SANITARY SEWER INVESTIGATION AND REMEDIATION

COLVIN BOULEVARD AND 96TH STREET

GLENN SPRINGS HOLDINGS, INC.
NIAGARA FALLS, NEW YORK

Prepared by:
Conestoga-Rovers & Associates

2055 Niagara Falls Boulevard, Suite #3
Niagara Falls, New York
U.S.A. 14304

Office: (716) 297-6150
Fax: (716) 297-2265

web: http://www.CRAworld.com

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EXECUTIVE SUMMARY

On January 11, 2011, a contractor employed by the City of Niagara Falls (CNF) and the Niagara Falls Water Board (NFWB) found chemical impacted sediments during work to correct a deflection (i.e., low spot) within a 50-foot length of sanitary sewer piping along Colvin Boulevard, just east of 96th Street in Niagara Falls, New York. The sewer repair site was the last of 17 repairs near the Love Canal containment area, which is operated by Glenn Springs Holdings, Inc., an affiliate of Occidental Chemical Corporation (OCC).

NFWB informed GSH of the impacted sediments on January 11, 2011. GSH verbally notified the New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH) on January 11, 2011 and provided written notification (via email) on January 14, 2011. GSH immediately commenced an investigation to determine the potential source of the impacted sediments.

On January 26, 2011, GSH and its environmental consultant Conestoga-Rovers & Associates (CRA) met with representatives from the NFWB, CNF, United States Environmental Protection Agency (USEPA), NYSDEC, and NYSDOH to present the preliminary results of the investigation and discuss a path forward that included GSH completing the Colvin Boulevard sanitary sewer replacement. On January 28, 2011, GSH submitted a letter to NYSDEC formally presenting the preliminary results of the investigation and a work plan to replace the 50-foot sewer section and address any impacts found.

The investigation completed by GSH into the source of the impacted sediments concluded the following:

- The Love Canal remedial system is operating as designed and is protective of human health and the environment. As demonstrated by NYSDEC annual Site inspections, the landfill cap is in-place and undisturbed.
- Love Canal treated effluent does not flow through the section of sewer that was repaired and was not the source of chemistry observed.
- Based on the "Sampling Manual, Love Canal Site, Long-Term Groundwater Monitoring Program" (CRA 1996, updated 2001), bedrock groundwater flow is to the north or northwest.
- The analytical monitoring data (essentially non detects) and hydraulic monitoring data (inward gradients) collected under the Love Canal Long-term Groundwater Monitoring Program show that the remedial system at Love Canal is effective,

operating as designed, and is not the source of the chemistry observed in the section of sanitary sewer pipe beneath Colvin Boulevard just east of 96th Street.

- The approximate 50-foot long low spot in the Colvin Boulevard sanitary sewer has acted as a sediment trap.
- A 1983 Malcolm Pirnie, Inc. report states that the bedding materials of the sanitary sewers in the vicinity of Love Canal were found to be native clay materials and essentially un-impacted. The sewers also were found to be structurally sound and essentially water tight. No specific information for the section of sanitary sewer between 97th Street and 96th Street was provided in the Malcolm Pirnie, Inc. report.
- The Colvin Boulevard sanitary sewer was hydraulically cleaned in 1985/1986 but video inspection was not performed to confirm that all sediments were removed. As such, there is the potential that all sediments were not removed from the isolated low spot during the hydraulic cleaning and had remained there since the mid 1980s.
- The CNF did not identify any other areas of potential impact to the sewer systems around the Love Canal site based on a video inspection in 2000 and the 16 other repairs completed during the 2010/2011 LaSalle Area Spot Sewer Repair project.
- The chemistry present in the sanitary sewer along Colvin Boulevard east of 96th Street is an isolated event based on Love Canal activities conducted in 1985/1986, prior to the current remedy implementation.

GSH commenced fieldwork on February 1, 2011 and completed the work on February 23, 2011. GSH completed the following activities:

- Replaced approximately 50-feet of sanitary sewer beneath Colvin Boulevard between 97th and 96th Streets.
- Removed impacted soil materials down to bedrock to the extent possible from within the sewer trench.
- Removed liquids from the excavation which included sanitary sewer water and an amount of non-aqueous phase liquid (NAPL).
- Collected confirmatory samples from the bottom, sidewalls, and end walls of the sewer trench.
- Removed sediments from the Colvin Boulevard sanitary sewer from 97th Street to the 91st Street lift station.
- Conducted a video inspection of the sanitary sewer from 97th Street to the 91st Street lift station to verify the sewer was free of sediment.
- Completed interim restoration (due to weather conditions) of the road surface above the repaired section of Colvin Boulevard.

- Final restoration of the Colvin Boulevard road surface will be completed in late spring 2011. Any required landscaping and topsoil and sod placement will also be completed in the spring.
- During all intrusive repair activities, continuous air monitoring of the excavation area was performed to monitor for worker safety. In addition to the continuous air monitoring at the excavation area, air monitoring was completed at the perimeter of the work zone at 1-hour intervals to ensure the safety of the residents of the Black Creek neighborhood.

Based on these activities, the following was concluded:

- Video inspection of the repaired and cleaned Colvin Boulevard sanitary sewer confirmed that no sediments were present in the section of sanitary sewer between 97th Street and the lift station at 91st Street. Therefore, since residual sediments were removed from within the sanitary sewer line, there is no future potential for sediments to impact water quality in the sewer or air quality in the vicinity of the sewer.
- Confirmatory soil sampling completed showed that residual chemical impacts remain within the bottom of the trench; however, soil samples collected at the east and west end walls indicated that the residual impacts do not extend beyond the sewer repair area.
- It is likely that the low spot in the sewer developed over time prior to Love Canal investigations and remediation. As the sewer piping sank, the joints in the pipe sections became compromised, allowing discharge into the sewer bedding. This is likely the reason why the bedding materials were impacted in this section of sewer but not historically in other sections of sewer in the early 1980s. Based on the investigations conducted in the early 1980s and since the video inspection of the sewers conducted by the CNF in 2000 showed no evidence of deterioration in the other sections of sewer, there is negligible potential for the bedding to be impacted in other sections of sewer around Love Canal.
- Sixteen other sewer locations repaired during the 2010/2011 LaSalle Area Spot Sewer Repair Project did not find any evidence of impact to the associated bedding materials.
- The residual impacts do not pose a threat to human health and the environment since there is no mechanism for dermal, inhalation, and ingestion exposure or for the residuals to migrate into the environment. This conclusion is based on the following conditions:

- They are located approximately 20 to 22 feet below ground surface
- They are located at the bottom of the excavation trench at the top of bedrock that appears to be competent
- They are contained within clay walls
- They are capped by native clay soils and the asphalt paved road (Colvin Boulevard)

- To protect any potential future construction worker exposure, GSH will work with the CNF/NFWB to establish a protocol to be followed when any subsurface work is being conducted in the vicinity of Love Canal.
- As precautionary measure, GSH will install and monitor two bedrock groundwater monitoring wells; one to be installed to the north of the Colvin Boulevard sanitary sewer repair area (downgradient) and one to be installed to the south of the Colvin Boulevard sanitary sewer repair area (upgradient). These wells will be installed to monitor bedrock groundwater quality.
- As a precautionary measure, GSH will install up to two soil borings along the Colvin Boulevard Sanitary Sewer system to the east of the repair area to verify no additional chemistry is present east of the repair area. GSH will also install one observation well within the bedding material of the newly installed sanitary sewer line to monitor for the presence of NAPL, which was observed to be present during construction activities.

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1.0 INTRODUCTION

This Report has been prepared to document activities performed by Glenn Springs Holdings, Inc., an affiliate of Occidental Chemical Corporation (OCC), to investigate and address chemical impacts to sediments found within a sanitary sewer pipe along Colvin Boulevard east of 96th Street in Niagara Falls, New York. The impacted sediments were found on January 11, 2011, by a contractor employed by the City of Niagara Falls (CNF) and the Niagara Falls Water Board (NFWB), during work to correct a deflection (i.e., low spot) within the sanitary sewer piping beneath Colvin Boulevard between 96th Street and 97th Street.

1.1 REPORT ORGANIZATION

This report is organized as follows:

- Section 1.0 – Introduction
- Section 2.0 – Background
- Section 3.0 – Investigation Results
- Section 4.0 – Remedial Activities
- Section 5.0 – Conclusions
- Section 6.0 – Recommendations

2.0 BACKGROUND

Repairs to the Colvin Boulevard sanitary sewer east of 96th Street were being conducted as part of the NFWB LaSalle Area Spot Sewer Repair project. This project included the repair of 17 sewers in the vicinity of Love Canal to improve the conditions of the sanitary lines and prevent water infiltration. These repairs were identified by the NFWB based on the results of a video inspection of the LaSalle area sewer system conducted by the NFWB in April and May 2000. The Colvin Boulevard sanitary sewer line is an active sewer that extends from 102nd Street west to a lift station near 91st Street. The sewer flows in an east to west direction. Based on information provided by the CNF, the sewer pipe is constructed of a 15-inch diameter vitrified tile (VT) pipe and is buried approximately 20 feet below ground (street) surface (bgs).

The video inspection identified a deflection (i.e., low spot) in a 50-foot section of the sanitary sewer beneath the median area of Colvin Boulevard immediately east of the 96th Street. As part of the NFWB LaSalle Area Spot Sewer Repair project, this section of sewer was to be excavated and replaced to eliminate the low spot. The location of the 50-foot section of sanitary sewer is shown on Figure 2.1 and a plan and profile of the area to be repaired is shown on Figure 2.2.

The contractor for the NFWB was excavating to replace the 50-foot section of sanitary sewer on January 11, 2011. Upon breaking into the sewer pipe, the contractor encountered a chemical odor. There were reportedly no visual or olfactory indications of chemical presence in the sewer bedding around the top of the sewer. The contractor halted work, and subsequently installed a temporary pipe, and secured the area until the nature and presence of the odor could be investigated and the potential risk to human health and the environment evaluated. This event was immediately reported to the CNF and the NFWB. Due to the proximity to Love Canal, the NFWB notified GSH's environmental consultant, Conestoga-Rovers & Associates (CRA), on January 11, 2011. CRA immediately notified GSH and GSH verbally notified the New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH) on January 11, 2011. Subsequently, the United States Environmental Protection Agency (USEPA) was also notified.

The LaSalle Spot Sewer Repair project included excavation work at 16 other locations on streets located near or adjacent to Love Canal. These locations are shown on Figure 2.3. According to CNF/NFWB, the section of sanitary sewer along Colvin Boulevard east of 96th Street, where the odors were encountered, is the only section of sewer repaired under the LaSalle Area Spot Sewer Repair project that exhibited any evidence of odors or potential chemical impact.

Upon notification on January 11, 2011, GSH and CRA immediately began a review of the current operations of the treatment facility at Love Canal to determine if current operations could potentially have had an impact on the section of sewer being repaired. CRA personnel also inspected the excavation on January 11, 2011. CRA contacted the NFWB on January 13, 2011, as directed by GSH, to obtain additional information and offered to provide any assistance that the NFWB may require. NFWB stated that assistance was not required at this point in time. A formal notification was submitted to NYSDEC and NYSDOH by GSH on January 14, 2011 once additional information was received from the CNF/NFWB regarding the presence of impacted sediments. GSH and CRA also began an extensive document search to determine what historical activities, if any, had taken place in and around the section of sanitary sewer on Colvin Boulevard at 96th Street.

On January 17, 2011, a consultant for the CNF collected a mixed soil/sediment sample. It is unclear from discussions with CNF personnel and the consultant's report as to the exact location where the sample was collected and the sample matrix (i.e., roll-off vs. in-place, soil vs. sediment). Test America Laboratories, Inc. of Amherst, New York, analyzed the sample for Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs), and Total Organic Carbon (TOC). The laboratory analytical package is presented in Appendix A. A summary of the primary detected parameters is presented in Table 2.1. The analysis indicated the presence of the following primary compounds:

- Benzene
- Monochlorobenzene
- cis-1,2-Dichloroethene
- 1,2-Dichlorobenzene
- 1,4-Dichlorobenzene
- 1,2,4-Trichlorobenzene
- Toluene
- Hexachlorobenzene
- Hexachlorobutadiene

On January 20, 2011, the NYSDEC verbally requested GSH to prepare a response to the chemistry found within the sanitary sewer. NYSDEC followed up this request with a letter on January 25, 2011.

On January 26, 2011, GSH and CRA met with representatives from the NFWB, CNF, USEPA, NYSDEC, and NYSDOH to present the preliminary results of the investigation and discuss a path forward that included GSH replacing the 50-foot section of sewer and addressing any impacts found.

On January 28, 2011, GSH submitted a response to NYSDEC's January 25, 2011 letter. The response incorporated discussions from the January 26, 2011 meeting and included the following:

- The results of the investigation to date
- A work plan entitled "Spot Sewer Repair and Sediment Sampling Work Plan, LaSalle Area – Colvin Boulevard and 96th Street" (Work Plan) presenting measures GSH would implement to address the chemical impacts and complete the sewer repair

The following two sections of this report present the final results of the investigation conducted and the measures implemented to address the chemical impacts and repair the sanitary sewer.

A chronology of significant events is presented in Table 2.2.

3.0 INVESTIGATION RESULTS

GSH conducted an investigation to determine the source of the chemical impacts observed in the Colvin Boulevard sanitary sewer east of 96th Street in three parts as follows:

- Review of performance of Love Canal remedial systems
- Evaluation of the remedy implemented to address the sanitary sewer system around Love Canal in the 1980s
- Review of video inspections performed on the Colvin Boulevard sanitary sewer in April and May 2000

3.1 PERFORMANCE OF LOVE CANAL REMEDIAL SYSTEMS

The Love Canal remedial system has the following three components:

1. Landfill Cap and Barrier Drain
2. Leachate Treatment System
3. Long-Term Groundwater Monitoring
    a. Chemical Monitoring
    b. Hydraulic Monitoring

As demonstrated by NYSDEC annual Site inspections, the landfill cap is in-place and undisturbed; therefore, the investigation concentrated on evaluation of the Leachate Treatment System and the Long-Term Groundwater Monitoring Program.

Leachate Treatment System

Leachate collected at Love Canal by the barrier drain is treated through the on-Site leachate treatment system. The treated effluent is discharged to the sanitary sewer system under a Significant Industrial User (SIU) permit with the NFWB, which sets limits on the required conditions of the treated leachate prior to discharge. Daily and quarterly monitoring is conducted on the treated leachate prior to discharge to ensure that the treated leachate quality meets the standards set forth in the SIU permit. Monitoring results are submitted monthly and quarterly to the NFWB. NFWB records indicate that permit limits have been met since at least 1995, when OCC took over operation of the treatment system. The NFWB also conducts annual inspections of the leachate treatment system to determine if the condition and operation of the system meets NFWB standards. The most recent inspection was conducted on January 6, 2011. The results of that inspection demonstrate that the treatment system is functioning as designed and no operational issues were noted. A copy of the January 6, 2011 NFWB inspection form is presented in Appendix B.

Effluent from the Love Canal treatment system is discharged to the sanitary sewer on 95th Street. This sewer flows north to the intersection at Colvin Boulevard and 95th Street, where it connects to the sanitary sewer on Colvin Boulevard as shown on Figure 3.1. From this point, the sewer flows west along Colvin Boulevard to the intersection of 91st Street and Colvin Boulevard. As shown on the figure, the treated effluent from Love Canal enters the Colvin Boulevard sanitary sewer downstream of the section of sewer being replaced. Therefore, Love Canal treated effluent does not flow through the section of sewer being replaced and could not be the source of chemistry observed.

Long-Term Groundwater Monitoring

Groundwater monitoring at Love Canal is conducted in accordance with the agency approved monitoring plan entitled "Sampling Manual, Love Canal Site, Long-term Groundwater Monitoring Program", dated February 19, 2001.

Chemical Monitoring

Select monitoring wells on and around Love Canal are sampled on an annual basis to monitor the condition of the groundwater in and around the Love Canal. Several overburden and bedrock groundwater monitoring wells along the north boundary and in the northwest corner of Love Canal (closest to the sewer repair area) are sampled annually for VOCs, SVOCs, Pesticides, and Polychlorinated Biphenyls (PCBs). The locations of these wells in relation to the section of sewer being repaired are shown on Figure 3.2. All results have been non-detect with the exception of a few detections below 10 parts per billion (ppb). The analytical results for the past 5 years (2006 through 2010), deemed most representative of current conditions at the Site, are presented in Table 3.1.

The installed depths of these wells are presented in the table that follows:

Well ID	*Type*	*Well Depth (ft bgs)*
7125	OB	24.5
7130	OB	27.0
7132	OB	28.0
7155	OB	25.6
7161	OB	21.7
8110	OB	24.0
8106	OB	17.0
3257	BR	29.4
Colvin Blvd Sanitary Sewer	---	20

OB - Overburden Well

BR - Bedrock Well

Based on the well depths presented above, the monitoring wells are likely screened at approximately the same or greater depth than the sewer.

Hydraulic Monitoring

Overburden and bedrock groundwater monitoring wells are monitored on a quarterly basis for groundwater elevations. Several of these are overburden monitoring wells within clusters along the alignment of the collection system. The locations of these wells are shown on Figure 3.3. As shown on Figure 3.3, Cluster 1180 (located along Colvin Boulevard east of the sewer excavation site) and Cluster 1170 (located in the northwest portion of the landfill south of the sewer excavation site) show inward gradients towards the barrier drain both currently and historically.

The "Sampling Manual, Love Canal Site, Long-Term Groundwater Monitoring Program," dated February 19, 2001, provides a summary of bedrock geology and hydrogeology beneath the Love Canal site. The upper bedrock is part of the Lockport Formation. The bedrock surface is about 540 feet above mean sea level and is relatively smooth with a gentle slope to the south. The thickness of the Lockport Formation ranges from 162 to 178 feet. The Lockport Formation is comprised of an Upper and Lower Lockport Dolomite underlain by Rochester Shale. The main groundwater aquifer for the Lockport Formation lies in the Upper Lockport Dolomite, specifically in the upper 10 to 15 feet of the formation. Groundwater flow is indicated to be to the north or northwest, away from the Niagara River. The Niagara River appears to act as a source of bedrock recharge and the nearby Niagara Gorge to the north-northwest acts as a bedrock groundwater sink. A review of 2010 bedrock groundwater elevation data confirmed that bedrock groundwater flow in the northern section of the Love Canal Site is to the north-northwest as shown on Figure 3.4.

The results of monitoring activities are presented in the Love Canal "Periodic Review Report," which is submitted annually to the NYSDEC and USEPA. All annual reports have shown that the remedial system is operating as designed and is protective of human health and the environment.

The analytical monitoring data (essentially non detects) and hydraulic monitoring data (inward gradients) evaluated above show that the remedial system at Love Canal is effective, operating as designed, and is not the source of the chemistry observed in the section of sanitary sewer pipe on Colvin Boulevard just east of 96th Street.

3.2 HISTORICAL SANITARY SEWER INVESTIGATIONS AND REMEDY

In the early 1980s, the storm and sanitary sewers surrounding Love Canal were extensively investigated. Samples of water, sediment, and bedding materials were collected and analyzed for VOCs, SVOCs, Pesticides, PCBs, and Dioxins, and Furans. Based upon the analytical results, remedial alternatives were developed to address issues within and surrounding the storm and sanitary sewers. The investigation results and remedial alternatives evaluated were presented in the "Site Investigations and Remedial Action Alternatives, Love Canal" report, by Malcolm Pirnie, Inc. in 1983. The remedial alternatives were further evaluated in the "Love Canal Sewer and Creek Remedial Alternatives Evaluation and Risk Assessment" report, by CH2M in 1985. Both of these reports detailed extensively an alternative that included cleaning the storm and sanitary sewers surrounding Love Canal and video inspection of select storm and sanitary sewers.

The 1983 Malcolm Pirnie, Inc. report states that the bedding materials of the sewers in the vicinity of Love Canal were found to be native clay materials and essentially un-impacted, which indicates that the exterior of the sewers were not contaminant migration pathways. The sewers were found to be structurally sound and essentially water tight.

Sample results from the 1983 Malcolm Pirnie, Inc. report show elevated chlorinated organic concentrations in the sediments within the sanitary sewer along Colvin Boulevard east of 96th Street but not west of 96th Street. The sample locations are presented on Figure 3.5. Areas of impacted sediments are shown on Figure 3.6. A summary of the analytical data is presented in Table 3.2. Sediment was present at manholes MH257 (101st Street – furthest east from the sewer excavation site on figure), MH262 (100th Street), MH264 (99th Street), MH265 (98th Street), and MH267 (97th Street). However, sediments were not found in MH274, which is located at the corner of 96th Street. The absence of sediment in MH274 indicates that the low spot in the sewer pipe identified by the video inspection conducted by the NFWB in 2000 (which is located approximately 10 feet east of MH274) acts as a "sediment trap." Therefore, it is reasonable to conclude that contaminated sediments present upstream from MH274 could have possibly been flushed down to the low spot, prior to 1983 and the original Love Canal remedial actions, and settled there, being unable to move further west to MH274.

The remedy implemented in 1985 and 1986 to address the sanitary sewers included hydraulic cleaning in certain sections and video inspection and hydraulic cleaning in other sections of the sewer. These sewer sections to be cleaned are shown on Figure 3.7.

No completion records for the sewer remediation have been found to date. Review of the USEPA document list also shows no listing for a final construction report for the sewer remediation. However, based upon review of the CH2M Hill report and 1985 and 1987 Record of Decisions (RODs), the sewer remediation along Colvin Boulevard was performed in accordance with the remedial action proposed in the 1983 Malcolm Pirnie, Inc. report. The section of sanitary sewer along Colvin Boulevard was hydraulically cleaned, but not video inspected. As discussed above, the identified low spot in the Colvin Boulevard sanitary east of the intersection with 96th Street acts as a sediment trap. Also, it is not uncommon that when sediment collects in a low spot of a sewer, consistent and regular flow over that low spot can compact the sediment to the extent that hydraulic cleaning may not be effective in removing the sediment. Therefore, the potential exists that sediment remained within the low spot deposited prior to 1983, even after hydraulic cleaning was performed in 1985/1986.

3.3 2000 SANITARY SEWER INSPECTION

In April and May 2000, the sanitary sewers along Colvin Boulevard and to the north and south were video inspected. The NFWB provided GSH with the videotapes of these inspections. GSH reviewed the video inspection information for the section of sanitary sewer beneath Colvin Boulevard from 95th Street to 102nd Street. This section of the Colvin Boulevard sanitary sewer parallels the north end of the Love Canal Site. Overall, the integrity and competency of the sewer was observed to be in good to excellent condition. After review of the videotapes, it was evident that the sanitary sewer along

Colvin Boulevard to the east of 97th Street and west of the sewer excavation area at 96th Street to 95th Street was in good condition, showed no signs of deterioration or infiltration, and was free of sediment. At the section of sewer pipe where the current sewer excavation repair area is located (just east of 96th Street), the camera did show that a low point exists. The camera became submerged for approximately 45 feet. The sewer further upstream to 101st Street (parallel to the north end of Love Canal) showed the sanitary sewer to be in good condition, with no signs of deterioration or infiltration, and to be free of sediment.

Based on the review of the 1983 Malcolm Pirnie, Inc. Report and a review of the 2000 sewer inspection videos provided by the NFWB, it appears that all service utilities emanating from the Love Canal area were either plugged or severed during the remedial activities completed in the 1980s.

