Highway Committee

Committee Meeting

~ Minutes ~

60 Central Ave.
Cortland, NY 13045
http://www.cortland-co.org

Tuesday, March 7, 2023 **11:00 AM** **Room 302**

CALL TO ORDER

The meeting was called to order at 11:03 AM by Committee Vice Chair Ronald J. Van Dee

Attendee Name	Organization	Title	Status	Arrived
George Wagner	Cortland County, NY	Committee Member	Present	
Linda Jones	Cortland County, NY	Committee Member	Present	
Christopher Newell	Cortland County, NY	Committee Chair	Excused	
Ronald J. Van Dee	Cortland County, NY	Committee Vice Chair	Present	
Cathy Bischoff	Cortland County, NY	Committee Member	Present	
Joseph Nauseef	Cortland County, NY	Committee Member	Excused	
Eugene Waldbauer	Cortland County, NY	Committee Member	Present	
Rob Corpora	Cortland County, NY	County Administrator	Present	
Savannah Hempstead	Cortland County, NY	Clerk of the Legislature	Present	
Andrea Herzog	Cortland County, NY	Director of Finance	Present	
Charles Sudbrink	Cortland County, NY	Highway Superintendent	Present	
Melanie Vilardi	Cortland County, NY	Deputy County Administrator	Present	
James L. Aiken	Cortland County, NY	Supervisor of Solid Waste	Present	
Alan Ricottilli	Cortland County, NY	Deputy Highway Superintendent	Present	
Paul Heider	Cortland County, NY	Board Member	Present	
Scott Steve	Cortland County, NY	City of Cortland Mayor	Present	
Bruce Adams		City of Cortland Wastewater Treatment	Present	
Ray Oliver	Cortland County, NY	Resident	Present	

MINUTES

1. Highway Committee - Committee Meeting - Feb 7, 2023 11:00 AM

RESULT:	**APPROVED [UNANIMOUS]**
MOVER:	George Wagner, Committee Member
SECONDER:	Eugene Waldbauer, Committee Member
AYES:	Wagner, Jones, Van Dee, Bischoff, Waldbauer
EXCUSED:	Christopher Newell, Joseph Nauseef

MONTHLY REPORTS

1. Highway Department Activities Report

RESULT:	**COMPLETED**

2. Solid Waste Activities Report

RESULT:	**COMPLETED**

DISCUSSION ITEMS

1. Leachate Pipeline Feasibility

RESULT:	**COMPLETED**

2. City of Cortland Vermicomposting

RESULT:	**COMPLETED**

3. Cortland County Landfill Site Life and Financial Assurance

RESULT:	**COMPLETED**

RESOLUTIONS

AGENDA ITEM NO. 1 – Amend Resolution No. 114-22 - Authorize Agreement/Installation of Active Landfill Gas Collection and Control System - Highway Department

RESULT:	**APPROVED [UNANIMOUS]** **Next: 3/14/2023 10:00 AM**
MOVER:	Eugene Waldbauer, Committee Member
SECONDER:	George Wagner, Committee Member
AYES:	Wagner, Jones, Van Dee, Bischoff, Waldbauer
EXCUSED:	Christopher Newell, Joseph Nauseef

ON MOTION OF NEWELL **RESOLUTION NO.**

Amend Resolution No. 114-22 - Authorize Agreement/Installation of Active Landfill Gas Collection and Control System - Highway Department

WHEREAS, Resolution No. 114-22 authorized the County Administrator to enter into agreements and award bids needed for the planning, installation and implementation of an active gas collection and flaring system at the Cortland County Landfill for a cost not to exceed $1.7 million, AND

WHEREAS, the amount needed for the planning, installation and implementation of an active gas collection and flaring system at the Cortland County Landfill came in at a cost of $2,215,000, NOW THEREFORE BE IT

RESOLVED, that Resolution No. 114-22 be and hereby is amended to authorize the County Administrator, upon approval of the County Attorney, or their designee, to enter into agreements and award bids needed for the planning, installation and implementation of an active gas collection and flaring system at the Cortland County Landfill for a cost not to exceed $2,215,000 million.

AGENDA ITEM NO. 2 – Authorize Agreement City of Cortland Vermicomposting at Cortland County Landfill

RESULT:	**APPROVED [UNANIMOUS]**
	Next: 3/23/2023 6:00 PM
MOVER:	Eugene Waldbauer, Committee Member
SECONDER:	George Wagner, Committee Member
AYES:	Wagner, Jones, Van Dee, Bischoff, Waldbauer
EXCUSED:	Christopher Newell, Joseph Nauseef

ON MOTION OF NEWELL **RESOLUTION NO.**

Authorize Agreement City of Cortland Vermicomposting at Cortland County Landfill

WHEREAS, the City of Cortland has been awarded a grant to install a vermicomposting site for the use of Cortland County businesses and residents, AND

WHEREAS, an ideal location for this site is the Cortland County Landfill, AND

WHEREAS, the Cortland County Legislature's Highway Committee recommends a long-term agreement with the City of Cortland for the use of a portion of the Cortland County Landfill as a vermicomposting site, NOW THEREFORE BE IT

RESOLVED, that the Cortland County Legislature authorizes the County Administrator, upon review and approval of the County Attorney or designee, to enter into a long-term agreement with the City of Cortland for said purposes at no cost to Cortland County.

ADJOURNMENT

The meeting was closed at 11:59 AM

Highway Committee

Committee Meeting

~ Minutes ~

60 Central Ave.
Cortland, NY 13045
http://www.cortland-co.org

Tuesday, February 7, 2023 | **11:00 AM** | **Room 302**

CALL TO ORDER

The meeting was called to order at 11:13 AM by Committee Chair Christopher Newell

Attendee Name	Organization	Title	Status	Arrived
George Wagner	Cortland County, NY	Committee Member	Present	
Linda Jones	Cortland County, NY	Committee Member	Present	
Christopher Newell	Cortland County, NY	Committee Chair	Present	
Ronald J. Van Dee	Cortland County, NY	Committee Vice Chair	Present	
Cathy Bischoff	Cortland County, NY	Committee Member	Present	
Joseph Nauseef	Cortland County, NY	Committee Member	Present	
Eugene Waldbauer	Cortland County, NY	Committee Member	Present	
Savannah Hempstead	Cortland County, NY	Clerk of the Legislature	Present	
Rob Corpora	Cortland County, NY	County Administrator	Present	
Charles Sudbrink	Cortland County, NY	Highway Superintendent	Present	
James L. Aiken	Cortland County, NY	Solid Waste Supervisor	Present	
Andrea Herzog	Cortland County, NY	Director of Finance	Present	
Melanie Vilardi	Cortland County, NY	Deputy County Administrator	Present	
Ray Oliver		Resident	Present	
Kelly L. Fairchild-Preston	Cortland County, NY	Board Member	Present	
Margaret Mellott	Cortland Standard	Reporter	Present	
Sandra Price	Cortland County, NY	Board Member	Present	
Paul Heider	Cortland County, NY	Board Member	Present	11:40 AM
Kevin Fitch	Cortland County, NY	Chair of the Legislature	Present	11:44 AM

MINUTES

1. Highway Committee - Committee Meeting - Dec 6, 2022 11:00 AM

RESULT:	**APPROVED [UNANIMOUS]**
MOVER:	Joseph Nauseef, Committee Member
SECONDER:	George Wagner, Committee Member
AYES:	Wagner, Jones, Newell, Van Dee, Bischoff, Nauseef, Waldbauer

RESOLUTIONS

AGENDA ITEM NO. 1 – Appoint Members to the Dwyer Memorial Park Advisory Board - Highway Department

Mr. Van Dee MADE A MOTION TO AMEND the resolution to include Gary Lawrence as an at large member. Ms. Jones SECONDED THE MOTION, and upon unanimous voice vote of members present; MOTION CARRIED.

RESULT:	**APPROVED [UNANIMOUS]**
	Next: 2/23/2023 6:00 PM
MOVER:	Joseph Nauseef, Committee Member
SECONDER:	Eugene Waldbauer, Committee Member
AYES:	Wagner, Jones, Newell, Van Dee, Bischoff, Nauseef, Waldbauer

ON MOTION OF NEWELL **RESOLUTION NO.**

Appoint Members to the Dwyer Memorial Park Advisory Board - Highway Department

WHEREAS, the Cortland County Legislature adopted Resolution No. 298-18 to Establish The Dwyer Memorial Park Citizen's Advisory Committee, AND

WHEREAS, the Committee provides recommendations and feedback regarding current and future use of the park, NOW THEREFORE BE IT

RESOLVED, that in accordance with the recommendation of the Cortland County Legislature's Highway Committee, the following names are hereby approved for service on said Committee for a term to expire on December 31, 2023:

Linda Jones - 2087 E. River, Cortland, NY 13045
Larry Jones - 2087 E. River, Cortland, NY 13045
Judah Currie - 6559 Steger Rd, Preble, NY 13141
Daron Foster - 5771 Haights Gulf Rd, Cortland, NY 13045
Kaidon Foster - 5771 Haights Gulf Rd, Cortland, NY 13045
Mike Thayer - 280 Route 90 Cortland, NY 13045
Gary Lawrence - 1805 Mountain View Dr, Homer, NY 13077

AGENDA ITEM NO. 2 – Authorize 2023 Landfill Amnesty Credit for Municipalities - Highway Department/Landfill

RESULT:	**APPROVED [UNANIMOUS]**
	Next: 2/23/2023 6:00 PM
MOVER:	Eugene Waldbauer, Committee Member
SECONDER:	Linda Jones, Committee Member
AYES:	Wagner, Jones, Newell, Van Dee, Bischoff, Nauseef, Waldbauer

ON MOTION OF NEWELL **RESOLUTION NO.**

Authorize 2023 Landfill Amnesty Credit for Municipalities - Highway Department/Landfill

WHEREAS, the Highway Committee of this Legislature believes that the municipalities of Cortland County will be better served by authorizing a credit to be used at the Cortland County Landfill for the disposal of waste other than garbage at no charge, AND

WHEREAS, the Highway Committee has previously recommended that there be a 30-ton limit per municipality, AND

WHEREAS, the Cortland County Landfill no longer accepts tires at their facility, AND

WHEREAS, the Superintendent of the Highway Department is authorized to establish a credit for each municipality to dispose of waste at no charge, NOW THEREFORE BE IT

RESOLVED, the Superintendent of the Highway Department shall provide each municipality in Cortland County a credit of $2,700.00 for 2023 and allow said municipalities to dispose of their waste other than garbage at the Cortland County Landfill, AND BE IT FURTHER

RESOLVED, that only authorized municipal representatives utilizing authorized municipal vehicles may bring the waste to the County Landfill in order to make use of the above referenced credit, AND BE IT FURTHER

RESOLVED, that any metal objects (including white goods), construction and demolition waste, and tree waste shall be separated by category at the landfill site by the municipality making delivery, AND BE IT FURTHER

RESOLVED, that tires shall be excluded as an item that is accepted from the municipalities wishing to utilize the amnesty credit, AND BE IT FURTHER

RESOLVED, the Superintendent of the Highway Department shall furnish the Legislature with an accounting of all waste delivered to the landfill utilizing the amnesty credit.

COMMITTEE NOTIFICATION

1. Municipalitiy Letters Regarding Hauler Route

RESULT:	COMPLETED

DISCUSSION/REPORTS

1. February Highway Report

RESULT:	COMPLETED

ADJOURNMENT

The meeting was closed at 11:59 AM

MARCH 2023 HIGHWAY DEPARTMENT REPORT

Administration

Monthly Superintendents Meeting
Department Head Meeting

Projects

BRIDGE-NY Projects:

Marathon-McGraw bridge replacement – Structure complete

Other Structure Projects:
East River Crossing bridge replacement – Preliminary design has begun
Landers Corners Bridge- Deck replacement

Road Projects:
Telephone Road- Hot mix asphalt, Recycled asphalt
Baldwin Corners Road- Cold mix asphalt
Cuyler Linclean Road- Hot mix asphalt
Merrill Creek Road- Recycled asphalt
Fair Haven Road- Hot mix asphalt
Song Lake Crossing Road- Hot mix asphalt

Staffing - 1 full time positions open.

Equipment - Trucks to be delivered June- July.

Road Maintenance –Cross Culvert Replacement, Pothole repairs, tree maintenance, ditching.

Salt Usage - 9,160 tons of salt used as of February 26, 2023

Dwyer Park **–**Construction of pier has begun.

Airport
T Hangar Occupancy- All hangers are occupied. 100LL fuel farm, advertise for bids late spring.

MARCH 2023 SOLID WASTE DEPARTMENT REPORT

Landfill

Administration

- Working on annual reports.

Operations

- **Leachate Hauling** – Continued transportation of leachate to the City's WWTP. We have hauled 160,000 gallons from Pine Tree and 472,000 gallons from West Side in February.
- **Cover Material -** Approximately 840.65 tons of shredded auto fluff has been delivered for use as Alternate Operating Cover material at the landfill in February.
- **Solid Waste -** 1790.45 tons received for the month of February.
- **Site Maintenance –** Downsizing our working face to the smallest open area that we can. Adding additional cover material to mitigate odor.
- **Equipment** - Ongoing scheduled service and routine preventive maintenance.
  - Dozer Track chains were replaced as well as sprockets.
  - RFP for an Excavator.
  - Generator has returned from being repaired at Kinsley Power Systems.
  - Pump house 1B Primary system, replaced bellows and transducer.

Recycling

- **Single Stream to Southern Tier -** 164.39 tons
- **Cardboard to market –** None because of low market. Have 125 bales ready to go.
- **Glass from Recycling to Landfill –** 9.98 tons
- **Compost To Landfill –** none
- **Glass Retrieved from Southern Tier –** 151.90 tons
- .**Electronic Recycling –** Continuing collections of electronics. None have been turned in this month.
- **Garbage from Recycling to Landfill –** 1.74 tons

Technical Study

Leachate Sewer Line Feasibility Study

Cortland County Landfill

Prepared For

Cortland County

60 Central Avenue
Cortland, New York

Revision 1
February 2023

Barton&Loguidice

Cortland County Landfill

Leachate Sewer Line Feasibility Study

February 2023

Prepared For

Cortland County
60 Central Avenue
Cortland, New York 13045

Prepared By

Barton & Loguidice, D.P.C.
443 Electronics Parkway
Liverpool, New York 13088

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EXECUTIVE SUMMARY

Transportation of leachate from the Cortland County Landfill to the point of treatment represents a large annual operating expense for the County which will continue even after landfill closure. The construction of a leachate conveyance pipeline would require a relatively large capital investment, however, it is anticipated that some Federal funding for the project could be obtained.

Based on an annual estimated cost in excess of $410,000 for hauling leachate by tanker truck, the least expensive alternative option of constructing and operating a leachate pipeline would result in similar costs or cost savings over a 15-year financing period, depending on the terms. If the project were to qualify for low or zero-interest financing, the project would likely result in immediate cost savings.

The transport of leachate by sewer pipeline presents non-financial benefits such as the removal of leachate tanker trucks from the roadway and the reduction in greenhouse gas emissions associated with their fuel use. The primary drawback of the pipeline solution is the lack of flexibility in disposal facilities. The ability of the City of Cortland WPCF to continue to treat the leachate effectively and to do so at a competitive price is imperative to the success of the project. Although a change in the leachate characteristics or the effectiveness of the WPCF is not anticipated, changes in the regulatory landscape are likely.

ABBREVIATIONS

cfs	Cubic feet per second
DEC	New York State Department of Environmental Conservation
DWSRF	Drinking Water State Revolving Fund
EFC	New York State Environmental Facilities Corporation
fps	Feet per second
gpd	Gallons per day
gpm	Gallons per minute
hp	Horsepower
LF	linear feet
MHI	Median Household Income
NYCRR	New York Official Compilation of Codes, Rules and Regulations
Part 360	6 NYCRR Part 360 Regulations
Q	Volumetric flow rate (gpm, MGD)
USDA	United States Department of Agriculture
WPCF	Water Pollution Control Facility

1.0 INTRODUCTION

Cortland County owns and operates a municipal solid waste landfill facility which is located in the Towns of Solon, Cortlandville, and Homer in Cortland County, New York. The facility generates leachate which must be collected and treated prior to discharge to surface waters and the transport and treatment of which represents a substantial annual cost to the facility. 6 NYCRR Part 360-2(b)(157) defines leachate as any solid waste in the form of a liquid, including any suspended components, that results from contact with waste.

This report will address the feasibility of utilizing a dual-contained (pipe within a pipe) pipeline to convey leachate from the Cortland County landfill off-site, ultimately to be treated at the City of Cortland Water Pollution Control Facility (WPCF). Five alternative pipeline route options will be discussed. Leachate generation and strength will also be discussed in an effort to identify any long-term concerns for transport or treatment.

1.1. Leachate Generation

In 2021, Cortland County generated (based on shipping records, see Table 1) approximately 10.8 million gallons of leachate that required treatment at a WPCF. This shipped leachate is currently generated by three separate facilities: the West Side Extension of the Cortland County Landfill, the Pine Tree Site and the collected groundwater from beneath the Pine Tree Site.

Table 1: Leachate Shipped in 2021 (Gallons)

Date	West Side Extension	Pine Tree*	Total
January	712,000	64,000	776,000
February	688,000	72,000	760,000
March	1,032,000	128,000	1,160,000
April	584,000	48,000	632,000
May	400,000	96,000	496,000
June	744,000	96,000	840,000
July	480,000	72,000	552,000
August	992,000	80,000	1,072,000
September	1,232,000	72,000	1,304,000
October	968,000	73,000	1,041,600
November	1,064,000	48,000	1,112,000
December	968,000	48,000	1,016,000
*Hauling numbers for Pine Tree include both leachate and groundwater.			

