ALPHA GEOSCIENCE

Geology
Hydrology
Remediation
Water Supply

January 16, 2020

Mr. Tom Biamonte
Shelby Crushed Stone
10830 Blair Rd
Medina, New York 14103

Re: Wetland Hydrogeology Impact Evaluation
Medina Mine Expansion

Dear Tom:

It is our understanding that Shelby Crushed Stone (Shelby) has proposed to expand its Medina Mine southward through the existing 100-ft wetland buffer and into a wetland that borders the mine on the southern side. Alpha Geoscience (Alpha) was asked by Brian Milliman of Strategic Mining Solutions (SMS) to conduct a hydrogeologic evaluation for you regarding the potential impact of the mine expansion on the remaining wetland south of the expansion.

The Medina Mine is located on the south side of Blair Road in the Town of Shelby, NY (Figure 1). The mining plan map prepared by SMS indicates that the current life-of-mine (LOM) is approximately 106 acres and that the proposed southward expansion is approximately 15 acres (Attachment 1). Figure 2 shows the expansion area in more detail. Approximately 8.7 acres of the 15-acre expansion area are Federal and State wetland comprised of emergent marsh and hardwood swamp. The southern border of the expansion area is adjacent to an east-northeast oriented ditch (Figures 1 and 2). This ditch will be referred to in this report as the primary ditch. The primary ditch will remain undisturbed and an earthen berm will be constructed between the primary ditch and the quarry.

Based on the information provided below, we anticipate that the proposed removal of 8.7 acres of wetland, which represents a loss of approximately 1.7% of the total wetland area (502 acres), will have no significant hydrogeological impact to the remaining wetland as a result of the mine expansion.

Hydrogeologic Characteristics of the Wetland

Soil and Unconsolidated Material

The wetlands continue southward beyond the primary ditch onto property owned by Shelby (Figure 2). The wetland area is approximated by the large, flat area of Palms Muck soils on Figure 3. According to the online Soil Survey of Orleans County, New York, this area of Palms Muck soil is 502 acres. Palms Muck is an organic, level soil that is very poorly drained and typically underlain by low-permeability silty clay loam. The silt layers retard downward percolation during the wet season.

A test pit (TP-1) was dug to 8.5 feet below ground surface (BGS) on October 5, 2019, approximately 150 ft south of the primary ditch, to confirm the soil stratigraphy in the wetland area (Figure 2). The log for test pit TP-1 is included in Attachment 2. The presence of silt layers beneath the wetland were confirmed in the test pit. A sample of the silt from 5.0-5.4 feet BGS was submitted to Atlantic Testing Laboratory (ATL) for sieve analysis with hydrometer. The results show the sample was 88% silt, 8% clay, and 4% fine sand (Attachment 3). The test pit was dry to a depth of 8.0 ft BGS. Wet, silty clay was encountered at the bottom of the test pit.

Two bore holes (B-1-14 and B-2-14) were drilled in the wetland in 2014. The locations of the bore holes are shown on Figure 2. The boreholes were drilled using hollow stem augers through the overburden and were cored into the underlying bedrock. Split-spoon samples were collected through the overburden and placed in jars. Logs for the two boreholes are provided in Attachment 2. Wet silty clay, which was similar to that encountered at the base of test pit TP-1, was encountered from 7.0-8.5 ft BGS.

A soil sample from bore hole B-1-14, which is located in the middle of the wetland area north of the primary ditch, was also sent to ATL for sieve analysis. The sample was from a depth of 6.0-8.0 ft BGS and, according to the boring log, represented both a silty sand and the underlying clayey silt layer. The results of the sieve analysis are consistent with that description and indicate the sample was comprised of 50% silt, 21% clay, and 29% sand. The log from bore hole B-2-14 did not indicate any specific silt or clay layers; however, no split-spoon samples were collected from 6.0-9.0 ft BGS, which is the interval in which the silty clay was encountered at B-1-14. It is reasonable to assume that the clayey silt layer extends across the wetland, given the fact that the clayey silt was deposited in a glacial lake setting (Lake Tonowanda) thousands of years ago (Bradford et. al).

Bedrock

The logs for B-1-14 and B-2-14 (Attachment 2) indicate that the depth to bedrock ranges from 12 ft, at B-1-14 to 18.5 ft at B-2-14 and that the depth to bedrock increases southward across the wetland. The bedrock consists of the Gasport and Decew Members of the Lockport Group dolostones that are underlain by the Rochester Shale. The quarry adjacent to the wetland is currently mining the Lockport dolostones; however, the plan is to also mine the top of the Rochester shale.

Surface water

The Soil Survey of Orleans County, NY (1977 Printed Version) has 1:15,840 scale soil map sheets with black and white aerial images that were taken in the early 1970s, prior to mining at the site. The aerial image for the site shows that the present-day wetland area was nearly treeless and that the vast majority of the wetland had ditches that drained into a primary ditch. The land was being drained and used for muck farming (potatoes and/or onions) on both sides of the primary ditch. This is consistent with the fact that the USGS Medina Quadrangle map, which was published in 1973, does not indicate a wetland present in the area south of the mine (see Figure 1). The ditches south of the primary ditch drained northward to the primary ditch, whereas those on the north side drained southward to the primary ditch. The topographic contours on Figure 1 indicate that a 10 to 15-ft high ridge bordered the wetland on the north side, where the quarry presently resides.

The ditches are still visible more than 20 years later in a 1994-1999 Color Infrared aerial image of the site obtained from the NYS Office of Information Technology Services (Figure 4). The ditches on both sides of the primary ditch had water in them and several were still clearly defined, although brush and small trees had started to take over the wetland since the muck farming area had gone fallow by that time. The edge of the quarry was between 350 ft and 600 ft north of the primary ditch in the 1994-1999 image. The presence of surface water in the wetland area is an indication that the wetland had not been affected by the presence of the nearby quarry.

Surface water was present seasonally in the wetland and its ditches. Aerial images of the site available from GoogleEarth and the NYS Office of Information Technology, as well as on-site monitoring of the ditch, indicate that the wetland is typically dry during the summer and fall and wet during the winter and spring (Table 1). On-site monitoring of a staff gage (SG-1) in the primary ditch confirms that the ditch was again dry in the fall of 2019, but water had started to back up in the ditch as of early November (Table 2). Figure 2 shows the location of SG-1. The

present edge of the quarry is between 300 ft to 350 ft north of the primary ditch (Figure 2). Ponded water has been present in the primary ditch from November 9, 2019 through January 9, 2020, the most recent measurement date.

A source of the water in the wetland, in addition to direct precipitation, is from surface water backing up in the primary ditch as a result of beaver dams further downstream. The investigation that you conducted into the current location of the beaver dam on October 29, 2019 revealed that the dam was located in the primary ditch approximately 0.9 miles east of the site (Figure 1). Water was ponded behind the dam to a position approximately 1,800 ft east of the site. As of November 9, 2019, the water had backed up in the primary ditch to a position west of SG-1.