4.0 REMEDIAL ACTIVITIES

Remedial activities performed by GSH included the following:

- Replace the 50-foot sanitary sewer section
- Clean the sanitary sewer from 97th Street to the lift station at 91st Street
- Clean the lift station at 91st Street
- Video-inspect the sanitary sewer from 97th Street to the lift station at 91st Street

Op-Tech Environmental Services (Op-Tech) of Syracuse, New York, was retained to complete the sewer replacement and assist in sewer cleaning. Op-Tech retained the following subcontractors to assist:

- Roy's Plumbing Heating and Cooling (Roy's) of Tonawanda, New York
- Kandey Company, Inc. (Kandey) of West Seneca, New York

Roy's provided sewer jetting services and Kandey provided sewer video inspection services.

All work activities were conducted in accordance with a Site-specific Health and Safety Plan (HASP) prepared in accordance with 29 Code of Federal Regulations (CFR) Part 1910 and 29 CFR 1926. The HASP specified protective measures and procedures that were followed during the field activities to minimize exposure of workers and the surrounding community to hazardous Site-related materials. All personnel working at the Site were 40-Hour HAZWOPER trained.

All work activities were performed between approximately 7:00 am and 6:00 pm to minimize impact to residents; however, bypass pumps were operated 24 hours per day during sewer repair activities.

Progress updates were emailed to USEPA, NYSDEC, NYSDOH, CNF, and NFWB throughout the project, generally on a daily basis. Copies of the progress updates are provided in Appendix C.

A photographic log documenting the activities performed is presented in Appendix D.

4.1 SEWER REPAIR ACTIVITIES

Sewer repair activities were conducted in accordance with the Work Plan between February 1 and 18, 2011. NYSDEC approved the Work Plan and requested minor changes via email dated January 31, 2011. The requested minor changes were implemented as discussed in Section 4.1.2.

The sewer repair area was secured by temporary chainlink fence that was previously installed by the CNF's contractor. Traffic along Colvin Boulevard was re-routed to the north via 96th Street and 97th Street.

4.1.1 EXCAVATION OF DAMAGED SANITARY SEWER PIPING

Prior to the removal or replacement of any existing sewer sections, a sewer plug was installed in the downstream outlet of the manhole located at 97th Street and the sewer flow bypassed to the manhole on 96th Street using aboveground pumps and piping. The sewer plug prevented water from entering the downstream section of sewer while repairs were being conducted. The pumps were operated 24 hours per day during repair activities to prevent sewage from backing up in upstream sewer sections.

Once the sewer flow was bypassed, excavation commenced to remove the existing sewer pipe. Excavation commenced at the downstream section (west end) where the CNF contractor left off and proceeded upstream to the east. The excavation extended from approximately 13 feet east of the manhole at 96th Street to approximately 72 feet east of the manhole at 96th Street.

Trench boxes were used to stabilize the trench during excavation. All materials lying above the pipe bedding were stockpiled on polyethylene sheeting for reuse during backfilling activities. All piping and bedding material was placed in lined roll-offs. Full roll-offs were moved and staged at Love Canal.

During all intrusive repair activities, continuous air monitoring of the excavation area was performed to monitor for worker safety. In addition to the continuous air monitoring at the excavation area, air monitoring was completed at the perimeter of the work zone at 1-hour intervals to ensure the safety of the residents of the Black Creek neighborhood. The results of the air monitoring are further discussed in Section 4.6 - Community Air Monitoring Results.

Dewatering of the excavation on a continuous basis was not required except for the removal of minor amounts of water that would accumulate in the excavation during work activities. The source of the water that accumulated in the excavation did not appear to be groundwater seeping into the excavation but appeared to be the result of seepage from several other sources, specifically:

- The saturated granular bedding material at the bottom of the trench was saturated from sanitary flow that entered the excavation when work was halted by the previous CNF contractor (a temporary pipe was placed in the excavation, but was not connected to the existing piping)
- The sanitary water trapped within the sagging sewer line
- Infiltration located at 179.50 feet upstream from the manhole at 96th Street (identified during the 2011 video inspection completed by GSH)
- Minor amounts of water leaking past the sewer plug installed upstream at the 97th Street manhole

The materials surrounding the trench were observed to be clay extending from a depth of approximately 1.5 to 2 feet bgs to bedrock at approximately 22 feet bgs with a 6 to 8-inch layer of granular bedding material located at a depth of approximately 20 to 21 feet bgs. No water seepage from the trench walls was observed through the duration that the trench was open.

Granular bedding materials were not expected to be encountered based on the historic bedding investigation results presented in the 1983 Malcolm Pirnie, Inc. Report; however, as noted in Section 3.2, no specific bedding samples were collected from the section of sanitary sewer beneath Colvin Boulevard between 97th Street and 96th Street during that investigation.

The temporary pipe installed by the CNF contractor prior to ceasing their activities was removed prior to any substantial excavation. It was observed that the temporary pipe was not sealed to the existing sewer, which allowed sanitary flow to continue to enter the excavation area.

Immediately west of the portion of pipe removed by the CNF contractor, a broken PVC pipe section was unearthed during excavation. The PVC pipe was connected to the concrete pipe extending from the manhole at 96th Street and sealed at the joint with a poured concrete collar located 13 feet east of the 96th Street manhole. The pipe appeared to have been present for some period of time. The break in the pipe was located approximately 10 feet east of the concrete collar. The pipe was observed to be nearly full of granular materials and sediment. CNF representatives were not aware that this section of sewer had been repaired in the past. The pipe was cut just downstream of the break to provide a connection point for the new pipe in concurrence with the CNF On-Site representative. Once the broken section of PVC pipe was removed, sand bags were placed over the downstream section as a precautionary measure to prevent potentially impacted sediments and odors from possibly migrating downstream. The sand bags were replaced by a sewer plug the following day.

The remainder of the pipe encountered was concrete (not VT as indicated on CNF drawings) and was observed to be in good condition.

As stated previously, the CNF contractor broke into the sewer pipe on January 11, 2011. When GSH contractors removed the plywood cover placed by the CNF/NFWB contractor over the excavation on February 1, 2011, water was observed flowing through the broken pipe/excavation. Given this, the unsealed temporary pipe subsequently in place for approximately three weeks with the excavation open and only covered with plywood, and the broken PVC pipe nearly full of granular material and sediment, there was potential that impacted materials were washed downstream into the sewer sections west of 96th Street.

Once the pipe and bedding was exposed, visual and olfactory (odor) evidence of chemical impact was observed in the bedding materials underneath the existing pipe. Visual and olfactory evidence also was observed in the clay material underneath the granular material but to a lesser degree than what was present in the granular material. Visual indicators were dark staining of the clay and granular bedding material beneath the sanitary sewer piping. It is speculated that the staining was the result of biological decay resulting from leaking sanitary waste and the chemical impacts. A non-aqueous phase liquid (NAPL) was observed to be present in the excavation at varying times throughout the work activities. The NAPL material appeared to be dark brown to black in color and floated at the surface of the water. As water seeped into the excavation from the saturated granular bedding material, discernible amounts of NAPL would sporadically be observed to seep in as well. NAPL was removed from the excavation with a vacuum truck whenever observed. The greatest visual and olfactory evidence of chemical impact (including NAPL) was found in the central and western portions of the excavation. Due to the evidence of chemical impact, all bedding materials and the underlying native clay were removed until bedrock was encountered for the entire length of the trench to the extent possible. Some minor amounts of clay (3 to 6 inches) could not be removed due to the slightly uneven bedrock surface, the teeth of the excavator bucket, and restrictions posed by the trench boxes. The bedrock surface appeared to be solid as there was no visible evidence of fracturing rock as the excavator bucket scraped over the bedrock.

Based on the evidence of chemical impact, the open excavation and any roll-offs in the work area were covered every night to prevent potential fugitive odors. Once new bedding was placed, the excavation was no longer covered at night.

As noted in Section 3, it was originally believed that the chemically impacted materials were only present in the sewer pipe within the low spot. The 1983 Malcolm Pirnie, Inc. report states that the bedding materials of the sanitary sewers in the vicinity of Love Canal were found to be native clay materials and essentially un-impacted. The sewers also were found to be structurally sound and essentially water tight. No specific information for the section of sanitary sewer between 97th Street and 96th Street was provided in the Malcolm Pirnie report. It is likely that the low spot in the sewer developed over time prior to Love Canal investigations and remediation. As the sewer piping sank, the joints in the pipe sections became compromised, allowing discharge into the sewer bedding. This is likely the reason why the bedding materials were impacted in this section of sewer but not historically in other sections of sewer in the early 1980s. Based on the investigations conducted in the early 1980s and since the video inspection of the sewers conducted by the CNF in 2000 showed no evidence of deterioration in the other sections of sewer, there is negligible potential for the bedding to be impacted in other sections of sewer around Love Canal. The other 16 sewer locations repaired during the 2010/2010 LaSalle Area Spot Sewer Repair Project also did not find any evidence of impact to the bedding materials.

4.1.2 CONFIRMATORY SOIL SAMPLING

The original NYSDEC-approved confirmatory soil sampling scope of work, based on their approval of the Work Plan and comments dated January 31, 2011, was as follows:

- Collect a soil sample at each 10-foot interval of removed pipe based on the results of field screening with a photonization detector (PID) and composite into one sample for analysis
- Collect discrete samples at any and all points if the soil/sediment appears to be visually impacted, has elevated PID readings or olfactory evidence of impact, and/or NAPL is present
- Collect a discrete sample at the beginning and end of the trench and submit each for analysis

- Analyze all soil/sediment samples for Love Canal indicator chemicals; complete VOC, SVOC and Pesticide scan

Based on the visual and olfactory evidence of chemical impacts (including NAPL) to the bedding and underlying clay, samples were not collected at each 10-foot interval but were collected based on the location of the greatest evidence of visual and olfactory impacts. A sample summary is presented in Table 4.1. The locations of the samples are presented on Figure 4.1. Samples were collected of bedding material at each end wall (002 west end and 009 east end), residual clay remaining in the trench below the removed bedding material (001, 003, 004, 005, and 008), and clay material along the north and south side wall (006 north and 007 south). Samples from the bottom of the excavation were collected using the excavator bucket to retrieve the sample from the excavation and the samples were then collected from the excavator bucket and placed directly into laboratory-supplied containers. At the direction of CRA personnel, soil samples from the endwalls and sidewalls were collected by hand by the contractor and then placed directly into the laboratory-supplied containers by CRA personnel.

All samples were submitted to Test America Laboratories, Inc. of Pittsburg, Pennsylvania, for rush analysis. Test America is a certified Environmental Laboratory Approval Program (ELAP) testing laboratory. Analytical reports and data validations for the confirmatory soil samples are presented in Appendix E.

A summary of detected compounds is presented in Table 4.2 and on Figure 4.2. The detected compound concentrations are compared to NYSDEC Part 375 and CP-51 Soil Cleanup Objectives for unrestricted use and restricted use for protection of public health under both residential and commercial scenarios in both Table 4.2 and Figure 4.2. As shown in Table 4.2 and on Figure 4.2, no VOCs or SVOCs exceeded commercial use soil cleanup objectives. Two pesticides, alpha-BHC and gamma-BHC, in one sample (003) marginally exceed commercial use soil cleanup objectives. The concentration of these two compounds was 5.5 milligram per kilogram (mg/kg) and 11 mg/kg and the commercial soil cleanup objectives are 3 mg/kg and 9.2 mg/kg, respectively.

No VOCs were detected at concentrations that exceeded residential soil cleanup objectives. One SVOC, hexachlorobenzene (HCB), was detected above the residential soil cleanup objective in samples 003 (0.57 mg/kg), 004/005 (1.5/2.1 mg/kg), and 006 (0.61 mg/kg). The residential soil cleanup objective for HCB is 0.41 mg/kg. Three detected pesticides, alpha-BHC, delta-BHC, and gamma BHC, exceeded residential soil cleanup objectives.

It should be noted that all detected compounds in the east end wall sample were below unrestricted use soil cleanup objectives and only three detected compounds, alpha-BHC, delta-BHC, and gamma BHC, exceeded unrestricted use soil cleanup objectives in the west end wall sample. Only one of these, alpha-BHC, also exceeded residential and commercial soil cleanup objectives.

Based on the confirmatory soil sampling data, residual impacts remain at the bottom of the trench; however, the end wall sample results show that the residual impacts do not extend east or west beyond the sewer repair area.

The residual impacts do not pose a threat to human health and the environment due to the following:

- The residual impacts are located at a depth of approximately 20 to 22 feet bgs. As such, the only potential exposure pathway would be a future construction worker; which could readily be controlled.
- The trench walls were found to be clay from approximately 1.5 to 2 feet bgs to bedrock (approximately 20 to 22 feet bgs). The clay will prevent any potential lateral migration.
- The bedrock surface was found to be competent, which would mitigate any potential vertical migration.
- No groundwater infiltration was observed entering the excavation; however, water was present in the excavation from other sources (predominantly the sanitary sewer itself and the granular bedding materials) as outlined previously in Section 4.1.1.
- The asphalt road surface provides a relatively impermeable surface that is graded to catchbasins to capture stormwater (some of which were replaced with new during sewer replacement), which would mitigate surface water infiltration.
- The replaced sewer has water tight joints, which would prevent exfiltration from the sewer.
- The lack of observed groundwater infiltration into the excavation, the clay trench walls, the asphalt road surface overlying the area, and the watertight sewer joints result in negligible potential for water to enter the trench. Therefore, there is no mechanism to hydraulically flush any residuals into bedrock in addition to the fact that bedrock appeared to be competent based on the lack of flaking or excavatable fractured bedrock during excavation activities.

As a precautionary measure, GSH recommends the implementation of the following:

- Installation and monitoring of two bedrock groundwater monitoring wells; one to be installed to the north of the Colvin Boulevard sanitary sewer repair area (downgradient) and one to be installed to the south of the Colvin Boulevard sanitary sewer repair area (upgradient). These wells would be installed in the median areas to monitor bedrock groundwater quality at a depth of approximately 5 to 15 feet below top of bedrock. The wells would be sampled two times for VOCs, SVOCs, and Pesticides at a minimum interval of 1 month. The data from the two sampling events would be used to evaluate future monitoring requirements.
- Installation of up to two soil borings along the Colvin Boulevard Sanitary Sewer system to the east of the repair area to verify no additional chemistry is present east of the repair area. A soil sample would be collected from the bedding material surrounding the existing sanitary sewer 20 feet beneath Colvin Boulevard and analyzed for VOCs, SVOCs, and Pesticides.
- Installation of one flush-mount monitoring well within the bedding material of the newly installed Colvin Boulevard sanitary sewer line at the downgradient end of the repair to monitor for the presence of NAPL that was observed during construction activities.

To protect any potential future construction worker exposure, GSH will work with the CNF/NFWB to ensure that the residual impacts are documented on their record sewer drawings and to establish a protocol such that GSH is notified of, and will potentially assist with, any subsurface work being conducted in the vicinity of Love Canal.

4.1.3 SEWER PIPING REPLACEMENT

Once the impacted pipe and bedding materials were removed to the satisfaction of GSH's oversight engineer/consultant and the CNF On-Site representative and confirmatory samples collected, new granular bedding material and 15-inch SDR 35 polyvinyl chloride (PVC) sewer pipe with water tight couplings were installed. The new PVC pipe extended from approximately 19 feet east of the manhole at 96th Street to approximately 61 feet east of the manhole at 96th Street. The PVC piping was connected to the existing concrete pipe using a mechanical coupling (Fernco coupling) to ensure a water tight seal. As all the sewer joints have watertight seals, there is no potential for residual chemically impacted soil remaining at the bottom of the trench to enter the sewer or impact water quality within the sewer.

Once the new pipe was placed and grade verified, additional granular bedding material was placed to a level of approximately 2 feet above the top of pipe. Extra granular fill was placed in the west end of the excavation up to and around a natural gas line crossing the excavation at a depth of approximately 4.5 feet bgs to support the natural gas line. The granular fill was placed in approximate one-foot lifts and compacted with mechanical tamper.

The remainder of the excavation was backfilled and compacted with native materials removed from the excavation to road subgrade level. Prior to backfilling, the stockpiled native material was inspected to ensure there were no odors or evidence of chemical impacts before use as backfill. No odors or photoionization detector (PID) readings were detected from the native soils used as backfill. Native materials that could not be backfilled (excess, frozen, etc.) were placed in lined roll-off boxes temporarily staged near the excavation. Native materials were placed in approximate two-foot lifts and compacted with the excavator bucket and mechanical tamper.

Granular materials were placed and compacted on top of the backfilled native materials. Cold asphalt patch then was installed to restore the road surface. The cold patch will be replaced, low spots in the subgrade filled and compacted, and hot asphalt placed in late spring to complete road restoration. Any required landscaping and topsoil and sod placement will also be completed in the spring.

All work was performed in accordance with the NFWB/CNF project specifications, except for the use of native soils removed during excavation as backfill. NFWB/CNF project specifications required that the entire excavation be backfilled with granular materials. Given that native materials were originally present and that they were present under the remainder of the road, CNF personnel approved the use of native material instead of granular material on February 2, 2011. All work was supervised by CNF's on-Site representative and completed to the satisfaction of the CNF's on-Site representative.

At a request from the CNF, GSH also replaced a catchbasin on the northeast corner of Colvin Boulevard and 96th Street and storm sewer piping leading to a catchbasin on the southeast corner of Colvin Boulevard and 96th Street that had been removed and broken by the CNF/NFWB contractor.

4.2 SEWER CLEANING ACTIVITIES

As indicated in section 4.1, there was potential that sediments were washed downstream due to historic sewer repair work and/or the excavation being left open by the CNF/NFWB between January 11, 2011 and February 2, 2011. Therefore, as a precautionary measure, the section of sanitary sewer beneath Colvin Boulevard between 97th Street and the lift station at 91st Street were hydraulically cleaned to remove any sediment that may have been present (see Figure 4.3) upon completion of the sewer repair. The lift station was also inspected to determine if any visually impacted liquids were present. None were observed. Cleaning of the sanitary sewer downstream of the lift station at 91st Street was not required as the lift station is the end and lowest point in the Colvin Boulevard sanitary sewer. As such, sediments would accumulate in the lift station and would not be able to migrate further downstream.

Sewer cleaning activities were conducted between February 12 and 23, 2011. Cleaning was conducted in sections between an upstream and downstream manhole. Cleaning proceeded from furthest upstream section (97th Street to 96th Street) to the furthest downstream section (92nd Street to the lift station at 91st Street).

A sewer plug was installed in the downstream manhole of each section and the sewer flow was bypassed using aboveground pumps and piping. The sewer plug prevented sediments from entering downstream sections during cleaning.

Each section was cleaned using high-pressure water. On some sections of sewer, numerous runs were performed to ensure that all the sediment was removed. Wash water and sediment were collected in the downstream manhole and removed by vacuum truck.

Significant solid materials were removed from the sewer between 93rd Street and 96th Street. The material included sediment, granular bedding material, bricks, and other miscellaneous debris. NAPL was not observed during the sewer cleaning activities in any section of the Colvin Boulevard sanitary sewer or within the 91st Street Lift Station.

4.3 VIDEO INSPECTION

Once the sewers were cleaned, the pipes were video-inspected from 97th Street to the lift station at 91st Street to ensure that all sediment had been removed (see Figure 4.3). Video inspection of the sewer was completed between February 15 and 22, 2011.

As with the sewer cleaning, video inspection was conducted in sections from an upstream manhole to a downstream manhole. A sewer plug was installed in the downstream manhole and the sewer flow bypassed using aboveground pumps and piping to facilitate the inspection.

The results of the video inspection (logs and video) are contained on a compact disk (CD) included in Appendix F. As shown on the video, no sediments were present in the section of sanitary sewer between 97th Street and the lift station at 91st Street. Therefore, there is no future potential for sediments to impact water quality in the sewer or air quality in the vicinity of the sewer.

It should be noted that at 179.5 feet east of the manhole at 96th Street, infiltration was noted at the joint of the sewer piping in the 12 o'clock position. This infiltration is noteworthy only since the LaSalle Sanitary Spot Sewer Repair Project occurred as part of an ongoing effort to reduce sanitary sewer overflows. Sanitary sewer overflow events happen when there are large quantities of rain or melting snow and the sewer lines become overloaded by stormwater inflow or groundwater infiltration. A number of municipalities throughout the State, including the NFWB, have been asked to undertake projects such as these to improve local water quality. As such, this infiltration point may warrant repair by the NFWB which would involve the implementation of procedures being established between the NFWB, CNF, and GSH for future subsurface work activities near Love Canal (see Section 6 for further details).

4.4 EQUIPMENT DECONTAMINATION

All equipment that came in contact with potentially impacted soil, sediment, or water was decontaminated at the Love Canal Site within containment in the drum barn. Decontamination involved removal of any solid materials (i.e., excavator bucket) and then washing the equipment with high-pressure potable water. Wash water as collected in the barn's concrete floor drains, which drain by gravity to the drum barn sump. From there, wash water was handled as described in Section 4.5.

4.5 WASTE HANDLING AND DISPOSAL

Wastes generated during remedial activities included liquids (comprised of water and NAPL), sediment, and soil/debris. These materials were managed as described below.

Liquid materials generated from sewer cleaning and sewer repairs were transported from the work area via vacuum truck to the Love Canal Site. Any suspended solids (sediments) were allowed to settle in the vacuum truck overnight. Liquids were then decanted off and discharged to the drum barn sump. From there, the liquids were transferred to the underground holding tank at P-3A, pumped to and treated by the Love Canal leachate treatment system, and discharged as permitted to the NFWB sanitary sewer system.

Decontamination water was pumped from the drum barn sump to the underground holding tank at P-3A and then pumped to and treated by the Love Canal leachate treatment system, and discharged as permitted to the NFWB sanitary sewer system.

Sediments that settled out of the liquids in the vacuum truck were removed and placed in sealed drums. The drums are stored in the drum storage area in the drum barn pending characterization. A total of four drums were generated. All drums will be disposed of off-site in accordance with federal and state regulations.

Lined roll-offs were staged for use within the excavation area. Once full, the roll-offs were covered and transported to the Love Canal site. A total of 15 full roll-offs are staged at the Love Canal site. Four roll-offs contain piping and bedding material. Ten roll-offs contain native excavated material from above the former sanitary sewer that could not be used as backfill (i.e., excess, frozen materials, etc.). One roll-off contains material removed from the CNF/NFWB contractor's roll-off. All roll-offs will be disposed off-site in accordance with federal and state regulations.

All characterization data and final disposition information for the drums and lined roll-offs will be provided to the NYSDEC under separate cover. This data will be compiled once the laboratory analysis is complete and the material has been manifested and transported.

4.6 COMMUNITY AIR MONITORING RESULTS

In order to ensure the safety of the project workers as well as the residents of the Black Creek neighborhood, continuous air monitoring was conducted during all work activities. A PID equipped with a 10.6 eV lamp was used along with an oxygen (O_2)/ lower explosive limit (LEL) meter and a hydrogen sulfide (H_2S) meter to monitor air quality within the excavation and along the perimeter of the work area (i.e., at the exclusion zone fence line).

PID, O_2/LEL, and H_2S measurements were collected continuously in the excavation/work area and once per hour at the perimeter of the work area (north, south, east, and west). Readings were recorded in a field notebook, and field worksheets. A summary of the daily readings is presented in Table 4.3.