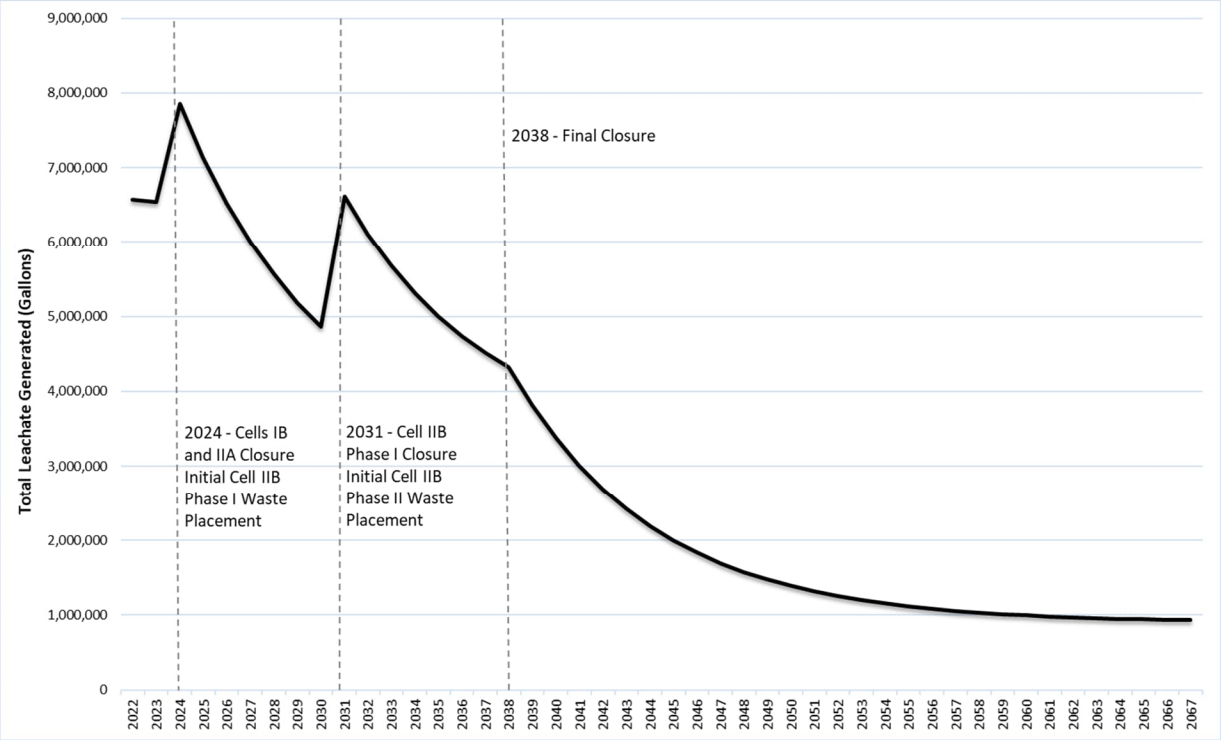
The primary generator of leachate in Cortland County is the West Side Extension of the Cortland County Landfill. The West Side Extension contains a double composite liner system and was opened in October of 1991. There have been two closure events since the landfills construction; the Stage I closure of 6.9 acres in 2006, and the Stage II closure of approximately six acres in 2014. There are approximately 11 acres of uncapped waste, as well as a 7.1 acre expansion area constructed. The West Side Expansion accounted for over 9.8 million gallons (92%) of total leachate in 2021.

Long-term leachate generation up to and after final closure was projected in order to assess the sizing of a pipeline conveyance system. The past five years of leachate hauling data for the West Side Extension was compiled from facility annual reports submitted to the NYSDEC as well as correspondence with County employees. To consider leachate generation from both capped and uncapped areas separately, a gallons of leachate per acre per year average was calculated for uncapped areas. Using the leachate hauling data mentioned above, it was calculated that uncapped areas generate approximately 633,648 gallons of leachate per uncapped acre per year. It was assumed that capped areas receive no stormwater or groundwater infiltration. Leachate generation from capped areas was assumed to decrease by 15% every year post-closure. It was also assumed that a capping event would take place upon each area reaching its maximum capacity. Three capping events were considered; an 11 acre capping of both cells IB and IIA in 2023, a 3.4 acre cap of cell IIB in 2030, and a 3.7 acre cap of IIB in 2038. Long-term leachate generation does not consider future expansion.

The leachate contribution of the two Pine Tree Sites is nominal compared to that of the West Side Extension. The Pine Tree Site was closed in October of 1991 and was capped with a Part 360 compliant capping system. In 2021, the Pine Tree Sites accounted for approximately nine hundred thousand gallons of leachate. This number is not expected to dramatically change, as these landfills were not constructed with double composite liner systems and are susceptible to groundwater infiltration. For the purpose of long-term leachate generation projection, it was assumed that nine hundred thousand gallons of leachate would be collected from the Pine Tree landfill annually.

The results of the long-term leachate generation projection are included as Appendix A. A graphical summary is included as Figure 2. Leachate generation will fluctuate as cells are closed and waste is placed in new areas. Upon final closure, leachate generation will decrease, however, per Part 360 regulations, leachate capture and treatment will be required for a minimum of 30 years following the final closure of the landfill facility.

Figure 1-1: Long-Term Leachate Generation Estimate



1.2. Leachate Storage

The West Side Extension utilizes a 1.5 million gallon divided concrete tank to store its leachate. Based on the 2021 generation rate, this tank allows for approximately two months of storage without leachate hauling. There is 35,000 gallons of storage available for leachate and groundwater from the Pine Tree Site, which, based on 2021 generation rates, provides less than one month of storage.

2.0 CURRENT LEACHATE DISPOSAL PRACTICES

The leachate generated from the West Side Extension, the Pine Tree Site and the Pine Tree Site groundwater is collected and stored on-site in leachate tanks and then transported via tank trailer to the City of Cortland wastewater treatment plant. There, the leachate is mixed with and diluted by the domestic and industrial sewage as it flows into the City of Cortland WPCF. The leachate is then treated along with the plant's normal influent.

2.1. Current Transportation Practices

There is currently an agreement between the City of Cortland WPCF and the Cortland County Landfill whereby each disposes of its generated wastes at the others facility. In other words, landfill leachate is taken to the WPCF, while sludge from the WPCF's treatment process is disposed of at the County Landfill. This leachate for sludge "trade-off" agreement eliminates a major portion of the costs normally related to the disposal of landfill leachate. Therefore, the transportation of leachate from the landfill comprises the majority of Cortland County's leachate disposal costs. In 2020, Cortland County spent approximately $413,548 to haul its leachate for disposal. This cost was based on leachate quantity rather than leachate quality.

2.2. Current Pre-Treatment Practices

Currently, Cortland County leachate undergoes no formal active pre-treatment. The leachate does, however, receive some passive treatment in the leachate tanks. This treatment occurs as a result of additional mixing and aeration caused by wind and wave action on the surface of the leachate and the settling of some suspended solids to the bottom of the tanks. Evaporation of some of the leachate by the sun is another form of passive treatment that occurs in the leachate tanks.

2.3. Current Quality Testing Practices

The Cortland County sampling program includes yearly (baseline) and quarterly sampling and analysis from both the Pine Tree leachate tank and the West Side Landfill leachate tank. The annual and quarterly testing are done to satisfy both the landfill permit and the pre-treatment requirements for the City of Cortland WPCF. This work is currently completed through an agreement with Cortland County Soil and Water Conservation District. These costs will exist independent of the leachate disposal method utilized by Cortland County.

2.3.1. Leachate Quality

Historically, Cortland County landfill leachate has been of an acceptable quality for processing at the City of Cortland WPCF without pretreatment. Laboratory analysis of the leachate, included as Appendix B, has not exhibited any trends over the past five years which would indicate a change in leachate characteristics. There are no anticipated issues with the capability of the Cortland WPCF to accept landfill leachate under the current regulatory limits and pre-treatment agreement with the WPCF.

It should be noted that NYSDEC regulations related to wastewater treatment, and specifically, pre-treatment limits for industrial users, may become more stringent in the future. There has been much attention recently in regard to emerging contaminants such as PFOA, PFOS, and 1,4-Dioxane. Presently, Cortland County landfill is not required to monitor for the concentration of emerging contaminants in its leachate. This will become a requirement as the county landfill begins operating under the updated 6 NYCRR Part 360 regulations in 2024. Although there are currently no limits or restrictions on the concentration of these contaminants in leachate slated for treatment at WPCFs, there is a potential for such restrictions in the future. This restriction would likely be universal to any final treatment facility for leachate.

3.0 LEACHATE CONVEYANCE PIPELINE

Pumping of the leachate from the on-site leachate storage directly to an existing sewer system was identified as an option for the County to reduce the costs associated with transport of leachate to the treatment plant.

The advantages to constructing a leachate pipeline are:

- The elimination of annual transportation costs.
- The removal of leachate transport vehicles from the local roadways reducing wear and tear on local roads and the possibility of accidents involving tanker trucks.
- The mixing and dilution of leachate by the domestic and industrial sewage as it flows through the sewer system providing a more consistent inflow to the WPCF.

As with all options, there are also disadvantages. These include:

- Required NYSDEC approval to connect to the sewer system and transport leachate through it. There is precedent of this practice being approved for other landfill leachate in Region 7.
- The risk of accidental damage to the pipeline caused by future excavations resulting in sewage release, which includes leachate.
- The potential for the City of Cortland WPCF to no longer be able to accept the leachate without pre-treatment.

Although a detailed sewer pipeline design would be required to produce detailed cost estimates and to meet the requirements for regulator review, a conceptual design of five pipeline route options has been developed for the purposes of preliminary feasibility analysis.

In each case, it is anticipated that the system would consist of a submersible leachate pump station located at the landfill facility near the existing leachate storage tank. This pumping system would draw directly from the leachate storage tank and pump into the proposed dual-contained leachate force main. The pump station, like any other required in the following options, would be equipped with level sensors, flow meters, and other controls capable of monitoring and controlling the leachate levels in the tanks and the flow of leachate to the force main. The pump station would lift leachate from the tank elevation to the highest point in the proposed force main, where the leachate would flow by gravity to the tie-in point or the next low point along the pipeline route, where an additional pump station would be constructed.

In addition to the pump station at the landfill, it is anticipated that a metering station would be installed where each option ties into existing infrastructure. This would allow for controlled flow of the leachate into the sewer system at the point of tie-in and would allow for better control of the leachate in the new

force main. In addition to the metering station, a number of maintenance manholes would be installed along the new force main for maintenance access or for air pressure release, as needed.

Since the landfill property is separated from the location of the City of Cortland WPCF by the east branch or the main section of the Tioughnioga River, there are limited options for connection to the existing City of Cortland sewer collection system. The only existing river crossing is located at the Route 11/41 bridge (Port Watson Street) which is accomplished via the sewer pump station owned by the Village of McGraw and used by both the Village and the Town of Cortlandville for sewage conveyance to the City sewer system. Use of this existing river crossing was considered in Options 1-3. The aforementioned existing sewer pump station may require modifications and/or upgrades to convey the volume of leachate considered in this feasibility study. Upgrades/modifications to the existing sewer pump station are not included in the preliminary cost analyses provided in Appendix C.

The second option would be to construct a new river crossing at an alternate location. Upon review of the roadways, bridges, and existing sewer system terminations between the landfill and the City of Cortland sewer system, a potential river crossing at Lorings Crossing Road was assessed. Directional drilling under the river was included for the purpose of cost estimates. Alternatively, hanging the sewer piping from the bridge structure could also be assessed if this option were to be selected for further design. The existing terminus of the City of Cortland sewer system at OCM BOCES on Clinton Ave. (Route 13) would be used as the sewer system tie in point for this scenario. This was considered in options 4 and 5. It should be noted that permitting costs for the river crossing and other water bodies and wetlands encountered along the route are difficult to estimate fully at the preliminary review phase, and may result in significant additional costs for permitting/engineering.

A discussion of the five analyses is presented below, as well as a graphical summary of each pipeline route is provided in figures 1 through 5.

3.1. Option 1 – Tie-In to McGraw Sewer System North of Town

This leachate transportation option would consist of the construction of an underground double contained leachate pipeline directly from the West Side Extension leachate storage tank West along Heath Road to South along Route 116A, tying in at the northern limit of the Village of McGraw sewer system (approximately 2.6 miles). This pipeline would carry leachate from the leachate tank to the sewer connection, and from there it would flow within the Village of McGraw sewer system with the domestic sewage to the City of Cortland WPCF. The current sewer system within the Village of McGraw consists of a predominantly gravity fed system, which flows to a pump station located on Bennett Street, where it is pumped to the sewer forcemain located just inside the Village limits along West Main Street (NYS Route 41). This forcemain/gravity main extends along NYS Route 41/US Route 11 for several miles before it

terminates in a pump station located just east of the Tioughnioga River which pumps it to the treatment plant.

The total elevation gain along this route is 261 feet, as reported by Google Earth. This route would require one pump station at the landfill and one valve station at the tie-in point North of McGraw. Assuming the pipeline is constructed on the South and East sides of the road, this route would include one road crossing. Assuming the construction of one manhole every 500 feet, this option would include the construction of 28 manholes.

It is estimated that the cost to install the new leachate pump station, dual contained force main, metering station, maintenance manholes and other associated items would be approximately $3,441,000 in 2023 dollars. The detailed cost estimate is attached in Appendix C. The operation of the pump station and metering station, along with the maintenance of the pipeline would result in annual O&M costs estimated in the range of $30,000 - 40,000 per year.

3.2. Option 2 – Through McGraw to Existing Forcemain

This leachate transportation option would consist of the construction of an underground double contained leachate pipeline directly from the West Side Extension leachate storage tank running West along Heath Road, to South along Route 116A through McGraw, to West along West Main Street, tying in at the East end of the existing McGraw sewer forcemain. This route is approximately 3.48 miles. The total elevation gain along this route is 276 feet, as reported by Google Earth. This route would require one pump station at the landfill and one valve station at the tie-in point West of McGraw. Assuming the pipeline is constructed on the South side of Heath Road, the West side of Route 116A, and the North side of West Main Street, this route would include seven road crossings. One manhole every 500 feet results in the construction of 37 manholes.

A benefit of this option is that the leachate would be tied into the conveyance forcemain outside of the Village of McGraw. This would avoid use of the gravity system within the village and the pump station on Bennett Road. The constructability of this option is more complex, however, as the pipeline will run directly through McGraw where increased traffic density and existing utilities will impede construction progress. This option also requires seven road crossings, further affecting traffic flow in the area.

It is estimated that the cost to install the new leachate pump station, dual contained force main, metering station, maintenance manholes, and other associated items would be approximately $4,517,000 in 2022 dollars. The operation of the pump station and metering station, along with the maintenance of the pipeline would result in annual O&M costs estimated in the range of $30,000 - 40,000 per year.

3.3. Option 3 – Along Hicks Hill Road to Existing Forcemain

This leachate transportation option would consist of the construction of an underground double contained leachate pipeline directly from the West Side Extension leachate storage tank running West along Heath Road, to South along Route 116A through McGraw, to West and South along Hicks Hill Road, to West along West Main Street, tying in at the East end of the existing McGraw sewer forcemain. This route is approximately 3.57 miles. The total elevation gain along this route is 328 feet, as reported by Google Earth. This route would require two pump stations, one at the landfill and the other approximately 1.44 miles along the route. One valve station would be required at the tie-in point West of McGraw. Assuming the pipeline is constructed on the South side of Heath Road, the West side of Route 116A, North and West side of Hicks Hill Road, and the North side of West Main Street, this route would include five road crossings. One manhole every 500 feet results in the construction of 38 manholes.

This option is similar to option 2 in that the McGraw gravity sewer system and Bennett Road pump station is avoided. This option is more constructible than option 2 as the pipeline will not run directly through the central Village McGraw. Traffic and existing utilities will be less dense along Hicks Hill Road. The total cost of this option will be more significant as the construction of a second pump station is required.

It is estimated that the cost to install the new leachate pump stations, dual contained force main, metering station, maintenance manholes and other associated items would be approximately $5,271,000 in 2023 dollars. The operation of the pump station and metering station, along with the maintenance of the pipeline would result in annual O&M costs estimated in the range of $60,000 – 70,000 per year.

3.4. Option 4 – North Along Route 116B to Cortland Sewer System

This leachate transportation option would consist of the construction of an underground double contained leachate pipeline directly from the West Side Extension leachate storage tank running North along the landfill main road, to West along Route 116B, to Southwest along Route 114, to West along Lorings Crossing Road, to South along State Route 13, tying in at the North end of the existing Cortland sewer system. This route is approximately 6.96 miles. The total elevation gain along this route is 588 feet, as reported by Google Earth. This route would require three pump stations, one at the landfill, one at approximately 1.33 miles along the route, and one at approximately 2.5 miles along the route. One valve station would be required at the tie-in point immediately South of OCM BOCES Cortland (McEvoy Campus). Assuming the pipeline is constructed on the West side of the landfill main road, the North side of Route 116B, the Southeast side of Route 114, South side of Lorings Crossing Road, and the East Side of State Route 13, this route would include five road crossings. One manhole every 500 feet results in the construction of 74 manholes. This option will also require the pipeline to cross the East Branch of the Tioughnioga River at approximately 5.6 miles along the route.

Much of this path is through an area with presumably sparse traffic and existing utilities. The last 2 miles of the pipeline will be installed in the outskirts of Cortland, which will have increased traffic and existing utility density. This option is considerably longer than the three discussed above. The total cost of this option will be more significant as the construction of three pump stations and a river crossing is required.

It is estimated that the cost to install the new leachate pump stations, dual contained force main, metering station, maintenance manholes and other associated items would be approximately $9,919,000 in 2023 dollars. The operation of the pump station and metering station, along with the maintenance of the pipeline would result in annual O&M costs estimated in the range of $100,000 – 115,000 per year.

3.5. Option 5 – North Along Route 114 to Cortland Sewer System

This leachate transportation option would consist of the construction of an underground double contained leachate pipeline directly from the West Side Extension leachate storage tank running North along the landfill main road, to North along Town Line Road, to Southwest along Route 114, to West along Lorings Crossing Road, to South along State Route 13, tying in at the North end of the existing Cortland sewer system. This route is approximately 9.73 miles. The total elevation gain along this route is 693 feet, as reported by Google Earth. This route would require two pump stations, one at the landfill and one at approximately 3.86 miles along the route. One valve station would be required at the tie-in point immediately South of OCM BOCES Cortland (McEvoy Campus). Assuming the pipeline is constructed on the West side of the landfill main road, the West side of Town Line Road, the Southeast side of Route 114, South side of Lorings Crossing Road, and the East Side of State Route 13, this route would include five road crossings. One manhole every 500 feet results in the construction of 103 manholes. This option will also require the pipeline to cross the East Branch of the Tioughnioga River at approximately 8.35 miles along the route.

Much of this path is through an area with presumably sparse traffic and existing utilities. The last 2 miles of the pipeline will be installed in the outskirts of Cortland, which will have increased traffic and existing utility density. This option is considerably longer than the four discussed above. The total cost of this option will be more significant as the construction of two pump stations and a river crossing is required.

It is estimated that the cost to install the new leachate pump stations, dual contained force main, metering station, maintenance manholes and other associated items would be approximately $12,065,000 in 2023 dollars. The operation of the pump station and metering station, along with the maintenance of the pipeline would result in annual O&M costs estimated in the range of $80,000 – 95,000 per year.

4.0 PROPERTY ACQUISITION AND EASEMENTS

Based on preliminary analysis and site reconnaissance, the leachate pump station and the initial length of leachate force main to the initial high point could be located on property owned by Cortland County and associated with the landfill or the landfill soil borrow area. From that point, the pipeline would be located within the highway right of way. Any road crossings and river/stream crossings which would be required along the pipeline would likely be accomplished with directional drilling to limit disturbance.