Ground Water

Well points PZ-1 and PZ-2 were installed to depths below grade of 5.0 ft and 6.4 ft BGS, respectively, in the wetland on either side of the primary ditch, on October 5, 2019. Their locations are shown on Figure 2. Well point PZ-1 was installed adjacent to the location of core hole B-1-14. Both well points remained dry for over two weeks after water had backed up in the primary ditch past SG-1 (Table 2). Well point PZ-2 had water in it prior to water appearing in PZ-1. The water level in both well points eventually rose above the water level in the primary ditch (SG-1). There was standing water around the base of the southern well point (PZ-2) at the time of the January 9, 2020 measurement; however, the ground around the northern well (PZ-1) point was still dry.

The primary source of water to the wetland is direct precipitation. The beaver activity results in a secondary "surcharge" of water to the wetland. The ponding of surface water within the primary ditch and its feeders occurs first, followed by the development of a seasonal, semi-perched water table on the underlying clayey silt and silty clayey layers. This is shown by the data in Table 2 and in the hydrographs of SG-1, PZ-1 and PZ-2 presented in Figure 5. There is a lag time between when surface water appears in the ditches and when the shallow, perched water table develops. The elevation of the perched water table on both sides of the ditch rises above the elevation of the primary ditch as the wet season continues. The semi-perched water table occurs during the winter and spring and is drawn down during summer and fall by evapotranspiration and very slow percolation downward to bedrock. This process occurs with or without the nearby presence of the quarry, which is currently approximately 215 ft north of PZ-1.

Data from bedrock well MW-6, which was located near the present quarry edge, indicates that the ground water table generally stays within the bedrock, separate from the perched water table.

Shelby has monitored water levels in various bedrock monitoring wells at the quarry since 2001. Well MW-6, also known as the Muck Well, was located just inside the LOM boundary (Figure 2) and was installed in 2007 to a depth of 24 ft BGS. Water levels were monitored on a monthly basis there from 2007 until it was mined out in 2016. The hydrograph of the MW-6 water level elevation data is presented in Figure 6. The hydrograph indicates that the water table rarely rose above the bedrock surface during the nine years the well was monitored and never dropped below the Gasport Member (Figure 6). The water table at MW-6 fluctuated up and down seasonally by approximately four to five feet from 2007 until late fall 2105 and early winter 2016 when an apparent downward trend in water levels began as the mine approached the well and ultimately took it out of commission. The southern quarry face was approximately 280 ft from well MW-6 in 2014 and there was no apparent impact to the water level trend in MW-6 at that time.

Ground water seepage from the southern quarry face is stratigraphically controlled and emanates from the contact between the Gasport Member and the underlying Decew Member.

Hydrogeologic Cross Sections

Hydrogeologic cross sections were constructed to represent conditions in June 2014, October 2019, and in the future on the last day of mining. The date of June 2014 was chosen because a topographic survey of the mine had been conducted for the mining permit renewal in 2014 and because well MW-6 had water level data available for that month. The cross sections are presented as Figure 7, 8 and 9 and were constructed using information from the following sources:

- 2019 Mining Plan Map showing proposed expansion area (Attachment 1)
- Log of test pit TP-1 (Attachment 2)
- Log of core holes B-1-14 and B-2-14 (Attachment 2)
- Ground water data from well points PZ-1 and PZ-2, staff gauge SG-1, and monitoring well MW-6 (Table 2; Figure 6)
- Elevation of seepage in southern quarry wall and its stratigraphic position (Figure 8)
- 2014 Mining Plan Map, dated June 9, 2014 (not attached)
- 2019 Reclamation Plan Map showing proposed expansion area (Attachment 1)

The water table drawdown curve away from the quarry face is estimated using the elevation of the known seepage at the quarry face at the base of the Gasport Member, the water level at MW-6 on June 22, 2014, and the fact that the water table typically remains within the Gasport Member, or just above it. The June 22, 2014 water-level date for MW-6 is only two weeks after the topographic survey completed for the 2014 mining plan map; consequently, the location of the quarry face at that time can be determined as 280 ft from MW-6. The drawdown curve is steeper as it approaches the quarry face and gradually flattens southward and away from the face. A very slight upward slope on the water table is maintained southward across the wetland due to the rise of the water table within the higher terrain immediately south of the wetland area (Figure 1). Ground water flow will follow the high to low water table elevation from the higher terrain in the south, northward across the wetland and toward the quarry. The hydrogeologic cross sections indicate that the vast majority of water table drawdown takes place within approximately 150 ft of the edge of the quarry.

Potential Impact to the Wetland

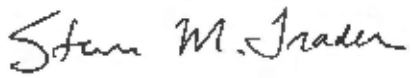
The proposed removal of 8.7 acres of wetland represents a loss of approximately 1.7% of the total wetland area (502 acres), as defined by the presence of Palms Muck. Other than the physical removal of wetland by mining, no significant hydrogeologic impact to the remaining wetland is anticipated as a result of the mine expansion. The evidence for this is summarized in the following bullets:

- The primary source of water in the wetland is from direct precipitation. An additional contribution comes from surface water ponding in the ditches and wetland due to beaver dam(s) downstream in the primary ditch. This will not change as a result of the mine expansion;
- Water in the primary ditch will continue to naturally back up into the feeder ditches and low areas of the wetland south of the primary ditch as it has done for decades, with or without the presence of the mine;
- The clayey silt layer beneath the wetland will remain and continue to retard infiltration to the bedrock during the seasonal wet periods;
- The rate of infiltration to the subsurface will not change as a result of the expansion; consequently, the length of time that the wetland remains wet at the surface will not change as a result of the expansion;
- A seasonal, semi-perched, water table condition develops on the underlying clayey silt and silty clay layers during the winter and spring. The semi-perched water table is drawn

down by evapotranspiration and slow percolation during the summer and fall. This condition will not change as a result of the mine expansion;

- The earthen berm to be created between the primary ditch and the quarry will prevent surface waters from entering the quarry from the wetland and ditches;
- The ground water table, which is typically within the bedrock, will be lowered by as much as 10 feet at the proposed southern quarry face; however, the extent of water table drawdown will diminish away from the quarry face. Based on the hydrograph of MW-6, the impact will be *de minimis* beyond approximately 280 ft, where the water table will be relatively unchanged.

Let me know if you have any questions regarding this evaluation.
Sincerely,



Steven M. Trader, PG, CPG
Alpha Geoscience

Reference:

Bradford, A.H., Puglia, P.S. and Yoakum, TD., 1973, Soil Survey of Orleans County, New York, USDA, Soil Conservation Service, 138 p.