All readings were compared to the HASP Action Levels to determine the appropriate action to be taken based on the readings. PID readings in the breathing zone of the excavation area ranged between 0 and 4.2 parts per million (ppm), all below the Action Level of 10 ppm when work activities would have to cease. All PID readings in the breathing zone at the perimeter of the work area ranged between 0 and 0.7 ppm, all below the Action Level of 1 ppm when a respirator would be required.

Oxygen levels were all within acceptable range (19.5 to 23.5 percent). H_2S was not detected and only one low-level detection of carbon monoxide was detected (1 ppm), well below the Action Level of 35 ppm. LEL monitoring indicated a maximum LEL of 1 percent, well below the Action Level of 10 percent.

4.7 COMMUNITY OUTREACH

Due to the nature and duration of the project, CRA personnel visited 68 residences in the vicinity of the work area as directed by GSH on February 17, 2011. The purpose of the visits was to explain the work activities being conducted and to answer any questions the residents might have. A fact post card was also left at all residences. The card provided an update about the project, estimated completion dates, and a local phone number for the residents to call for information about the work.

5.0 CONCLUSIONS

Based on the investigation and remedial activities performed, the following conclusions have been made:

1. The Love Canal remedial system is operating as designed and is protective of human health and the environment.
2. The presence of chemistry in the sediments within the sanitary sewer along Colvin Boulevard immediately east of 96th Street is not a result of current operations at the Love Canal site.
3. The approximate 50-foot long low spot in the sanitary sewer has acted as a sediment trap.
4. The sanitary sewer was hydraulically cleaned in 1985/1986 but video inspection was not performed to confirm that all sediments were removed. As such, there is the potential that all sediments were not removed from the isolated low spot during the hydraulic cleaning.
5. The sanitary sewer along Colvin Boulevard was video inspected in April and May 2000. Review of the video inspection showed the low-spot in the sewer and the sanitary sewer along Colvin Boulevard to the east of 97th Street and west of the sewer excavation area at 96th Street to 95th Street was in good condition, showed no signs of deterioration or infiltration, and was free of sediment.
6. The CNF did not identify any other areas of potential impact to the sewer systems around Love Canal based on the 2000 video inspection and the 16 other repairs completed during the 2010/2011 LaSalle Area Spot Sewer Repair project.
7. The chemistry present in the sanitary sewer along Colvin Boulevard east of 96th Street is an isolated event based on Love Canal activities in 1985/1986 prior to the current remedy implementation.
8. Visual and olfactory evidence of chemical impact was observed in the bedding materials beneath the sewer along the 50-foot low spot during sewer pipe removal. Although NAPL was also observed, it was removed from the excavation with a vacuum truck whenever present. As a result of the chemical impacts and NAPL presence, all bedding materials and the underlying native clay were removed until bedrock was encountered for the entire length of the trench to the extent possible. Some minor amounts of clay (3 to 6 inches) could not be removed due to the slightly uneven bedrock surface, the teeth of the excavator bucket, and restrictions posed by the trench boxes.
9. The impacts to the bedding materials in this area were likely the result of the sewer pipe sinking over time prior to Love Canal investigations and remediation.

As the sewer piping sank, the joints in the pipe sections became compromised, allowing discharge into the sewer bedding, prior to implementation of the original Love Canal remedial actions. This is likely the reason why the bedding materials were impacted in this section of sewer but not historically in other sections of sewer in the early 1980s. Based on the sewer investigations (bedding and sediments) conducted in the early 1980s, and since the video inspection of the sewers conducted by the CNF in 2000 showed no evidence of deterioration in the other sections of sewer, there is negligible potential for the bedding to be impacted in other sections of sewer around the Love Canal site.

10. Confirmatory soil sampling completed after the impacted bedding and clay materials were removed showed that residual chemical impacts remain within the bottom of the trench; however, samples collected at the east and west end walls had detected concentrations below NYSDEC Part 375 unrestricted soil cleanup objectives (east) or only one compound, alpha-BHC, that exceeded restricted use residential and commercial criteria (west). These data show that the residual impacts do not extend beyond the sewer repair area.

11. All new PVC piping joints have watertight seals; therefore there is no potential for residual chemically-impacted soil remaining at the bottom of the trench to enter the sewer or impact water quality within the sewer.

12. Residual impacts do not pose a threat to human health and the environment due to the following:

    a. The residual impacts are located at a depth of approximately 20 to 22 feet bgs. As such, the only potential exposure pathway would be a future construction worker; which will be addressed by the implementation of control procedures developed by GSH in conjunction with the CNF/NFWB.

    b. The trench walls were found to be clay from approximately 1.5 to 2 feet bgs to bedrock (at approximately 20 to 22 feet bgs). The clay will prevent any potential lateral migration.

    c. The bedrock surface is considered to be solid based on an inability to excavate the top surface of the rock and therefore vertical migration would be limited.

    d. No groundwater infiltration was observed entering the excavation; however water was present in the excavation from other sources (predominantly the sanitary sewer itself and granular bedding materials).

    e. The asphalt road surface provides a relatively impermeable surface that is graded to catchbasins to capture stormwater (some of which were replaced during the sewer replacement), which would mitigate surface water infiltration.

f. The replaced sewer has water tight joints, which would prevent exfiltration from the sewer.

g. The lack of observed groundwater infiltration into the excavation, the clay trench walls, the asphalt road surface overlying the area, and the watertight sewer joints result in negligible potential for water to enter the trench. Therefore, there is no mechanism to hydraulically flush any residuals into bedrock in addition to the fact that bedrock appeared to be competent based on the lack of flaking or excavatable fractured bedrock during excavation activities.

13. Video inspection of the replaced and cleaned sewer showed that no sediments were present in the section of sanitary sewer between 97th Street and the lift station at 91st Street. Therefore, there is no future potential for sediments to impact water quality in the sewer or air quality in the vicinity of the sewer.

6.0 RECOMMENDATIONS

Based on the conclusions from the investigation and remedial activities performed, the following recommendations are made:

- Work with the CNF/NFWB to establish procedures such that:
  - The area of residual impacts are documented on their record sewer drawings
  - GSH is notified in advance of any subsurface activities to be conducted in the vicinity of Love Canal
  - GSH will provide assistance to the CNF/NFWB when subsurface work is being performed near the Love Canal site should environmental issues arise and ensure that construction worker exposure is controlled
- Install and monitor two bedrock groundwater monitoring wells; one to be installed to the north of the Colvin Boulevard sanitary sewer repair area (downgradient) and one to be installed to the south of the Colvin Boulevard sanitary sewer repair area (upgradient). These wells would be installed in the median areas to monitor bedrock groundwater quality at a depth of approximately 5 to 15 feet below top of bedrock. The wells would be sampled two times for VOCs, SVOCs, and Pesticides at a minimum interval of one month. The data from the two sampling events will be used to evaluate future monitoring requirements.
- Install up to two soil borings along the Colvin Boulevard Sanitary Sewer system to the east of the repair area to verify no additional chemistry is present east of the repair area. A soil sample will be collected from the bedding material surrounding the existing sanitary sewer 20 feet beneath Colvin Boulevard and analyzed for VOCs, SVOCs, and Pesticides.
- Install one flush-mount monitoring well within the bedding material of the newly installed Colvin Boulevard sanitary sewer line at the downgradient end of the repair to monitor for the presence of NAPL that was observed to be present during construction activities.

The attached Figure 6.1 shows the location of the recommended well and boring installations.

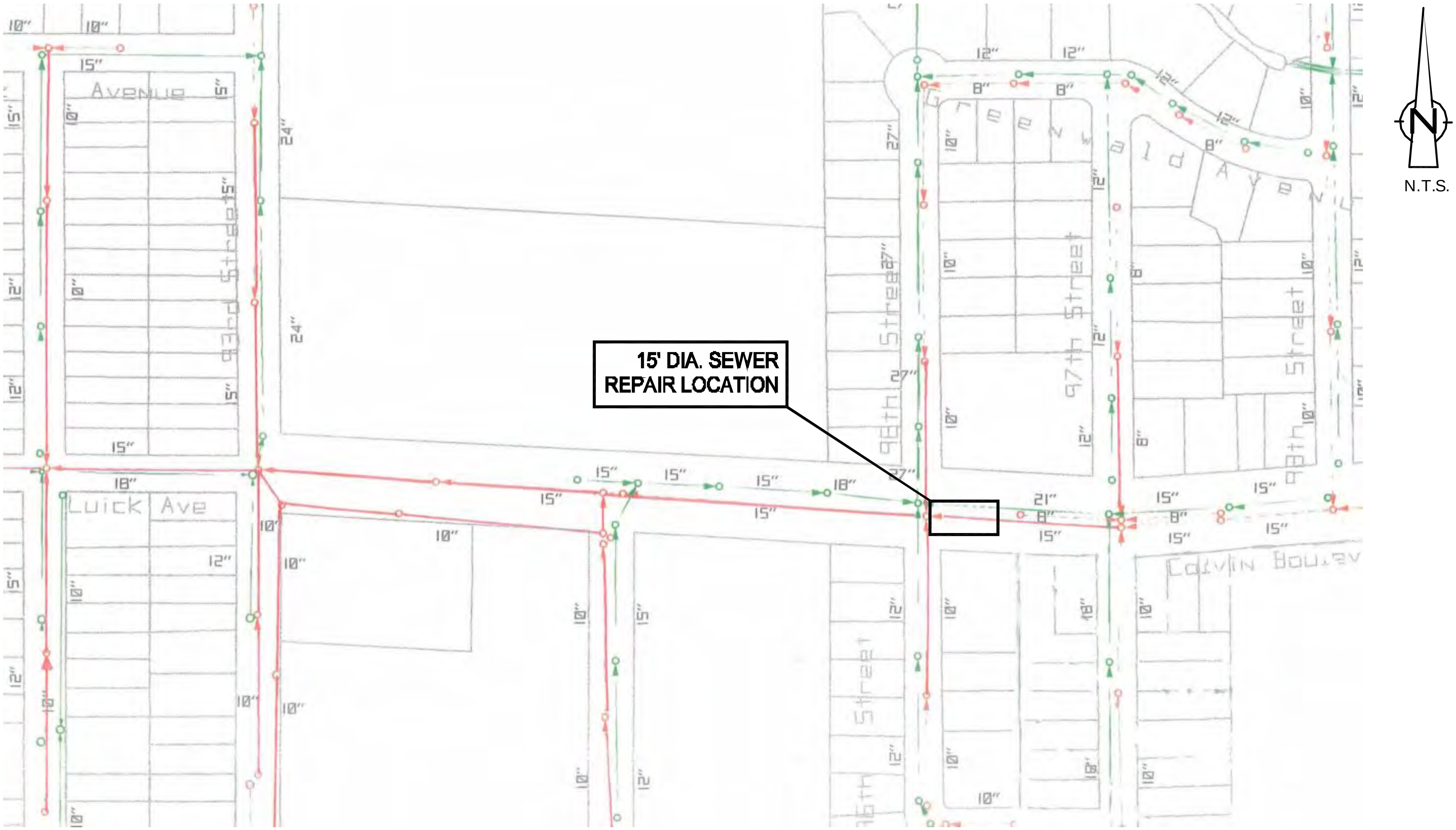


figure 2.1

LOCATION OF SEWER REPLACEMENT AREA
COLVIN BOULEVARD SANITARY SEWER REPAIR
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

SOURCE: NIAGARA FALLS WATER BOARD

09954-D23101(021)GN-WA006 FEB 23/2011

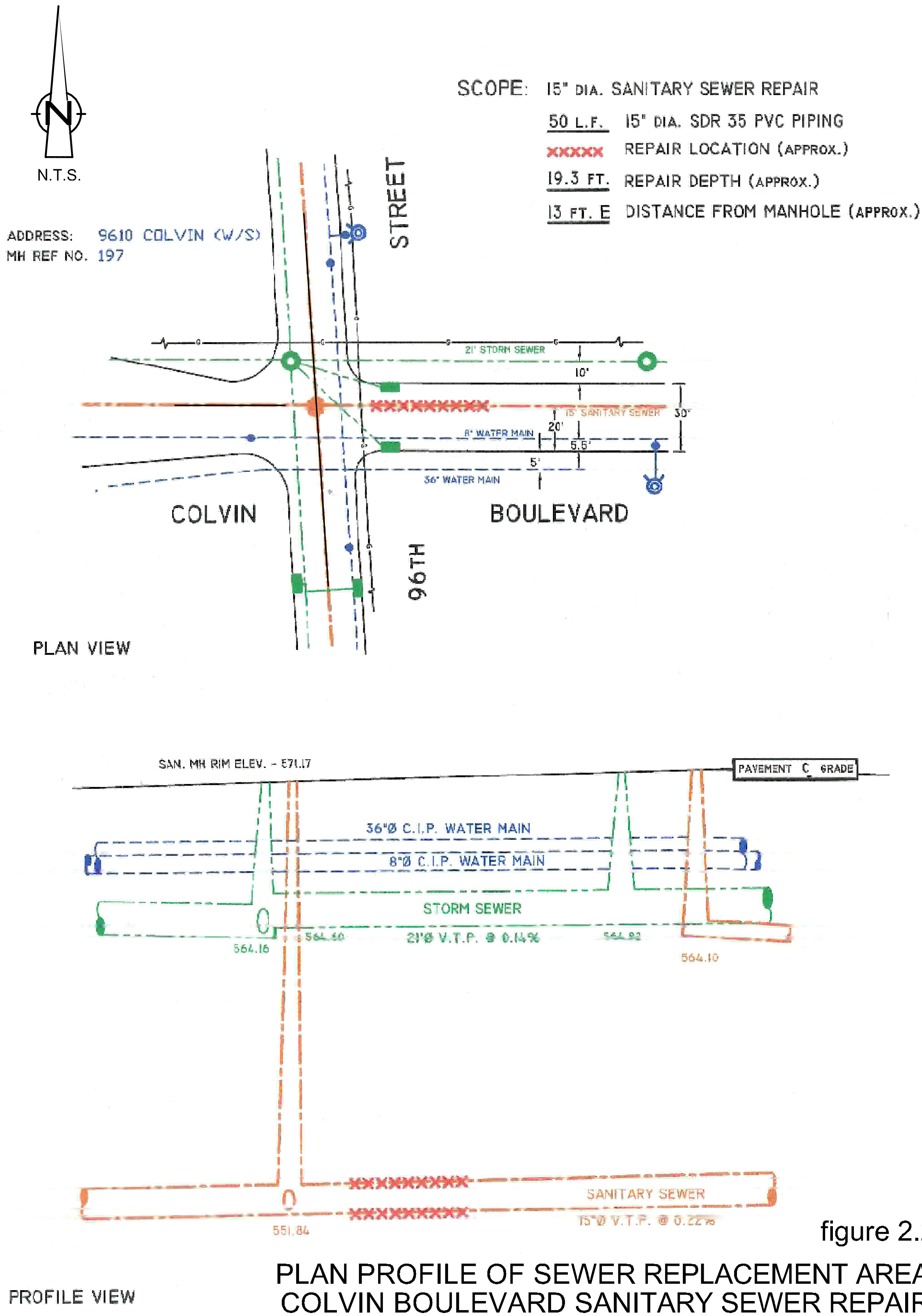
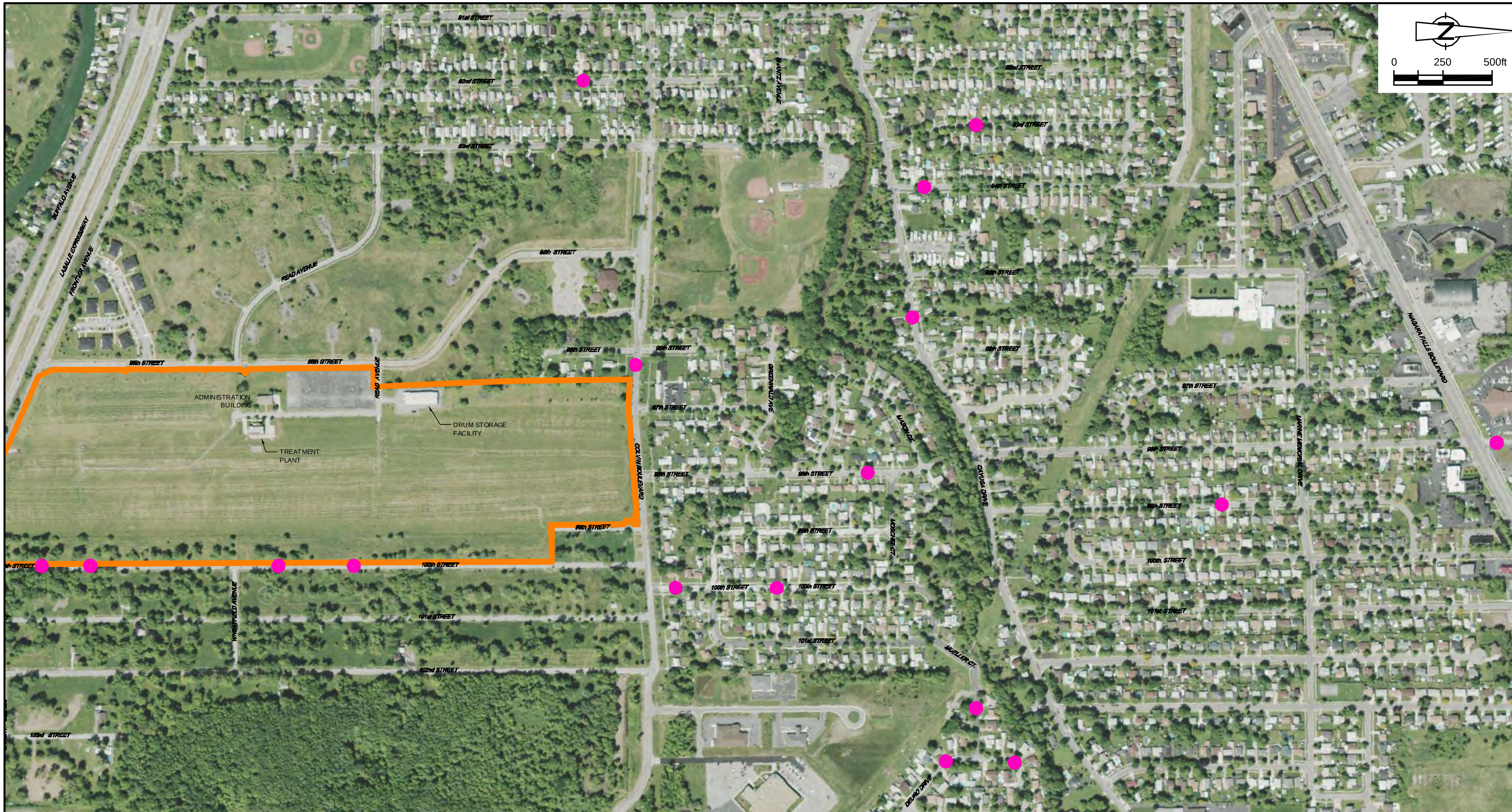


figure 2.2

PLAN PROFILE OF SEWER REPLACEMENT AREA
COLVIN BOULEVARD SANITARY SEWER REPAIR
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

SOURCE: NIAGARA FALLS WATER BOARD



LEGEND

LOVE CANAL SITE BOUNDARY

AREA OF ADDITIONAL SEWER REPAIR CONDUCTED BY THE CITY OF NIAGARA FALLS/NIAGARA FALLS WATER BOARD

AERIAL PHOTOGRAPHY SOURCE: NATIONAL AGRICULTURE IMAGERY PROGRAM (NAIP) NIAGARA COUNTY 2009 MOSAIC PROVIDED BY THE UNITED STATES DEPARTMENT OF AGRICULTURE (USDA), 2010.

figure 2.3

LOCATION OF SEWER REPAIRS - LaSALLE AREA SPOT SEWER REPAIR PROJECT
COLVIN BOULEVARD SANITARY SEWER REPAIR
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