The proposed pump stations and metering/valve stations would likely require easements to be obtained to allow sufficient area for the structure. In some cases, routes could be shortened by obtaining easements through private property for short distances.

5.0 FUNDING OPPORTUNITIES

There are multiple funding or financing options which serve typical wastewater transmission and treatment projects which could likely be applied to this project. The USDA Rural Development Water and Waste Disposal Loan and Grant Program and the EFC Clean Water State Revolving Fund, or the EFC State Water Grants. Details and requirements of each program and detailed below in Figure 3.

Figure 5-1: Funding Opportunity Summary

Funding Agency/Program	EFC Clean Water	EFC CWRF	USDA Rural Development
Type	Grant	Loan	Loan
Terms	No Match Required	Zero or Low Interest	Low Interest
Eligibility Requirement	Sewage treatment projects must serve multiple municipalities to be eligible. Intermunicipal agreement is required. An IMA between Cortland County, the City of Cortland, and the Village of McGraw may qualify.	Municipally owned landfill leachate collection, storage and treatment projects are eligible.	Availible for projects located in rural areas and towns with populations of 10,000 or less. Loan term and interest rate based on useful life of facilities and the median household income of the area served. Grants available in limited cases.
Deadline	September 9, 2022	June 2023	Ongoing

6.0 CONCLUSIONS

Table 2 provides a summary of the 5 options discussed as well as their associated costs.

Table 2: Pipeline Option Summary

Pipeline Option	Sewer Length (Mi.)	Pump Stations	Estimated Annual Capital Cost*	Estimated Annual Operating Cost
Option 1: Tie-In to McGraw System North of Town	2.6	1	$230,000	$30,000 - $40,000
Option 2: Through McGraw	3.5	1	$290,000	$30,000 - $40,000
Option 3: South to Hicks Hill Road	3.6	2	$370,000	$60,000 - $70,000
Option 4: North Along Salisbury Road	7.0	4	$670,000	$100,000 - $115,000
Option 5: North Along Route 114	9.7	3	$750,000	$80,000 - $95,000

*With 0% financing

While the options which are routed through the Village of McGraw (1 and 2) present the most cost effective solution, there are other factors to consider such disruption to village residents and traffic and the use of the existing Village and City infrastructure requiring additional coordination and inter-municipal agreements. Option 3 would require less disruption to the village and use less of the Village's existing infrastructure, but would still require multiple inter-municipal agreements to be successful. Options 4 and 5 are the most expensive due to the topography of the route and requirement for a new river crossing, however, they do provide the County with more flexibility and ownership of a larger portion of the conveyance infrastructure, requiring the use of only the City of Cortland's existing conveyance system.

Based on the estimated project costs, if zero interest bonding were to be obtained for the project, it is estimated that an initial annual cost for the proposed pipeline (capital and O&M) would be in the range of $260,000 - $845,000. The most recently available hauling costs for leachate from 2020 were $413,000 with fuel and labor costs increasing significantly since that time. Based on the historical leachate hauling costs and the projected annual cost of constructing and operating the pipeline, leachate pipeline Options 1-3 are viable alternatives to hauling by tanker truck. The pipeline also has the benefit of being a fixed annual cost for leachate transport which will assist the County in budgeting for their leachate management. It should be noted, however, that should the quantity of leachate generated at the landfill decrease significantly, these fixed costs would result in a higher cost per gallon generated whereas hauling by tanker would be a relatively fixed cost per gallon.

Figure 1

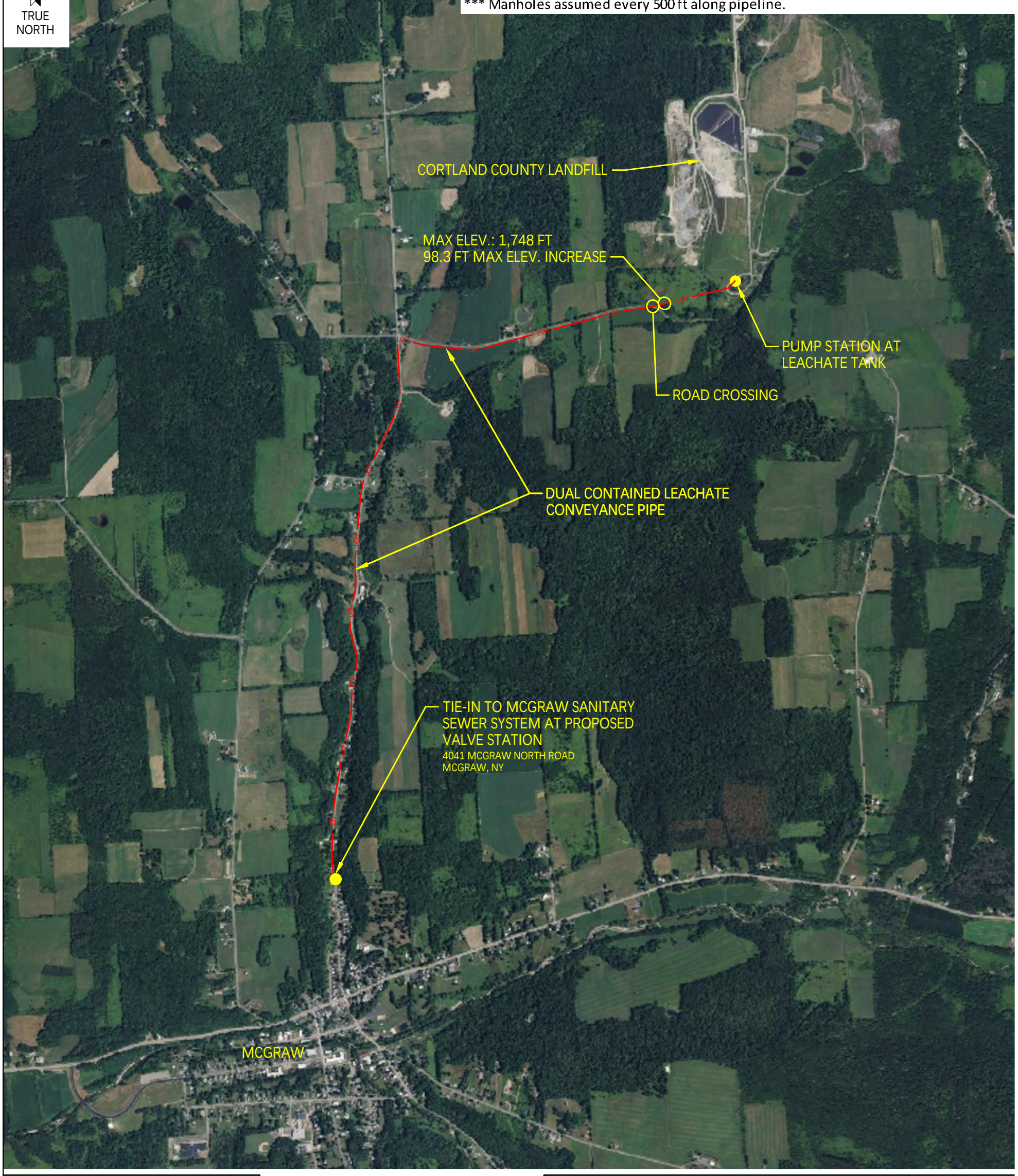
Leachate Conveyance Piping Layout
Option 1: Tie-In to McGraw Sewer System North of Town

Plotted: Feb 06, 2023 – 2:36PM SYR By: erabbia
C:\Users\erabbia\AppData\Local\Temp\AcPublish_15552\331156 Pipeline Options (ID 2647958).dwg

Path ID		Distance (Miles)	Max Head Gain (FT)*	No. of Pump Stations**	No. of Valve Stations	No. of Manholes***	Road Crossings	River Crossings
Option 1	Tie-in to McGraw System North of Town	2.6	98.3	1	1	28	1	0

* Elevation gain reported from Google Earth - elevations to be verified in the field.
** Includes initial pump station at leachate lagoons.
*** Manholes assumed every 500 ft along pipeline.

N
TRUE NORTH



443 Electronics Parkway
Liverpool, NY
13088
Barton & Loguidice, D.P.C.

1500' 0 1500'
1"=1500'

Date	Scale
JANUARY 2023	1" = 1500'

CORTLAND COUNTY HIGHWAY DEPARTMENT
CORTLAND COUNTY LANDFILL

LEACHATE CONVEYANCE PIPELINE OPTION 1

TOWN OF CORTLANDVILLE/SOLON CORTLAND COUNTY, NEW YORK

Figure Number 1

Project Number 331.156.001

Figure 2

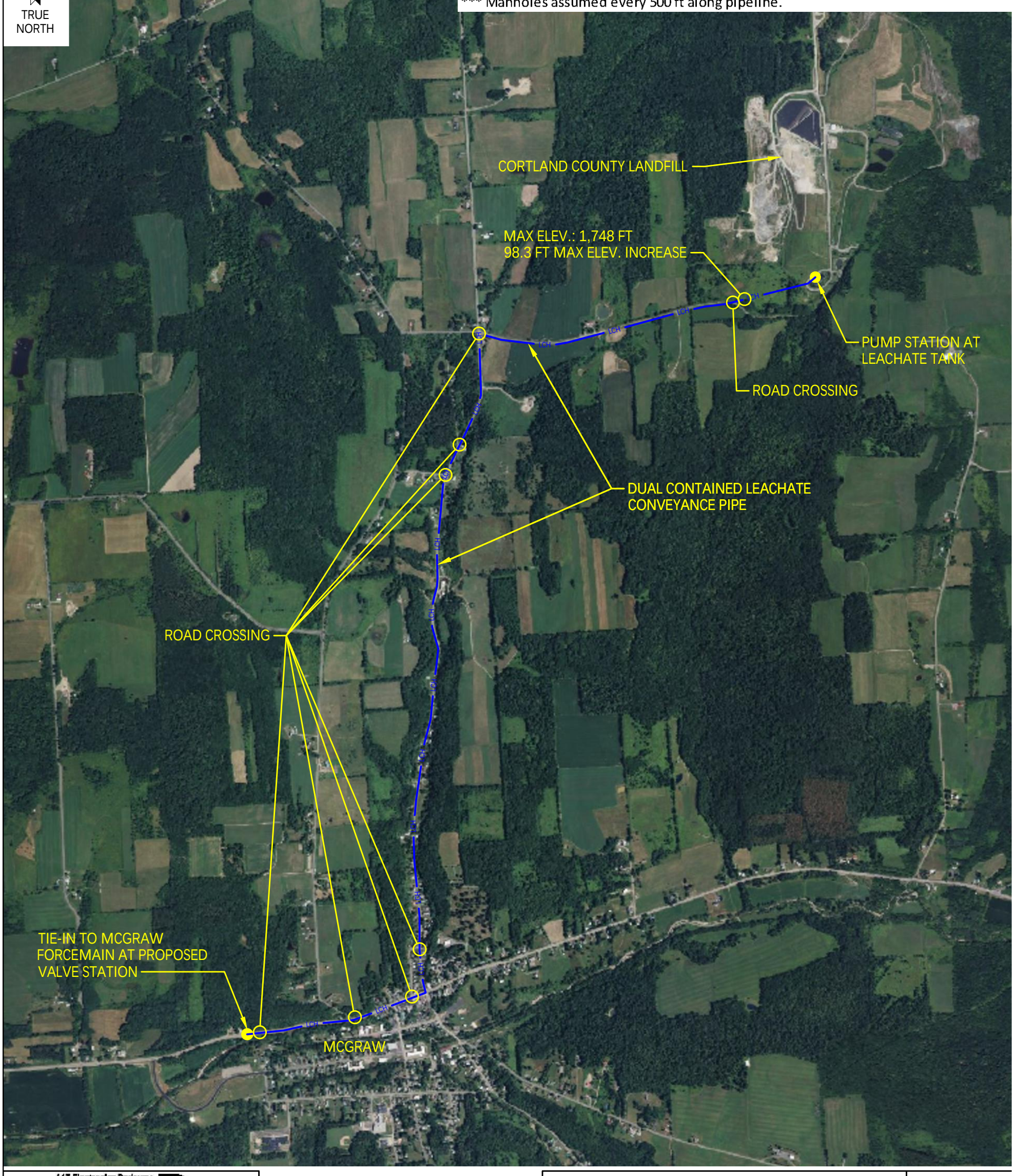
Leachate Conveyance Piping Layout
Option 2: Through McGraw to Existing Forcemain

Plotted: Feb 06, 2023 – 2:36PM SYR By: erabbia
C:\Users\erabbia\AppData\Local\Temp\AcPublish_15552\331156 Pipeline Options (ID 2647958).dwg

Path ID		Distance (Miles)	Max Head Gain (FT)*	No. of Pump Stations**	No. of Valve Stations	No. of Manholes***	Road Crossings	River Crossings
Option 2	Through McGraw	3.48	98.3	1	1	37	8	0

* Elevation gain reported from Google Earth - elevations to be verified in the field.
** Includes initial pump station at leachate lagoons.
*** Manholes assumed every 500 ft along pipeline.

N
TRUE NORTH



443 Electronics Parkway
Liverpool, NY
13088
Barton & Loguidice, D.P.C.

Date	Scale
JANUARY 2023	1" = 1500'

1500' 0 1500'
1"=1500'

CORTLAND COUNTY HIGHWAY DEPARTMENT
CORTLAND COUNTY LANDFILL

LEACHATE CONVEYANCE PIPELINE OPTION 2

TOWN OF CORTLANDVILLE/SOLON CORTLAND COUNTY, NEW YORK

Figure Number 2

Project Number 331.156.001

Figure 3

Leachate Conveyance Piping Layout
Option 3: Along Hicks Hill Road to Existing Forcemain

Plotted: Feb 06, 2023 – 2:36PM SYR By: erabbia
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Path ID		Distance (Miles)	Max Head Gain (FT)*	No. of Pump Stations**	No. of Valve Stations	No. of Manholes***	Road Crossings	River Crossings
Option 3	South to Hicks Hill Road	3.57	155	2	1	38	6	0

* Elevation gain reported from Google Earth - elevations to be verified in the field.
** Includes initial pump station at leachate lagoons.
*** Manholes assumed every 500 ft along pipeline.

N
TRUE NORTH

CORTLAND COUNTY LANDFILL
PUMP STATION AT LEACHATE TANK
ROAD CROSSING
PUMP STATION AT 1.44 MILES 1,365 FT
MAX ELEV.: 1,481 FT
155 FT MAX ELEV. INCREASE
ROAD CROSSING
TIE-IN TO MCGRAW FORCEMAIN AT PROPOSED VALVE STATION
MCGRAW
LCH

443 Electronics Parkway
Liverpool, NY
13088
Barton & Loguidice, D.P.C.

1500' 0 1500'
1"=1500'

CORTLAND COUNTY HIGHWAY DEPARTMENT
CORTLAND COUNTY LANDFILL

LEACHATE CONVEYANCE PIPELINE OPTION 3

TOWN OF CORTLANDVILLE/SOLON CORTLAND COUNTY, NEW YORK

Date	Scale
JANUARY 2023	1" = 1500'

Figure Number 3

Project Number 331.156.001

Figure 4

Leachate Conveyance Piping Layout
Option 4: North Along Route 116B to Cortland Sewer System

N

TRUE NORTH

2000' 0 2000'

1"=2000'

EAST HOMER

PUMP STATION AT 1.33 MILES
1,707 FT
ROAD CROSSING

PUMP STATION AT 2.5 MILES
1,429 FT

ROAD CROSSING

RIVER CROSSING AT 5.6 MILES

PUMP STATION AT RIVER CROSSING
1,113 FT

ROAD CROSSING

ROAD CROSSING (X2)

MAX ELEV.: 1,845 FT
192 FT MAX ELEV. GAIN

CORTLAND COUNTY LANDFILL

PUMP STATION AT
LEACHATE TANK

TIE-IN TO CORTLAND SEWER SYSTEM
AT PROPOSED VALVE STATION

CORTLAND

LCH

Path ID		Distance (Miles)	Max Head Gain (FT)*	No. of Pump Stations**	No. of Valve Stations	No. of Manholes***	Road Crossings	River Crossings
Option 4	North Along 116B	6.96	192	4	1	74	5	1

* Elevation gain reported from Google Earth - elevations to be verified in the field.
** Includes initial pump station at leachate lagoons.
*** Manholes assumed every 500 ft along pipeline.

CORTLAND COUNTY HIGHWAY DEPARTMENT
CORTLAND COUNTY LANDFILL

LEACHATE CONVEYANCE PIPELINE
OPTION 4

CORTLAND COUNTY, NEW YORK

TOWN OF CORTLANDVILLE/SOLON

B&L
Barton & Loguidice, D.P.C.
443 Electronics Parkway
Liverpool, NY
13088

Date
JANUARY 2023

Scale
1" = 2000'

Figure Number
4

Project Number
331.156.001

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Figure 5

Leachate Conveyance Piping Layout
Option 5: North Along Route 114 to Cortland Sewer System

N

TRUE NORTH

2500' 0 2500'

1"=2500'

EAST HOMER

PUMP STATION AT 3.86 MILES
1,135 FT

ROAD CROSSING

ROAD CROSSING

MAX ELEV.: 1,845 FT
192 FT MAX ELEV. GAIN

RIVER CROSSING AT 8.35 MILES

ROAD CROSSING

ROAD CROSSING (X2)

PUMP STATION AT RIVER CROSSING
1,113 FT

TIE-IN TO CORTLAND SEWER SYSTEM AT
PROPOSED VALVE STATION

CORTLAND

CORTLAND COUNTY LANDFILL

PUMP STATION AT
LEACHATE TANK

Path ID		Distance (Miles)	Max Head Gain (FT)*	No. of Pump Stations**	No. of Valve Stations	No. of Manholes***	Road Crossings	River Crossings
Option 5	North Along 114	9.73	192	3	1	103	5	1

* Elevation gain reported from Google Earth - elevations to be verified in the field.
** Includes initial pump station at leachate lagoons.
*** Manholes assumed every 500 ft along pipeline.

CORTLAND COUNTY HIGHWAY DEPARTMENT
CORTLAND COUNTY LANDFILL

LEACHATE CONVEYANCE PIPELINE
OPTION 5

CORTLAND COUNTY, NEW YORK

TOWN OF CORTLANDVILLE/SOLON

B&L
443 Electronics Parkway
Liverpool, NY
13088
Barton & Loguidice, D.P.C.