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TABLES

TABLE 1
Historical Wet and Dry Conditions
Wetland Ditches
Shelby Crushed Stone - Medina Mine

Image Date or Monitoring Date	Condition of Wetland Ditches	Source
11/9/2019 - 1/9/2020	Wet	On-site Monitoring
10/5/2019 -11/1/2019	Dry	On-site Monitoring
9/22/2018	Dry	GoogleEarth
10/14/2016	Dry	GoogleEarth
5/30/2016	Wet	GoogleEarth
4/15/2015 > <5/7/2015	Wet	NYS Office of Info. Tech.
6/5/2015	Wet	GoogleEarth
6/21/2014	Wet	GoogleEarth
10/5/2011	Dry	GoogleEarth
April 2010	Wet	NYS Office of Info. Tech.
5/3/2009	Wet	GoogleEarth
6/4/2006	Wet	GoogleEarth
April 2005	Wet	NYS Office of Info. Tech.
April 2002	Wet	NYS Office of Info. Tech.
3/27/1995	Wet	GoogleEarth

TABLE 2

Water Level Measurements

Wetland Monitoring Points

Shelby Crushed Stone - Medina Mine

ID	PZ1		PZ2		SG1	
Total Depth	7.08		9.30		3.54	
MP Elevation	595.9		596.60		594.9	
Bottom Elevation	588.82		587.30		591.36	
Date	Depth to Water					
10/5/2019	Dry	<588.82	Dry	<587.3	Dry	<591.36
10/7/2019	Dry	<588.82	Dry	<587.3	Dry	<591.36
10/18/2019	Dry	<588.82	Dry	<587.3	Dry	<591.36
10/25/2019	Dry	<588.82	Dry	<587.3	Dry	<591.36
11/1/2019	Dry	<588.82	Dry	<587.3	Dry	<591.36
11/9/2019	Dry	<588.82	Dry	<587.3	3.01	591.89
11/15/2019	Dry	<588.82	Dry	<587.3	2.31	592.59
11/20/2019	Dry	<588.82	Dry	<587.3	2.21	592.69
12/5/2019	Dry	<588.82	3.62	592.98	1.95	592.95
12/17/2019	4.54	591.36	2.55	594.05	1.7	593.2
12/27/2019	4.44	591.46	*NR*	*NR*	1.83	593.07
1/3/2020	2.16	593.74	*NR*	*NR*	1.66	593.24
1/9/2020	2.5	593.4	2.67	593.93	2	592.9

Note: Total depth and depth to water measurements are made from the top of the well casing, or top of staff gauge. All measurements are in feet and made by Shelby Crushed Stone except for 10/5/2019.

NR = No reading due to limited access
Total Depth measured from Measuring Point (MP)

FIGURES

Beaver Dam (10/29/2019)

Dry Wet

Site of Neuner Fort

Quarry

Shelby Center

Town Hall

Water

Cem

Landing Strip

Orchard

Oak

Creek

Jeddo

Fish

Letts Cem

Mt Pleasant Cem

Swart Culver

SHELBY

FREEMAN ROAD

SALT ROAD

BLAIR ROAD

RYAN ROAD

SANDERSON ROAD

MUNZEI ROAD

MARTIN ROAD

HARRISON ROAD

BATES ROAD

EDWARDS ROAD

WEST SHELBY ROAD

CREEK ROAD

0 2,000 4,000 Feet

LEGEND

Site

Source:
-NYSDOT 7.5-minute topographic map (Medina quadrangle).
-Elevations are shown in feet above mean sea level.
-Contour interval is 5 feet.

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FIGURE 1
Site Location Map

Shelby Crushed Stone
Medina Mine
Town of Shelby
Orleans County, New York

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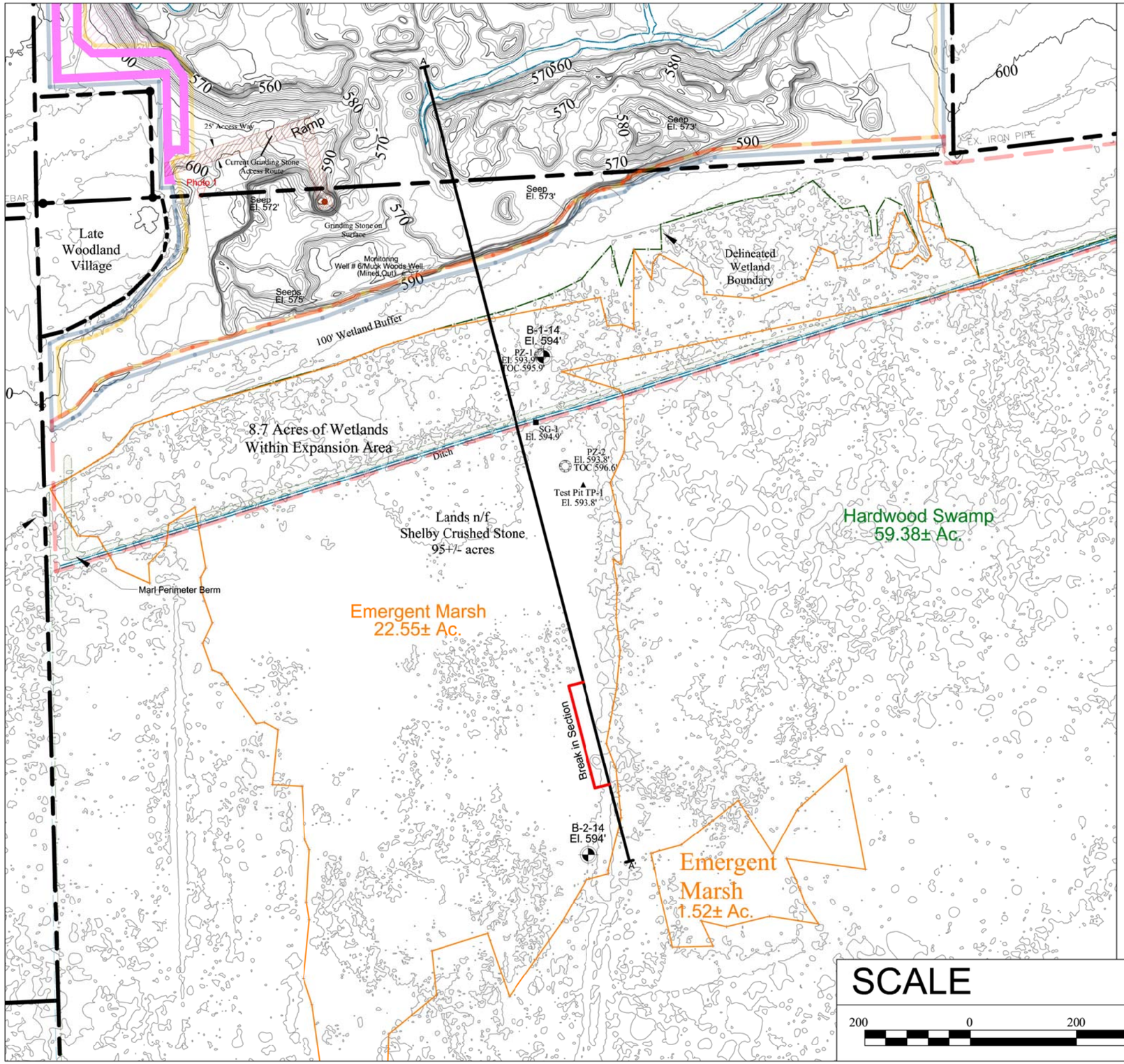

LEGEND

- Property Line
- 10' Contour Line (570)
- 2' Contour Line
- Current Life of Mine
- Proposed Life of Mine
- Water
- Proposed Marl Perimeter Berm
- Emergent Marsh Boundary
- Piezometer with Surface Elevation
- Core Hole with Surface Elevation

NOTES

1. Mining Plan Map prepared by Griggs-Lang Consulting Geologists, last updated June 9, 2014, and modified by Strategic Mining Solutions in 2018 and 2019.
2. Extended elevation contours (2-foot) derived from LiDAR dataset provided through NYSGIS Clearinghouse.
3. Topographic survey of delineated wetland area performed by Strategic Mining Solutions on August 16, 2019.