09954-D23101(021)GN-WA009 MAR 04/2011

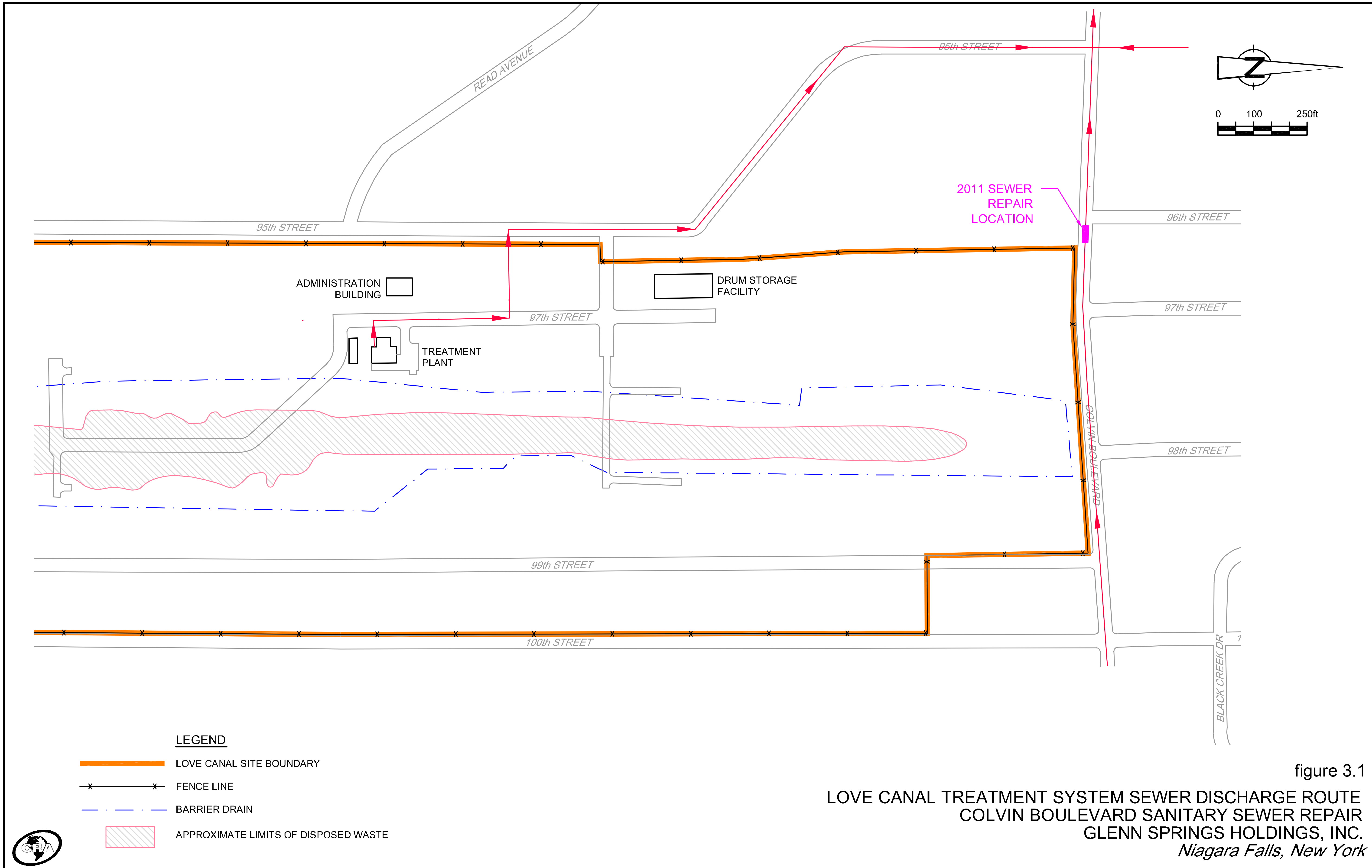
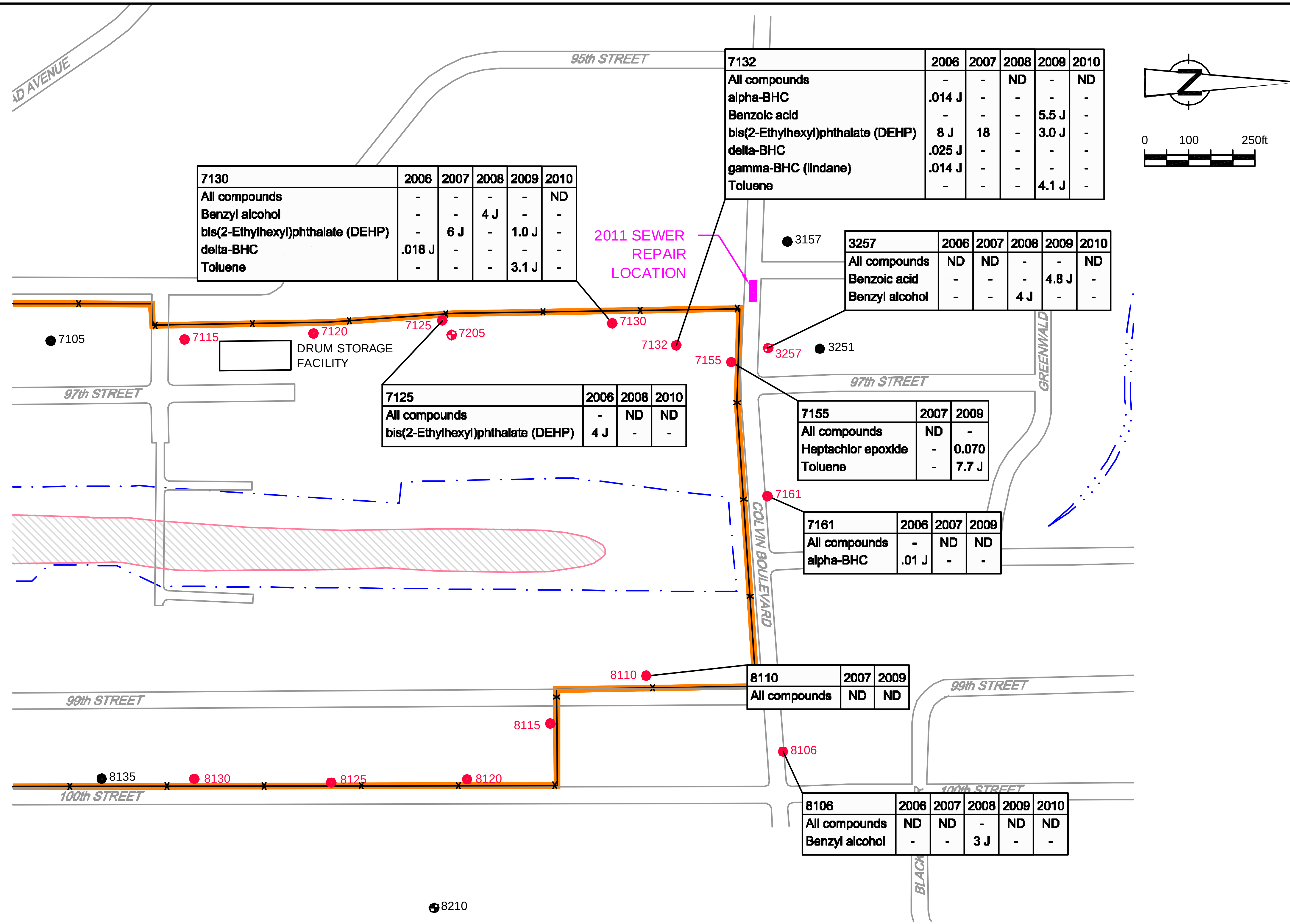


figure 3.1

LOVE CANAL TREATMENT SYSTEM SEWER DISCHARGE ROUTE
COLVIN BOULEVARD SANITARY SEWER REPAIR
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

09954-D23101(021)GN-WA002 FEB 23/2011



7130	2006	2007	2008	2009	2010
All compounds	-	-	-	-	ND
Benzyl alcohol	-	-	4 J	-	-
bis(2-Ethylhexyl)phthalate (DEHP)	-	6 J	-	1.0 J	-
delta-BHC	.018 J	-	-	-	-
Toluene	-	-	-	3.1 J	-

7132	2006	2007	2008	2009	2010
All compounds	-	-	ND	-	ND
alpha-BHC	.014 J	-	-	-	-
Benzoic acid	-	-	-	5.5 J	-
bis(2-Ethylhexyl)phthalate (DEHP)	8 J	18	-	3.0 J	-
delta-BHC	.025 J	-	-	-	-
gamma-BHC (lindane)	.014 J	-	-	-	-
Toluene	-	-	-	4.1 J	-

3257	2006	2007	2008	2009	2010
All compounds	ND	ND	-	-	ND
Benzoic acid	-	-	-	4.8 J	-
Benzyl alcohol	-	-	4 J	-	-

7125	2006	2008	2010
All compounds	-	ND	ND
bis(2-Ethylhexyl)phthalate (DEHP)	4 J	-	-

7155	2007	2009
All compounds	ND	-
Heptachlor epoxide	-	0.070
Toluene	-	7.7 J

7161	2006	2007	2009
All compounds	-	ND	ND
alpha-BHC	.01 J	-	-

8110	2007	2009
All compounds	ND	ND

8106	2006	2007	2008	2009	2010
All compounds	ND	ND	-	ND	ND
Benzyl alcohol	-	-	3 J	-	-

LEGEND

LOVE CANAL SITE BOUNDARY
FENCE LINE
BARRIER DRAIN
9120 OVERBURDEN OBSERVATION WELL
10270 BEDROCK OBSERVATION WELL
APPROXIMATE LIMITS OF DISPOSED WASTE
8120 MONITORING INCLUDED IN CHEMICAL MONITORING PROGRAM
ND NOT DETECTED
J ESTIMATED CONCENTRATION BELOW METHOD DETECTION LIMIT

figure 3.2

LOVE CANAL GROUNDWATER ANALYTICAL DETECTIONS
COLVIN BOULEVARD SANITARY SEWER REPAIR
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

09954-D23101(021)GN-WA003 FEB 23/2011

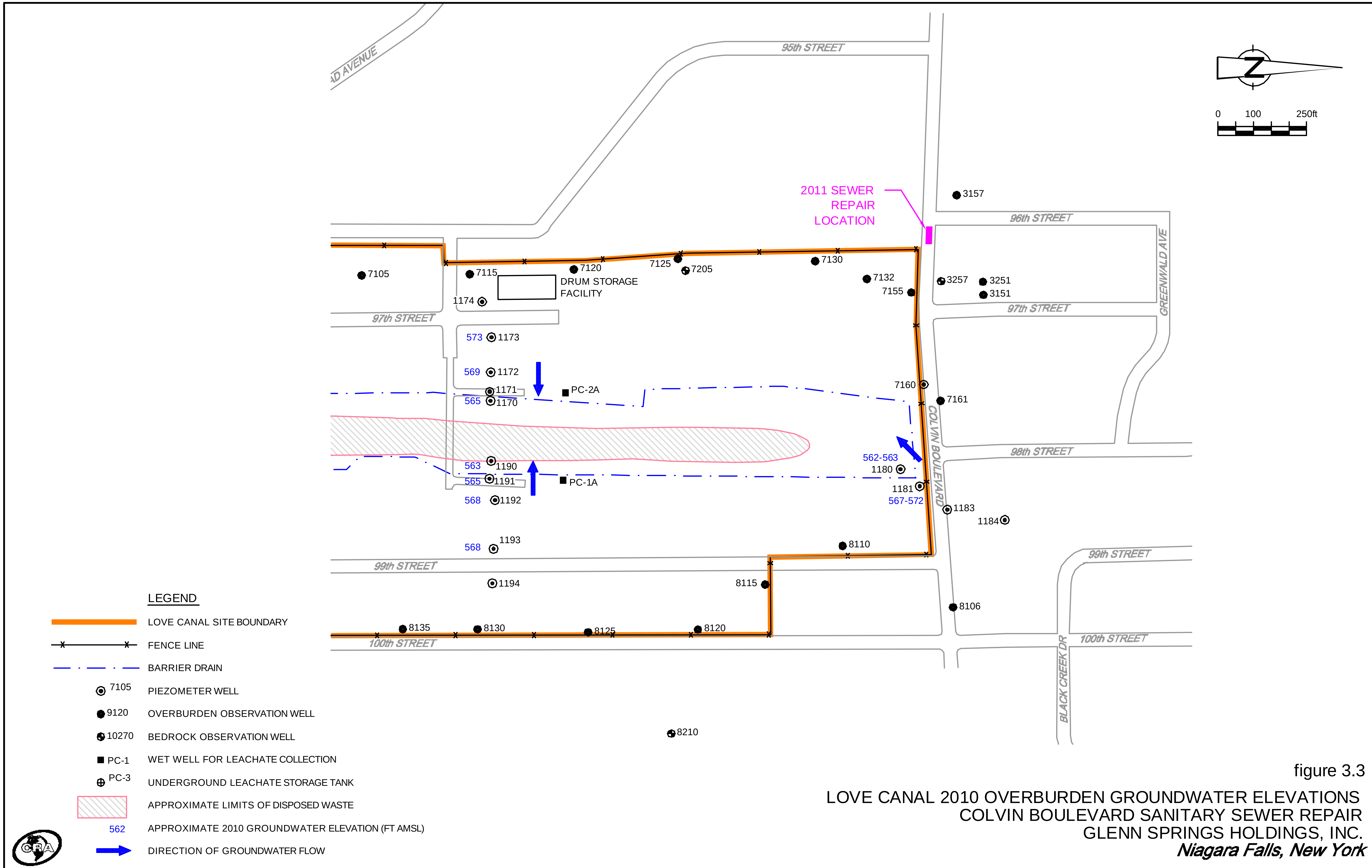
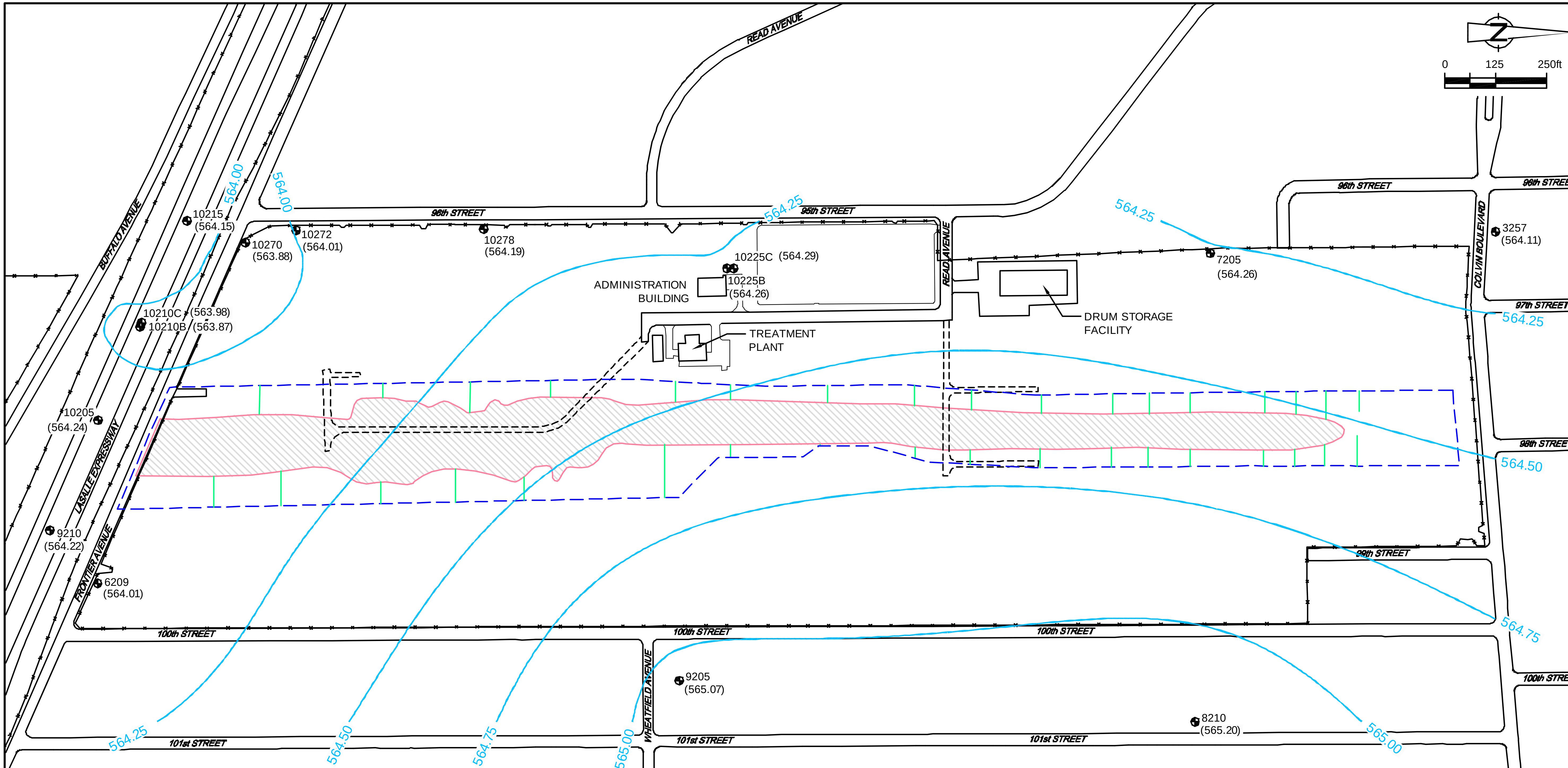


figure 3.3

LOVE CANAL 2010 OVERBURDEN GROUNDWATER ELEVATIONS
COLVIN BOULEVARD SANITARY SEWER REPAIR
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

09954-D23101(021)GN-WA004 MAR 04/2011



LEGEND

FENCE LINE	BEDROCK OBSERVATION WELL (10270)
APPROXIMATE BARRIER DRAIN	(565.07) BEDROCK GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION (JUNE 2010)
APPROXIMATE LATERAL LOCATION	565.00 BEDROCK GROUNDWATER POTENTIOMETRIC SURFACE CONTOUR (JUNE 2010)
APPROXIMATE LIMITS OF DISPOSED WASTE	

figure 3.4

2010 BEDROCK GROUNDWATER POTENTIOMETRIC SURFACE CONTOURS
COLVIN BOULEVARD SANITARY SEWER REPAIR
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

09954-D23101(021)GN-WA010 MAR 04/2011

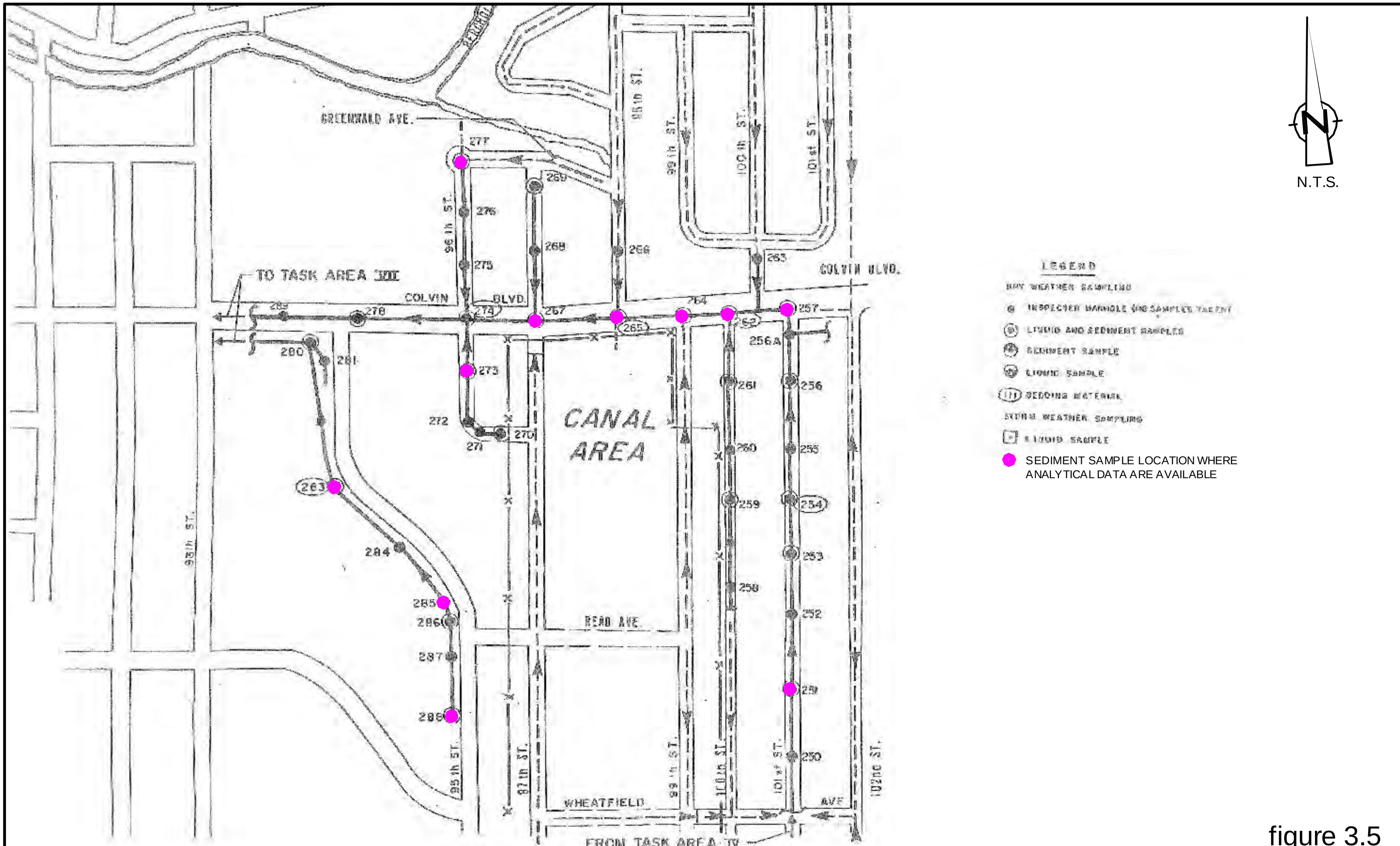


figure 3.5

HISTORIC SANITARY SEWER SEDIMENT SAMPLE LOCATIONS
COLVIN BOULEVARD SANITARY SEWER REPAIR
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

SOURCE: SITE INVESTIGATIONS AND REMEDIAL ACTION ALTERNATIVES, LOVE CANAL", MALCOLM PIRNIE, INC., OCTOBER 1983

09954-D23101(021)GN-WA006 MAR 04/2011

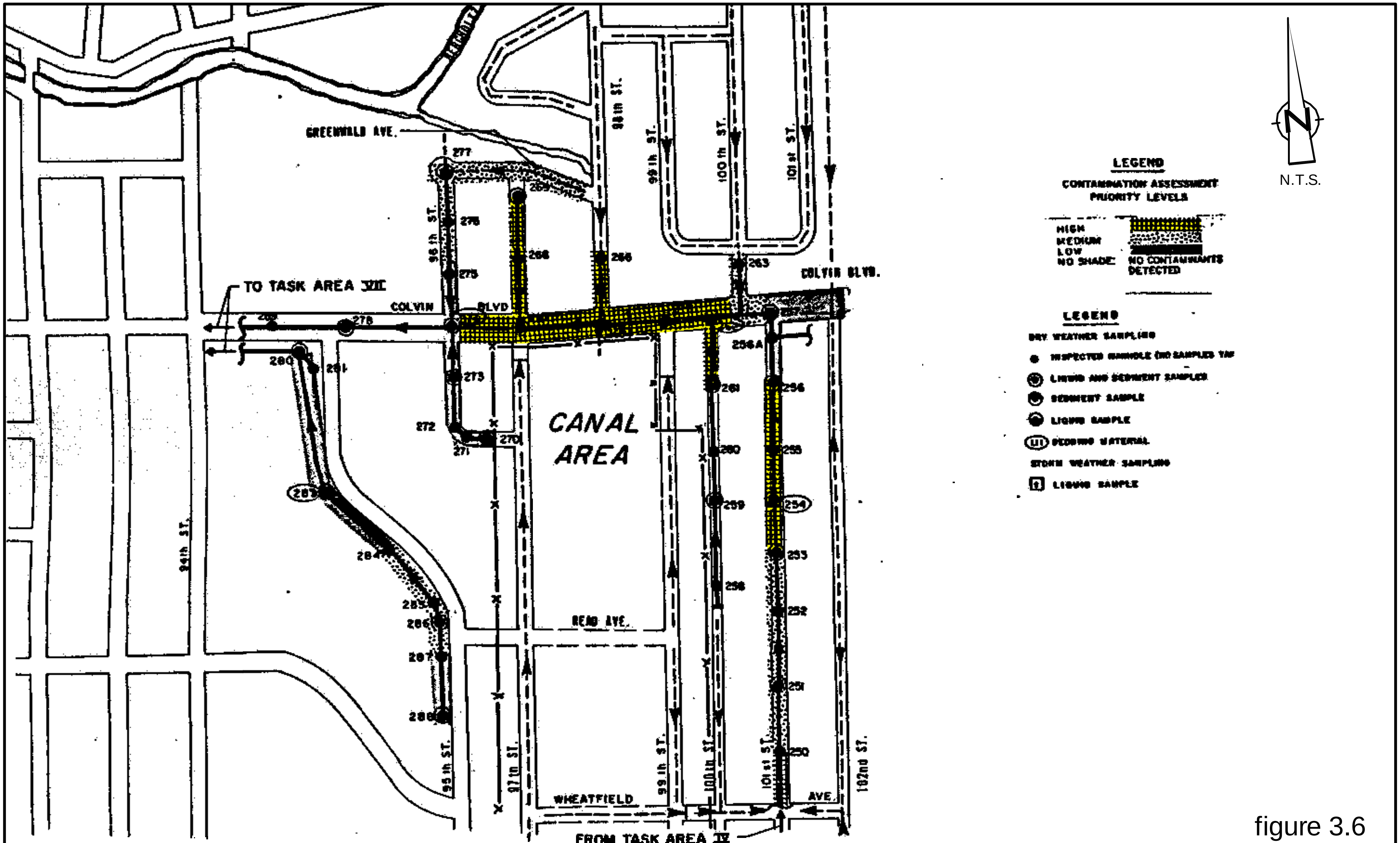


figure 3.6

HISTORIC SANITARY SEWER IMPACTED SEDIMENT AREAS
COLVIN BOULEVARD SANITARY SEWER REPAIR
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

