT PORTION OF THE ENOS COOPER DONATION CLAIM LYING WITHIN THE SOUTHEAST QUARTER OF SECTION 15, TOWNSHIP 22 NORTH, RANGE 4 EAST, W.M., KING COUNTY, WASHINGTON, DEFINED AS FOLLOWS:

BEGINNING AT A POINT OF INTERSECTION WITH THE CENTERLINE OF KENT-DES MOINES HIGHWAY AND THE SOUTH LINE OF THE NORTH HALF OF SAID SUBDIVISION;

THENCE SOUTHEASTERLY ALONG SAID CENTERLINE A DISTANCE OF 135.48 FEET;

THENCE NORTH 62°30'00" EAST 30 FEET TO THE TRUE POINT OF BEGINNING;

THENCE CONTINUING NORTH 62°30'00" EAST 525 FEET;

THENCE NORTHWESTERLY ON A CURVE TO THE LEFT AND RUNNING PARALLEL WITH THE PROPOSED NORTHEASTERLY MARGIN OF STATE ROUTE 516 (AS SHOWN ON THAT CERTAIN MAP DATED MAY 8, 1969, SHEET 2 OF 11 SHEETS, JUNCTION STATE ROUTE 5 TO JUNCTION STATE ROUTE 167 MILEPOST 2.21 TO MILEPOST 4.83) TO THE WEST LINE OF SAID DONATION CLAIM;

THENCE SOUTH ALONG THE WEST LINE OF SAID DONATION CLAIM TO THE CENTERLINE OF SAID HIGHWAY;

THENCE SOUTHEASTERLY TO A POINT WHICH BEARS SOUTH 62°30'00" WEST FROM THE TRUE POINT OF BEGINNING;

THENCE NORTH 62°30'00" EAST 30 FEET TO THE TRUE POINT OF BEGINNING.

EXCEPT THAT PORTION DEFINED AS FOLLOWS:
BEGINNING AT A POINT OF INTERSECTION OF THE WEST LINE OF THE COOPER DONATION CLAIM WITH THE NORTH MARGIN OF SSH 5A (KENT-DES MOINES HIGHWAY) BEING THE TRUE POINT OF BEGINNING OF EXCEPTION HEREIN DESCRIBED;

THENCE NORTH ALONG SAID DONATION CLAIM LINE 450 FEET;

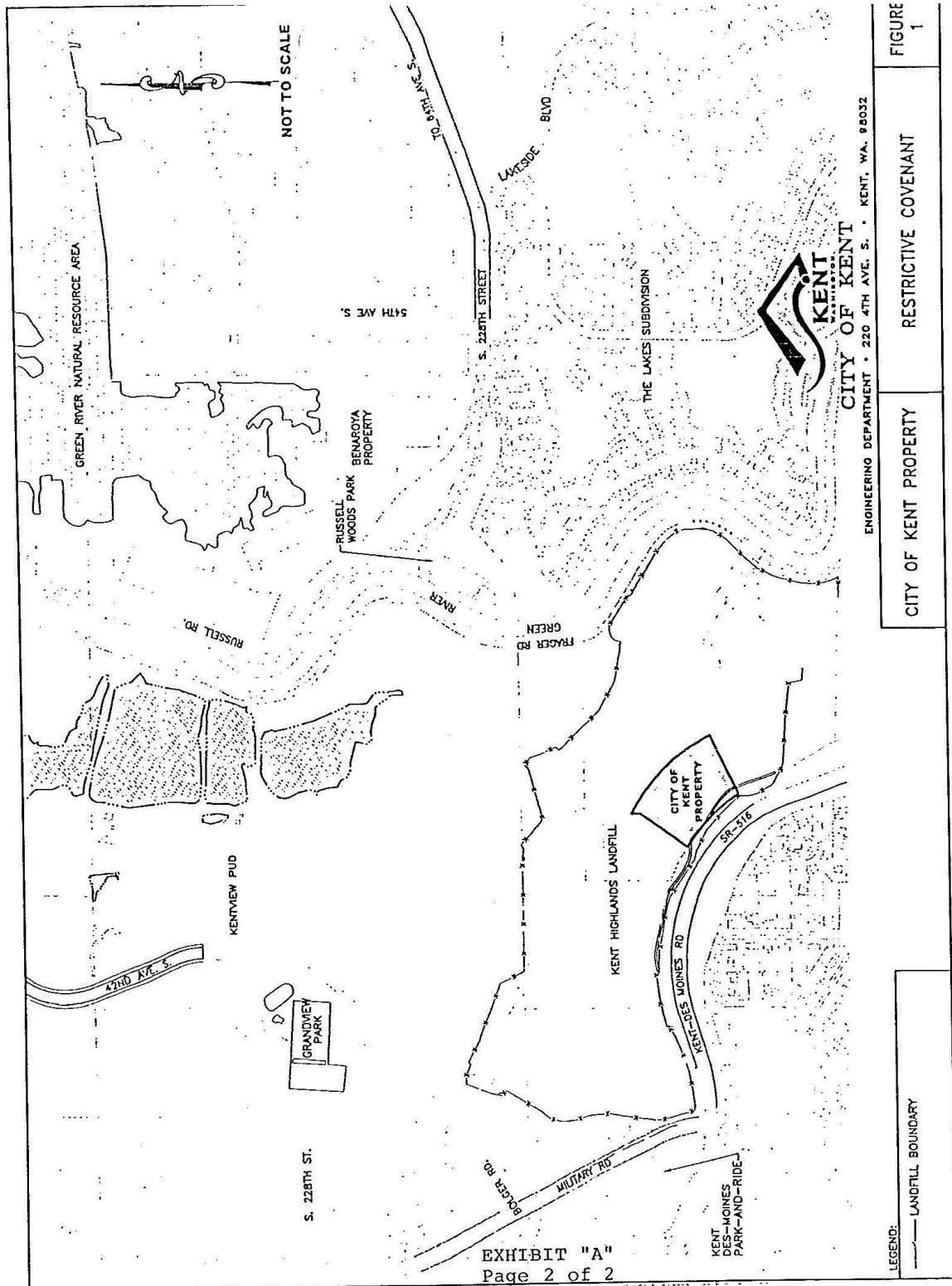
THENCE EAST AT RIGHT ANGLES TO SAID DONATION CLAIM LINE 400 FEET;