DETAILS

Topographic Survey Date: August 16, 2019
Horizontal Scale: 1" = 200'
Datum: Mean Sea Level
USGS Quad: Medina 7.5'
Contour Interval: 2 feet

SCALE

200 0 200 400 600

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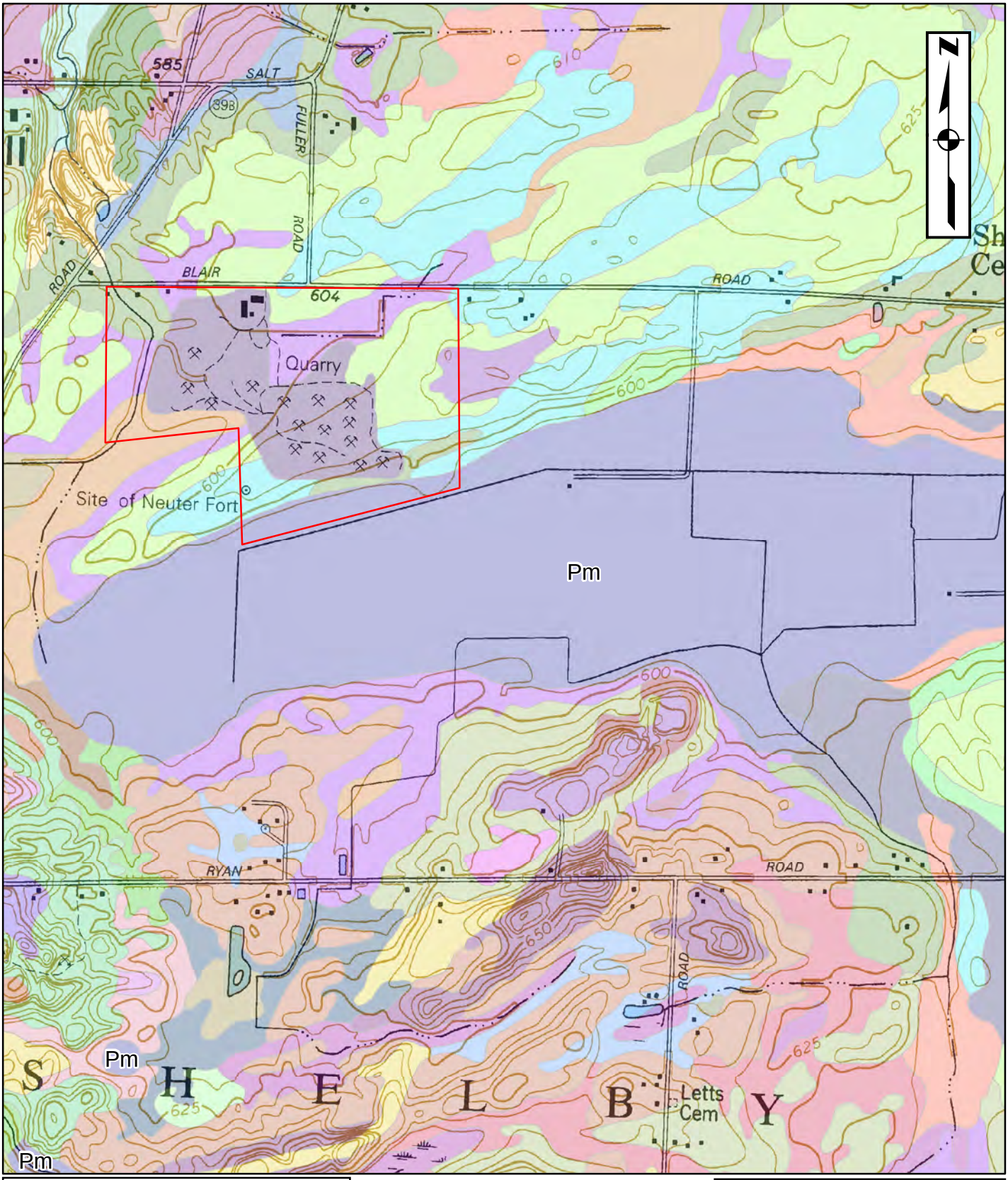
Project #19120

FIGURE 2

SITE MAP

Shelby Crushed Stone
Medina Mine
Town of Medina, Orleans County, New York



LEGEND

- Approximate Site Boundary
- Palms muck

Source:
-Orleans County Topographic Maps and Soils data
from NYS Office of Information Technology Services (ITS).

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FIGURE 3
Soils Map
Shelby Crushed Stone
Medina Mine
Town of Shelby
Orleans County, New York

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LEGEND

- Flow Direction
- Current Life of Mine Area (approx.)
- Lands Proposed To Be Added To The Life of Mine Area (approx.)

Source:
-Orleans County infared images from NYS Office of Information Technology Services (ITS).

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FIGURE 4
Drainage Features Circa 1996

Shelby Crushed Stone
Medina Mine
Town of Shelby
Orleans County, New York

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FIGURE 5
Hydrographs for Wetland Monitoring Points
Shelby Crushed Stone - Medina Mine