SOURCE: SITE INVESTIGATIONS AND REMEDIAL ACTION ALTERNATIVES, LOVE CANAL", MALCOLM PIRNIE, INC., OCTOBER 1983

09954-D23101(021)GN-WA006 MAR 04/2011

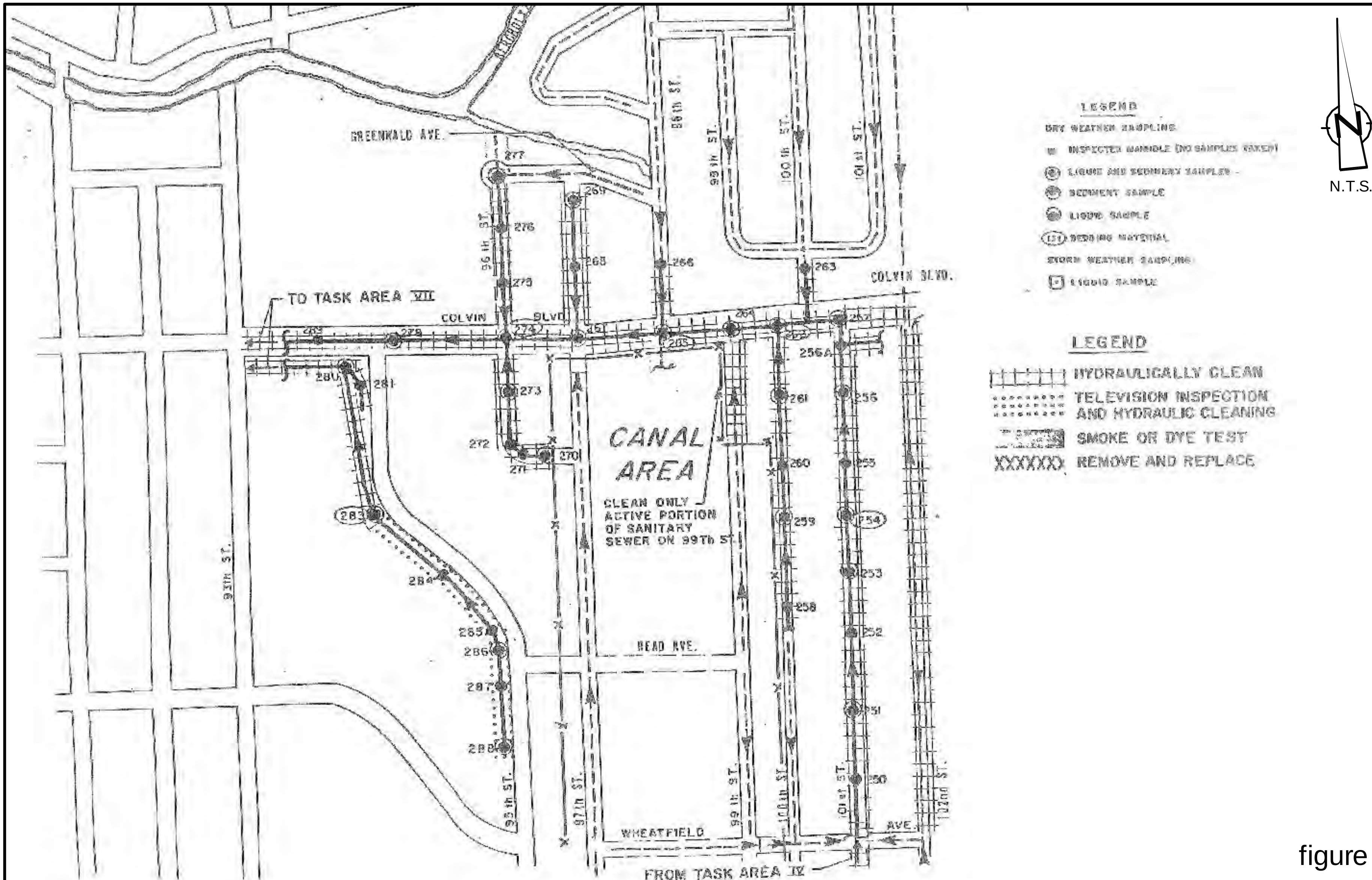


figure 3.7

HISTORIC SANITARY SEWER REMEDIAL ACTION PLAN
COLVIN BOULEVARD SANITARY SEWER REPAIR
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

SOURCE: SITE INVESTIGATIONS AND REMEDIAL ACTION ALTERNATIVES, LOVE CANAL", MALCOLM PIRNIE, INC., OCTOBER 1983

09954-D23101(021)GN-WA006 MAR 04/2011

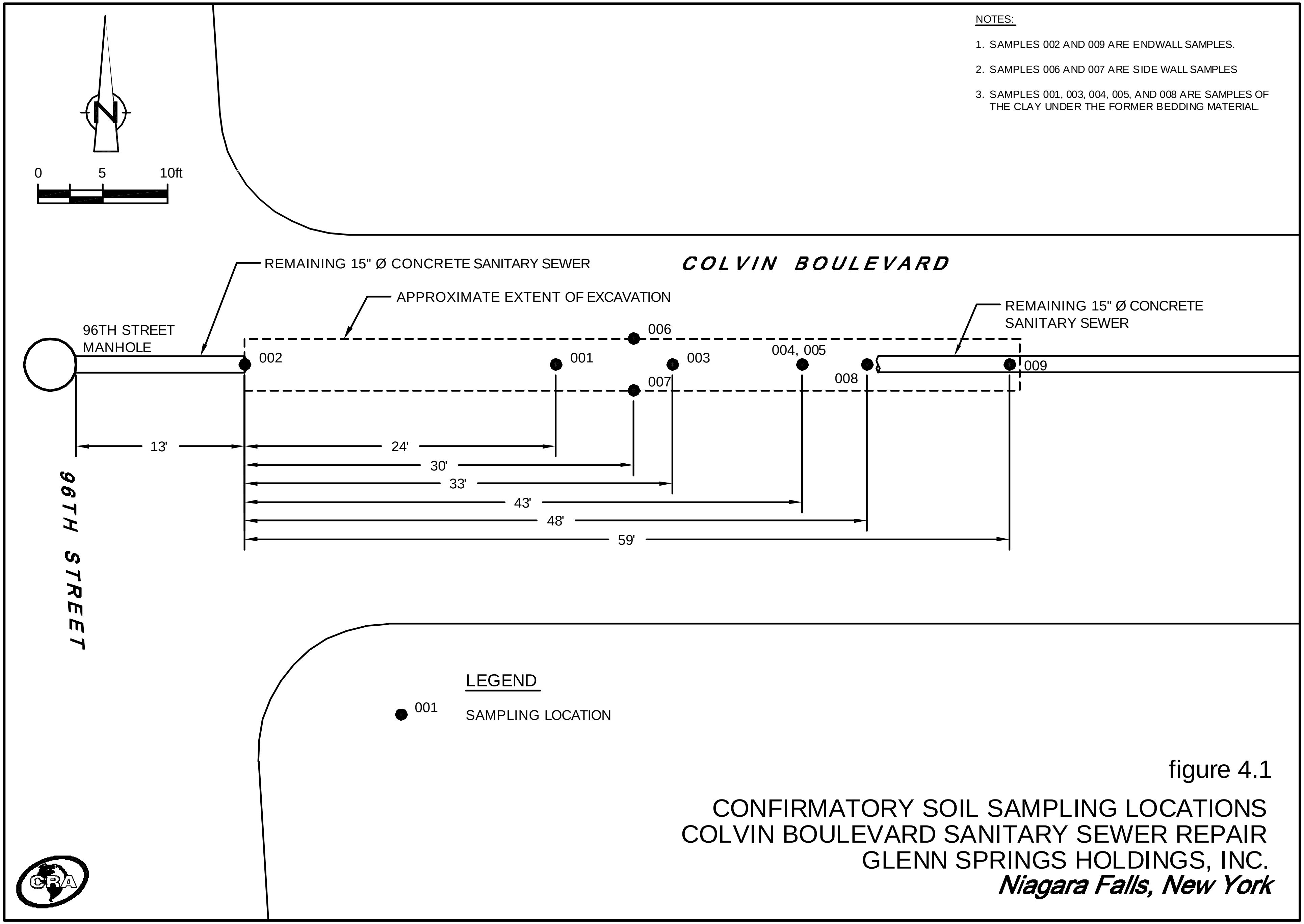
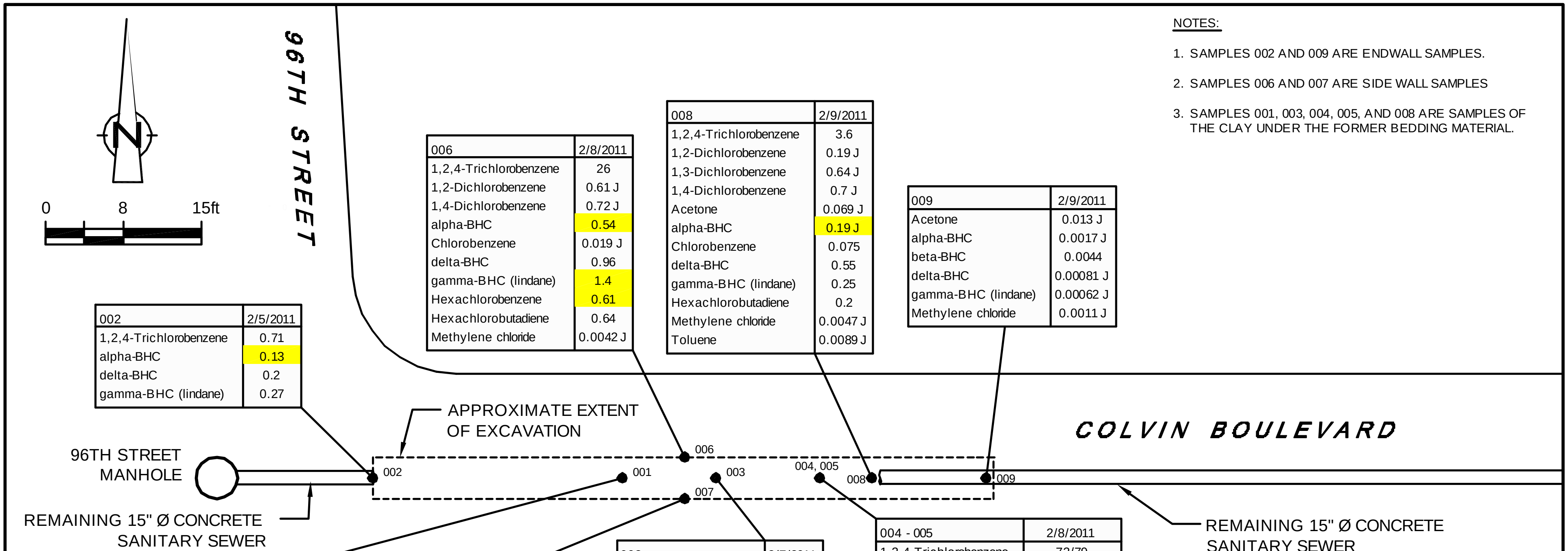


figure 4.1

CONFIRMATORY SOIL SAMPLING LOCATIONS
COLVIN BOULEVARD SANITARY SEWER REPAIR
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

09954-D23101(021)GN-WA005 FEB 23/2011



NOTES:

1. SAMPLES 002 AND 009 ARE ENDWALL SAMPLES.
2. SAMPLES 006 AND 007 ARE SIDE WALL SAMPLES
3. SAMPLES 001, 003, 004, 005, AND 008 ARE SAMPLES OF THE CLAY UNDER THE FORMER BEDDING MATERIAL.

002	2/5/2011
1,2,4-Trichlorobenzene	0.71
alpha-BHC	0.13
delta-BHC	0.2
gamma-BHC (lindane)	0.27

006	2/8/2011
1,2,4-Trichlorobenzene	26
1,2-Dichlorobenzene	0.61 J
1,4-Dichlorobenzene	0.72 J
alpha-BHC	0.54
Chlorobenzene	0.019 J
delta-BHC	0.96
gamma-BHC (lindane)	1.4
Hexachlorobenzene	0.61
Hexachlorobutadiene	0.64
Methylene chloride	0.0042 J

008	2/9/2011
1,2,4-Trichlorobenzene	3.6
1,2-Dichlorobenzene	0.19 J
1,3-Dichlorobenzene	0.64 J
1,4-Dichlorobenzene	0.7 J
Acetone	0.069 J
alpha-BHC	0.19 J
Chlorobenzene	0.075
delta-BHC	0.55
gamma-BHC (lindane)	0.25
Hexachlorobutadiene	0.2
Methylene chloride	0.0047 J
Toluene	0.0089 J

009	2/9/2011
Acetone	0.013 J
alpha-BHC	0.0017 J
beta-BHC	0.0044
delta-BHC	0.00081 J
gamma-BHC (lindane)	0.00062 J
Methylene chloride	0.0011 J

001	2/4/2011
1,2,4-Trichlorobenzene	9.3
1,2-Dichlorobenzene	0.17 J
1,3-Dichlorobenzene	0.045 J
1,4-Dichlorobenzene	0.29 J
2-Methylnaphthalene	0.019 J
4,4'-DDT	0.008 J
alpha-BHC	0.41
beta-BHC	0.0069 J
Chlorobenzene	0.015
delta-BHC	0.59
gamma-BHC (lindane)	0.74
Hexachlorobenzene	0.28
Hexachlorobutadiene	0.22
Phenanthrene	0.028 J
Toluene	0.0021 J

007	2/8/2011
1,2,4-Trichlorobenzene	2.4
1,2-Dichlorobenzene	0.068 J
1,3-Dichlorobenzene	0.11 J
1,4-Dichlorobenzene	0.099 J
2-Methylnaphthalene	0.036 J
4-Methylphenol	0.053 J
Acenaphthene	0.028 J
Acenaphthylene	0.027 J
Acetone	0.058 J
alpha-BHC	0.17 J
Anthracene	0.032 J
Benzo(a)anthracene	0.037 J
Benzo(b)fluoranthene	0.028 J
Benzo(g,h,i)perylene	0.036 J
Benzo(k)fluoranthene	0.038 J
Chlorobenzene	0.015 J
Chrysene	0.044 J
delta-BHC	0.39
Dibenz(a,h)anthracene	0.024 J
Fluoranthene	0.04 J
gamma-BHC (lindane)	0.5
Hexachlorobutadiene	0.089
Indeno(1,2,3-cd)pyrene	0.028 J
Naphthalene	0.026 J
Phenanthrene	0.045 J
Pyrene	0.039 J

003	2/7/2011
1,2,4-Trichlorobenzene	20
1,2-Dichlorobenzene	0.64
1,4-Dichlorobenzene	0.82
4,4'-DDD	0.071 J
4,4'-DDT	0.11 J
alpha-BHC	5.5
Benzene	0.016
beta-BHC	0.18 J
Chlorobenzene	0.072
cis-1,2-Dichloroethene	0.0036 J
delta-BHC	8.8
gamma-BHC (lindane)	11
Hexachlorobenzene	0.57
Hexachlorobutadiene	0.55
Toluene	0.024
Vinyl chloride	0.0023 J

004 - 005	2/8/2011
1,2,4-Trichlorobenzene	72/79
1,2-Dichlorobenzene	2.7/2.3
1,3-Dichlorobenzene	2.3/2.6
1,4-Dichlorobenzene	6.4/5.5
2,4-Dichlorophenol	0.14 J
4,4'-DDD	0.059 J
Acetone	0.069 J
alpha-BHC	2.4/2.2
Benzene	0.0076 J/0.02 J
Benzoic acid	1.3 J
beta-BHC	0.076 J
Chlorobenzene	0.31 J/1.2 J
cis-1,2-Dichloroethene	0.018 J/0.015 J
delta-BHC	3.9/3.3
gamma-BHC (lindane)	5.2/3.8
Hexachlorobenzene	1.5/2.1
Hexachlorobutadiene	1.5/1.8
Tetrachloroethene	0.012 J
Toluene	0.022 J/0.049
Xylenes (total)	0.017 J

LEGEND

● 001	SAMPLING LOCATION
0.013	CONCENTRATION IN mg/kg
J	ESTIMATED CONCENTRATION BELOW METHOD DETECTION LIMIT
(yellow highlight)	CONCENTRATION EXCEEDS PART 375 RESIDENTIAL SOIL CLEANUP OBJECTIVES

figure 4.2

SUMMARY OF DETECTED COMPOUNDS IN CONFIRMATORY SOIL SAMPLE LOCATIONS
COLVIN BOULEVARD SANITARY SEWER REPAIR
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

CRA

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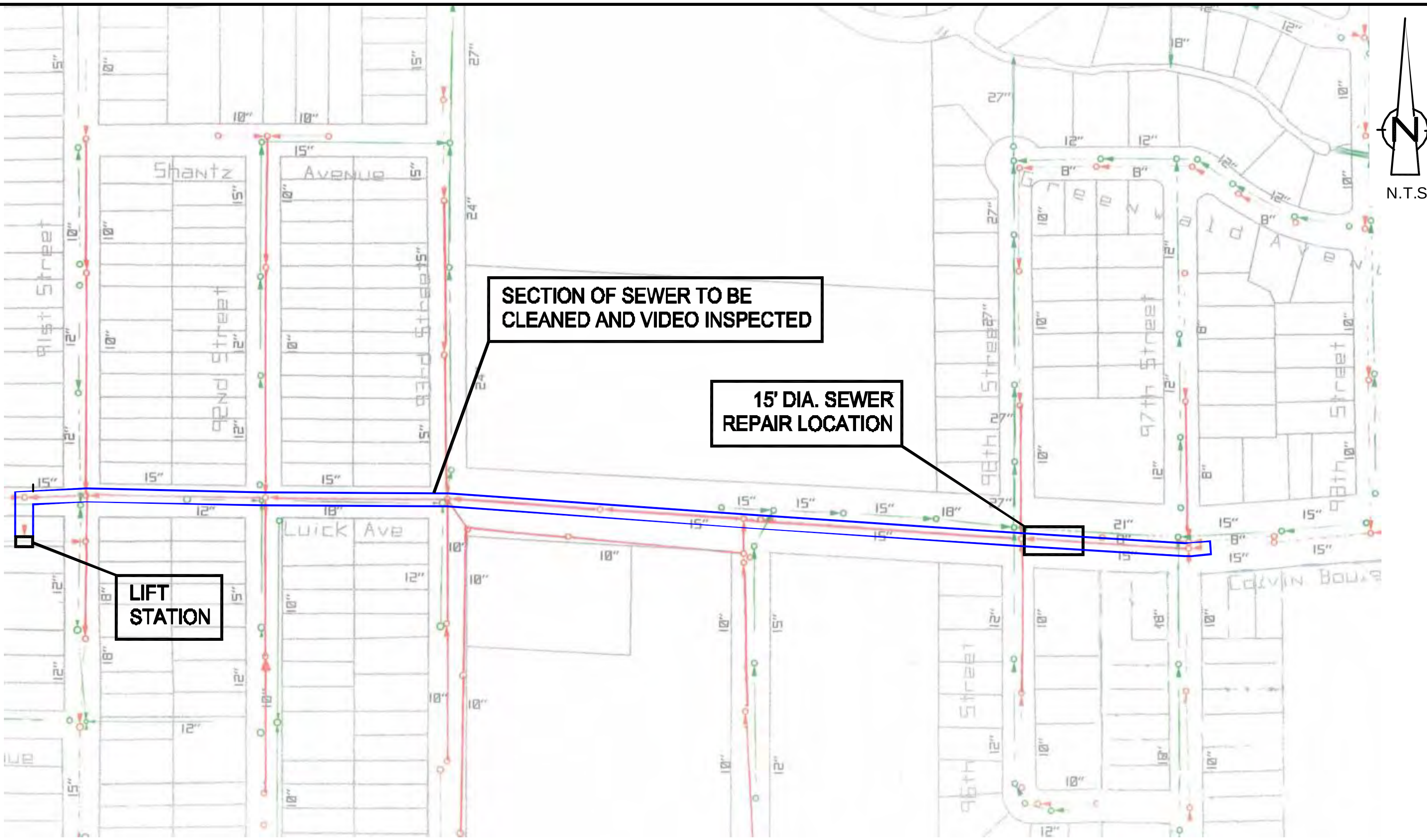

figure 4.3

LOCATION OF SEWER CLEANING AND VIDEO INSPECTION
COLVIN BOULEVARD SANITARY SEWER REPAIR
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

SOURCE: NIAGARA FALLS WATER BOARD

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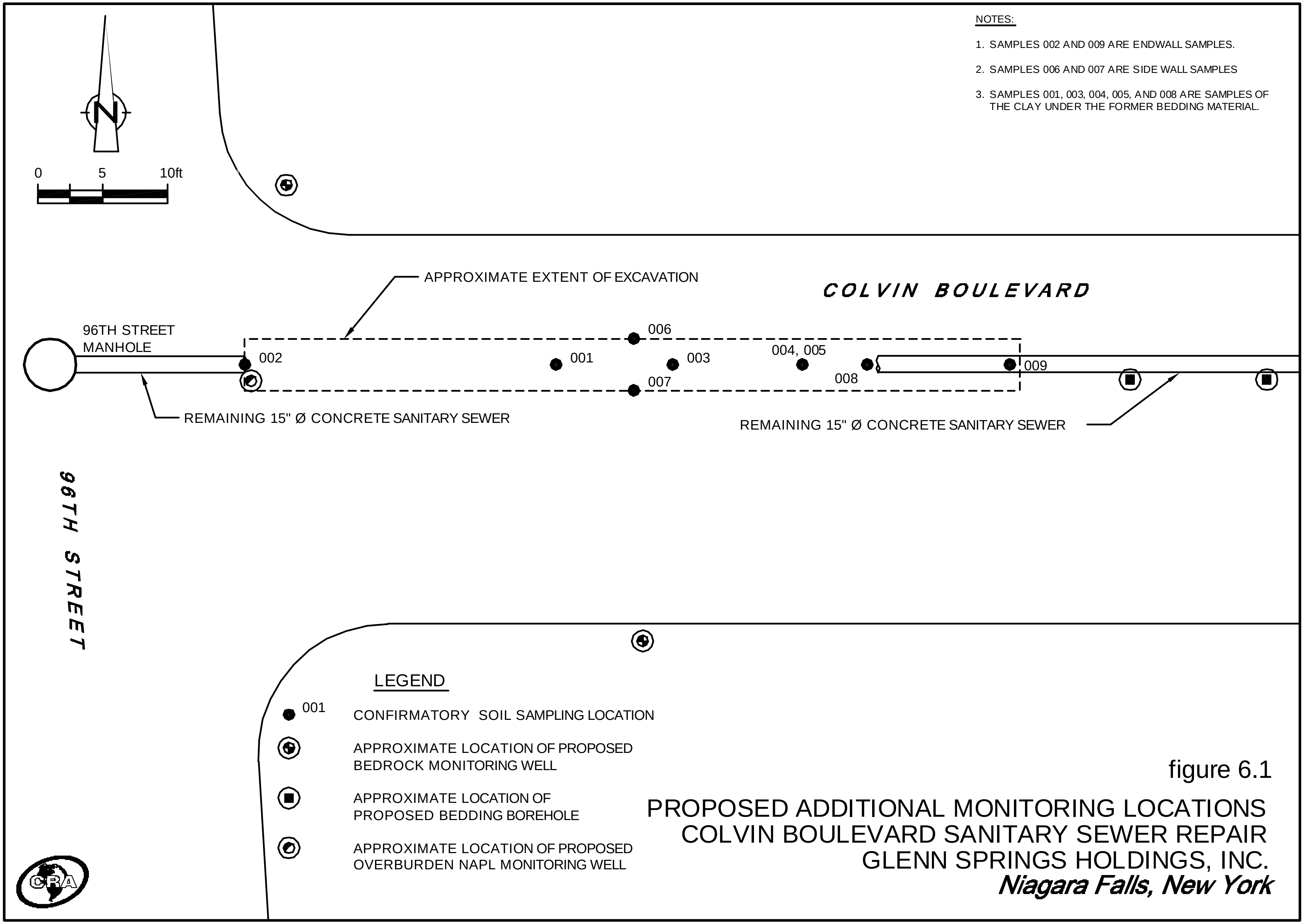

NOTES:

1. SAMPLES 002 AND 009 ARE ENDWALL SAMPLES.
2. SAMPLES 006 AND 007 ARE SIDE WALL SAMPLES
3. SAMPLES 001, 003, 004, 005, AND 008 ARE SAMPLES OF THE CLAY UNDER THE FORMER BEDDING MATERIAL.