Date
JANUARY 2023

Scale
1" = 2500'

Figure Number
5

Project Number
331.156.001

Plotted: Feb 06, 2023 – 2:36PM SYR By: erabbia
C:\Users\erabbia\AppData\Local\Temp\AcPublish_15552\331156 Pipeline Options (ID 2647958).dwg

Appendix A

Leachate Generation Estimates

Cortland County Landfill
Projected Leachate Generation Rate
Permitted Conditions

Year	Month	Acres Developed	Average Monthly Leachate Generated (Gal/ac)	Total Monthly Leachate Generated (Gal)	Peak 3-Month Flow (Gal)
2022	January	23.66	38,189.27	903,558.20	
	February	23.66	36,972.98	874,780.60	
	March	23.66	34,970.25	827,396.00	2,605,734.80
	April	23.66	30,245.86	715,617.00	2,417,793.60
	May	23.66	22,305.40	527,745.80	2,070,758.80
	June	23.66	22,564.04	533,865.20	1,777,228.00
	July	23.66	30,897.09	731,025.20	1,792,636.20
	August	23.66	20,616.09	487,776.80	1,752,667.20
	September	23.66	21,937.81	519,048.60	1,737,850.60
	October	23.66	30,756.32	727,694.60	1,734,520.00
	November	23.66	34,197.14	809,104.40	2,055,847.60
	December	23.66	35,679.22	844,170.40	2,380,969.40
Total				**8,501,782.80**	
2023	January	23.66	38,189.27	903,558.20	2,556,833.00
	February	23.66	36,972.98	874,780.60	2,622,509.20
	March	23.66	34,970.25	827,396.00	2,605,734.80
	April	23.66	30,245.86	715,617.00	2,417,793.60
	May	23.66	22,305.40	527,745.80	2,070,758.80
	June	27.06	22,564.04	610,582.94	1,853,945.74
	July	27.06	30,897.09	836,075.31	1,974,404.05
	August	27.06	20,616.09	557,871.52	2,004,529.77
	September	27.06	21,937.81	593,637.16	1,987,583.99
	October	27.06	30,756.32	832,266.10	1,983,774.78
	November	27.06	34,197.14	925,374.69	2,351,277.94
	December	27.06	35,679.22	965,479.76	2,723,120.54
Total				**9,170,385.07**	
2024	January	27.06	38,189.27	1,033,401.73	2,924,256.17
	February	27.06	36,972.98	1,000,488.72	2,999,370.20
	March	27.06	34,970.25	946,294.83	2,980,185.28
	April	27.06	30,245.86	818,452.92	2,765,236.47
	May	27.06	22,305.40	603,584.17	2,368,331.92
	June	27.06	22,564.04	610,582.94	2,032,620.02
	July	27.06	30,897.09	836,075.31	2,050,242.42
	August	27.06	20,616.09	557,871.52	2,004,529.77
	September	27.06	21,937.81	593,637.16	1,987,583.99
	October	27.06	30,756.32	832,266.10	1,983,774.78
	November	27.06	34,197.14	925,374.69	2,351,277.94
	December	27.06	35,679.22	965,479.76	2,723,120.54
Total				**9,723,509.83**	
2025	January	27.06	38,189.27	1,033,401.73	2,924,256.17
	February	27.06	36,972.98	1,000,488.72	2,999,370.20
	March	27.06	34,970.25	946,294.83	2,980,185.28
	April	27.06	30,245.86	818,452.92	2,765,236.47
	May	27.06	22,305.40	603,584.17	2,368,331.92
	June	27.06	22,564.04	610,582.94	2,032,620.02
	July	27.06	30,897.09	836,075.31	2,050,242.42
	August	27.06	20,616.09	557,871.52	2,004,529.77
	September	27.06	21,937.81	593,637.16	1,987,583.99
	October	27.06	30,756.32	832,266.10	1,983,774.78
	November	27.06	34,197.14	925,374.69	2,351,277.94
	December	27.06	35,679.22	965,479.76	2,723,120.54
Total				**9,723,509.83**	

Cortland County Landfill
Projected Leachate Generation Rate
Permitted Conditions

Year	Month	Acres Developed	Average Monthly Leachate Generated (Gal/ac)	Total Monthly Leachate Generated (Gal)	Peak 3-Month Flow (Gal)
2026	January	27.06	38,189.27	1,033,401.73	2,924,256.17
	February	27.06	36,972.98	1,000,488.72	2,999,370.20
	March	27.06	34,970.25	946,294.83	2,980,185.28
	April	27.06	30,245.86	818,452.92	2,765,236.47
	May	27.06	22,305.40	603,584.17	2,368,331.92
	June	27.06	22,564.04	610,582.94	2,032,620.02
	July	27.06	30,897.09	836,075.31	2,050,242.42
	August	27.06	20,616.09	557,871.52	2,004,529.77
	September	27.06	21,937.81	593,637.16	1,987,583.99
	October	27.06	30,756.32	832,266.10	1,983,774.78
	November	27.06	34,197.14	925,374.69	2,351,277.94
	December	27.06	35,679.22	965,479.76	2,723,120.54
Total				**9,723,509.83**	
2027	January	27.06	38,189.27	1,033,401.73	2,924,256.17
	February	27.06	36,972.98	1,000,488.72	2,999,370.20
	March	27.06	34,970.25	946,294.83	2,980,185.28
	April	27.06	30,245.86	818,452.92	2,765,236.47
	May	27.06	22,305.40	603,584.17	2,368,331.92
	June	27.06	22,564.04	610,582.94	2,032,620.02
	July	27.06	30,897.09	836,075.31	2,050,242.42
	August	27.06	20,616.09	557,871.52	2,004,529.77
	September	27.06	21,937.81	593,637.16	1,987,583.99
	October	27.06	30,756.32	832,266.10	1,983,774.78
	November	27.06	34,197.14	925,374.69	2,351,277.94
	December	27.06	35,679.22	965,479.76	2,723,120.54
Total				**9,723,509.83**	
2028	January	27.06	38,189.27	1,033,401.73	2,924,256.17
	February	27.06	36,972.98	1,000,488.72	2,999,370.20
	March	27.06	34,970.25	946,294.83	2,980,185.28
	April	27.06	30,245.86	818,452.92	2,765,236.47
	May	27.06	22,305.40	603,584.17	2,368,331.92
	June	27.06	22,564.04	610,582.94	2,032,620.02
	July	27.06	30,897.09	836,075.31	2,050,242.42
	August	27.06	20,616.09	557,871.52	2,004,529.77
	September	27.06	21,937.81	593,637.16	1,987,583.99
	October	27.06	30,756.32	832,266.10	1,983,774.78
	November	27.06	34,197.14	925,374.69	2,351,277.94
	December	27.06	35,679.22	965,479.76	2,723,120.54
Total				**9,723,509.83**	
2029	January	27.06	38,189.27	1,033,401.73	2,924,256.17
	February	27.06	36,972.98	1,000,488.72	2,999,370.20
	March	27.06	34,970.25	946,294.83	2,980,185.28
	April	27.06	30,245.86	818,452.92	2,765,236.47
	May	27.06	22,305.40	603,584.17	2,368,331.92
	June	27.06	22,564.04	610,582.94	2,032,620.02
	July	27.06	30,897.09	836,075.31	2,050,242.42
	August	27.06	20,616.09	557,871.52	2,004,529.77
	September	27.06	21,937.81	593,637.16	1,987,583.99
	October	27.06	30,756.32	832,266.10	1,983,774.78
	November	27.06	34,197.14	925,374.69	2,351,277.94
	December	27.06	35,679.22	965,479.76	2,723,120.54
Total				**9,723,509.83**	

Cortland County Landfill
Projected Leachate Generation Rate
Permitted Conditions

Year	Month	Acres Developed	Average Monthly Leachate Generated (Gal/ac)	Total Monthly Leachate Generated (Gal)	Peak 3-Month Flow (Gal)
2030	January	27.06	38,189.27	1,033,401.73	2,924,256.17
	February	30.76	36,972.98	1,137,288.73	3,136,170.21
	March	30.76	34,970.25	1,075,684.74	3,246,375.19
	April	30.76	30,245.86	930,362.59	3,143,336.06
	May	30.76	22,305.40	686,114.15	2,692,161.48
	June	30.76	22,564.04	694,069.89	2,310,546.63
	July	30.76	30,897.09	950,394.55	2,330,578.59
	August	30.76	20,616.09	634,151.07	2,278,615.51
	September	30.76	21,937.81	674,807.06	2,259,352.68
	October	30.76	30,756.32	946,064.49	2,255,022.62
	November	30.76	34,197.14	1,051,904.11	2,672,775.66
	December	30.76	35,679.22	1,097,492.88	3,095,461.49
Total				**10,911,735.99**	
2031	January	30.76	38,189.27	1,174,702.04	3,324,099.03
	February	30.76	36,972.98	1,137,288.73	**3,409,483.64**
	March	30.76	34,970.25	1,075,684.74	3,387,675.50
	April	30.76	30,245.86	930,362.59	3,143,336.06
	May	30.76	22,305.40	686,114.15	2,692,161.48
	June	30.76	22,564.04	694,069.89	2,310,546.63
	July	30.76	30,897.09	950,394.55	2,330,578.59
	August	30.76	20,616.09	634,151.07	2,278,615.51
	September	30.76	21,937.81	674,807.06	2,259,352.68
	October	30.76	30,756.32	946,064.49	2,255,022.62
	November	30.76	34,197.14	1,051,904.11	2,672,775.66
	December	30.76	35,679.22	1,097,492.88	3,095,461.49
Total				**11,053,036.30**	
2032	January	30.76	38,189.27	1,174,702.04	3,324,099.03
	February	30.76	36,972.98	1,137,288.73	**3,409,483.64**
	March	30.76	34,970.25	1,075,684.74	3,387,675.50
	April	30.76	30,245.86	930,362.59	3,143,336.06
	May	30.76	22,305.40	686,114.15	2,692,161.48
	June	30.76	22,564.04	694,069.89	2,310,546.63
	July	30.76	30,897.09	950,394.55	2,330,578.59
	August	30.76	20,616.09	634,151.07	2,278,615.51
	September	30.76	21,937.81	674,807.06	2,259,352.68
	October	30.76	30,756.32	946,064.49	2,255,022.62
	November	30.76	34,197.14	1,051,904.11	2,672,775.66
	December	30.76	35,679.22	1,097,492.88	3,095,461.49
Total				**11,053,036.30**	
2033	January	30.76	38,189.27	1,174,702.04	3,324,099.03
	February	30.76	36,972.98	1,137,288.73	**3,409,483.64**
	March	30.76	34,970.25	1,075,684.74	3,387,675.50
	April	30.76	30,245.86	930,362.59	3,143,336.06
	May	30.76	22,305.40	686,114.15	2,692,161.48
	June	30.76	22,564.04	694,069.89	2,310,546.63
	July	30.76	30,897.09	950,394.55	2,330,578.59
	August	30.76	20,616.09	634,151.07	2,278,615.51
	September	30.76	21,937.81	674,807.06	2,259,352.68
	October	30.76	30,756.32	946,064.49	2,255,022.62
	November	30.76	34,197.14	1,051,904.11	2,672,775.66
	December	30.76	35,679.22	1,097,492.88	3,095,461.49
Total				**11,053,036.30**	

Cortland County Landfill
Projected Leachate Generation Rate
Permitted Conditions

Year	Month	Acres Developed	Average Monthly Leachate Generated (Gal/ac)	Total Monthly Leachate Generated (Gal)	Peak 3-Month Flow (Gal)
2034	January	30.76	38,189.27	1,174,702.04	3,324,099.03
	February	30.76	36,972.98	1,137,288.73	**3,409,483.64**
	March	30.76	34,970.25	1,075,684.74	3,387,675.50
	April	30.76	30,245.86	930,362.59	3,143,336.06
	May	30.76	22,305.40	686,114.15	2,692,161.48
	June	30.76	22,564.04	694,069.89	2,310,546.63
	July	30.76	30,897.09	950,394.55	2,330,578.59
	August	30.76	20,616.09	634,151.07	2,278,615.51
	September	30.76	21,937.81	674,807.06	2,259,352.68
	October	30.76	30,756.32	946,064.49	2,255,022.62
	November	30.76	34,197.14	1,051,904.11	2,672,775.66
	December	30.76	35,679.22	1,097,492.88	3,095,461.49
Total				**11,053,036.30**	
2035	January	30.76	38,189.27	1,174,702.04	3,324,099.03
	February	30.76	36,972.98	1,137,288.73	**3,409,483.64**
	March	30.76	34,970.25	1,075,684.74	3,387,675.50
	April	30.76	30,245.86	930,362.59	3,143,336.06
	May	30.76	22,305.40	686,114.15	2,692,161.48
	June	30.76	22,564.04	694,069.89	2,310,546.63
	July	30.76	30,897.09	950,394.55	2,330,578.59
	August	30.76	20,616.09	634,151.07	2,278,615.51
	September	30.76	21,937.81	674,807.06	2,259,352.68
	October	30.76	30,756.32	946,064.49	2,255,022.62
	November	30.76	34,197.14	1,051,904.11	2,672,775.66
	December	30.76	35,679.22	1,097,492.88	3,095,461.49
Total				**11,053,036.30**	
2036	January	30.76	38,189.27	1,174,702.04	3,324,099.03
	February	30.76	36,972.98	1,137,288.73	**3,409,483.64**
	March	30.76	34,970.25	1,075,684.74	3,387,675.50
	April	30.76	30,245.86	930,362.59	3,143,336.06
	May	30.76	22,305.40	686,114.15	2,692,161.48
	June	30.76	22,564.04	694,069.89	2,310,546.63
	July	30.76	30,897.09	950,394.55	2,330,578.59
	August	30.76	20,616.09	634,151.07	2,278,615.51
	September	30.76	21,937.81	674,807.06	2,259,352.68
	October	30.76	30,756.32	946,064.49	2,255,022.62
	November	30.76	34,197.14	1,051,904.11	2,672,775.66
	December	30.76	35,679.22	1,097,492.88	3,095,461.49
Total				**11,053,036.30**	
2037	January	30.76	38,189.27	1,174,702.04	3,324,099.03
	February	30.76	36,972.98	1,137,288.73	**3,409,483.64**
	March	30.76	34,970.25	1,075,684.74	3,387,675.50
	April	30.76	30,245.86	930,362.59	3,143,336.06
	May	30.76	22,305.40	686,114.15	2,692,161.48
	June	30.76	22,564.04	694,069.89	2,310,546.63
	July	30.76	30,897.09	950,394.55	2,330,578.59
	August	30.76	20,616.09	634,151.07	2,278,615.51
	September	30.76	21,937.81	674,807.06	2,259,352.68
	October	30.76	30,756.32	946,064.49	2,255,022.62
	November	30.76	34,197.14	1,051,904.11	2,672,775.66
	December	30.76	35,679.22	1,097,492.88	3,095,461.49
Total				**11,053,036.30**	

Cortland County Landfill
Projected Leachate Generation Rate
Permitted Conditions

Year	Month	Acres Developed	Average Monthly Leachate Generated (Gal/ac)	Total Monthly Leachate Generated (Gal)	Peak 3-Month Flow (Gal)
2038	January	30.76	38,189.27	1,174,702.04	3,324,099.03
	February	30.76	36,972.98	1,137,288.73	**3,409,483.64**
	March	30.76	34,970.25	1,075,684.74	3,387,675.50
	April	30.76	30,245.86	930,362.59	3,143,336.06
	May	30.76	22,305.40	686,114.15	2,692,161.48
	June	30.76	22,564.04	694,069.89	2,310,546.63
	July	30.76	30,897.09	950,394.55	2,330,578.59
	August	30.76	20,616.09	634,151.07	2,278,615.51
	September	30.76	21,937.81	674,807.06	2,259,352.68
	October	30.76	30,756.32	946,064.49	2,255,022.62
	November	30.76	34,197.14	1,051,904.11	2,672,775.66
	December	30.76	35,679.22	1,097,492.88	3,095,461.49
Total				**11,053,036.30**	
2039	January	30.76	38,189.27	1,174,702.04	3,324,099.03
	February	30.76	36,972.98	1,137,288.73	**3,409,483.64**
	March	30.76	34,970.25	1,075,684.74	3,387,675.50
	April	30.76	30,245.86	930,362.59	3,143,336.06
	May	30.76	22,305.40	686,114.15	2,692,161.48
	June	30.76	22,564.04	694,069.89	2,310,546.63
	July	30.76	30,897.09	950,394.55	2,330,578.59
	August	30.76	20,616.09	634,151.07	2,278,615.51
	September	30.76	21,937.81	674,807.06	2,259,352.68
	October	30.76	30,756.32	946,064.49	2,255,022.62
	November	30.76	34,197.14	1,051,904.11	2,672,775.66
	December	30.76	35,679.22	1,097,492.88	3,095,461.49
Total				**11,053,036.30**	
2040	January	30.76	38,189.27	1,174,702.04	3,324,099.03
	February	30.76	36,972.98	1,137,288.73	**3,409,483.64**
	March	30.76	34,970.25	1,075,684.74	3,387,675.50
	April	30.76	30,245.86	930,362.59	3,143,336.06
	May	30.76	22,305.40	686,114.15	2,692,161.48
	June	30.76	22,564.04	694,069.89	2,310,546.63
	July	30.76	30,897.09	950,394.55	2,330,578.59
	August	30.76	20,616.09	634,151.07	2,278,615.51
	September	30.76	21,937.81	674,807.06	2,259,352.68
	October	30.76	30,756.32	946,064.49	2,255,022.62
	November	30.76	34,197.14	1,051,904.11	2,672,775.66
	December	30.76	35,679.22	1,097,492.88	3,095,461.49
Total				**11,053,036.30**	
2041	January	30.76	38,189.27	1,174,702.04	3,324,099.03
	February	30.76	36,972.98	1,137,288.73	**3,409,483.64**
	March	30.76	34,970.25	1,075,684.74	3,387,675.50
	April	30.76	30,245.86	930,362.59	3,143,336.06
	May	30.76	22,305.40	686,114.15	2,692,161.48
	June	30.76	22,564.04	694,069.89	2,310,546.63
	July	30.76	30,897.09	950,394.55	2,330,578.59
	August	30.76	20,616.09	634,151.07	2,278,615.51
	September	30.76	21,937.81	674,807.06	2,259,352.68
	October	30.76	30,756.32	946,064.49	2,255,022.62
	November	30.76	34,197.14	1,051,904.11	2,672,775.66
	December	30.76	35,679.22	1,097,492.88	3,095,461.49
Total				**11,053,036.30**	