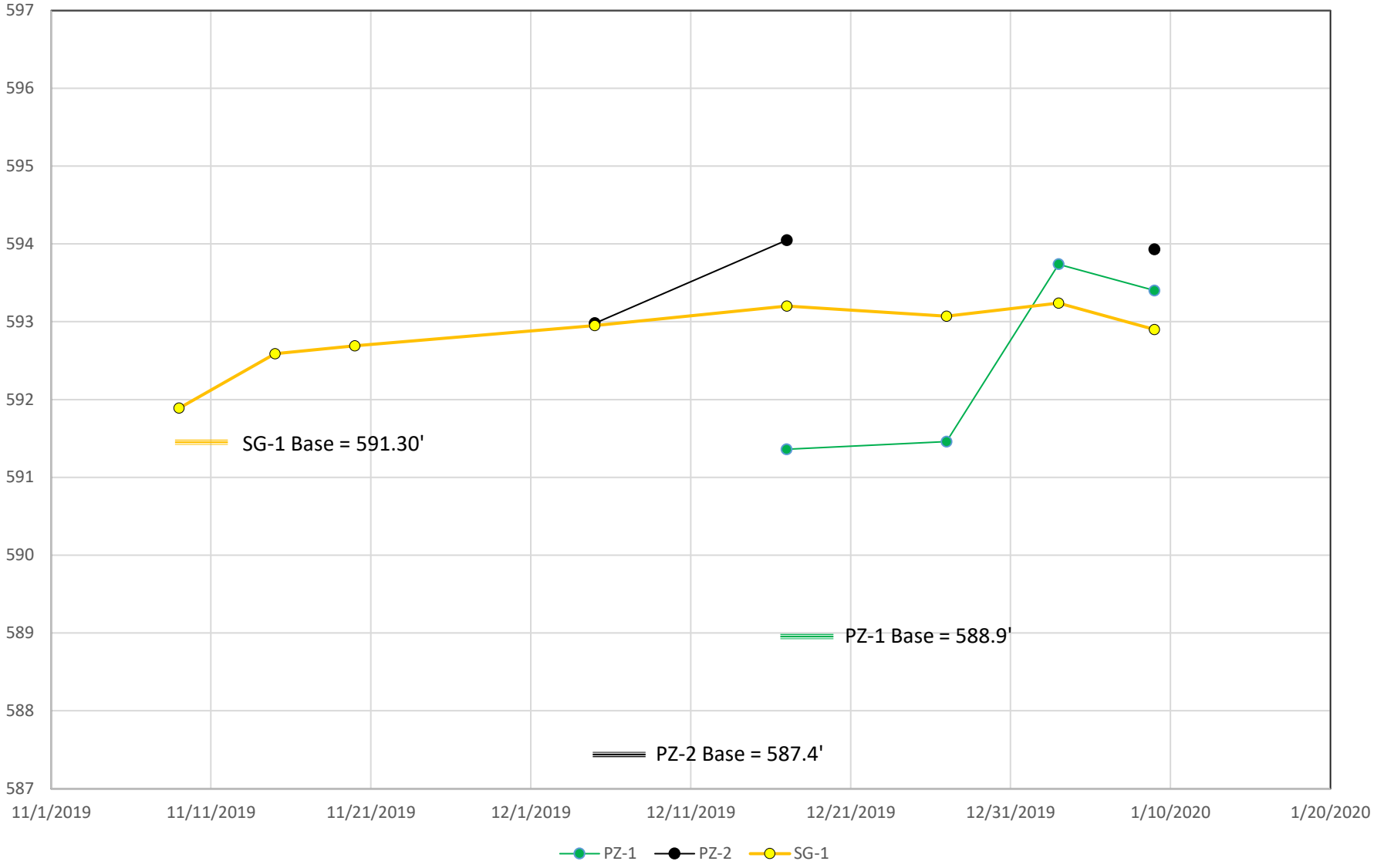

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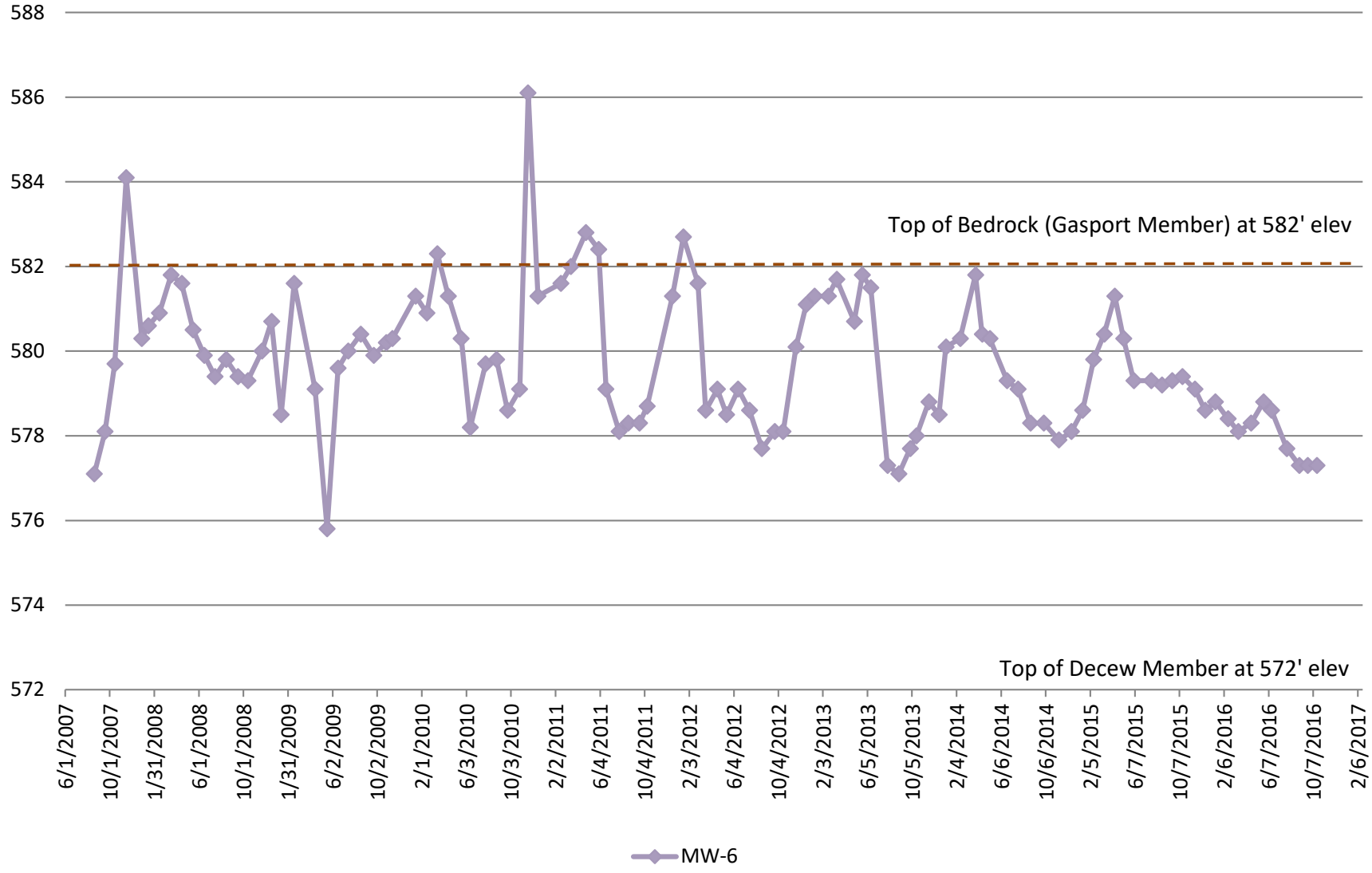
FIGURE 6
MW-6 Water Level Elevations
Shelby Crushed Stone - Medina Mine



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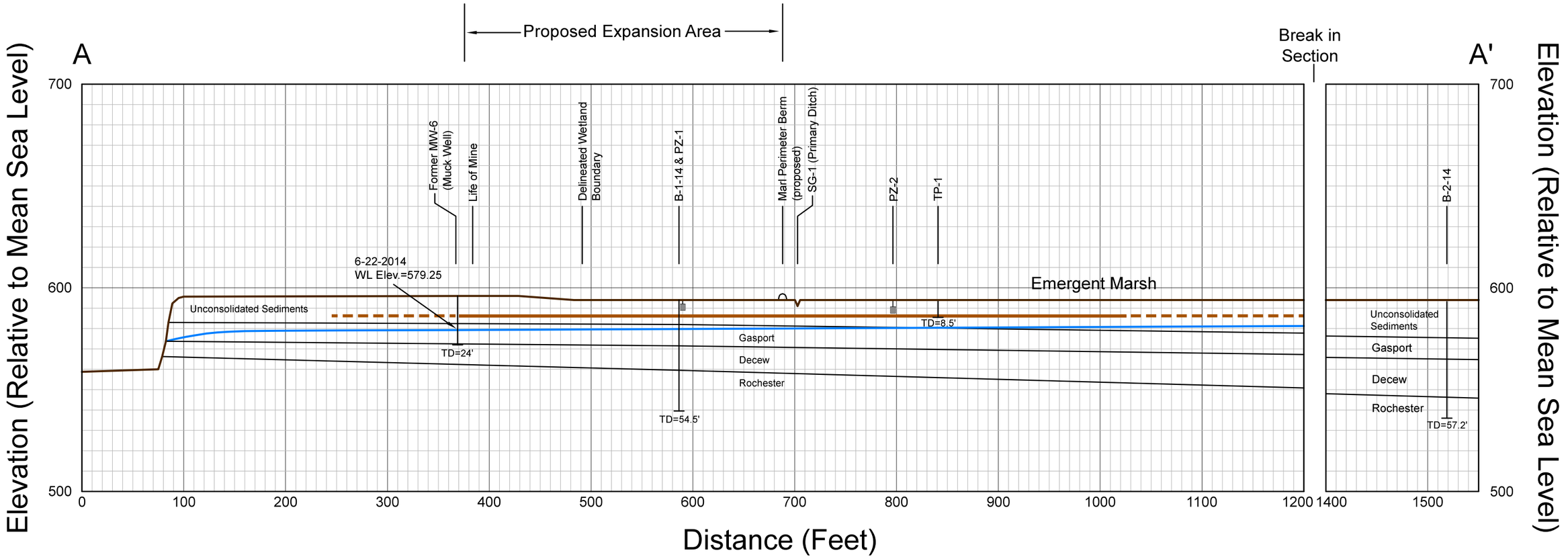