LEGEND

001 CONFIRMATORY SOIL SAMPLING LOCATION

APPROXIMATE LOCATION OF PROPOSED BEDROCK MONITORING WELL

APPROXIMATE LOCATION OF PROPOSED BEDDING BOREHOLE

APPROXIMATE LOCATION OF PROPOSED OVERBURDEN NAPL MONITORING WELL

figure 6.1

PROPOSED ADDITIONAL MONITORING LOCATIONS
COLVIN BOULEVARD SANITARY SEWER REPAIR
GLENN SPRINGS HOLDINGS, INC.
Niagara Falls, New York

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TABLE 2.1

SUMMARY OF DETECTED COMPOUNDS IN SEDIMENT/SOIL SAMPLE
COLLECTED BY THE CITY OF NIAGARA FALLS
COLVIN BOULEVARD SANITARY SEWER REPAIR
NIAGARA FALLS, NEW YORK

Sample Location		***96th/Colvin***
Sample ID		***SS-1***
Sample Date		***1/11/2011***
	Units	
SVOAs		
1,2,4-Trichlorobenzene	mg/kg	1600
1,2-Dichlorobenzene	mg/kg	4.5 J
1,3-Dichlorobenzene	mg/kg	12
1,4-Dichlorobenzene	mg/kg	10 J
bis(2-Ethylhexyl)phthalate (DEHP)	mg/kg	0.18 J
Hexachlorobenzene	mg/kg	17
Hexachlorobutadiene	mg/kg	14
VOAs		
Benzene	mg/kg	0.12 J
Chlorobenzene	mg/kg	8.1
cis-1,2-Dichloroethene	mg/kg	0.051 J
Cyclohexane	mg/kg	ND
Toluene	mg/kg	0.37

Notes:

mg/kg - milligrams per kilogram
"--" - Not Sampled.
ND - Not Detected.
J - Estimated concentration below method detection limit

TABLE 2.2

CHRONOLOGY OF SIGNIFICANT EVENTS
COLVIN BOULEVARD SANITARY SEWER REPAIR
NIAGARA FALLS, NEW YORK

Date	*Activity*
January 11, 2011	- Contractor for City of Niagara Falls (CNF)/Niagara Falls Water Board (NFWB) discovers impacted sediments within the sanitary sewer - NFWB notifies Glenn Springs Holdings, Inc. (GSH) and their consultant, Conestoga-Rovers & Associates (CRA), of impacted sediments - GSH verbally notified New York State of Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH) - GSH and CRA immediately commenced investigation to determine the potential source of the impacted sediments
January 13, 2001	- GSH offers assistance to NFWB
January 14, 2011	- GSH submits formal notification to NYSDEC and NYSDOH. NFWB declines assistance at this point in time
January 25, 2011	- NYSDEC submits formal request to GSH via letter to investigate the impacts
January 26, 2011	- GSH meets with NYSDEC, NYSDOH, CNF, NFWB, and United States Environmental Protection Agency (USEPA) to present the preliminary results of investigation and discuss path forward that included GSH replacing the sewer section and addressing any impacts found
January 28, 2011	- GSH submits to NYSDEC, NYSDOH, USEPA, CNF, and NFWB a response to NYSDEC's request that includes investigation report and work plan presenting measures to address the impacts and complete the sewer replacement
January 31, 2011	- NYSDEC approves the work plan with minor additions
February 1, 2011	- GSH commence activities to replace the 50-foot section of sewer
February 12, 2011	- GSH commences sewer cleaning activities between 97^{th} Street and the lift station at 91^{st} Street
February 15, 2011	- GSH commences video inspection of sewer between 97^{th} Street and the lift station at 91^{st} Street
February 17, 2011	- GSH visited 68 residences in the vicinity of the work area to explain the activities being conducted and to answer any questions. A fact card was also left at all residences that provided an update about the project, estimated completion dates, and local phone number to call for information regarding the work
February 18, 2011	- GSH completes sewer replacement and reopens Colvin Boulevard to traffic
February 22, 2011	- GSH completes sewer cleaning and video inspection of sewers
February 23, 2011	- GSH completes visual inspection of the lift station at 91^{st} Street
February 23, 2011	- GSH submits "Sanitary Sewer Investigation and Remediation" report to NYSDEC, NYSDOH, USEPA, CNF, and NFWB

TABLE 3.1

SUMMARY OF LOVE CANAL GROUNDWATER CHEMICAL MONITORING DATA
2006 TO 2010
COLVIN BOULEVARD SANITARY SEWER REPAIR
NIAGARA FALLS, NEW YORK

Sample Location:		*3257*	*3257*	*3257*	*3257*	*3257*	*3257*	*7125*	*7125*	*7125*	*7125*	*7130*	*7130*	*7130*	*7130*	*7130*	*7132*	*7132*	*7132*	*7132*	*7132*	*7155*
Sample ID:		*LC-3257-606*	*LC-3257-607*	*LC-3257-608*	*LC-3257-609*	*LC3257-610*	*LC8225-610*	*LC-7125-606*	*LC-7125-608*	*LC-7125-610*	*LC-8215-610*	*LC-7130-606*	*LC-7130-707*	*LC-7130-608*	*LC-7130-609*	*LC-7130-610*	*LC-7132-606*	*LC-7132-707*	*LC-7132-608*	*LC-7132-609*	*LC-7132-610*	*LC-7155-707*
Sample Date:		*6/20/2006*	*6/26/2007*	*6/24/2008*	*6/25/2009*	*6/23/2010*	*6/23/2010 (Duplicate)*	*6/21/2006*	*6/10/2008*	*6/16/2010*	*6/16/2010 (Duplicate)*	*6/21/2006*	*7/13/2007*	*6/12/2008*	*6/24/2009*	*6/16/2010*	*6/22/2006*	*7/16/2007*	*6/10/2008*	*6/24/2009*	*6/16/2010*	*7/16/2007*
Parameters	*Units*																					
Volatile Organic Compounds																						
1,1,1-Trichloroethane	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
1,1,2,2-Tetrachloroethane	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
1,1,2-Trichloroethane	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
1,1-Dichloroethane	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
1,1-Dichloroethene	ug/L	10 UJ	10 U	10 U	10 U	5.0 U	5.0 U	10 UJ	10 U	5.0 U	5.0 U	10 UJ	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
1,2-Dichloroethane	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
1,2-Dichloropropane	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
2-Hexanone	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 UJ	5.0 U	5.0 U	10 U	10 U	10 UJ	10 U	5.0 U	10 U	10 U	10 UJ	10 U	5.0 U	10 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
Acetone	ug/L	10 UJ	10 UJ	10 U	10 U	20 U	20 U	10 UJ	10 U	20 U	20 U	10 UJ	10 U	10 UJ	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10 U
Benzene	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
Bromodichloromethane	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
Bromoform	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 UJ	10 U	10 U	5.0 U	10 U	10 UJ	10 U	10 U	5.0 U	10 UJ
Bromomethane (Methyl bromide)	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
Carbon disulfide	ug/L	10 U	10 U	10 U	10 U	9.3 U	8.8 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
Carbon tetrachloride	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
Chlorobenzene	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
Chloroethane	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
Chloroform (Trichloromethane)	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
Chloromethane (Methyl chloride)	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 UJ	10 U	10 U	5.0 U	10 U	10 UJ	10 U	10 U	5.0 U	10 UJ
cis-1,2-Dichloroethene	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
cis-1,3-Dichloropropene	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
Dibromochloromethane	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
Ethylbenzene	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
Methylene chloride	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
Styrene	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
Tetrachloroethene	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
Toluene	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	3.1 J	5.0 U	10 U	10 U	10 U	4.1 J	5.0 U	10 U
trans-1,2-Dichloroethene	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
trans-1,3-Dichloropropene	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
Trichloroethene	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
Vinyl acetate	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 UJ	5.0 U	5.0 U	10 U	10 U	10 UJ	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
Vinyl chloride	ug/L	10 U	10 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	5.0 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U	10 U
Xylenes (total)	ug/L	10 U	10 U	10 U	10 U	15 U	15 U	10 U	10 U	15 U	15 U	10 U	10 U	10 U	10 U	15 U	10 U	10 U	10 U	10 U	15 U	10 U

TABLE 3.1

SUMMARY OF LOVE CANAL GROUNDWATER CHEMICAL MONITORING DATA
2006 TO 2010
COLVIN BOULEVARD SANITARY SEWER REPAIR
NIAGARA FALLS, NEW YORK

Sample Location:		*3257*	*3257*	*3257*	*3257*	*3257*	*3257*	*7125*	*7125*	*7125*	*7125*	*7130*	*7130*	*7130*	*7130*	*7130*	*7132*	*7132*	*7132*	*7132*	*7132*	*7155*
Sample ID:		*LC-3257-606*	*LC-3257-607*	*LC-3257-608*	*LC-3257-609*	*LC3257-610*	*LC8225-610*	*LC-7125-606*	*LC-7125-608*	*LC-7125-610*	*LC-8215-610*	*LC-7130-606*	*LC-7130-707*	*LC-7130-608*	*LC-7130-609*	*LC-7130-610*	*LC-7132-606*	*LC-7132-707*	*LC-7132-608*	*LC-7132-609*	*LC-7132-610*	*LC-7155-707*
Sample Date:		*6/20/2006*	*6/26/2007*	*6/24/2008*	*6/25/2009*	*6/23/2010*	*6/23/2010*	*6/21/2006*	*6/10/2008*	*6/16/2010*	*6/16/2010*	*6/21/2006*	*7/13/2007*	*6/12/2008*	*6/24/2009*	*6/16/2010*	*6/22/2006*	*7/16/2007*	*6/10/2008*	*6/24/2009*	*6/16/2010*	*7/16/2007*
							(Duplicate)				*(Duplicate)*											
Parameters	*Units*																					
Semi-volatile Organic Compounds																						
1,2,4-Trichlorobenzene	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
1,2-Dichlorobenzene	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
1,3-Dichlorobenzene	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
1,4-Dichlorobenzene	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
2,4,5-Trichlorophenol	ug/L	25 U	25 U	25 U	25 U	9.4 U	9.6 U	25 U	25 U	9.4 U	9.5 U	25 U	25 U	25 U	25 U	10 U	25 U	25 U	25 U	25 U	9.9 U	25 U
2,4,6-Trichlorophenol	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
2,4-Dichlorophenol	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
2,4-Dimethylphenol	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
2,4-Dinitrophenol	ug/L	25 UJ	25 UJ	25 U	25 UJ	47 U	48 U	25 UJ	25 U	47 U	48 U	25 UJ	25 U	25 U	25 UJ	50 U	25 UJ	25 U	25 U	25 UJ	50 U	25 U
2,4-Dinitrotoluene	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
2,6-Dinitrotoluene	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
2-Chloronaphthalene	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
2-Chlorophenol	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
2-Methylnaphthalene	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
2-Methylphenol	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
2-Nitroaniline	ug/L	25 U	25 U	25 U	25 U	47 U	48 U	25 U	25 U	47 U	48 U	25 U	25 U	25 U	25 U	50 U	25 U	25 U	25 U	25 U	50 U	25 U
2-Nitrophenol	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
3,3'-Dichlorobenzidine	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
3-Nitroaniline	ug/L	25 U	25 U	25 U	25 U	47 U	48 U	25 U	25 U	47 U	48 U	25 U	25 U	25 U	25 U	50 U	25 U	25 U	25 U	25 U	50 U	25 U
4,6-Dinitro-2-methylphenol	ug/L	25 UJ	25 U	25 U	25 U	47 U	48 U	25 UJ	25 U	47 U	48 U	25 UJ	25 U	25 U	25 U	50 U	25 UJ	25 U	25 U	25 U	50 U	25 U
4-Bromophenyl phenyl ether	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
4-Chloro-3-methylphenol	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
4-Chloroaniline	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
4-Chlorophenyl phenyl ether	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U	10 U	10 U	9.9 U	10 U
4-Methylphenol	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
4-Nitroaniline	ug/L	25 U	25 UJ	25 U	25 U	47 U	48 U	25 U	25 U	47 U	48 U	25 U	25 U	25 U	25 U	50 U	25 U	25 U	25 U	25 U	50 U	25 U
4-Nitrophenol	ug/L	25 U	25 U	25 U	25 U	47 U	48 U	25 U	25 U	47 U	48 U	25 U	25 U	25 U	25 U	50 U	25 U	25 U	25 U	25 U	50 U	25 U
Acenaphthene	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 UJ	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
Acenaphthylene	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
Anthracene	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
Benzo(a)anthracene	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
Benzo(a)pyrene	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
Benzo(b)fluoranthene	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
Benzo(g,h,i)perylene	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
Benzo(k)fluoranthene	ug/L	10 UJ	10 U	10 U	10 U	1.9 U	1.9 U	10 UJ	10 U	1.9 U	1.9 U	10 UJ	10 U	10 U	10 U	2.0 U	10 UJ	10 U	10 U	10 U	2.0 U	10 U
Benzoic acid	ug/L	50 U	50 U	50 U	4.8 J	47 U	48 U	50 U	50 U	47 UJ	48 U	50 U	50 U	50 U	25 UJ	50 UJ	50 U	50 U	50 U	5.5 J	50 UJ	50 U
Benzyl alcohol	ug/L	10 U	10 U	4 J	10 U	9.4 U	9.6 U	10 U	24 U	9.4 U	9.5 U	10 U	10 U	4 J	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
bis(2-Chloroethoxy)methane	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
bis(2-Chloroethyl)ether	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
bis(2-Ethylhexyl)phthalate (DEHP)	ug/L	10 U	10 U	10 U	10 U	19 U	19 U	4 J	10 U	19 U	19 U	10 U	6 J	10 U	1.0 J	20 U	8 J	18	10 U	3.0 J	20 U	10 U
Butyl benzylphthalate (BBP)	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
Chrysene	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
Dibenz(a,h)anthracene	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
Dibenzofuran	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
Diethyl phthalate	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
Dimethyl phthalate	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
Di-n-butylphthalate (DBP)	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
Di-n-octyl phthalate (DnOP)	ug/L	10 UJ	10 U	10 U	10 U	9.4 U	9.6 U	10 UJ	10 U	9.4 U	9.5 U	10 UJ	10 U	10 U	10 U	10 U	10 UJ	10 U	10 U	10 U	9.9 U	10 U
Fluoranthene	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
Fluorene	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
Hexachlorobenzene	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 UJ	10 U	1.9 U	1.9 U	10 UJ	10 U	10 U	10 U	2.0 U	10 UJ	10 U	10 U	10 U	2.0 U	10 U
Hexachlorobutadiene	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 UJ	10 U	1.9 U	1.9 U	10 UJ	10 U	10 U	10 U	2.0 U	10 UJ	10 U	10 U	10 U	2.0 U	10 U
Hexachlorocyclopentadiene	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 UJ	10 U	10 U	9.4 UJ	9.5 U	10 U	10 U	10 U	10 U	10 UJ	10 U	10 U	10 U	10 U	9.9 UJ	10 U
Hexachloroethane	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
Indeno(1,2,3-cd)pyrene	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
Isophorone	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U

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SUMMARY OF LOVE CANAL GROUNDWATER CHEMICAL MONITORING DATA
2006 TO 2010
COLVIN BOULEVARD SANITARY SEWER REPAIR
NIAGARA FALLS, NEW YORK

Sample Location:		*3257*	*3257*	*3257*	*3257*	*3257*	*3257*	*7125*	*7125*	*7125*	*7125*	*7130*	*7130*	*7130*	*7130*	*7130*	*7132*	*7132*	*7132*	*7132*	*7132*	*7155*
Sample ID:		*LC-3257-606*	*LC-3257-607*	*LC-3257-608*	*LC-3257-609*	*LC3257-610*	*LC8225-610*	*LC-7125-606*	*LC-7125-608*	*LC-7125-610*	*LC-8215-610*	*LC-7130-606*	*LC-7130-707*	*LC-7130-608*	*LC-7130-609*	*LC-7130-610*	*LC-7132-606*	*LC-7132-707*	*LC-7132-608*	*LC-7132-609*	*LC-7132-610*	*LC-7155-707*
Sample Date:		*6/20/2006*	*6/26/2007*	*6/24/2008*	*6/25/2009*	*6/23/2010*	*6/23/2010 (Duplicate)*	*6/21/2006*	*6/10/2008*	*6/16/2010*	*6/16/2010 (Duplicate)*	*6/21/2006*	*7/13/2007*	*6/12/2008*	*6/24/2009*	*6/16/2010*	*6/22/2006*	*7/16/2007*	*6/10/2008*	*6/24/2009*	*6/16/2010*	*7/16/2007*
Parameters	*Units*																					
Naphthalene	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
Nitrobenzene	ug/L	10 U	10 U	10 U	10 U	19 U	19 U	10 U	10 U	19 U	19 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U	20 U	10 U
N-Nitrosodi-n-propylamine	ug/L	10 U	10 UJ	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
N-Nitrosodiphenylamine	ug/L	10 U	10 U	10 U	10 U	9.4 U	9.6 U	10 U	10 U	9.4 U	9.5 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.9 U	10 U
Pentachlorophenol	ug/L	25 UJ	25 U	25 U	25 U	9.4 U	9.6 U	25 UJ	25 U	9.4 U	9.5 U	25 UJ	25 U	25 U	25 U	10 U	25 UJ	25 U	25 U	25 U	9.9 U	25 U
Phenanthrene	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
Phenol	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
Pyrene	ug/L	10 U	10 U	10 U	10 U	1.9 U	1.9 U	10 U	10 U	1.9 U	1.9 U	10 UJ	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	2.0 U	10 U
Pesticides																						
4,4'-DDD	ug/L	.1 U	0.10 U	0.10 U	0.10 U	0.049 UJ	0.048 U	.1 U	0.10 U	0.048 U	0.047 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	0.10 U
4,4'-DDE	ug/L	.1 U	0.10 U	0.10 U	0.10 U	0.049 UJ	0.048 U	.1 U	0.10 U	0.048 U	0.047 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	0.10 U
4,4'-DDT	ug/L	.1 U	0.10 U	0.10 U	0.10 U	0.049 UJ	0.048 U	.1 U	0.10 U	0.048 U	0.047 U	.1 U	0.10 U	0.10 UJ	0.10 U	0.048 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	0.10 U
Aldrin	ug/L	.05 U	0.050 U	0.050 U	0.050 U	0.049 UJ	0.048 U	.05 U	0.050 U	0.048 U	0.047 U	.05 U	0.050 U	0.050 UJ	0.050 U	0.048 U	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	0.050 U
alpha-BHC	ug/L	.05 U	0.050 U	0.050 U	0.050 U	0.049 UJ	0.048 U	.05 U	0.050 U	0.048 U	0.047 U	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	.014 J	0.050 U	0.050 U	0.050 U	0.048 U	0.050 U
alpha-Chlordane	ug/L	.05 U	0.050 U	0.050 U	0.050 U	0.049 UJ	0.048 U	.05 U	0.050 U	0.048 U	0.047 U	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	0.050 U
beta-BHC	ug/L	.05 U	0.050 U	0.050 U	0.050 U	0.049 UJ	0.048 U	.05 U	0.050 U	0.048 U	0.047 U	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	0.050 U
delta-BHC	ug/L	.05 U	0.050 U	0.050 U	0.050 U	0.049 UJ	0.048 U	.05 U	0.050 U	0.048 U	0.047 U	.018 J	0.050 U	0.050 U	0.050 U	0.048 U	.025 J	0.050 U	0.050 U	0.050 U	0.048 U	0.050 U
Dieldrin	ug/L	.1 U	0.10 U	0.10 U	0.10 U	0.049 UJ	0.048 U	.1 U	0.10 U	0.048 U	0.047 U	.1 U	0.10 U	0.10 UJ	0.10 U	0.048 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	0.10 U
Endosulfan I	ug/L	.05 U	0.050 U	0.050 U	0.050 U	0.049 UJ	0.048 U	.05 U	0.050 U	0.048 U	0.047 U	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	0.050 U
Endosulfan II	ug/L	.1 U	0.10 U	0.10 U	0.10 U	0.049 UJ	0.048 U	.1 U	0.10 U	0.048 U	0.047 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	0.10 U
Endosulfan sulfate	ug/L	.1 U	0.10 U	0.10 U	0.10 U	0.049 UJ	0.048 U	.1 U	0.10 U	0.048 U	0.047 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	0.10 U
Endrin	ug/L	.1 U	0.10 U	0.10 U	0.10 U	0.049 UJ	0.048 U	.1 U	0.10 U	0.048 U	0.047 U	.1 U	0.10 U	0.10 UJ	0.10 U	0.048 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	0.10 U
Endrin aldehyde	ug/L	.1 U	0.10 U	-	-	-	-	.1 U	-	-	-	.1 U	0.10 U	-	-	-	.1 U	0.10 U	-	-	-	0.10 U
Endrin ketone	ug/L	.1 U	0.10 U	0.10 U	0.10 U	0.049 UJ	0.048 U	.1 U	0.10 U	0.048 U	0.047 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	0.10 U
gamma-BHC (lindane)	ug/L	.05 U	0.050 U	0.050 UJ	0.050 U	0.049 UJ	0.048 U	.05 U	0.050 U	0.048 U	0.047 U	.05 U	0.050 U	0.050 UJ	0.050 U	0.048 U	.014 J	0.050 U	0.050 U	0.050 U	0.048 U	0.050 U
gamma-Chlordane	ug/L	.05 U	0.050 U	0.050 U	0.050 U	0.049 UJ	0.048 U	.05 U	0.050 U	0.048 U	0.047 U	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	0.050 U
Heptachlor	ug/L	.05 U	0.050 U	0.050 U	0.050 U	0.049 UJ	0.048 U	.05 U	0.050 U	0.048 U	0.047 U	.05 U	0.050 U	0.050 UJ	0.050 U	0.048 U	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	0.050 U
Heptachlor epoxide	ug/L	.05 U	0.050 U	0.050 U	0.050 U	0.049 UJ	0.048 U	.05 U	0.050 U	0.048 U	0.047 U	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	0.050 U
Methoxychlor	ug/L	.5 U	0.50 U	0.50 U	0.50 U	0.098 UJ	0.095 U	.5 U	0.50 U	0.095 U	0.094 U	.5 U	0.50 U	0.50 U	0.50 U	0.095 U	.5 U	0.50 U	0.50 U	0.50 U	0.097 U	0.50 U
Toxaphene	ug/L	5 U	5.0 U	5.0 U	5.0 U	3.9 UJ	3.8 U	5 U	5.0 U	3.8 U	3.8 U	5 U	5.0 U	5.0 U	5.0 U	3.8 U	5 U	5.0 U	5.0 U	5.0 U	3.9 U	5.0 U
PCBs																						
Aroclor-1016 (PCB-1016)	ug/L	1 U	1.0 U	1.0 U	1.0 U	0.39 U	0.38 U	1 U	1.0 U	0.38 U	0.38 U	1 U	1.0 U	1.0 U	1.0 U	0.38 U	1 U	1.0 U	1.0 U	1.0 U	0.39 U	1.0 U
Aroclor-1221 (PCB-1221)	ug/L	2 U	2.0 U	2.0 U	1.0 U	0.39 U	0.38 U	2 U	2.0 U	0.38 U	0.38 U	2 U	2.0 U	2.0 U	1.0 U	0.38 U	2 U	2.0 U	2.0 U	1.0 U	0.39 U	2.0 U
Aroclor-1232 (PCB-1232)	ug/L	1 U	1.0 U	1.0 U	1.0 U	0.39 U	0.38 U	1 U	1.0 U	0.38 U	0.38 U	1 U	1.0 U	1.0 U	1.0 U	0.38 U	1 U	1.0 U	1.0 U	1.0 U	0.39 U	1.0 U
Aroclor-1242 (PCB-1242)	ug/L	1 U	1.0 U	1.0 U	1.0 U	0.39 U	0.38 U	1 U	1.0 U	0.38 U	0.38 U	1 U	1.0 U	1.0 U	1.0 U	0.38 U	1 U	1.0 U	1.0 U	1.0 U	0.39 U	1.0 U
Aroclor-1248 (PCB-1248)	ug/L	1 U	1.0 U	1.0 U	1.0 U	0.39 U	0.38 U	1 U	1.0 U	0.38 U	0.38 U	1 U	1.0 U	1.0 U	1.0 U	0.38 U	1 U	1.0 U	1.0 U	1.0 U	0.39 U	1.0 U
Aroclor-1254 (PCB-1254)	ug/L	1 U	1.0 U	1.0 U	1.0 U	0.39 U	0.38 U	1 U	1.0 U	0.38 U	0.38 U	1 U	1.0 U	1.0 U	1.0 U	0.38 U	1 U	1.0 U	1.0 U	1.0 U	0.39 U	1.0 U
Aroclor-1260 (PCB-1260)	ug/L	1 U	1.0 U	1.0 U	1.0 U	0.39 U	0.38 U	1 U	1.0 U	0.38 U	0.38 U	1 U	1.0 U	1.0 U	1.0 U	0.38 U	1 U	1.0 U	1.0 U	1.0 U	0.39 U	1.0 U

Notes:

J - Estimated concentration.
U - Not present at or above the associated value.
UJ - Estimated reporting limit.
- Not analyzed.