THENCE SOUTH PARALLEL WITH THE WEST LINE OF SAID DONATION CLAIM LINE 220 FEET;

THENCE SOUTH 36° WEST 440 FEET MORE OR LESS TO NORTHERLY MARGIN OF SSH 5A;

THENCE NORTHWESTERLY ALONG THE NORTHERLY MARGIN OF SSH 5A TO THE TRUE POINT OF BEGINNING OF EXCEPTION HEREIN DESCRIBED.

AND ALSO EXCEPT THAT PORTION LYING SOUTHERLY OF SAID NORTHEASTERLY MARGIN OF SAID STATE ROUTE 516.



6.4 Photo log

Photo 1: Sign at Entrance - from the across Military Road



Photo 2: Gas Control Facility - from the south



Photo 3: Gas Control Facility Equipment and Building - near the entrance



Photo 4: Typical Drainage ditch and East Face – looking approximately northeast



Photo 5: Input w/ New Aerator at Stormwater Treatment Pond Obscured by Vegetation



Photo 6: Stormwater Treatment Pond – Improved Discharge Structure, Aerator



Photo 7: New Leachate Pump Station



Photo 8: Leachate Pond – looking east



6.5 Proposed Annotated Outline

Background

Introduction

This could be a bullet list of essential facts like reporting period, name of site, facility site ID, project contacts, etc..

Site Description

Brief, with some standard figures showing location and conditions

Regulatory Status, Who is Involved

Previous Five-Year Periodic Review Issues and Resolutions

*This section would provide a synopsis of the issues identified in the previous periodic review,
and how they were handled.*

Land Use Changes During the Reporting Period

This section would be used to describe land use changes that occurred during the reporting period, and would include some figures showing those changes.

Remedial Action System Changes/Events During the Reporting Period

This section would be used to describe physical changes made during the reporting period, and the potential impacts/mitigations of those changes. It could also be used to describe unanticipated events or accidents that occurred.

Landfill Gas Control

Storm Water Capture and Discharge

Cap/Cover Integrity

Slope Stability

Leachate Capture and Discharge

Monitoring Systems

Other Features (fencing, alarms, landscaping, etc.)

Accidents or Upsets

Monitoring Program and Results

This section would provide a brief description of the monitoring program and regulatory criteria for each media or system, and then report on the monitoring results for the review period.

Landfill Gas Control

Storm Water Capture and Quality

Cap/Cover Integrity

Slope Stability

Leachate Capture and Discharge

Ground Water Quality

Other Institutional Control Features (fencing, alarms, landscaping, etc.)

Modifications or Changes Planned for Next Five-Year Period

Landfill Gas Control
Storm Water Capture and Discharge
Cap/Cover Integrity
Slope Stability
Leachate Capture and Discharge
Monitoring Systems
Other Features (fencing, alarms, landscaping, etc.)
Property Transfers, Changes in Use