Note: Vertical Exaggeration = 2x

LEGEND

- Surface Topography 6-9-2014
- Lacustrine Silt and Clay
- 2014 Ground Water Table
- Piezometer & Well Screen
- Core Hole, Well, or Test Pit with Total Depth (TD=54.5')

NOTES

1. Cross section A-A' prepared by Alpha Geoscience based on topographic survey by Strategic Mining Solutions.

DETAILS

Topographic Survey Date: June 9, 2014
Vertical Exaggeration: 2x
Datum: Mean Sea Level

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FIGURE 7

Section A-A'
2014 Profile

Shelby Crushed Stone
Medina Mine
Town of Medina, Orleans County, New York

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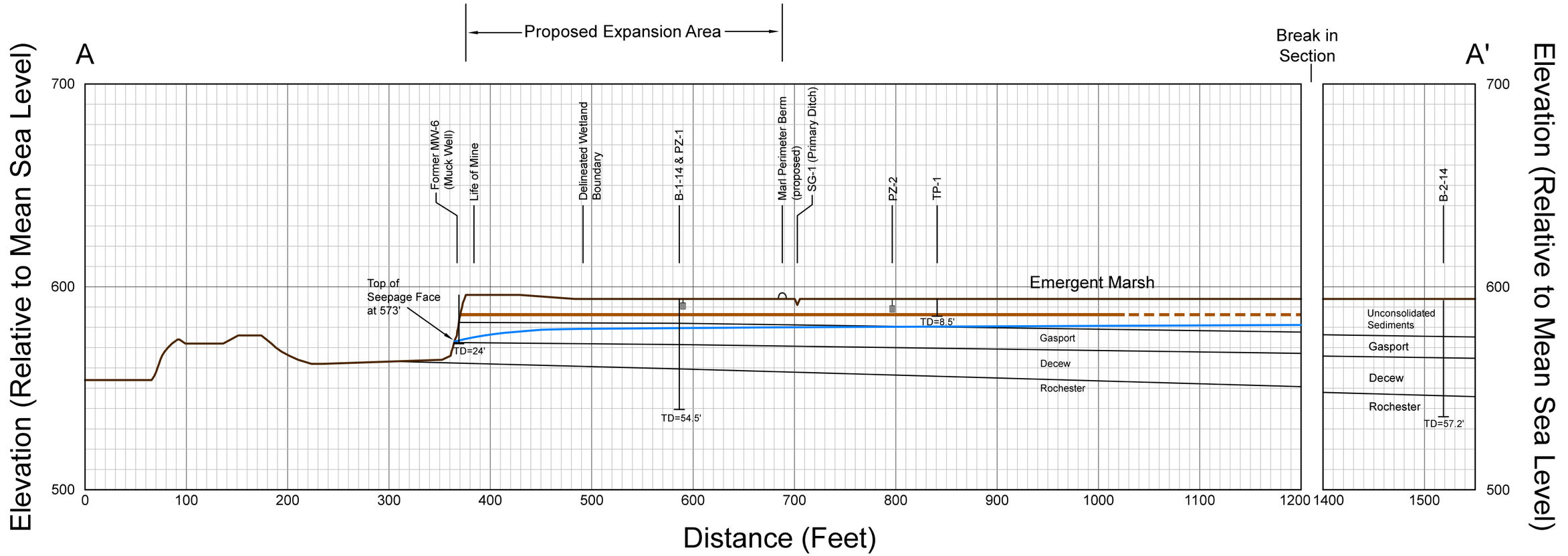

Note: Vertical Exaggeration = 2x

LEGEND

- Surface Topography 6-9-2014
- Lacustrine Silt and Clay
- 2014 Ground Water Table
- Piezometer & Well Screen
- Core Hole, Well, or Test Pit with Total Depth (TD=54.5')

NOTES

1. Cross section A-A' prepared by Alpha Geoscience based on topographic survey by Strategic Mining Solutions.

DETAILS

Topographic Survey Date: August 16, 2019
Vertical Exaggeration: 2x
Datum: Mean Sea Level

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FIGURE 8

Section A-A'
2019 Profile

Shelby Crushed Stone
Medina Mine
Town of Medina, Orleans County, New York

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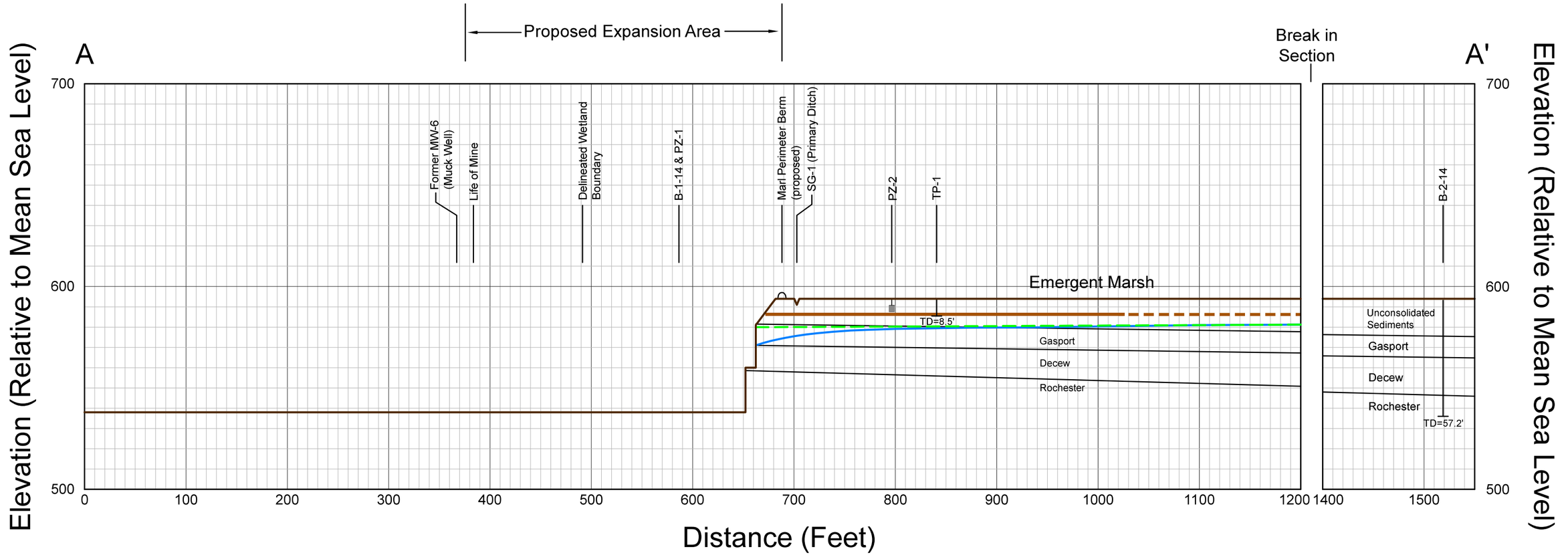