Cortland County Landfill
Projected Leachate Generation Rate
Permitted Conditions

Year	Month	Acres Developed	Average Monthly Leachate Generated (Gal/ac)	Total Monthly Leachate Generated (Gal)	Peak 3-Month Flow (Gal)
2042	January	30.76	38,189.27	1,174,702.04	3,324,099.03
	February	30.76	36,972.98	1,137,288.73	**3,409,483.64**
	March	30.76	34,970.25	1,075,684.74	3,387,675.50
	April	30.76	30,245.86	930,362.59	3,143,336.06
	May	30.76	22,305.40	686,114.15	2,692,161.48
	June	30.76	22,564.04	694,069.89	2,310,546.63
	July	30.76	30,897.09	950,394.55	2,330,578.59
	August	30.76	20,616.09	634,151.07	2,278,615.51
	September	30.76	21,937.81	674,807.06	2,259,352.68
	October	30.76	30,756.32	946,064.49	2,255,022.62
	November	30.76	34,197.14	1,051,904.11	2,672,775.66
	December	30.76	35,679.22	1,097,492.88	3,095,461.49
Total				**11,053,036.30**	
2043	January	30.76	38,189.27	1,174,702.04	3,324,099.03
	February	30.76	36,972.98	1,137,288.73	**3,409,483.64**
	March	30.76	34,970.25	1,075,684.74	3,387,675.50
	April	30.76	30,245.86	930,362.59	3,143,336.06
	May	30.76	22,305.40	686,114.15	2,692,161.48
	June	30.76	22,564.04	694,069.89	2,310,546.63
	July	30.76	30,897.09	950,394.55	2,330,578.59
	August	30.76	20,616.09	634,151.07	2,278,615.51
	September	30.76	21,937.81	674,807.06	2,259,352.68
	October	30.76	30,756.32	946,064.49	2,255,022.62
	November	30.76	34,197.14	1,051,904.11	2,672,775.66
	December	30.76	35,679.22	1,097,492.88	3,095,461.49
Total				**11,053,036.30**	
2044	January	30.76	38,189.27	1,174,702.04	3,324,099.03
	February	30.76	36,972.98	1,137,288.73	**3,409,483.64**
	March	30.76	34,970.25	1,075,684.74	3,387,675.50
	April	30.76	30,245.86	930,362.59	3,143,336.06
	May	30.76	22,305.40	686,114.15	2,692,161.48
	June	30.76	22,564.04	694,069.89	2,310,546.63
	July	30.76	30,897.09	950,394.55	2,330,578.59
	August	30.76	20,616.09	634,151.07	2,278,615.51
	September	30.76	21,937.81	674,807.06	2,259,352.68
	October	30.76	30,756.32	946,064.49	2,255,022.62
	November	30.76	34,197.14	1,051,904.11	2,672,775.66
	December	30.76	35,679.22	1,097,492.88	3,095,461.49
Total				**11,053,036.30**	
2045	January	30.76	38,189.27	1,174,702.04	3,324,099.03
	February	30.76	36,972.98	1,137,288.73	**3,409,483.64**
	March	30.76	34,970.25	1,075,684.74	3,387,675.50
	April	30.76	30,245.86	930,362.59	3,143,336.06
	May	30.76	22,305.40	686,114.15	2,692,161.48
	June	30.76	22,564.04	694,069.89	2,310,546.63
	July	30.76	30,897.09	950,394.55	2,330,578.59
	August	30.76	20,616.09	634,151.07	2,278,615.51
	September	30.76	21,937.81	674,807.06	2,259,352.68
	October	30.76	30,756.32	946,064.49	2,255,022.62
	November	30.76	34,197.14	1,051,904.11	2,672,775.66
	December	30.76	35,679.22	1,097,492.88	3,095,461.49
Total				**11,053,036.30**	

Cortland County Landfill
Projected Leachate Generation Rate
Permitted Conditions

Year	Month	Acres Developed	Average Monthly Leachate Generated (Gal/ac)	Total Monthly Leachate Generated (Gal)	Peak 3-Month Flow (Gal)
2046	January	30.76	38,189.27	1,174,702.04	3,324,099.03
	February	30.76	36,972.98	1,137,288.73	**3,409,483.64**
	March	30.76	34,970.25	1,075,684.74	3,387,675.50
	April	30.76	30,245.86	930,362.59	3,143,336.06
	May	30.76	22,305.40	686,114.15	2,692,161.48
	June	30.76	22,564.04	694,069.89	2,310,546.63
	July	30.76	30,897.09	950,394.55	2,330,578.59
	August	30.76	20,616.09	634,151.07	2,278,615.51
	September	30.76	21,937.81	674,807.06	2,259,352.68
	October	30.76	30,756.32	946,064.49	2,255,022.62
	November	30.76	34,197.14	1,051,904.11	2,672,775.66
	December	30.76	35,679.22	1,097,492.88	3,095,461.49
Total				**11,053,036.30**	
2047	January	30.76	38,189.27	1,174,702.04	3,324,099.03
	February	30.76	36,972.98	1,137,288.73	**3,409,483.64**
	March	30.76	34,970.25	1,075,684.74	3,387,675.50
	April	30.76	30,245.86	930,362.59	3,143,336.06
	May	30.76	22,305.40	686,114.15	2,692,161.48
	June	30.76	22,564.04	694,069.89	2,310,546.63
	July	30.76	30,897.09	950,394.55	2,330,578.59
	August	30.76	20,616.09	634,151.07	2,278,615.51
	September	30.76	21,937.81	674,807.06	2,259,352.68
	October	30.76	30,756.32	946,064.49	2,255,022.62
	November	30.76	34,197.14	1,051,904.11	2,672,775.66
	December	30.76	35,679.22	1,097,492.88	3,095,461.49
Total				**11,053,036.30**	

Appendix B

Historical Leachate Quality Data

LTCS

Trends in water quality 2015-2021. Metals units are mg/L, organics units are µg/L. Historic minimum and maximum and the years in which they occurred are included for each parameter.

Period	Temperature (°C)	EH/ORP (mV)	pH	Conductivity (umhos/cm)	Dissolved Oxygen (mg/L)	Color (Color Units)	Turbidity (NTU)	Alkalinity, Total (mg/L)	Hardness (mg/L)	Total Dissolved Solids (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Bromide (mg/L)	Boron (mg/L)	Nitrate as N (mg/L)	Ammonia (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Chemical Oxygen Demand (mg/L)	Biochemical Oxygen Demand (mg/L)	Total Organic Carbon (mg/L)	Sulfide (mg/L)	Phenolics, Total Recoverable (mg/L)	Cyanide, Total (mg/L)
Min	4.3	-188	6.44	255	0.2	5	2.53	460	490	550	54.4	<10	<0.1	0.848	<0.1	1.57	1.69	27	10	6.4	<0.1	<0.05	<0.00001
Min Year	2013	2015	2007	2009	2015	2012	2008	2012	2012	2012	2012	mult	mult	2012	2006	2012	2012	2012	2012	2012	mult	mult	2008
Max	22.2	329.1	9.05	9053	8.25	1350	326	3700	3000	4910	1260	112	94.9	16.8	23.6	463	463	2580	2110	958	3.99	1.26	0.012
Max Year	2021	2016	2009	2014	2018	2012	2010	2008	2005	2008	2016	2011	2014	2015	2010	2018	2008	2008	2008	2008	2006	2011	2017
2015Q2	18.99	-188	7.64	7153	0.2	300	8.99	2140	946	2980	1070	96.6	<20	16.8	<0.05	244	240	622	253	180	<0.1	0.14	0.01
2015Q4	11.72	-108	7.56	7022	4.5	300		3240	1050	3550	1140	<5	5.7	12.6	0.68	403	450	515	48.4	144	<0.1	0.038	<0.01
2016Q2	19.24	-173	7.55	8016	1.4	500	17	2400	740	3610	1260	<5	3.5	13.6	<0.05	302	361	528	27.2	181	<0.1	0.056	<0.01
2016Q4	9.17	329.1	7.2	5573	1.19		24									288			283			0.069	<0.01
2017Q2	10.24	47	7.74	7215	1.21		38									320			33.7			0.028	0.012
2017Q4	13.28	-11.2	6.89	3689	4.51											250			35.4			0.027	<0.01
2018Q2	10.75	20.6	7.48	8551	8.25											463			229			0.45	<0.01
2018Q4	5.59	147.6	7.61	7700	1.24		28									460			61.6			0.063	<0.01
2019Q2	12.31	26.14	8.03	6507	7.37											405			44.2			0.1	<0.01
2019Q4																362			47			0.039	0.011
2020Q2	20.8	77.8	8.37	7025	2.13		8.84									247			16.2			0.017	<0.01
2020Q4	13.4	88.2	7.86	6136	4.68		13.5									382			19.8			0.045	<0.01
2021Q2	22.2	118.4	7.79	6697	2.12		9.85									333			114			0.014	<0.01
2021Q4	3.8	171.6	6.84	2887	1.25		10.04									213			10.1			<0.01	<0.01

J - value is estimated because sample did not meet laboratory QAQC protocol

mult - multiple detections

nd - not detected

LTCS

Trends in water quality 2015-2021. Metals units are mg/L, organics units are µg/L. Historic minimum and maximum and the years in which they occurred are included for each parameter.

Period	Aluminum	Antimony	Tin	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Chromium, hexavalent	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Sodium	Selenium	Silver	Thallium	Vanadium	Zinc
Min	<0.1	<0.015	<0.01	<0.01	0.158	<0.002	<0.002	106	0.0116	<0.01	<0.02	<0.01	2.3	<0.003	23.5	0.569	<0.0002	0.035	<5	26.5	<0.005	<0.0006	<0.0006	<0.03	<0.01
Min Year	mult	2007	mult	mult	2008	mult	mult	2016	2006	mult	mult	mult	2020	mult	2012	2008	mult	2006	2006	2011	mult	2013	2013	mult	2010
Max	0.33	0.087	<0.5	0.049	0.969	<0.005	0.0013	348	0.455	0.31	0.032	0.197	29.3	0.058	176	4.4	<0.0002	0.187	329	1360	0.033	<0.01	0.0147	0.009	5.35
Max Year	2015	2006	nd	2018	2012	nd	2005	2011	2008	2007	2008	2012	2012	2012	2009	2013	nd	2009	2009	2008	2006	nd	2009	2016	2008
2015Q2	0.33	<0.02	<0.01	0.032	0.42	<0.002	<0.002	219	0.029	<0.05	0.007	<0.01	2.9	<0.01	96.8	2.2	<0.0002	0.06	150	687	<0.025	<0.006	<0.02	0.006	0.11
2015Q4	<0.2	<0.02	<0.01	0.02	0.67	<0.002	<0.002	233	0.029	<0.01	0.011	<0.01	8.5	<0.01	114	2.4	<0.0002	0.097	224	907	<0.025	<0.006	<0.02	0.007	0.036
2016Q2	0.21	<0.02	<0.01	0.023	0.33	<0.002	<0.002	106	0.033	<0.01	0.01	<0.01	3	<0.01	115	0.59	<0.0002	0.095	234	945	<0.025	<0.006	<0.02	0.009	0.016
2016Q4				0.021			<0.002		0.024			<0.01	7.9	<0.01				0.062			<0.025	<0.006			0.036
2017Q2				0.027			<0.002		0.036			<0.01	3.7	<0.01				0.068			<0.025	<0.006			0.039
2017Q4		<0.02		0.021		<0.002	<0.002		0.025			<0.01		<0.01				0.054			<0.025	<0.006	<0.02		0.017
2018Q2																									
2018Q4				0.049			<0.002		0.07			<0.01	3.9	<0.01				0.11			<0.025	<0.006			0.082
2019Q2				0.029			<0.002		0.052			<0.01	3.3	<0.01				0.1			<0.025	<0.006			0.1
2019Q4				0.048			<0.002		0.074			0.015	6.2	<0.01				0.096			<0.025	<0.006			0.057
2020Q2				0.037			<0.002		0.049			<0.01	2.3	<0.01				0.1			<0.025	<0.006			0.017
2020Q4				0.033			<0.002		0.042			0.011	4.4	<0.01				0.075			<0.025	<0.006			0.034
2021Q2				0.037			<0.002		0.049			0.01	2.8	<0.01				0.085			<0.025	<0.006			0.036
2021Q4				0.021			<0.002		0.024			<0.01	2	<0.01				0.045			<0.025	<0.006			0.037

J - value is estimated because sample did not meet laboratory QAQC protocol

mult - multiple detections

nd - not detected

LTCS

Trends in water quality 2015-2021. Metals units are mg/L, organics units are µg/L. Historic minimum and maximum and the years in which they occurred are included for each parameter.

Period	Benzene	Methylene chloride	Carbon disulfide	Toluene	Ethylbenzene	Bromodichloromethane	Chloroethane	Phenol	Chloroform	Chloromethane	1,2-Dichlorobenzene	cis-1,2-Dichloroethene	1,4-Dichlorobenzene	Dichlorodifluoromethane	1,1-Dichloroethane	1,2-Dichloroethane	Tetrachloroethene	1,1,1-Trichloroethane	Trichloroethene	Trichlorofluoromethane
Min	<1	<1	<5	<1	<1	<0.625	<0.625	<5	<0.313	<1	<0.313	<1	<2.5	<0.625	<0.313	<1	<0.625	<0.625	<0.625	<250
Min Year	2020	2020	2012	2020	2020	2013	2013	2020	2013	2020	2013	2020	2013	2013	2013	2020	2013	2013	2013	2013
Max	1.6	110	4.43	21	4.88	<250	3.2	600	<250	<250	<540	0.756	1.4	<250	<250	0.811	<250	<250	<250	<250
Max Year	2013	2010	2013	2005	2013	nd	2020	2008	nd	nd	nd	2013	2020	nd	nd	2013	nd	nd	nd	nd
2015Q2	<10	<10	<10	<10	<10	<10	<10	<60	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2015Q4	<10	<10	<10	<10	<10	<10	<10	<20	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2016Q2	<10	<10	<10	<10	<10	<10	<10	<53	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2016Q4	<50	<50		<50	<50	<50	<50	<200	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
2017Q2	<50	<50		<50	<50	<50	<50	<49	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
2017Q4	<50	<50		<50	<50	<50	<50	<53	<50	<50	<50		<50		<50	<50	<50	<50	<50	
2018Q2	<50	<50		<50	<50	<50	<50	<250	<50	<50	<50		<50		<50	<50	<50	<50	<50	
2018Q4	<50	<50		<50	<50	<50	<50	<250	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
2019Q2	<25	<25		<25	<25	<25	<25	<50	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
2019Q4	<100	<100		<100	<100	<100	<100	<50	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
2020Q2	<100	<100		<100	<100	<100	<100	<5	<100	<100	<10	<100	<10	<100	<100	<100	<100	<100	<100	<100
2020Q4	<1	<1		<1	<1	<1	3.2	<50	<1	<1	<1	<1	1.4	<1	<1	<1	<1	<1	<1	<1
2021Q2	<1	<1		<1	<1	<1	<1	<50	<1	<1	<50.5	<1	<50.5	<1	<1	<1	<1	<1	<1	<1
2021Q4	<100	<100		<100	<100	<100	<100	<5	<100	<100	<55	<100	<55	<100	<100	<100	<100	<100	<100	<100

mult - multiple detections

nd - not detected

detected organic

LTCS

Trends in water quality 2015-2021. Metals units are mg/L, organics units are µg/L. Historic minimum and maximum and the years in which they occurred are included for each parameter.

Period	Acetone	2-Butanone (MEK)	2-Hexanone	4-Methyl-2-pentanone (MIBK)	Vinyl chloride	1,2-Dibromo-3-chloropropane	Parathion methyl	4-Chloro-3-methylphenol	Diethyl phthalate	Bis(2-ethylhexyl) phthalate	Naphthalene	Acetophenone	m,p-Xylene	o-Xylene	Xylenes, Total	3 & 4 Methylphenol	3-Methylphenol	4-Methylphenol	Bromomethane
Min	<510	<10	<6.25	<10	<0.625	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<5	<5	<20	<40	<20	<20	<1
Min Year	2012	2012	2013	2012	2013	2013	2013	2013	2013	2013	2013	2013	2012	2012	mult	2015	2006	2006	2020
Max	7800	7200	<500	14.1	<250	<500	<540	<1000	30	2.9	4	<1000	40	2.19	4.7	160	190	190	<250
Max Year	2008	2008	nd	2013	nd	nd	nd	nd	2006	2012	2007	nd	2007	2013	2020	2013	2005	2005	nd
2015Q2	710	480	<50	<50	<10	<10	<120	<60	<60	<60	<10	<60	<20	<10	<20	<120	<120	<120	<10
2015Q4	<100	<100	<50	<50	<10	<10	<40	<20	<20	<20	<10	<20	<20	<10	<20	<40	<40	<40	<10
2016Q2	<100	<100	<50	<50	<10	<10	<110	<53	<53	<53	<10	<53	<20	<10	<20	<110	<110	<110	<10
2016Q4					<50			<200	<200	<400	<200			<50	<100				<50
2017Q2					<50			<49	<49	<99	<49			<50	<100				<50
2017Q4					<50			<53	<53	<110	<53			<50	<100				<50
2018Q2					<50			<250	<250	<500	<250			<50	<100				<50
2018Q4					<50			<250	<250	<500	<250			<50	<100				<50
2019Q2					<25			<50	<50	<100	<50			<25	<50				<25
2019Q4					<100			<50	<50	<100	<50			<100	<200				<100
2020Q2					<100			<5	<5	<10	<5			<100	<200				<100
2020Q4					<1			<50	<50	<100	<50			2.1	4.7				<1
2021Q2					<1			<50	<50	<100				<1	<2				<1
2021Q4					<100			<5	<5	<10	<5			<100	<200				<100

mult - multiple detections

nd - not detected

detected organic

Appendix C

Preliminary Cost Estimate

Barton & Loguidice
443 Electronics Parkway, Liverpool, New York 13088
Phone 315-457-5200 · Fax 315-451-0052

JOB	Cortland County Leachate Conveyance Pipe Feasibility Study		
SHEET NO.	1	OF	2
CALCULATED BY	ETR	DATE	2/2/2023
CHECKED BY	JMB2	DATE	2/2/2023
NOTES	Option 1: Tie-In to McGraw System North of Town		

Quantity Calculations:

$$Q = \frac{1.486}{n} AR^{2/3} S^{1/2} = \frac{1.486}{n}\left(\frac{\pi D^2}{4}\right)\left(\frac{D}{4}\right)^{2/3} S^{1/2} = \frac{0.1474\pi}{n} D^{8/3} S^{1/2}$$

Name	Definition
Q	Flow rate
A	Cross-sectional area of pipe
R	Hydraulic Radius

Variable Name	Design Input			Variable Definition	Units
S	=	0.010	=	Minimum Pipe Slope	ft/ft
n	=	0.010	=	Manning's Coefficient	-
D	=	0.3300	=	Inside Diameter of Pipe	ft
q_p	=	75	=	Primary Flow	gpm
FS	=	1.00	=	Factor of Safety	-

$$Q_6 = \frac{0.147}{0.010} \cdot 3.1415927 \cdot 0.330^{8/3} \cdot 0.010^{1/2} = 0.24 \frac{ft^3}{s} = 108 \frac{gal}{min} > 75 \frac{gal}{min}$$