TABLE 3.1

SUMMARY OF LOVE CANAL GROUNDWATER CHEMICAL MONITORING DATA
2006 TO 2010
COLVIN BOULEVARD SANITARY SEWER REPAIR
NIAGARA FALLS, NEW YORK

Sample Location:		*7155*	*7161*	*7161*	*7161*	*7205*	*7205*	*7205*	*7205*	*7205*	*8106*	*8106*	*8106*	*8106*	*8106*
Sample ID:		*LC-7155-609*	*LC-7161-606*	*LC-7161-707*	*LC-7161-609*	*LC-7205-606*	*LC-7205-707*	*LC-7205-608*	*LC-7205-609*	*LC-7205-610*	*LC-8106-606*	*LC-8106-607*	*LC-8106-608*	*LC-8106-609*	*LC-8106-610*
Sample Date:		*6/24/2009*	*6/20/2006*	*7/17/2007*	*6/25/2009*	*6/21/2006*	*7/18/2007*	*6/10/2008*	*7/8/2009*	*6/16/2010*	*6/20/2006*	*6/26/2007*	*6/24/2008*	*6/25/2009*	*6/16/2010*
Parameters	*Units*														
Volatile Organic Compounds															
1,1,1-Trichloroethane	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
1,1,2,2-Tetrachloroethane	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
1,1,2-Trichloroethane	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
1,1-Dichloroethane	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
1,1-Dichloroethene	ug/L	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	5.0 U	10 UJ	10 U	10 U	10 U	5.0 U
1,2-Dichloroethane	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
1,2-Dichloropropane	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
2-Hexanone	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Acetone	ug/L	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 UJ	10 U	20 U	10 UJ	10 UJ	10 U	10 U	20 U
Benzene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Bromodichloromethane	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Bromoform	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Bromomethane (Methyl bromide)	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Carbon disulfide	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Carbon tetrachloride	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Chlorobenzene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Chloroethane	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Chloroform (Trichloromethane)	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Chloromethane (Methyl chloride)	ug/L	10 U	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
cis-1,2-Dichloroethene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
cis-1,3-Dichloropropene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Dibromochloromethane	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Ethylbenzene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Methylene chloride	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Styrene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Tetrachloroethene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Toluene	ug/L	7.7 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
trans-1,2-Dichloroethene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
trans-1,3-Dichloropropene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Trichloroethene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Vinyl acetate	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Vinyl chloride	ug/L	10 U	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	5.0 U	10 U	10 U	10 U	10 U	5.0 U
Xylenes (total)	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	15 U	10 U	10 U	10 U	10 U	15 U

TABLE 3.1

SUMMARY OF LOVE CANAL GROUNDWATER CHEMICAL MONITORING DATA
2006 TO 2010
COLVIN BOULEVARD SANITARY SEWER REPAIR
NIAGARA FALLS, NEW YORK

Sample Location:		*7155*	*7161*	*7161*	*7161*	*7205*	*7205*	*7205*	*7205*	*7205*	*8106*	*8106*	*8106*	*8106*	*8106*
Sample ID:		*LC-7155-609*	*LC-7161-606*	*LC-7161-707*	*LC-7161-609*	*LC-7205-606*	*LC-7205-707*	*LC-7205-608*	*LC-7205-609*	*LC-7205-610*	*LC-8106-606*	*LC-8106-607*	*LC-8106-608*	*LC-8106-609*	*LC-8106-610*
Sample Date:		*6/24/2009*	*6/20/2006*	*7/17/2007*	*6/25/2009*	*6/21/2006*	*7/18/2007*	*6/10/2008*	*7/8/2009*	*6/16/2010*	*6/20/2006*	*6/26/2007*	*6/24/2008*	*6/25/2009*	*6/16/2010*
Parameters	*Units*														
Semi-volatile Organic Compounds															
1,2,4-Trichlorobenzene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
1,2-Dichlorobenzene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
1,3-Dichlorobenzene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
1,4-Dichlorobenzene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
2,2'-Oxybis(1-chloropropane) (bis(2-Chloroisopropyl) ether)	ug/L	10 U	10 U	10 U	10 UJ	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
2,4,5-Trichlorophenol	ug/L	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	10 U	25 U	25 U	25 U	25 U	9.4 U
2,4,6-Trichlorophenol	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
2,4-Dichlorophenol	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
2,4-Dimethylphenol	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
2,4-Dinitrophenol	ug/L	25 UJ	25 UJ	25 UJ	25 U	25 UJ	25 UJ	25 U	25 U	50 U	25 UJ	25 UJ	25 U	25 UJ	47 U
2,4-Dinitrotoluene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
2,6-Dinitrotoluene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
2-Chloronaphthalene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
2-Chlorophenol	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
2-Methylnaphthalene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
2-Methylphenol	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
2-Nitroaniline	ug/L	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	50 U	25 U	25 U	25 U	25 U	47 U
2-Nitrophenol	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
3,3'-Dichlorobenzidine	ug/L	10 U	10 U	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
3-Nitroaniline	ug/L	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	50 U	25 U	25 U	25 U	25 U	47 U
4,6-Dinitro-2-methylphenol	ug/L	25 U	25 UJ	25 U	25 U	25 UJ	25 U	25 U	25 U	50 U	25 UJ	25 U	25 U	25 U	47 U
4-Bromophenyl phenyl ether	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
4-Chloro-3-methylphenol	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
4-Chloroaniline	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
4-Chlorophenyl phenyl ether	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
4-Methylphenol	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
4-Nitroaniline	ug/L	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 UJ	50 U	25 U	25 U	25 U	25 U	47 U
4-Nitrophenol	ug/L	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	50 U	25 U	25 U	25 U	25 U	47 U
Acenaphthene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
Acenaphthylene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
Anthracene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
Benzo(a)anthracene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
Benzo(a)pyrene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
Benzo(b)fluoranthene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
Benzo(g,h,i)perylene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
Benzo(k)fluoranthene	ug/L	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	2.0 U	10 UJ	10 U	10 U	10 U	1.9 U
Benzoic acid	ug/L	25 UJ	50 U	50 U	25 U	50 U	50 U	50 U	25 U	50 U	50 U	50 U	50 U	25 UJ	47 U
Benzyl alcohol	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	17 U	10 U	10 U	10 U	10 U	3 J	10 U	9.4 U
bis(2-Chloroethoxy)methane	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
bis(2-Chloroethyl)ether	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
bis(2-Ethylhexyl)phthalate (DEHP)	ug/L	10 U	10 U	10 U	10 U	4 J	10 U	10 U	1.2 J	20 U	10 U	10 U	10 U	10 U	19 U
Butyl benzylphthalate (BBP)	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
Chrysene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
Dibenz(a,h)anthracene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
Dibenzofuran	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
Diethyl phthalate	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
Dimethyl phthalate	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
Di-n-butylphthalate (DBP)	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
Di-n-octyl phthalate (DnOP)	ug/L	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	10 U	10 UJ	10 U	10 U	10 U	9.4 U
Fluoranthene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
Fluorene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
Hexachlorobenzene	ug/L	10 U	10 U	10 U	10 U	10 UJ	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
Hexachlorobutadiene	ug/L	10 U	10 U	10 U	10 U	10 UJ	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
Hexachlorocyclopentadiene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
Hexachloroethane	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
Indeno(1,2,3-cd)pyrene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
Isophorone	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U

TABLE 3.1

SUMMARY OF LOVE CANAL GROUNDWATER CHEMICAL MONITORING DATA
2006 TO 2010
COLVIN BOULEVARD SANITARY SEWER REPAIR
NIAGARA FALLS, NEW YORK

Sample Location:		*7155*	*7161*	*7161*	*7161*	*7205*	*7205*	*7205*	*7205*	*7205*	*8106*	*8106*	*8106*	*8106*	*8106*
Sample ID:		*LC-7155-609*	*LC-7161-606*	*LC-7161-707*	*LC-7161-609*	*LC-7205-606*	*LC-7205-707*	*LC-7205-608*	*LC-7205-609*	*LC-7205-610*	*LC-8106-606*	*LC-8106-607*	*LC-8106-608*	*LC-8106-609*	*LC-8106-610*
Sample Date:		*6/24/2009*	*6/20/2006*	*7/17/2007*	*6/25/2009*	*6/21/2006*	*7/18/2007*	*6/10/2008*	*7/8/2009*	*6/16/2010*	*6/20/2006*	*6/26/2007*	*6/24/2008*	*6/25/2009*	*6/16/2010*
Parameters	*Units*														
Naphthalene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
Nitrobenzene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	20 U	10 U	10 U	10 U	10 U	19 U
N-Nitrosodi-n-propylamine	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
N-Nitrosodiphenylamine	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9.4 U
Pentachlorophenol	ug/L	25 U	25 UJ	25 U	25 UJ	25 UJ	25 U	25 U	25 U	10 U	25 UJ	25 U	25 U	25 U	9.4 U
Phenanthrene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
Phenol	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
Pyrene	ug/L	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2.0 U	10 U	10 U	10 U	10 U	1.9 U
Pesticides															
4,4'-DDD	ug/L	0.10 U	.1 U	0.10 U	0.10 UJ	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U
4,4'-DDE	ug/L	0.10 U	.1 U	0.10 U	0.10 UJ	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U
4,4'-DDT	ug/L	0.10 U	.1 U	0.10 U	0.10 UJ	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U
Aldrin	ug/L	0.050 U	.05 U	0.050 U	0.050 UJ	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	.05 U	0.050 U	0.051 U	0.050 U	0.048 U
alpha-BHC	ug/L	0.050 U	.01 J	0.050 U	0.050 UJ	.023 J	0.014 J	0.050 U	0.050 U	0.048 U	.05 U	0.050 U	0.051 U	0.050 U	0.048 U
alpha-Chlordane	ug/L	0.050 U	.05 U	0.050 U	0.050 UJ	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	.05 U	0.050 U	0.051 U	0.050 U	0.048 U
beta-BHC	ug/L	0.050 U	.05 U	0.050 U	0.050 UJ	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	.05 U	0.050 U	0.051 U	0.050 U	0.048 U
delta-BHC	ug/L	0.050 U	.05 U	0.050 U	0.050 UJ	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	.05 U	0.050 U	0.051 U	0.050 U	0.048 U
Dieldrin	ug/L	0.10 U	.1 U	0.10 U	0.10 UJ	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U
Endosulfan I	ug/L	0.050 U	.05 U	0.050 U	0.050 UJ	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	.05 U	0.050 U	0.051 U	0.050 U	0.048 U
Endosulfan II	ug/L	0.10 U	.1 U	0.10 U	0.10 UJ	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U
Endosulfan sulfate	ug/L	0.10 U	.1 U	0.10 U	0.10 UJ	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U
Endrin	ug/L	0.10 U	.1 U	0.10 U	0.10 UJ	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U
Endrin aldehyde	ug/L	-	.1 U	0.10 U	-	.1 U	0.10 U	-	-	-	.1 U	0.10 U	-	-	-
Endrin ketone	ug/L	0.10 U	.1 U	0.10 U	0.10 UJ	.1 U	0.10 U	0.10 U	0.10 U	0.048 U	.1 U	0.10 U	0.10 U	0.10 U	0.048 U
gamma-BHC (lindane)	ug/L	0.050 U	.05 U	0.050 U	0.050 UJ	.0099 J	0.050 U	0.050 U	0.050 U	0.048 U	.05 U	0.050 U	0.051 UJ	0.050 U	0.048 U
gamma-Chlordane	ug/L	0.050 U	.05 U	0.050 U	0.050 UJ	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	.05 U	0.050 U	0.051 U	0.050 U	0.048 U
Heptachlor	ug/L	0.050 U	.05 U	0.050 U	0.050 UJ	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	.05 U	0.050 U	0.051 U	0.050 U	0.048 U
Heptachlor epoxide	ug/L	0.070	.05 U	0.050 U	0.050 UJ	.05 U	0.050 U	0.050 U	0.050 U	0.048 U	.05 U	0.050 U	0.051 U	0.050 U	0.048 U
Methoxychlor	ug/L	0.50 U	.5 U	0.50 U	0.50 UJ	.5 U	0.50 U	0.50 U	0.50 U	0.096 U	.5 U	0.50 U	0.51 U	0.50 U	0.097 U
Toxaphene	ug/L	5.0 U	5 U	5.0 U	5.0 UJ	5 U	5.0 U	5.0 U	5.0 U	3.8 U	5 U	5.0 U	5.1 U	5.0 U	3.9 U
PCBs															
Aroclor-1016 (PCB-1016)	ug/L	1.0 U	1 U	1.0 U	1.0 UJ	1 U	1.0 U	1.0 U	1.0 U	0.38 U	1 U	1.0 U	1.0 U	1.0 U	0.39 U
Aroclor-1221 (PCB-1221)	ug/L	1.0 U	2 U	2.0 U	1.0 UJ	2 U	2.0 U	2.0 U	1.0 U	0.38 U	2 U	2.0 U	2.1 U	1.0 U	0.39 U
Aroclor-1232 (PCB-1232)	ug/L	1.0 U	1 U	1.0 U	1.0 UJ	1 U	1.0 U	1.0 U	1.0 U	0.38 U	1 U	1.0 U	1.0 U	1.0 U	0.39 U
Aroclor-1242 (PCB-1242)	ug/L	1.0 U	1 U	1.0 U	1.0 UJ	1 U	1.0 U	1.0 U	1.0 U	0.38 U	1 U	1.0 U	1.0 U	1.0 U	0.39 U
Aroclor-1248 (PCB-1248)	ug/L	1.0 U	1 U	1.0 U	1.0 UJ	1 U	1.0 U	1.0 U	1.0 U	0.38 U	1 U	1.0 U	1.0 U	1.0 U	0.39 U
Aroclor-1254 (PCB-1254)	ug/L	1.0 U	1 U	1.0 U	1.0 UJ	1 U	1.0 U	1.0 U	1.0 U	0.38 U	1 U	1.0 U	1.0 U	1.0 U	0.39 U
Aroclor-1260 (PCB-1260)	ug/L	1.0 U	1 U	1.0 U	1.0 UJ	1 U	1.0 U	1.0 U	1.0 U	0.38 U	1 U	1.0 U	1.0 U	1.0 U	0.39 U

Notes:

J - Estimated concentration.
U - Not present at or above the associated value.
UJ - Estimated reporting limit.
- Not analyzed.

TABLE 3.2

SUMMARY OF HISTORIC SEWER SEDIMENT ANALYTICAL DATA
COLVIN BOULEVARD SANITARY SEWER REPAIR
NIAGARA FALLS, NEW YORK

Sample Location		*MH-257-Sewer*	*MH-257-Sewer*	*MH-262-Sewer*	*MH-262-Sewer*	*MH-264-Sewer*	*MH-264-Sewer*	*MH-265-Sewer*	*MH-265-Sewer*	*MH-267-Sewer*	*MH-267-Sewer*
Sample ID		*SEWSAN_257*	*SEWSAN_257*	*SEWSAN_262*	*SEWSAN_262*	*SEWSAN_264*	*SEWSAN_264*	*SEWSAN_265*	*SEWSAN_265*	*SEWSAN_267*	*SEWSAN_267*
Sample Date		*1/6/1983*	*1/6/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*
Sample Type		*(Duplicate)*		*(Duplicate)*		*(Duplicate)*		*(Duplicate)*		*(Duplicate)*	
	Units										
Dioxin/Furans											
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ppb	-	-	-	-	-	30	-	-	-	-
Pesticides											
4,4'-DDD	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
4,4'-DDE	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
4,4'-DDT	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Aldrin	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
alpha-BHC	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Aroclor-1016 (PCB-1016)	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Aroclor-1221 (PCB-1221)	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Aroclor-1232 (PCB-1232)	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Aroclor-1242 (PCB-1242)	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Aroclor-1248 (PCB-1248)	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Aroclor-1254 (PCB-1254)	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Aroclor-1260 (PCB-1260)	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
beta-BHC	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Chlordane	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
delta-BHC	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Dieldrin	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Endosulfan I	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Endosulfan II	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Endosulfan sulfate	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Endrin	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Endrin aldehyde	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
gamma-BHC (lindane)	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Heptachlor	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Heptachlor epoxide	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Toxaphene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
SVOAs											
1,1'-Thiobisdodecane	ppb	-	-	-	-	-	-	-	-	-	-
1,2,3,4-Tetrachlorobenzene	ppb	-	-	-	-	-	-	-	-	-	-
1,2,3,5-Tetrachlorobenzene	ppb	-	-	56000	32000	-	-	-	220000	-	17000
1,2,3-Trichlorobenzene	ppb	-	-	-	-	-	-	-	-	-	-
1,2,4,5-Tetrachlorobenzene	ppb	-	-	-	100000	-	-	-	-	-	-
1,2,4-Trichlorobenzene	ppb	-	ND	ND	39000	5200	ND	160000	ND	7200	ND
1,2,4-Trithiolane	ppb	-	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dimethoxyethane	ppb	-	-	-	-	-	-	-	-	-	-
1,2-Diphenylhydrazine	ppb	-	-	-	-	-	-	-	-	-	-
1,3,5-Trichlorobenzene	ppb	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	ppb	ND	ND	ND	ND	ND	ND	-	4800	ND	ND
1,4-Dichlorobenzene	ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dioxane	ppb	-	-	-	-	-	-	-	-	-	-
1-Chloronaphthalene	ppb	-	-	-	-	-	-	-	-	-	-
1-Cyclopentyl heneicosane	ppb	-	-	-	-	-	-	-	-	-	-
1-Dodecanol	ppb	-	-	-	-	-	-	-	-	-	-
1-Heptadecanol	ppb	-	-	-	-	-	-	-	-	-	-

TABLE 3.2

SUMMARY OF HISTORIC SEWER SEDIMENT ANALYTICAL DATA
COLVIN BOULEVARD SANITARY SEWER REPAIR
NIAGARA FALLS, NEW YORK

Sample Location		*MH-257-Sewer*	*MH-257-Sewer*	*MH-262-Sewer*	*MH-262-Sewer*	*MH-264-Sewer*	*MH-264-Sewer*	*MH-265-Sewer*	*MH-265-Sewer*	*MH-267-Sewer*	*MH-267-Sewer*
Sample ID		*SEWSAN_257*	*SEWSAN_257*	*SEWSAN_262*	*SEWSAN_262*	*SEWSAN_264*	*SEWSAN_264*	*SEWSAN_265*	*SEWSAN_265*	*SEWSAN_267*	*SEWSAN_267*
Sample Date		*1/6/1983*	*1/6/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*
Sample Type		*(Duplicate)*		*(Duplicate)*		*(Duplicate)*		*(Duplicate)*		*(Duplicate)*	
	Units										
1-Hexadecene	ppb	-	-	-	-	-	-	-	-	-	-
1-Hexadecyne	ppb	-	-	-	-	-	-	-	-	-	-
1H-Indole	ppb	-	-	-	-	-	-	-	-	-	-
1-Methyl-4-(1-methylethyl)-1,4-cyclohexadiene	ppb	-	-	-	-	-	-	-	-	-	-
1-Octadecene	ppb	-	-	-	-	-	-	-	-	-	-
2,2,3,3-Tetramethylpentane	ppb	-	-	-	-	-	-	-	-	-	-
2,2'-Oxybis(2-chloropropane)	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
2,4,4-Trimethyl-1-pentene (Diisobutylene)	ppb	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
2,4-Dichlorophenol	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
2,4-Dichlorotoluene	ppb	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
2,4-Dinitrophenol	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
2,4-Dinitrotoluene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
2,5,8,11,14-Pentaoxapentadecane	ppb	-	-	-	-	-	-	-	-	-	-
2,6-Dimethyloctane	ppb	-	-	-	-	-	-	-	-	-	-
2,6-Dinitrotoluene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
2-Chloronaphthalene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
2-Chlorophenol	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
2-Heptadecanone	ppb	-	-	-	-	-	-	-	-	-	-
2-Methyl-1-pentene	ppb	-	-	-	-	-	-	-	-	-	-
2-Methyl-2-propanamine	ppb	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	ppb	-	-	-	-	-	-	-	-	-	-
2-Methyltridecane	ppb	-	-	-	-	-	-	-	-	-	-
2-Nitrophenol	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
3,3'-Dichlorobenzidine	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
3,4-Dichloroaniline	ppb	-	-	-	-	-	-	-	-	-	-
3,4-Dichlorotoluene	ppb	-	-	-	-	-	-	-	-	-	-
3-Methyl-1H-indole	ppb	-	-	-	-	-	-	-	-	-	-
3-Pentanamine	ppb	-	3500	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
4-Bromophenyl phenyl ether	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
4-Chloro-3-methylphenol	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
4-Chlorophenyl phenyl ether	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
4-Nitrophenol	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Acenaphthene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Acenaphthylene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Anthracene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Anthracene/Phenanthrene	ppb	-	-	-	10400	-	-	-	-	-	-
Benzidine	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Benzo(a)anthracene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Benzo(a)anthracene/Chrysene	ppb	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Benzo(b)fluoranthene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Benzo(g,h,i)perylene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Benzo(k)fluoranthene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
bis(2-Chloroethoxy)methane	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
bis(2-Chloroethyl)ether	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
bis(2-Ethylhexyl)phthalate (DEHP)	ppb	ND	9200	-	ND	ND	4800	10000	ND	ND	5200
Butanoic acid	ppb	-	-	-	-	-	-	-	-	-	-
Butyl benzylphthalate (BBP)	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Chrysene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND

TABLE 3.2

SUMMARY OF HISTORIC SEWER SEDIMENT ANALYTICAL DATA
COLVIN BOULEVARD SANITARY SEWER REPAIR
NIAGARA FALLS, NEW YORK

Sample Location		*MH-257-Sewer*	*MH-257-Sewer*	*MH-262-Sewer*	*MH-262-Sewer*	*MH-264-Sewer*	*MH-264-Sewer*	*MH-265-Sewer*	*MH-265-Sewer*	*MH-267-Sewer*	*MH-267-Sewer*
Sample ID		*SEWSAN_257*	*SEWSAN_257*	*SEWSAN_262*	*SEWSAN_262*	*SEWSAN_264*	*SEWSAN_264*	*SEWSAN_265*	*SEWSAN_265*	*SEWSAN_267*	*SEWSAN_267*
Sample Date		*1/6/1983*	*1/6/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*
Sample Type		*(Duplicate)*		*(Duplicate)*		*(Duplicate)*		*(Duplicate)*		*(Duplicate)*	
	Units										
Diacetone alcohol	ppb	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Diethyl phthalate	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Dimethyl phthalate	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Di-n-butylphthalate (DBP)	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Di-n-octyl phthalate (DnOP)	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Dodecanoic acid	ppb	-	-	-	-	-	-	-	-	-	-
Eicosane	ppb	-	-	-	-	-	-	-	-	-	-
Fluoranthene	ppb	-	4000	-	ND	-	ND	-	ND	-	ND
Fluorene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Heneicosane	ppb	-	-	-	-	-	-	-	-	-	-
Heptacosane	ppb	-	-	-	-	-	-	-	-	-	-
Heptadecane	ppb	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	ppb	-	ND	-	22000	-	ND	-	20000	-	6000
Hexachlorobutadiene	ppb	-	ND	-	13000	-	ND	-	18000	-	ND
Hexachlorocyclopentadiene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Hexachloroethane	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Hexadecanoic acid	ppb	-	-	-	-	-	-	-	-	-	-
Hexadecanol	ppb	-	-	-	-	-	-	-	-	-	-
Hexamethylcyclotrisiloxane	ppb	-	-	-	-	-	4200	-	-	-	-
Hexathiepane	ppb	-	-	-	-	-	-	-	-	-	-
Hexatriacontane	ppb	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Isophorone	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Methyl formate	ppb	-	-	-	-	-	-	-	-	-	-
Naphthalene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
N-Dodecane	ppb	-	-	-	-	-	-	-	-	-	-
N-Hexadecane	ppb	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
N-Nitrosodimethylamine	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
N-Nitrosodi-n-propylamine	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
N-Nitrosodiphenylamine	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
N-Tetradecane	ppb	-	-	-	-	-	-	-	-	-	-
N-Undecane	ppb	-	-	-	-	-	-	-	-	-	-
Octadecane	ppb	-	-	-	-	-	-	-	-	-	-
Octamethylcyclotetrasiloxane	ppb	-	-	-	-	-	-	-	-	-	-
o-Decyl-hydroxylamine	ppb	-	-	-	-	-	-	-	-	-	-
Pentachlorobenzene	ppb	-	-	-	76000	-	1800	-	110000	-	10000
Pentachlorophenol	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Pentacosane	ppb	-	-	-	-	-	10000	-	-	-	-
Pentadecane	ppb	-	-	-	-	-	-	-	-	-	-
Pentafluorobenzene	ppb	-	-	-	-	-	-	-	-	-	-
Pentanoic acid	ppb	-	-	-	-	-	-	-	-	-	-
Pentatriacontane	ppb	-	-	-	-	-	-	-	-	-	-
Phenanthrene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Phenol	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Propionic acid	ppb	-	-	-	-	-	-	-	-	-	-
Pyrene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Tetradecanoic acid	ppb	-	-	-	-	-	-	-	-	-	-
Tricosane	ppb	-	-	-	-	-	-	-	-	-	-
Tridecane	ppb	-	-	-	-	-	-	-	-	-	-

TABLE 3.2

SUMMARY OF HISTORIC SEWER SEDIMENT ANALYTICAL DATA
COLVIN BOULEVARD SANITARY SEWER REPAIR
NIAGARA FALLS, NEW YORK

Sample Location		*MH-257-Sewer*	*MH-257-Sewer*	*MH-262-Sewer*	*MH-262-Sewer*	*MH-264-Sewer*	*MH-264-Sewer*	*MH-265-Sewer*	*MH-265-Sewer*	*MH-267-Sewer*	*MH-267-Sewer*
Sample ID		*SEWSAN_257*	*SEWSAN_257*	*SEWSAN_262*	*SEWSAN_262*	*SEWSAN_264*	*SEWSAN_264*	*SEWSAN_265*	*SEWSAN_265*	*SEWSAN_267*	*SEWSAN_267*
Sample Date		*1/6/1983*	*1/6/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*	*1/5/1983*
Sample Type		*(Duplicate)*		*(Duplicate)*		*(Duplicate)*		*(Duplicate)*		*(Duplicate)*	
	Units										
VOAs											
1,1,1-Trichloroethane	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
1,1,2,2-Tetrachloroethane	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
1,1,2-Trichloroethane	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
1,1-Dichloroethane	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
1,1-Dichloroethene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
1,2-Dichloroethane	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
1,2-Dichloropropane	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
2-Chloroethyl vinyl ether	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
2-Chlorotoluene	ppb	-	-	-	-	-	-	-	-	-	-
Acetone	ppb	-	-	-	-	-	-	-	-	-	-
Benzene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Bromodichloromethane	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Bromoform	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Bromomethane (Methyl bromide)	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Carbon tetrachloride	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Chlorobenzene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Chloroethane	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Chloroform (Trichloromethane)	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Chloromethane (Methyl chloride)	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
cis-1,3-Dichloropropene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Cyclohexane	ppb	-	-	-	-	-	-	-	-	-	24000
Dibromochloromethane	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Ethylbenzene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Methyl cyclohexane	ppb	-	-	-	-	-	-	-	-	-	-
Methylene chloride	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
m-Xylene	ppb	-	-	-	-	-	-	-	-	-	-
Pentane	ppb	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Toluene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
trans-1,2-Dichloroethene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
trans-1,3-Dichloropropene	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Trichloroethane	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Trichloroethene	ppb	-	-	-	-	-	-	-	-	-	-
Trichlorofluoromethane (CFC-11)	ppb	-	ND	-	ND	-	ND	-	ND	-	ND
Vinyl chloride	ppb	-	ND	-	ND	-	ND	-	ND	-	ND

Notes:

ND - Not detected
"-" - Not analyzed for

TABLE 4.1

CONFIRMATORY SOIL SAMPLE COLLECTION AND ANALYSIS SUMMARY
COLVIN BOULEVARD SANITARY SEWER REPAIR
NIAGARA FALLS, NEW YORK

Sample I.D.	*Location*	*Distance From West End of Excavation (feet)*	*Collection Date (mm/dd/yy)*	*Collection Time (hr:min)*	*Analysis/Parameters* VOCs plus TICs	SVOCs plus TICs	Pesticides	*Comments*
SO-009954-020411-SM-001	Floor	24	2/4/2011	12:00	X	X	X	
SO-009954-020511-SM-002	West endwall	NA	2/5/2011	13:50	X	X	X	
SO-009954-020711-JP-003	Floor	33	2/7/2011	10:50	X	X	X	
SO-009954-020811-SM-004	Floor	43	2/8/2011	0:00	X	X	X	
SO-009954-020811-SM-005	Floor	43	2/8/2011	10:00	X	X	X	Field duplicate of SO-009954-020811-SM-004
SO-009954-020811-SM-006	North sidewall	30	2/8/2011	11:00	X	X	X	
SO-009954-020811-SM-007	South sidewall	30	2/8/2011	11:30	X	X	X	
SO-009954-020911-SM-008	Floor	48	2/9/2011	14:45	X	X	X	
SO-009954-020911-SM-009	East endwall	59	2/9/2011	14:55	X	X	X	

Notes:

VOCs Volatile Organic Compounds
SVOCs Semi-Volatile Organic Compounds
TICs Tentatively Identified Compounds

TABLE 4.2

SUMMARY OF DETECTED COMPOUNDS IN CONFIRMATORY SOIL SAMPLES
COLVIN BOULEVARD SANITARY SEWER REPAIR
NIAGARA FALLS, NEW YORK

Sample Location:					*East endwall*	*Floor, 24'*	*Floor, 33'*	*Floor, 43'*	*Floor, 43'*
Sample ID:					*SO-009954-020911-SM-009*	*SO-009954-020411-SM-001*	*SO-009954-020711-JP-003*	*SO-009954-020811-SM-004*	*SO-009954-020811-SM-005*
Sample Date:					*2/9/2011*	*2/4/2011*	*2/7/2011*	*2/8/2011*	*2/8/2011*
Parameters	*Units*	*Restricted Commercial* a	*Restricted Residential* b	*Unrestricted Residential* c					*(Duplicate)*
Volatile Organic Compounds									
Acetone	mg/kg	500	100	0.05	0.013 J	ND	ND	**0.069 J[c]**	ND
Benzene	mg/kg	44	2.9	0.06	ND	ND	0.016	0.0076 J	0.02 J
Chlorobenzene	mg/kg	500	100	1.1	ND	0.015	0.072	0.31 J	**1.2 J[c]**
cis-1,2-Dichloroethene	mg/kg	500	59	0.25	ND	ND	0.0036 J	0.018 J	0.015 J
Methylene chloride	mg/kg	500	51	0.05	0.0011 J	ND	ND	ND	ND
Tetrachloroethene	mg/kg	150	5.5	1.3	ND	ND	ND	ND	0.012 J
Toluene	mg/kg	500	100	0.7	ND	0.0021 J	0.024	0.022 J	0.049
Vinyl chloride	mg/kg	13	0.21	0.02	ND	ND	0.0023 J	ND	ND
Xylenes (total)	mg/kg	500	100	0.26	ND	ND	ND	ND	0.017 J
Semi-volatile Organic Compounds									
1,2,4-Trichlorobenzene	mg/kg	500	100	100[1]	ND	9.3	20	72	79
1,2-Dichlorobenzene	mg/kg	500	100	1.1	ND	0.17 J	0.64	**2.7[c]**	**2.3[c]**
1,3-Dichlorobenzene	mg/kg	280	17	2.4	ND	0.045 J	ND	2.3	**2.6[c]**
1,4-Dichlorobenzene	mg/kg	130	9.8	1.8	ND	0.29 J	0.82	**6.4[c]**	**5.5[c]**
2,4-Dichlorophenol	mg/kg	500	100	100	ND	ND	ND	0.14 J	ND
2-Methylnaphthalene	mg/kg	500	100	0.41	ND	0.019 J	ND	ND	ND
4-Methylphenol	mg/kg	500	34	0.33	ND	ND	ND	ND	ND
Acenaphthene	mg/kg	500	100	20	ND	ND	ND	ND	ND
Acenaphthylene	mg/kg	500	100	100	ND	ND	ND	ND	ND
Anthracene	mg/kg	500	100	100	ND	ND	ND	ND	ND
Benzo(a)anthracene	mg/kg	5.6	1	1	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	mg/kg	5.6	1	1	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	mg/kg	500	100	100	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	mg/kg	56	1	0.8	ND	ND	ND	ND	ND
Benzoic acid	mg/kg	500	100	100	ND	ND	ND	ND	1.3 J
Chrysene	mg/kg	56	1	1	ND	ND	ND	ND	ND
Dibenz(a,h)anthracene	mg/kg	0.56	0.33	0.33	ND	ND	ND	ND	ND
Fluoranthene	mg/kg	500	100	100	ND	ND	ND	ND	ND
Hexachlorobenzene	mg/kg	6	0.41	0.33	ND	0.28	**0.57[bc]**	**1.5[bc]**	**2.1[bc]**
Hexachlorobutadiene	mg/kg	500	100	100[1]	ND	0.22	0.55	1.5	1.8
Indeno(1,2,3-cd)pyrene	mg/kg	5.6	0.5	0.5	ND	ND	ND	ND	ND
Naphthalene	mg/kg	500	100	12	ND	ND	ND	ND	ND
Phenanthrene	mg/kg	500	100	100	ND	0.028 J	ND	ND	ND
Pyrene	mg/kg	500	100	100	ND	ND	ND	ND	ND

TABLE 4.2

SUMMARY OF DETECTED COMPOUNDS IN CONFIRMATORY SOIL SAMPLES
COLVIN BOULEVARD SANITARY SEWER REPAIR
NIAGARA FALLS, NEW YORK

Sample Location:					*East endwall*	*Floor, 24'*	*Floor, 33'*	*Floor, 43'*	*Floor, 43'*
Sample ID:					*SO-009954-020911-SM-009*	*SO-009954-020411-SM-001*	*SO-009954-020711-JP-003*	*SO-009954-020811-SM-004*	*SO-009954-020811-SM-005*
Sample Date:					*2/9/2011*	*2/4/2011*	*2/7/2011*	*2/8/2011*	*2/8/2011*
		Restricted	*Restricted*	*Unrestricted*					*(Duplicate)*
Parameters	*Units*	*Commercial*	*Residential*	*Residential*					
Pesticides									
4,4'-DDD	mg/kg	92	2.6	0.0033	ND	ND	**0.071 J**[c]	ND	**0.059 J**[c]
4,4'-DDT	mg/kg	47	1.7	0.0033	ND	**0.008 J**[c]	**0.11 J**[c]	ND	ND
alpha-BHC	mg/kg	3.4	0.097	0.02	0.0017 J	**0.41**[bc]	**5.5**[abc]	**2.4**[bc]	**2.2**[bc]
beta-BHC	mg/kg	3	0.072	0.036	0.0044	0.0069 J	**0.18 J**[bc]	ND	**0.076 J**[bc]
delta-BHC	mg/kg	500	100	0.04	0.00081 J	**0.59**[c]	**8.8**[c]	**3.9**[c]	**3.3**[c]
gamma-BHC (lindane)	mg/kg	9.2	0.28	0.1	0.00062 J	**0.74**[bc]	**11**[abc]	**5.2**[bc]	**3.8**[bc]

Notes:
ND - not detected
mg/kg - milligrams per kilogram
J - estimated concentration below method detection limit
2.7[c] - concentration exceeds applicable NYSDEC Part 375 Soil Cleanup Objectives
NA - none available
[1] Per NYSDEC Part 375 and CP-51, values were capped at 100 mg/kg

TABLE 4.2

SUMMARY OF DETECTED COMPOUNDS IN CONFIRMATORY SOIL SAMPLES
COLVIN BOULEVARD SANITARY SEWER REPAIR
NIAGARA FALLS, NEW YORK

Sample Location:					*Floor, 48'*	*North sidewall, 30'*	*South sidewall, 30'*	*West endwall*
Sample ID:					*SO-009954-020911-SM-008*	*SO-009954-020811-SM-006*	*SO-009954-020811-SM-007*	*SO-009954-020511-SM-002*
Sample Date:					*2/9/2011*	*2/8/2011*	*2/8/2011*	*2/5/2011*
Parameters	*Units*	*Restricted Commercial*	*Restricted Residential*	*Unrestricted Residential*				
		a	b	c				
Volatile Organic Compounds								
Acetone	mg/kg	500	100	0.05	**0.069 J[c]**	ND	**0.058 J[c]**	ND
Benzene	mg/kg	44	2.9	0.06	ND	ND	ND	ND
Chlorobenzene	mg/kg	500	100	1.1	0.075	0.019 J	0.015 J	ND
cis-1,2-Dichloroethene	mg/kg	500	59	0.25	ND	ND	ND	ND
Methylene chloride	mg/kg	500	51	0.05	0.0047 J	0.0042 J	ND	ND
Tetrachloroethene	mg/kg	150	5.5	1.3	ND	ND	ND	ND
Toluene	mg/kg	500	100	0.7	0.0089 J	ND	ND	ND
Vinyl chloride	mg/kg	13	0.21	0.02	ND	ND	ND	ND
Xylenes (total)	mg/kg	500	100	0.26	ND	ND	ND	ND
Semi-volatile Organic Compounds								
1,2,4-Trichlorobenzene	mg/kg	500	100	100[1]	3.6	26	2.4	0.71
1,2-Dichlorobenzene	mg/kg	500	100	1.1	0.19 J	0.61 J	0.068 J	ND
1,3-Dichlorobenzene	mg/kg	280	17	2.4	0.64 J	-	0.11 J	ND
1,4-Dichlorobenzene	mg/kg	130	9.8	1.8	0.7 J	0.72 J	0.099 J	ND
2,4-Dichlorophenol	mg/kg	500	100	100	ND	ND	ND	ND
2-Methylnaphthalene	mg/kg	500	100	0.41	ND	ND	0.036 J	ND
4-Methylphenol	mg/kg	500	34	0.33	ND	ND	0.053 J	ND
Acenaphthene	mg/kg	500	100	20	ND	ND	0.028 J	ND
Acenaphthylene	mg/kg	500	100	100	ND	ND	0.027 J	ND
Anthracene	mg/kg	500	100	100	ND	ND	0.032 J	ND
Benzo(a)anthracene	mg/kg	5.6	1	1	ND	ND	0.037 J	ND
Benzo(b)fluoranthene	mg/kg	5.6	1	1	ND	ND	0.028 J	ND
Benzo(g,h,i)perylene	mg/kg	500	100	100	ND	ND	0.036 J	ND
Benzo(k)fluoranthene	mg/kg	56	1	0.8	ND	ND	0.038 J	ND
Benzoic acid	mg/kg	500	100	100	ND	ND	ND	ND
Chrysene	mg/kg	56	1	1	ND	ND	0.044 J	ND
Dibenz(a,h)anthracene	mg/kg	0.56	0.33	0.33	ND	ND	0.024 J	ND
Fluoranthene	mg/kg	500	100	100	ND	ND	0.04 J	ND
Hexachlorobenzene	mg/kg	6	0.41	0.33	ND	**0.61[bc]**	ND	ND
Hexachlorobutadiene	mg/kg	500	100	100[1]	0.2	0.64	0.089	ND
Indeno(1,2,3-cd)pyrene	mg/kg	5.6	0.5	0.5	ND	ND	0.028 J	ND
Naphthalene	mg/kg	500	100	12	ND	ND	0.026 J	ND
Phenanthrene	mg/kg	500	100	100	ND	ND	0.045 J	ND
Pyrene	mg/kg	500	100	100	ND	ND	0.039 J	ND

TABLE 4.2

SUMMARY OF DETECTED COMPOUNDS IN CONFIRMATORY SOIL SAMPLES
COLVIN BOULEVARD SANITARY SEWER REPAIR
NIAGARA FALLS, NEW YORK

Sample Location:					*Floor, 48'*	*North sidewall, 30'*	*South sidewall, 30'*	*West endwall*
Sample ID:					*SO-009954-020911-SM-008*	*SO-009954-020811-SM-006*	*SO-009954-020811-SM-007*	*SO-009954-020511-SM-002*
Sample Date:					*2/9/2011*	*2/8/2011*	*2/8/2011*	*2/5/2011*
Parameters	*Units*	*Restricted Commercial*	*Restricted Residential*	*Unrestricted Residential*				
Pesticides								
4,4'-DDD	mg/kg	92	2.6	0.0033	ND	ND	ND	ND
4,4'-DDT	mg/kg	47	1.7	0.0033	ND	ND	ND	ND
alpha-BHC	mg/kg	3.4	0.097	0.02	**0.19 J[bc]**	**0.54[bc]**	**0.17 J[bc]**	**0.13[bc]**
beta-BHC	mg/kg	3	0.072	0.036	ND	ND	ND	ND
delta-BHC	mg/kg	500	100	0.04	**0.55[c]**	**0.96[c]**	**0.39[c]**	**0.2[c]**
gamma-BHC (lindane)	mg/kg	9.2	0.28	0.1	**0.25[c]**	**1.4[bc]**	**0.5[bc]**	**0.27[c]**

Notes:

ND	- not detected
mg/kg	- milligrams per kilogram
J	- estimated concentration below method detection limit
2.7[c]	- concentration exceeds applicable NYSDEC Part 375 Soil Cleanup Objectives
NA	- none available
1	Per NYSDEC Part 375 and CP-51, values were capped at 100 mg/kg

TABLE 4.3

SUMMARY OF DAILY AIR MONITORING RESULTS
COLVIN BOULEVARD SANITARY SEWER REPAIR
NIAGARA FALLS, NEW YORK

	Daily PID Reading (ppm)					
Date	*Breathing Zone of Perimeter of Work Area*	*Breathing Zone of Work Area (Max)*	*Daily Oxygen Reading (%)*	*Hydrogen Sulfide (ppm)*	*Carbon Monoxide (ppm)*	*LEL (%)*
02/03/2011	0.0-0.4	3.0	20.9	0.0	0.0	0 - 1
02/04/2011	0.0-0.5	4.2	20.9 - 21.1	0	0	0 - 1
02/05/2011	0.0 - 0.6	0.4	20.9 - 21.1	0	0	0
02/07/2011	0.0	0.5	20.9	0	0 - 1	0
02/08/2011	0.0 - 0.7	3.2	20.9 - 21.3	0	0	0 - 1
02/09/2011	0.0	0.4	20.9 - 21.3	0	0	0 - 1
02/10/2011 (1)	0.0	3.2	20.9 - 21.4	0	0	0 - 1
02/11/2011	0.0	0.0	20.9 - 21.1	0	0	0 - 1
02/12/2011	0.0	0.0	20.9	0	0	0
02/13/2011	0.0 - 0.2	0.0	20.9	0	0	0
02/14/2011	0.0 - 0.4	0.0	20.9 - 21.1	0	0	0 - 1
02/15/2011	0.0 - 0.2	0.0	20.9- 21.1	0	0	0 - 1
02/16/2011	0.0 - 0.1	0.0	20.9 - 21.1	0	0	0 - 1
02/17/2011	0.0 - 0.1	0.0	20.9 - 21.1	0	0	0 - 1
02/18/2011	0.0	0.0	20.9	0	0	0
02/21/2011	0.0	0.0	20.9	0	0	0
02/22/2011	0.0	0.0	20.9	0	0	0
02/23/2011	0.0	0.0	20.9	0	0	0

Notes:

PID Photoionization detector
ppm parts per million
LEL Lower Explosive Limit
\- No detection
(1) Last day impacted materials removed from trench. All piping and bedding placement was complete