Note: Vertical Exaggeration = 2x

LEGEND

- Future Surface Topography
- Lacustrine Silt and Clay
- Future Ground Water Table
- 2019 Ground Water Table
- Piezometer & Well Screen
- Core Hole, Well, or Test Pit with Total Depth

TD=54.5'

NOTES

1. Cross section A-A' prepared by Alpha Geoscience based on topographic survey by Strategic Mining Solutions.

DETAILS

Topographic Survey Date: August 16, 2019
Vertical Exaggeration: 2x
Datum: Mean Sea Level

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FIGURE 9

Section A-A'
Future Profile

Shelby Crushed Stone
Medina Mine
Town of Medina, Orleans County, New York

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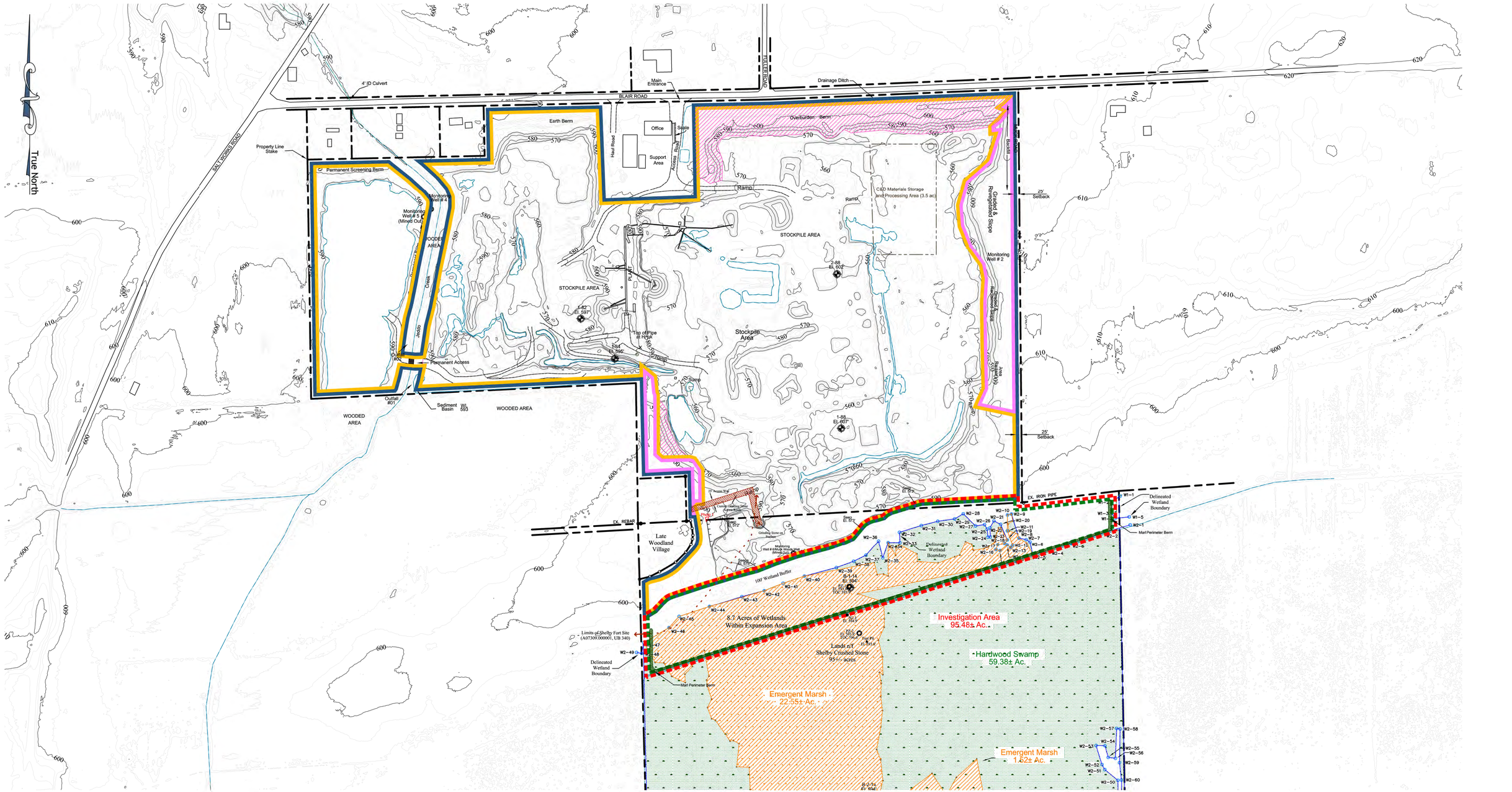
ATTACHMENT 1

2019 Mining Plan Map

2019 Reclamation Plan Map



MINING PLAN MAP

Medina Mine

NYSDEC Mine ID: 80346

Shelby Crushed Stone, Inc.

Town of Shelby, Orleans County, New York

Prepared by:

strategic mining solutions
prospecting • planning • permitting • problem solving

Strategic Mining Solutions LLC
Geologists & Mining Consultants
473 Brockway Road / Frankfort, New York 13340

David Shank 315.725.5734 dave@miningstrategy.com
Brian Milliman 315.725.6259 brian@miningstrategy.com

Details:
Date: August 17, 2016
Horizontal Scale: 1" = 200'
Datum: Mean Sea Level
USGS Quad: Medina 7.5'
Contour Interval: 2 feet
Drafted by: Milliman

REVISIONS

Date	Description	By
11/6/18	Add Expansion Area	BTM
6/21/19	Survey Update	BTM
8/16/19	Survey Update	BTM
10/4/19	Add Monitoring Data	BTM

LEGEND

- Property Line
- Life of Mine Boundary
- 10' Contour Line
- 2' Contour Line
- Stream/Edge of Water
- Structure
- Unpaved Road
- Paved Road
- Wetland

SCALE

1" = 200'