Single	Check Pipe Velocity:	Total Flow/Flow Area =	0.17	/	0.086	=	2	ft/sec		
Tandem	Check Pipe Velocity:	Total Flow/Flow Area =	0.33	/	0.086	=	3.9	ft/sec		

∴ **4 inch pipe**
4"/8" D.C. HDPE

Variable Name	Design Input			Variable Definition	Units
L_p	=	1224.000	=	Length of Pipe	ft.
D	=	4.000	=	Diameter of Pipe	in.
h	=	98.3	=	Change in elevation from pump discharge to pipe outlet	ft
Le*	=	40.000	=	Additional Pipe Length from Fittings	ft.
C*	=	140	=	Hazen-Williams Coefficient	Unitless

*Assumed
**140 for HDPE, 150 for PVC

Formulae:

Hazen-Williams Equation: $h_{f(feet)} = 10.44 V_{gpm}^{1.82} L / C^{1.85} d_{inches}^{4.87}$

V = Velocity (gpm), L = Length of Pipe (ft)
C = Hazen-Williams Coefficient, D = Diameter (in)

Outputs:

Flow (gpm)	Flow (cfs)	h_f	Total Head Loss
75	0.167	4.273	102.573
150	0.334	15.086	113.386

Attachment: Updated Leachate Sewer Line Feasibility (ID 2820488) (11319 : Leachate Pipeline Feasibility)

Barton & Loguidice

JOB	Cortland County Leachate Conveyance Pipe Feasibility		
SHEET NO.	2	OF	2
CALCULATED BY	ETR	DATE	2/2/2023
CHECKED BY	JMB2	DATE	2/2/2023
NOTES	Option 1: Tie-In to McGraw System North of Town		

Cost Estimate Calculations:

1. Pumps Stations
   - A. Pump Station with two Submersible Pumps = **$202,500**
   - B. Valve/Metering Station = **$268,750**

2. Piping and Manholes
   - A. Dual Contained 4"/8" HDPE Forcemain/Gravity Pipe = **$1,608,647**
   - B. Air Pressure Relief Manholes = **$12,204**
   - C. Maintenance Manholes = **$173,502**
   - D. Road Crossings = **$24,142**
   - E. River Crossings = **$0**

3. Power Requirements
   - A. On-site electrical work: = **$30,000**
   - B. Pump/Valve Station Electrical = **$59,400**

4. General Conditions, Overhead and Profit: = **$187,500**

5. Legal and Engineering = **$256,664**

Total Capital Costs **$2,823,309**

Contingency of 25% **$3,529,137**

Annual O&M:

12,000,000.00 gal/yr / 75 GPM * 60 min/hr = 2700 hr/yr operating time

Electricity = $0.22 /kWh

5.4 HP * 2700 hr/yr * 0.746 kWh/HP*Yr * 0.22 $/kWh = $2,400 per year

System Maintenance $30,000 **per year**

Total Annual O&M = **$33,000**

Contingency of 10% = **$37,000**

Debt Service:

Assume 15 years @ 5%

$3,529,137 / 15 = $235,275.78 = First year principal

$235,275.78 * 0.800 = $188,221 (Front end payment [80% for first 1/3, 100% for middle 1/3, 120% for final 1/3])

$3,529,136.73 * 0.050 = $176,457 (Interest on unpaid balance)

$370,000 = First year debt service

Total Annual Cost = $410,000 per year

Zero Interest:

Assume 15 years @ 0%

$3,529,137 / 15 = $235,275.78 = First year principal

$235,275.78 * 0.800 = $188,221 (Front end payment [80% for first 1/3, 100% for middle 1/3, 120% for final 1/3])

$3,529,136.73 * 0.000 = $0 (Interest on unpaid balance)

$190,000 = First year debt service

Total Annual Cost = $230,000 per year

Barton & Loguidice
443 Electronics Parkway, Liverpool, New York 13088
Phone 315-457-5200 · Fax 315-451-0052

JOB: Cortland County Leachate Conveyance Pipe Feasibility Study
SHEET NO.: 1 OF: 2
CALCULATED BY: ETR DATE: 2/2/2023
CHECKED BY: JMB2 DATE: 2/2/2023
NOTES: Option 2: Through McGraw

Quantity Calculations:

$$Q = \frac{1.486}{n} AR^{2/3} S^{1/2} = \frac{1.486}{n}\left(\frac{\pi D^2}{4}\right)\left(\frac{D}{4}\right)^{2/3} S^{1/2} = \frac{0.1474\pi}{n} D^{8/3} S^{1/2}$$

Name	Definition
Q	Flow rate
A	Cross-sectional area of pipe
R	Hydraulic Radius

Variable Name		Design Input		Variable Definition	Units
S	=	**0.010**	=	Minimum Pipe Slope	ft/ft
n	=	**0.010**	=	Manning's Coefficient	-
D	=	**0.3300**	=	Inside Diameter of Pipe	ft
q_p	=	**75**	=	Primary Flow	gpm
FS	=	**1.00**	=	Factor of Safety	-

$$Q_6 = \frac{0.147 \cdot 3.1415927}{0.010} \cdot 0.330^{8/3} \cdot 0.010^{1/2} = \mathbf{0.24}\ \frac{ft^3}{s} = \mathbf{108}\ \frac{gal}{min} > 75\ \frac{gal}{min}$$

Single — Check Pipe Velocity: Total Flow/Flow Area = 0.17 / 0.086 = 2 ft/sec
Tandem — Check Pipe Velocity: Total Flow/Flow Area = 0.33 / 0.086 = 3.9 ft/sec

∴ 4 inch pipe
4"/8" D.C. HDPE

Variable Name		Design Input		Variable Definition	Units
L_p	=	**1224.000**	=	Length of Pipe	ft.
D	=	**4.000**	=	Diameter of Pipe	in.
h	=	**98.3**	=	Change in elevation from pump discharge to pipe outlet	ft
Le*	=	**40.000**	=	Additional Pipe Length from Fittings	ft.
C*	=	**140**	=	Hazen-Williams Coefficient	Unitless

*Assumed
**140 for HDPE, 150 for PVC

Formulae:

Hazen-Williams Equation: $h_{f(feet)} = 10.44 V_{gpm}^{1.82} L / C^{1.85} d_{inches}^{4.87}$

V = Velocity (gpm), L = Length of Pipe (ft)
C = Hazen-Williams Coefficient, D = Diameter (in)

Outputs:

Flow (gpm)	Flow (cfs)	h_f	Total Head Loss
75	0.167	4.273	102.573
150	0.334	15.086	113.386

Attachment: Updated Leachate Sewer Line Feasibility (ID 2820488) (11319 : Leachate Pipeline Feasibility)

Barton & Loguidice

JOB	Cortland County Leachate Conveyance Pipe Feasibility
SHEET NO.	2 OF 2
CALCULATED BY	ETR DATE 2/2/2023
CHECKED BY	JMB2 DATE 2/2/2023
NOTES	Option 2: Through McGraw

Cost Estimate Calculations:

1. Pumps Stations
   - A. Pump Station with two Submersible Pumps = **$202,500**
   - B. Valve/Metering Station = **$268,750**
2. Piping and Manholes
   - A. Dual Contained 4"/8" HDPE Forcemain/Gravity Pipe = **$2,153,112**
   - B. Air Pressure Relief Manholes = **$12,204**
   - C. Maintenance Manholes = **$231,336**
   - D. Road Crossings = **$204,108**
   - E. River Crossings = **$0**
3. Power Requirements
   - A. On-site electrical work: = **$30,000**
   - B. Pump/Valve Station Electrical = **$59,400**
4. General Conditions, Overhead and Profit: = **$187,500**
5. Legal and Engineering = **$328,951**

Total Capital Costs **$3,618,462**

Contingency of 25% **$4,523,077**

Annual O&M:

###########	gal/yr	/	75	GPM	*	60	min/hr	=	2700	hr/yr operating time						
Electricity =	$0.22	/kWh														
5.4	HP	*	2700	hr/yr	*	0.746	kWh/HP*Yr	*	0.22	$/kWh	=	$2,400	per year			

System Maintenance $30,000 **per year**

Total Annual O&M = $33,000

Contingency of 10% = $37,000

Debt Service:

Assume 15 years @ 5%

$4,523,077	/	15	=	$301,538.47	= First year principal				
$301,538.47	*	0.800	=	$241,231	(Front end payment [80% for first 1/3, 100% for middle 1/3, 120% for final 1/3])				
$4,523,077.10	*	0.050	=	$226,154	(Interest on unpaid balance)				
				$470,000	=	First year debt service			

Total Annual Cost = **$510,000** **per year**

Zero Interest:

Assume 15 years @ 0%

$4,523,077	/	15	=	$301,538.47	= First year principal				
$301,538.47	*	0.800	=	$241,231	(Front end payment [80% for first 1/3, 100% for middle 1/3, 120% for final 1/3])				
$4,523,077.10	*	0.000	=	$0	(Interest on unpaid balance)				
				$250,000	=	First year debt service			

Total Annual Cost = **$290,000** **per year**

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443 Electronics Parkway, Liverpool, New York 13088
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JOB: Cortland County Leachate Conveyance Pipe Feasibility Study
SHEET NO. 1 OF 3
CALCULATED BY ETR DATE 2/2/2023
CHECKED BY JMB2 DATE 2/2/2023
NOTES: Option 3: South to Hicks Hill Road

Quantity Calculations:

$$Q = \frac{1.486}{n} AR^{2/3} S^{1/2} = \frac{1.486}{n}\left(\frac{\pi D^2}{4}\right)\left(\frac{D}{4}\right)^{2/3} S^{1/2} = \frac{0.1474\pi}{n} D^{8/3} S^{1/2}$$

Name	Definition
Q	Flow rate
A	Cross-sectional area of pipe
R	Hydraulic Radius

Variable Name		Design Input		Variable Definition	Units
S	=	**0.010**	=	Minimum Pipe Slope	ft/ft
n	=	**0.010**	=	Manning's Coefficient	-
D	=	**0.3300**	=	Inside Diameter of Pipe	ft
q_p	=	**75**	=	Primary Flow	gpm
FS	=	**1.00**	=	Factor of Safety	-

$$Q_6 = \frac{0.147 \cdot 3.141593}{0.010} \cdot 0.330^{8/3} \cdot 0.010^{1/2} = 0.24 \frac{ft^3}{s} = 108 \frac{gal}{min} > 75 \frac{gal}{min}$$

Single — Check Pipe Velocity: Total Flow/Flow Area = 0.17 / 0.086 = 2 ft/sec
Tandem — Check Pipe Velocity: Total Flow/Flow Area = 0.33 / 0.086 = 3.9 ft/sec

∴ **4 inch pipe**
4"/8" D.C. HDPE

Pump Station 1:

Variable Name		Design Input		Variable Definition	Units
L_p	=	**1224.000**	=	Length of Pipe	ft.
D	=	**4.000**	=	Diameter of Pipe	in.
h	=	**98.3**	=	Change in elevation from pump discharge to pipe outlet	ft
Le*	=	**40.000**	=	Additional Pipe Length from Fittings	ft.
C*	=	**140**	=	Hazen-Williams Coefficient	Unitless

*Assumed
**140 for HDPE, 150 for PVC

Formulae:

Hazen-Williams Equation: $h_{f(feet)} = 10.44 V_{gpm}^{1.82} L / C^{1.85} d_{inches}^{4.87}$

V = Velocity (gpm), L = Length of Pipe (ft)
C = Hazen-Williams Coefficient, D = Diameter (in)

Outputs:

Flow (gpm)	Flow (cfs)	h_f	Total Head Loss
75	0.167	4.273	102.573
150	0.334	15.086	113.386

Attachment: Updated Leachate Sewer Line Feasibility (ID 2820488) (11319 : Leachate Pipeline Feasibility)

Barton & Loguidice
443 Electronics Parkway, Liverpool, New York 13088
Phone 315-457-5200 · Fax 315-451-0052

JOB: Cortland County Leachate Conveyance Pipe Feasibility Study
SHEET NO.: 2 OF: 3
CALCULATED BY: ETR DATE: 2/2/2023
CHECKED BY: JMB2 DATE: 2/2/2023
NOTES: Option 3: South to Hicks Hill Road

Quantity Calculations:

Pump Station 2:

Variable Name		Design Input		Variable Definition	Units
L_p	=	3326.400	=	Length of Pipe	ft.
D	=	4.000	=	Diameter of Pipe	in.
h	=	155.0	=	Change in elevation from pump discharge to pipe outlet	ft
*Le**	=	40.000	=	Additional Pipe Length from Fittings	ft.
*C**	=	140	=	Hazen-Williams Coefficient	Unitless

*Assumed
**140 for HDPE, 150 for PVC

Formulae:

Hazen-Williams Equation: $h_{f(feet)} = 10.44 V_{gpm}^{1.82} L / C^{1.85} d_{inches}^{4.87}$

V = Velocity (gpm), L = Length of Pipe (ft)
C = Hazen-Williams Coefficient, D = Diameter (in)

Outputs:

Flow (gpm)	Flow (cfs)	h_f	Total Head Loss
75	0.167	11.379	166.379
150	0.334	40.178	195.178

Attachment: Updated Leachate Sewer Line Feasibility (ID 2820488) (11319 : Leachate Pipeline Feasibility)

Barton & Loguidice

JOB	Cortland County Leachate Conveyance Pipe Feasibility
SHEET NO.	3 OF 3
CALCULATED BY	ETR DATE 2/2/2023
CHECKED BY	JMB2 DATE 2/2/2023
NOTES	Option 3: South to Hicks Hill Road

Cost Estimate Calculations:

1. Pumps Stations
   - A. Pump Station with two Submersible Pumps = **$707,166**
   - B. Valve/Metering Station = **$268,750**
2. Piping and Manholes
   - A. Dual Contained 4"/8" HDPE Forcemain/Gravity Pipe = **$2,208,796**
   - B. Air Pressure Relief Manholes = **$24,408**
   - C. Maintenance Manholes = **$231,336**
   - D. Road Crossings = **$179,967**
   - E. River Crossings = **$0**
3. Power Requirements
   - A. On-site electrical work: = **$30,000**
   - B. Pump/Valve Station Electrical = **$118,800**
4. General Conditions, Overhead and Profit: = **$187,500**
5. Legal and Engineering = **$395,672**

Total Capital Costs **$4,352,395**

Contingency of 25% **$5,440,494**

Annual O&M:

########## gal/yr / 75 GPM * 60 min/hr = 2700 hr/yr operating time

Electricity = $0.22 /kWh

15 HP * 2700 hr/yr * 0.746 kWh/HP*Yr * 0.22 $/kWh = $6,700 per year per pump station = $13,400 per year

System Maintenance $45,000 **per year**

Total Annual O&M = **$59,000**

Contingency of 10% = **$65,000**

Debt Service:

Assume 15 years @ 5%

$5,440,494 / 15 = $362,699.60 = First year principal

$362,699.60 * 0.800 = $290,160 (Front end payment [80% for first 1/3, 100% for middle 1/3, 120% for final 1/3])

$5,440,493.96 * 0.050 = $272,025 (Interest on unpaid balance)

$570,000 = First year debt service

Total Annual Cost = $640,000 per year

Zero Interest:

Assume 15 years @ 0%

$5,440,494 / 15 = $362,699.60 = First year principal

$362,699.60 * 0.800 = $290,160 (Front end payment [80% for first 1/3, 100% for middle 1/3, 120% for final 1/3])

$5,440,493.96 * 0.000 = $0 (Interest on unpaid balance)

$300,000 = First year debt service

Total Annual Cost = $370,000 per year

Barton & Loguidice
443 Electronics Parkway, Liverpool, New York 13088
Phone 315-457-5200 · Fax 315-451-0052

JOB: Cortland County Leachate Conveyance Pipe Feasibility Study
SHEET NO. 1 OF 3
CALCULATED BY ETR DATE 2/2/2023
CHECKED BY JMB2 DATE 2/2/2023
NOTES: Option 4: North Along Salisbury Road

Quantity Calculations:

$$Q = \frac{1.486}{n} AR^{2/3} S^{1/2} = \frac{1.486}{n}\left(\frac{\pi D^2}{4}\right)\left(\frac{D}{4}\right)^{2/3} S^{1/2} = \frac{0.1474\pi}{n} D^{8/3} S^{1/2}$$

Name	Definition
Q	Flow rate
A	Cross-sectional area of pipe
R	Hydraulic Radius

Variable Name		Design Input		Variable Definition	Units
S	=	0.010	=	Minimum Pipe Slope	ft/ft
n	=	0.010	=	Manning's Coefficient	-
D	=	0.3300	=	Inside Diameter of Pipe	ft
q_p	=	75	=	Primary Flow	gpm
FS	=	1.00	=	Factor of Safety	-

$$Q_6 = \frac{0.147}{0.010} \cdot 3.14159 \cdot 0.330^{8/3} \cdot 0.010^{1/2} = 0.24 \frac{ft^3}{s} = 108 \frac{gal}{min} > 75 \frac{gal}{min}$$

Single — Check Pipe Velocity: Total Flow/Flow Area = 0.17 / 0.086 = 2 ft/sec
Tandem — Check Pipe Velocity: Total Flow/Flow Area = 0.33 / 0.086 = 3.9 ft/sec

∴ 4 inch pipe
4"/8" D.C. HDPE

Variable Name		Design Input		Variable Definition	Units
L_p	=	4224.000	=	Length of Pipe	ft.
D	=	4.000	=	Diameter of Pipe	in.
h	=	192.0	=	Change in elevation from pump discharge to pipe outlet	ft
Le*	=	40.000	=	Additional Pipe Length from Fittings	ft.
C*	=	140	=	Hazen-Williams Coefficient	Unitless

*Assumed
**140 for HDPE, 150 for PVC

Formulae:

Hazen-Williams Equation: $h_{f(feet)} = 10.44 V_{gpm}^{1.82} L / C^{1.85} d_{inches}^{4.87}$

V = Velocity (gpm), L = Length of Pipe (ft)
C = Hazen-Williams Coefficient, D = Diameter (in)

Outputs:

Flow (gpm)	Flow (cfs)	h_f	Total Head Loss
75	0.167	14.413	206.413
150	0.334	50.890	242.890

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443 Electronics Parkway, Liverpool, New York 13088
Phone 315-457-5200 · Fax 315-451-0052

JOB: Cortland County Leachate Conveyance Pipe Feasibility Study
SHEET NO.: 2 OF: 3
CALCULATED BY: ETR DATE: 2/2/2023
CHECKED BY: JMB2 DATE: 2/2/2023
NOTES: Option 3: South to Hicks Hill Road

Quantity Calculations:

Pump Station 2:

Variable Name		Design Input		Variable Definition	Units
L_p	=	1871.000	=	Length of Pipe	ft.
D	=	4.000	=	Diameter of Pipe	in.
h	=	53.5	=	Change in elevation from pump discharge to pipe outlet	ft
Le*	=	40.000	=	Additional Pipe Length from Fittings	ft.
C*	=	140	=	Hazen-Williams Coefficient	Unitless

*Assumed
**140 for HDPE, 150 for PVC

Formulae:

Hazen-Williams Equation: $h_{f(feet)} = 10.44 V_{gpm}^{1.82} L / C^{1.85} d_{inches}^{4.87}$

V = Velocity (gpm), L = Length of Pipe (ft)
C = Hazen-Williams Coefficient, D = Diameter (in)

Outputs:

Flow (gpm)	Flow (cfs)	h_f	Total Head Loss
75	0.167	6.460	59.960
150	0.334	22.808	76.308

Pump Station 3:

Variable Name		Design Input		Variable Definition	Units
L_p	=	1993.000	=	Length of Pipe	ft.
D	=	4.000	=	Diameter of Pipe	in.
h	=	189.0	=	Change in elevation from pump discharge to pipe outlet	ft
Le*	=	40.000	=	Additional Pipe Length from Fittings	ft.
C*	=	140	=	Hazen-Williams Coefficient	Unitless

*Assumed
**140 for HDPE, 150 for PVC

Formulae:

Hazen-Williams Equation: $h_{f(feet)} = 10.44 V_{gpm}^{1.82} L / C^{1.85} d_{inches}^{4.87}$

V = Velocity (gpm), L = Length of Pipe (ft)
C = Hazen-Williams Coefficient, D = Diameter (in)

Outputs:

Flow (gpm)	Flow (cfs)	h_f	Total Head Loss
75	0.167	6.872	195.872
150	0.334	24.264	213.264

Barton & Loguidice

JOB: Cortland County Leachate Conveyance Pipe Feasibility
SHEET NO.: 3 OF: 3
CALCULATED BY: ETR DATE: 2/2/2023
CHECKED BY: JMB2 DATE: 2/2/2023
NOTES: Option 4: North Along Salisbury Road

Cost Estimate Calculations:

1. Pumps Stations
   - A. Pump Station with two Submersible Pumps = **$1,414,332**
   - B. Valve/Metering Station = **$268,750**

2. Piping and Manholes
   - A. Dual Contained 4"/8" HDPE Forcemain/Gravity Pipe = **$4,306,224**
   - B. Air Pressure Relief Manholes = **$48,816**
   - C. Maintenance Manholes = **$449,820**
   - D. Road Crossings = **$193,135**
   - E. River Crossings = **$320,000**

3. Power Requirements
   - A. On-site electrical work: = **$30,000**
   - B. Pump/Valve Station Electrical = **$237,600**

4. General Conditions, Overhead and Profit: = **$187,500**

5. Legal and Engineering = **$745,618**

Total Capital Costs **$8,201,795**
Contingency of 25% **$10,252,244**

Annual O&M:

12,000,000.00 gal/yr / 75 GPM * 60 min/hr = 2700 hr/yr operating time

Electricity = $0.22 /kWh

15 HP * 2700 hr/yr * 0.746 kWh/HP*Yr * 0.22 $/kWh = $6,700 per year per pump station = $26,800 per year

System Maintenance $75,000 **per year**

Total Annual O&M = **$102,000**
Contingency of 10% = **$113,000**

Debt Service:

Assume 15 years @ 5%

$10,252,244 / 15 = $683,482.95 = First year principal

$683,482.95 * 0.800 = $546,786 (Front end payment [80% for first 1/3, 100% for middle 1/3, 120% for final 1/3])

$10,252,244.20 * 0.050 = $512,612 (Interest on unpaid balance)

$1,060,000 = First year debt service

Total Annual Cost = $1,180,000 per year

Zero Interest:

Assume 15 years @ 0%

$10,252,244 / 15 = $683,482.95 = First year principal

$683,482.95 * 0.800 = $546,786 (Front end payment [80% for first 1/3, 100% for middle 1/3, 120% for final 1/3])

$10,252,244.20 * 0.000 = $0 (Interest on unpaid balance)

$550,000 = First year debt service

Total Annual Cost = $670,000 per year

Attachment: Updated Leachate Sewer Line Feasibility (ID 2820488) (11319 : Leachate Pipeline Feasibility)

Barton & Loguidice
443 Electronics Parkway, Liverpool, New York 13088
Phone 315-457-5200 · Fax 315-451-0052

JOB: Cortland County Leachate Conveyance Pipe Feasibility Study
SHEET NO.: 1 OF: 3
CALCULATED BY: ETR DATE: 2/2/2023
CHECKED BY: JMB2 DATE: 2/2/2023
NOTES: Option 5: North Along Route 114

Quantity Calculations:

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2} = \frac{1.486}{n}\left(\frac{\pi D^2}{4}\right)\left(\frac{D}{4}\right)^{2/3} S^{1/2} = \frac{0.1474\pi}{n} D^{8/3} S^{1/2}$$

Name	Definition
Q	Flow rate
A	Cross-sectional area of pipe
R	Hydraulic Radius

Variable Name		Design Input		Variable Definition	Units
S	=	**0.010**	=	Minimum Pipe Slope	ft/ft
n	=	**0.010**	=	Manning's Coefficient	-
D	=	**0.3300**	=	Inside Diameter of Pipe	ft
q_p	=	**75**	=	Primary Flow	gpm
FS	=	**1.00**	=	Factor of Safety	-

$$Q_6 = \frac{0.147}{0.010} \cdot 3.14159 \cdot 0.330^{8/3} \cdot 0.010^{1/2} = \mathbf{0.24}\ \frac{ft^3}{s} = \mathbf{108}\ \frac{gal}{min} > 75\ \frac{gal}{min}$$

Single	Check Pipe Velocity:	Total Flow/Flow Area =	0.17	/	0.086	=	2	ft/sec
Tandem	Check Pipe Velocity:	Total Flow/Flow Area =	0.33	/	0.086	=	3.9	ft/sec

∴ 4 inch pipe
4"/8" D.C. HDPE

Variable Name		Design Input		Variable Definition	Units
L_p	=	**4224.000**	=	Length of Pipe	ft.
D	=	**4.000**	=	Diameter of Pipe	in.
h	=	**192.0**	=	Change in elevation from pump discharge to pipe outlet	ft
Le*	=	**40.000**	=	Additional Pipe Length from Fittings	ft.
C*	=	**140**	=	Hazen-Williams Coefficient	Unitless

*Assumed
**140 for HDPE, 150 for PVC

Formulae:

Hazen-Williams Equation: $h_{f(feet)} = 10.44 V_{gpm}^{1.82} L / C^{1.85} d_{inches}^{4.87}$

V = Velocity (gpm), L = Length of Pipe (ft)
C = Hazen-Williams Coefficient, D = Diameter (in)

Outputs:

Flow (gpm)	Flow (cfs)	h_f	Total Head Loss
75	0.167	14.413	206.413
150	0.334	50.890	242.890

Attachment: Updated Leachate Sewer Line Feasibility (ID 2820488) (11319 : Leachate Pipeline Feasibility)

Barton & Loguidice
443 Electronics Parkway, Liverpool, New York 13088
Phone 315-457-5200 · Fax 315-451-0052

JOB: Cortland County Leachate Conveyance Pipe Feasibility Study
SHEET NO.: 2 OF: 3
CALCULATED BY: ETR DATE: 2/2/2023
CHECKED BY: JMB2 DATE: 2/2/2023
NOTES: Option 3: South to Hicks Hill Road

Quantity Calculations:

Pump Station 2:

Variable Name	Design Input			Variable Definition	Units
L_p	=	4065.600	=	Length of Pipe	ft.
D	=	4.000	=	Diameter of Pipe	in.
h	=	102.0	=	Change in elevation from pump discharge to pipe outlet	ft
Le*	=	40.000	=	Additional Pipe Length from Fittings	ft.
C*	=	140	=	Hazen-Williams Coefficient	Unitless

*Assumed
**140 for HDPE, 150 for PVC

Formulae:

Hazen-Williams Equation: $h_{f(feet)} = 10.44 V_{gpm}^{1.82} L / C^{1.85} d_{inches}^{4.87}$

V = Velocity (gpm), L = Length of Pipe (ft)
C = Hazen-Williams Coefficient, D = Diameter (in)

Outputs:

Flow (gpm)	Flow (cfs)	h_f	Total Head Loss
75	0.167	13.878	115.878
150	0.334	49.000	151.000

Barton & Loguidice

JOB: Cortland County Leachate Conveyance Pipe Feasibility
SHEET NO.: 3 OF: 3
CALCULATED BY: ETR DATE: 2/2/2023
CHECKED BY: JMB2 DATE: 2/2/2023
NOTES: Option 5: North Along Route 114

Cost Estimate Calculations:

1. Pumps Stations
   - A. Pump Station with two Submersible Pumps = **$1,060,749**
   - B. Valve/Metering Station = **$268,750**

2. Piping and Manholes
   - A. Dual Contained 4"/8" HDPE Forcemain/Gravity Pipe = **$6,020,052**
   - B. Air Pressure Relief Manholes = **$36,612**
   - C. Maintenance Manholes = **$642,600**
   - D. Road Crossings = **$212,887**
   - E. River Crossings = **$320,000**

3. Power Requirements
   - A. On-site electrical work: = **$30,000**
   - B. Pump/Valve Station Electrical = **$178,200**

4. General Conditions, Overhead and Profit: = **$187,500**

5. Legal and Engineering = **$895,735**

Total Capital Costs **$9,853,086**
Contingency of 25% **$12,316,357**

Annual O&M:

########## gal/yr / 75 GPM * 60 min/hr = 2700 hr/yr operating time
Electricity = $0.22 /kWh
15 HP * 2700 hr/yr * 0.746 kWh/HP*Yr * 0.22 $/kWh = $6,700 per year per pump station = $20,100 per year

System Maintenance $60,000 **per year**

Total Annual O&M = **$81,000**
Contingency of 10% = **$90,000**

Debt Service:
Assume 15 years @ 5%
$12,316,357 / 15 = $821,090.49 = First year principal
$821,090.49 * 0.800 = $656,872 (Front end payment [80% for first 1/3, 100% for middle 1/3, 120% for final 1/3])
$12,316,357.28 * 0.050 = $615,818 (Interest on unpaid balance)
$1,280,000 = First year debt service

Total Annual Cost = $1,370,000 per year

Zero Interest:
Assume 15 years @ 0%
$12,316,357 / 15 = $821,090.49 = First year principal
$821,090.49 * 0.800 = $656,872 (Front end payment [80% for first 1/3, 100% for middle 1/3, 120% for final 1/3])
$12,316,357.28 * 0.000 = $0 (Interest on unpaid balance)
$660,000 = First year debt service

Total Annual Cost = $750,000 per year

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listen
The power to
solve℠

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March 1, 2023

Mr. Charles Sudbrink
Superintendent of Highways
Cortland County Department of Highways
60 Central Avenue
Cortland, New York 13045

Re: Cortland County Landfill
Remaining Site Life and Financial Assurance Information

File: 331.134.023

Dear Mr. Sudbrink:

In accordance with your request, Barton & Loguidice, D.P.C. (B&L), has calculated the remaining site life and updated the financial assurance information for Cortland County Landfill facility. The financial assurance estimates have been updated to include closure and post closure care separately for each landfill at the facility. These landfills include the active West Side Landfill, the closed Pine Tree Landfill, and the closed Old Cortland County (Towslee) Landfill. The information provided herein can be utilized for compliance with the Local Government Financial Test.

Remaining Capacity and Site Life

Attached is a drawing (Sheet FP2023) of the active West Side Landfill with the new survey completed on February 8, 2023.

The County is currently filling in Phase 1, Cell No. 1B and Phase 2, Cell No. 2A. Based on a comparison of the two top of waste surveys, approximately 67,695 CY of airspace was consumed between January 25, 2022, and February 8, 2023. Sheet FP2023 shows the top of intermediate cover fill grades for the landfill. Based on the February 8, 2023 survey, the permitted West Side Landfill (Phase 1 and 2) has a remaining capacity of approximately 790,546 CY.

The annual airspace consumption rate for 2022 was calculated by determining an average daily consumption rate between the two most recent survey dates and multiplying it by the number of days in the 2022 calendar year (365). This annual rate was averaged with the annual consumption rates from CY 2018 to present day, and an average annual airspace consumption rate was determined. Historically, the previous 10 years of consumption rates were utilized in average; however in 2017, the County enacted flow control which resulted in increased consumption rates over the last 5 years. In order to get a more accurate consumption rate for future planning, the averaging period was revised to the prior 5 years. Using the current calculated average annual airspace consumption rate of approximately 59,600 CY per year, the West Side Landfill has approximately 13.26 years of remaining site life. It should be noted that the remaining site life will be greatly dependent on waste receipts and compaction effort.

Financial Assurance Information

A summary of closure and post closure costs realized to date and future projections can be found on the attached Table 1. A detailed breakdown for each of the landfills has been completed and included as Tables 2a, 2b, 3 and 4. Below is a brief narrative for each facility.

Active West Side Landfill

The West Side Stage 1 Closure covering approximately 6.9 acres of Phase I, Cell No. 1A was completed in early spring 2007. The County is currently placing waste in Phase 1, Cell No. 1B and Phase 2, Cell No. 2A. The Phase II landfill expansion construction was completed in 2009 and NYS Department of Environmental Conservation approval was received in July 2010. The Phase II expansion area has been divided into multiple stages using a series of diversion berms to minimize active working area and reduce leachate generation. The West Side Stage 2 Closure was completed in the summer of 2014 and covers approximately 5.9 acres of Phase I. Therefore, the estimate for closure costs remaining includes only the small active Phase 1B landfill area which has not been capped to date and only Cell No. 2A of the Phase II expansion. This area totals approximately 11.1 acres. The detailed closure construction cost breakdown for the active 11.1 acres has been included in Table 2a. The estimated total closure construction cost is **$3,524,228**.

Table 2 also provides the estimated annual post closure cost for the West Side Landfill. Although data from multiple landfill facilities throughout New York State indicate that leachate generation will decrease significantly over time following closure, NYSDEC has requested that the post-closure leachate treatment costs be based on a worst case scenario wherein the leachate generated from recent operations was to remain unchanged for 30 years following closure. Over a 30-year post closure period, the post closure cost remaining to be realized has an estimated present value of **$11,717,180** assuming an interest rate of 3%.

Based on the above, the combined closure and post closure cost for the active West Side Landfill has been estimated at **$15,241,408.**

Pine Tree Landfill

The Pine Tree Landfill was active from 1987 to 1991, when it was eventually closed. No further closure construction activities are required for this landfill. Annual post closure costs have been calculated as outlined on Table 3. These costs include leachate collection and treatment from the leachate collection system based on historical annual costs. The landfill has reached the end of the initial 30-year post closure monitoring period; however, the County should continue to budget for the current annual post closure costs until such time that the NYSDEC approves a reduction or elimination of groundwater monitoring and/or leachate collection and treatment for the closed landfill. These costs are estimated at approximately $100,000 per year.

Old Cortland County Landfill

The area of the Old Cortland County Landfill was active from the 1940s through 1991. The Abandoned City of Cortland Landfill was consolidated and closed along with the Old Cortland County Landfill in 2001 and are, therefore, considered one landfill under these estimates. The landfill closure was completed as part of the NYS inactive hazardous waste site program. No further closure construction activities are required for this landfill and leachate is not collected and treated from the closed facility. Post closure monitoring has been ongoing at the facility for approximately 20 years. While past post closure estimates have assumed a finite post closure monitoring period of 30 years, the County should continue to budget for the current annual post closure costs until such time that the NYSDEC approves a reduction or elimination of groundwater monitoring for the closed landfill. These costs are estimated at approximately $25,000 per year.

As required by Part 360.22, the above closure and post closure costs will be updated annually to reflect current landfill conditions and associated costs.

If you have any questions or need any additional assistance, please do not hesitate to contact me.

Sincerely,

BARTON & LOGUIDICE, D.P.C.

Jillian M. Blake, P.E.
Associate

WEN/jms

Attachments: Figure FP2022 – West Side Landfill Fill Progression
Table 1 – Closure & Post Closure Financial Assurance Cost Estimate Summary
Table 2 – Active West Side Landfill Financial Assurance Summary
Table 3 – Pine Tree Landfill Financial Assurance Summary
Table 4 – Old Cortland County Landfill Financial Assurance Summary

cc: Jim Aiken – Cortland County (via email)

Figure FP2022

West Side Landfill Fill Progression

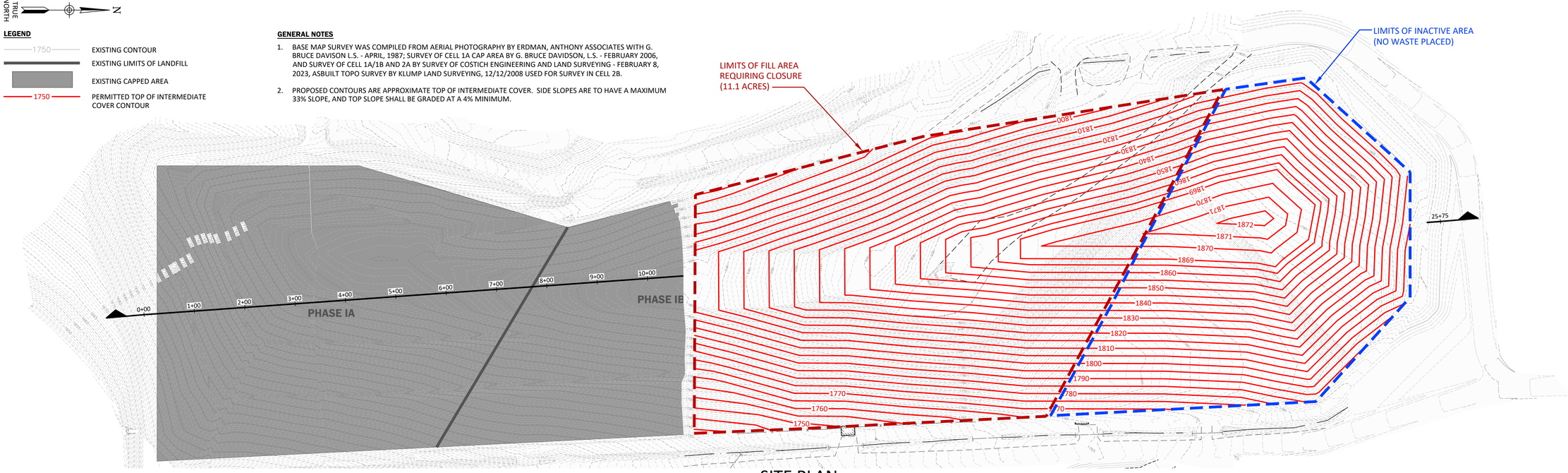
TRUE NORTH

LEGEND

- 1750 — EXISTING CONTOUR
- EXISTING LIMITS OF LANDFILL
- EXISTING CAPPED AREA
- 1750 — PERMITTED TOP OF INTERMEDIATE COVER CONTOUR

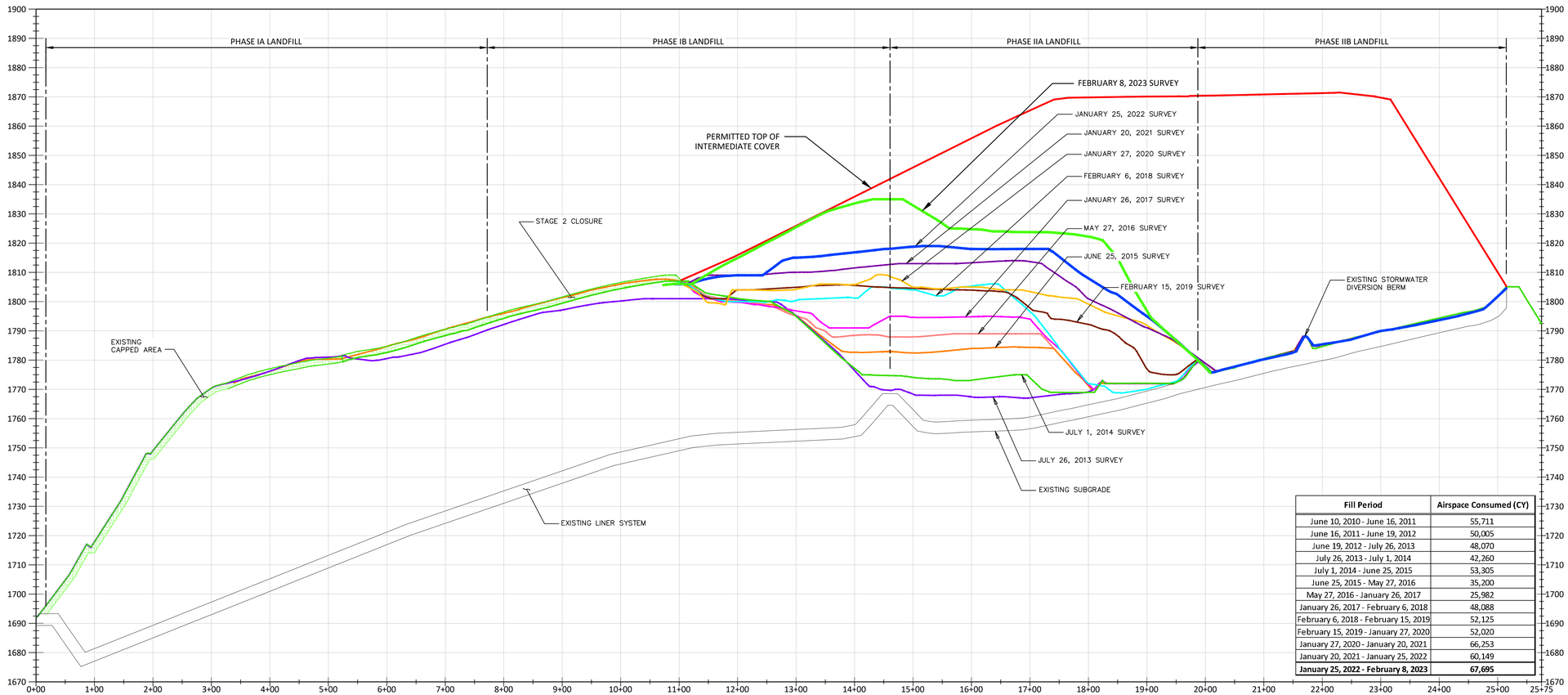
GENERAL NOTES

1. BASE MAP SURVEY WAS COMPILED FROM AERIAL PHOTOGRAPHY BY ERDMAN, ANTHONY ASSOCIATES WITH G. BRUCE DAVISON L.S. - APRIL, 1987; SURVEY OF CELL 1A CAP AREA BY G. BRUCE DAVIDSON, L.S. - FEBRUARY 2006, AND SURVEY OF CELL 1A/1B AND 2A BY SURVEY OF COSTICH ENGINEERING AND LAND SURVEYING - FEBRUARY 8, 2023, ASBUILT TOPO SURVEY BY KLUMP LAND SURVEYING, 12/12/2008 USED FOR SURVEY IN CELL 2B.
2. PROPOSED CONTOURS ARE APPROXIMATE TOP OF INTERMEDIATE COVER. SIDE SLOPES ARE TO HAVE A MAXIMUM 33% SLOPE, AND TOP SLOPE SHALL BE GRADED AT A 4% MINIMUM.



SITE PLAN

SCALE: 1" = 100'



Fill Period	Airspace Consumed (CY)
June 10, 2010 - June 16, 2011	55,711
June 16, 2011 - June 19, 2012	50,005
June 19, 2012 - July 26, 2013	48,070
July 26, 2013 - July 1, 2014	42,260
July 1, 2014 - June 25, 2015	53,305
June 25, 2015 - May 27, 2016	35,200
May 27, 2016 - January 26, 2017	25,982
January 26, 2017 - February 6, 2018	48,088
February 6, 2018 - February 15, 2019	52,125
February 15, 2019 - January 27, 2020	52,020
January 27, 2020 - January 20, 2021	66,253
January 20, 2021 - January 25, 2022	60,149
January 25, 2022 - February 8, 2023	**67,695**

SECTION

HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 20'

REVISIONS

CORTLAND COUNTY, NEW YORK

CORTLAND COUNTY HIGHWAY DEPARTMENT
CORTLAND COUNTY LANDFILL

WEST SIDE FILL PROGRESSION

TOWN OF CORTLANDVILLE/SOLON

443 Electronics Parkway
Liverpool, NY
13088

B&L
Barton & Loguidice, D.P.C.

Date: FERBUARY 2023
Scale: AS SHOWN
Sheet Number: FP2023
Project Number: 331.134.023

Drawn by: GSD/JGS — Designed by: JMB2 — In charge of: CWH — Checked by:

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Table 1

Closure & Post Closure Financial Assurance
Cost Estimate Summary

Table 1

CORTLAND COUNTY LANDFILL
CLOSURE & POST CLOSURE FINANCIAL ASSURANCE COST ESTIMATE SUMMARY
2022

LANDFILL AREA	CLOSURE COSTS			POST CLOSURE COSTS				TOTAL
	YEAR CLOSED	CLOSURE COST TO DATE	CLOSURE COST REMAINING (2022 Dollars)	POST-CLOSURE REMAINING (Years)	POST-CLOSURE TO DATE	POST-CLOSURE REMAINING (Annual Cost)	POST-CLOSURE REMAINING (Total) Present Value @ 3%	CLOSURE & POST CLOSURE REMAINING TO BE RECOGNIZED
WEST SIDE LANDFILL	Active	$2,461,492	$3,524,228	30	$15,522	$597,802	$11,717,180	**$15,241,408**
PINE TREE LANDFILL	1991	$563,000	$0	TBD	$1,455,450	$100,120	-	**$100,000 Per Year**
OLD CORTLAND COUNTY LANDFILL	2001	$5,195,740	$0	9	$399,924	$24,024	$187,050	**$187,050**
TOTALS:		**$8,220,232**	**$3,524,228**		**$1,870,896**	**$721,946**	**$11,904,230**	**$15,428,458**

Notes:
1. Post closure costs to date for the Active West Side include mowing costs.
2. Pine Tree Landfill closure costs based off of an estimated $80,000/acre and 10% engineering fee. Other closure costs reflect actual costs.
3. Refer to attached Tables 2, 3 and 4 for detailed breakdown of costs.
4. NYSDEC Part 360 Regulations require a rolling 30 years of post closure costs be included in financial assurance cost estimates.

Table 2

Active West Side Landfill
Financial Assurance Summary

Table 2
CORTLAND COUNTY LANDFILL
ACTIVE WEST SIDE LANDFILL FINANCIAL ASSURANCE SUMMARY

CLOSURE COST BREAKDOWN

Total Developed Area with Waste Placed - 2022: **23.90 acres**

9.4	acres	33% slopes
1.7	acres	4% slope
12.8	acres	Existing capped

Total Acreage Requiring Closure: 11.10

Notes:
1. Total constructed area (Phase I & Phase II) = 30.1 acres
2. Waste Placement only through Phase IIA. Remaining 6.2 acres are dormant with no waste.
3. Phase I closed in 2007 (Stage 1 Closure) = 6.9 acres. Closure costs = $1,086,157 including engineering / QA/QC.
4. Phase I closed in 2014 (Stage 2 Closure) = 5.9 acres. Closure costs = $1,375,335 including engineering / QA/QC.
   Cost does not include non-closure related items performed during the Stage 2 Closure project.
5. Closure unit costs below based on 2023 pricing.

Component	Quantity	Unit	Unit Cost	Cost
Mobilization/Demobilization	1.00	LS	$ 82,400.00	$ 82,400
Grading	11.10	acres	$ 7,725.00	$ 85,748
Erosion Control	11.10	acres	$ 5,150.00	$ 57,165
Fertilize, Seed & Mulch	11.10	acres	$ 5,150.00	$ 57,165
Barrier Protection Layer	26,862.00	cy	$ 38.11	$ 1,023,711
Geosynthetic Clay Layer (4% Slope Only)	74,052.00	sf	$ 0.67	$ 49,578
40 MIL Textured LLDPE Geomembrane	483,516.00	sf	$ 0.57	$ 273,912
Composite Geonet	483,516.00	sf	$ 0.74	$ 358,575
Topsoil Layer	8,954.00	cy	$ 16.48	$ 147,562
Vertical Gas Vents (4 per acre)	32.00	ea.	$ 5,150.00	$ 164,800
Stormwater Controls	11.10	acres	$ 51,500.00	$ 571,650
Toe Drain	1.00	LS	$ 46,350.00	$ 46,350
Design / QA/QC (15% of Construction Cost)				$ 437,792
Subtotal				***$ 3,356,408***
Contingencies (5%)				$ 167,820
			Total Closure Cost	**$ 3,524,228**
			Cost Per Acre	**$ 317,498**

Table 2 -- Continued
CORTLAND COUNTY LANDFILL
ACTIVE WEST SIDE LANDFILL FINANCIAL ASSURANCE SUMMARY

Annual Post Closure Costs

Operations, Maintenance, and Admin.	Units	Unit Cost		Quantity/Yr	Total Cost/Yr
Cap repair (labor and equipment)	hr	$ 206		16	$ 3,296
General labor	hr	$ 52		8	$ 412
Seeding and fertilizing cap	acre	$ 1,545		0.5	$ 773
Mowing	acre	$ 103		20.7	$ 2,132
Surface water management maintenance	lump sum	$ 2,500		1	$ 2,500
Security and building repairs	lump sum	$ 1,030		1	$ 1,030
Annual inspections and reports	lump sum	$ 2,000		1	$ 2,000
Site Utilities	annual	$ 1,545		1	$ 1,545
Subtotal					***$ 13,688***
Contingencies (5%)					$ 684
Operations, Maintenance, and Admin. Costs:					**$ 14,372**

Quarterly Monitoring Costs	Units	Unit Cost	Locations	Events/Year	Total Cost/Yr
Monitoring Well Sampling (Baseline)	each	$ 87	15	1	$ 1,305
Monitoring Well Laboratory Analysis (Baseline)	each	$ 280	15	1	$ 4,200
Monitoring Well Sampling Phase I Cell (Routine)	each	$ 87	11	2	$ 1,914
Monitoring Well Laboratory Analysis Phase I Cell (Routine)	each	$ 140	11	2	$ 3,080
Monitoring Well Sampling Phase II Cell (Routine)	each	$ 87	4	3	$ 1,044
Monitoring Well Laboratory Analysis Phase II Cell (Routine)	each	$ 140	4	3	$ 1,680
Surface Water Sampling (Baseline)	each	$ 87	3	1	$ 261
Surface Water Laboratory Analysis (Baseline)	each	$ 280	3	1	$ 840
Surface Water Sampling (Routine)	each	$ 87	3	2	$ 522
Surface Water Laboratory Analysis (Routine)	each	$ 140	3	2	$ 840
Residential Well Sampling (Baseline)	each	$ 87	4	1	$ 348
Residential Well Laboratory Analysis (Baseline)	each	$ 280	4	1	$ 1,120
Underdrains Sampling (Baseline)	each	$ 87	1	1	$ 87
Underdrains Laboratory Analysis (Baseline)	each	$ 280	1	1	$ 280
Underdrains Sampling (Routine)	each	$ 87	1	2	$ 174
Underdrains Laboratory Analysis (Routine)	each	$ 140	1	1	$ 140
Tank Leak Detection Well (LD-1) Sampling (Baseline)	each	$ 87	1	1	$ 87
Tank Leak Detection Well (LD-1) Laboratory Analysis (Baseline)	each	$ 280	1	1	$ 280
Tank Leak Detection Well (LD-1) Sampling (Routine)	each	$ 87	1	2	$ 174
Tank Leak Detection Well (LD-1) Laboratory Analysis (Routine)	each	$ 140	1	2	$ 280
Dissolved Metals Sampling (Baseline)	each	$ 10	7	1	$ 70
Dissolved Metals Laboratory (Baseline)	each	$ 77	1	1	$ 77
Dissolved Metals Sampling (Routine)	each	$ 10	7	2	$ 140
Dissolved Metals Laboratory (Routine)	each	$ 32	1	2	$ 64
West Side Landfill Water Quality Monitoring Costs Subtotal					*$ 19,007*
Combustible Gas Monitoring	each	$ 20	25	3	$ 1,500
Reporting	ls	$ 2,580	1	3	$ 7,740
West Side Monitoring Costs Subtotal					***$ 28,247***
Contingencies (5%)					$ 1,412
West Side Landfill Monitoring Costs					**$ 29,659**

Leachate Monitoring Costs	Units	Unit Cost	Locations	Quantity/Yr	Total Cost/Yr
Leachate Sampling	lump sum	$ 87	5	2	$ 870
Leachate Laboratory Analysis (Expanded Parameters)	each	$ 680	5	2	$ 6,800
Leachate Reporting	lump sum	$ 970		2	$ 1,940
Leachate Monitoring Costs Subtotal					***$ 9,610***
Contingencies (5%)					$ 481
Leachate Monitoring Costs:					**$ 10,091**

Annual Leachate Treatment Costs	Units	Unit Cost		Gallons/Yr*	Total Cost/Yr
Leachate Treatment Costs (transport and treatment)	gallons	$ 0.080		6,796,000	**$ 543,680**

*Based on 2022 leachate generation rate

Total Annual Post-Closure Cost Estimate: $ 597,802

Table 3

Pine Tree Landfill
Financial Assurance Summary

Table 3
CORTLAND COUNTY LANDFILL
PINE TREE LANDFILL FINANCIAL ASSURANCE SUMMARY

CLOSURE COST BREAKDOWN

Total Developed Area with Waste Placed: **6.40 acres**

0.00	acres	33% slopes to be Closed
0	acres	4% slope to be Closed
6.40	acres	Existing capped

Total Acreage Requiring Closure: 0.00

Notes:
1. Operational from 1987 to 1991. Closed with DEC approved capping system.
2. Perimeter leachate collection system remains operational.
3. Closure costs estimated at $563,000 including engineering / QA/QC.

Annual Post Closure Costs

Ops., Maint., Admin.	Units	Unit Cost	Quantity/Yr	Total Cost/Yr
Cap repair (labor and equipment)	hr	$ 206	8.0	$ 1,648
General labor	hr	$ 52	8.0	$ 412
Seeding and fertilizing cap	acre	$ 1,545	0.25	$ 386
Mowing	acre	$ 103	6.4	$ 659
Surface water management maintenance	lump sum	$ 500	1.0	$ 500
Security and building repairs	lump sum	$ 515	1.0	$ 515
Annual inspections and reports	lump sum	$ 1,000	1.0	$ 1,000
			Operation, Maint., Admin costs:	**$ 5,120**

Water Monitoring	Units	Unit Cost	Quantity/Yr	Total Cost/Yr
Water Quality Sampling, Analysis & Reporting	lump sum	$ 25,000	1	$ 25,000
			Ground and surface water monitoring costs:	**$ 25,000**

Leachate Management	Units	Unit Cost	Quantity/Yr	Total Cost/Yr
Leachate management system repairs	lump sum	$ 5,000	1	$ 5,000
Leachate Treatment per Year*	lump sum	$ 64,000	1	$ 64,000
Leachate sampling and testing	lump sum	$ 1,000	1	$ 1,000
			Leachate Management Costs:	**$ 70,000**

* Based on 2022 Generation

Annual Post Closure Costs : $ 100,120

Table 4

Old Cortland County Landfill
Financial Assurance Summary

Table 4
CORTLAND COUNTY LANDFILL
OLD CORTLAND COUNTY LANDFILL
FINANCIAL ASSURANCE SUMMARY

CLOSURE COST BREAKDOWN

Total Developed Area with Waste Placed: **40.44 acres**

0.00	acres	33% slopes to be Closed
0	acres	4% slope to be Closed
40.44	acres	Existing capped

Total Acreage Requiring Closure: 0.00

Notes:
1. NYS Inactive Hazardous Waste Site.
1. Operational from 1940s to 1991. Closed with DEC approved capping system.
3. City Landfill Consolidated with Old County Landfill and capped together.
4. No leachate collection system.
3. Closure costs estimated at $5,195,740 including engineering / QA/QC.

Annual Post Closure Costs

Ops., Maint., Admin.	Units	Unit Cost	Quantity/Yr	Total Cost/Yr
Cap repair (labor and equipment)	hr	$ 206.00	10.0	$ 2,060.00
General labor	hr	$ 51.50	8.0	$ 412.00
Seeding and fertilizing cap	acre	$ 1,545.00	0.25	$ 386.25
Mowing	acre	$ 103.00	40.4	$ 4,165.32
Surface water management maintenance	lump sum	$ 500.00	1.0	$ 500.00
Annual inspections and reports	lump sum	$ 1,500.00	1.0	$ 1,500.00
			Operation, Maint., Admin costs:	**$ 9,023.57**

Water Monitoring	Units	Unit Cost	Quantity/Yr	Total Cost/Yr
Water Quality Sampling, Analysis & Reporting	lump sum	$ 15,000.00	1	$ 15,000.00
			Ground and surface water monitoring costs:	**$ 15,000.00**

Annual Post Closure Costs : $ 24,023.57