200 0 200 400 600 800

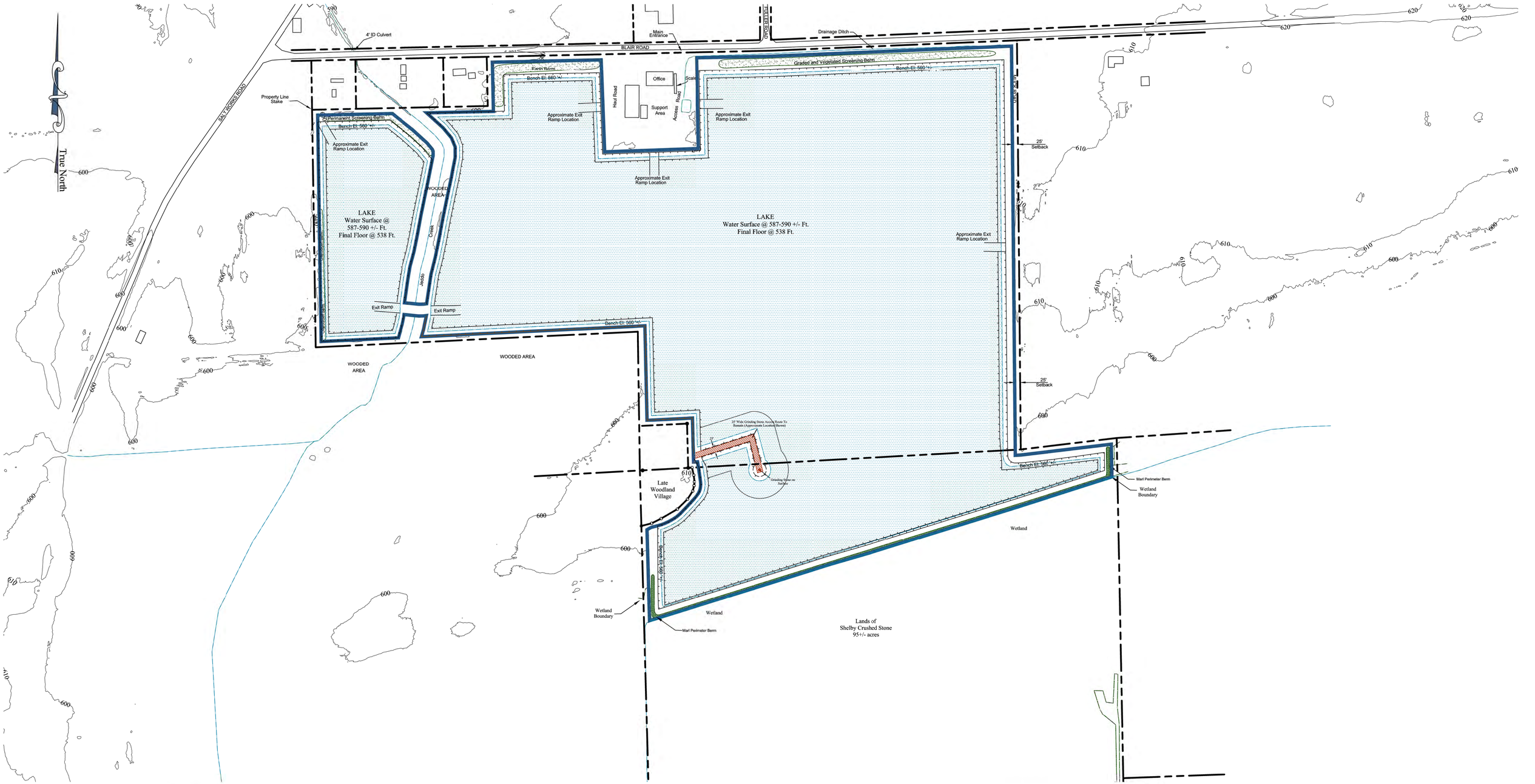
NOTES

Base Maps & Background Information

- Mining Plan Map prepared by Griggs-Lang Consulting Geologists, last updated June 9, 2014.
- Extended elevation contours (2 foot) derived from LiDAR dataset provided through NYSGIS Clearinghouse available at http://www.orthos.dhses.ny.gov/.
- Certain map features digitized from digital high resolution aerial orthophotos provided from the National Aerial Imagery Program (NAIP) and the NYSGIS Clearinghouse.
- Property lines updated from Map of Part of Lots-15, 16, & 29, TWP.-14, R.-4, Holland Purchase by McIntosh & McIntosh, PC, last revised 12/19/13.
- Limits of Shelby Fort Site and buffer area location updated from Survey of Part of Lot-15, TWP-14, Holland Purchase. By McIntosh & McIntosh, P.C. dated August 21, 2018.

ACREAGE SUMMARY

- Total Acreage Currently Affected by Mining Activities: 99.9+/- acres
- Lands Currently Affected By Mining Activities To Be Reclaimed During The 2018-2023 Permit Term 5.4+/- acres
- Lands Approved As Reclaimed By NYSDEC: 5.8+/- acres
- Additional Lands To Be Affected During The 2018-2023 Permit Term: 15+/- acres
- Total Lands To Be Affected by Mining Activities During The 2018-2023 Permit Term: 114.9+/- acres
- Current Life of Mine Area: 105.9+/- acres
- Lands Proposed To Be Added To The Life of Mine Area: 15+/- acres



RECLAMATION PLAN MAP

Medina Mine

NYSDEC Mine ID: 80346

Shelby Crushed Stone, Inc.

Town of Shelby, Orleans County, New York

Prepared by:

strategic mining solutions
prospecting • planning • permitting • problem solving

Strategic Mining Solutions LLC
Geologists & Mining Consultants
473 Brockway Road / Frankfort, New York 13340

David Shank
315.725.5734
dave@miningstrategy.com

Brian Milliman
315.725.6259
brian@miningstrategy.com

Details:

Date: August 17, 2016
Horizontal Scale: 1" = 200'
Datum: Mean Sea Level
USGS Quad: Medina 7.5'
Contour Interval: 10 feet
Drafted by: Milliman

REVISIONS

Date	Description	By
11/6/18	Add Expansion Area	BTM
6/21/19	Survey Update	BTM
8/16/19	Survey Update	BTM
11/12/19	Update Quarry Face	BTM

LEGEND

- Property Line
- Life of Mine Boundary
- 10' Contour Line
- Stream/Edge of Water
- Structure
- Unpaved Road
- Paved Road
- Wetland

SCALE

1" = 200'

200 0 200 400 600 800

NOTES

Base Maps & Background Information

- Mining Plan Map prepared by Griggs-Lang Consulting Geologists, last updated June 9, 2014.
- Extended elevation contours (2 foot) derived from LiDAR dataset provided through NYSGIS Clearinghouse available at http://www.orthos.dhses.ny.gov/.
- Certain map features digitized from digital high resolution aerial orthophotos provided from the National Aerial Imagery Program (NAIP) and the NYSGIS Clearinghouse.
- Property lines updated from Map of Part of Lots-15, 16, & 29, TWP.-14, R.-4, Holland Purchase by McIntosh & McIntosh, PC, last revised 12/19/13.
- Limits of Shelby Fort Site and buffer area location updated from Survey of Part of Lot-15, TWP-14, Holland Purchase. By McIntosh & McIntosh, P.C. dated August 21, 2018.

ACREAGE SUMMARY

Life of Mine Area To Be Reclaimed: 120.9+/- acres

ATTACHMENT 2

Test Pit Log

Core Hole Logs

Well Point Construction Logs

TEST PIT LOG

Alpha Geoscience
679 Plank Road
Clifton Park, New York 12065

ALPHA GEOSCIENCE

Test Pit No. TP-1
Project No. 19120

DATE/TIME STARTED: 10/5/2019
DATE/TIME COMPLETED: 10/5/2019
PROJECT: Shelby Crushed Stone - Medina Mine
SURFACE ELEVATION: 593.8 ft amsl
WATER ELEVATION: None Encountered

SITE: Shelby Stone - Medina Mine
CONTRACTOR: Shelby Crushed Stone
EQUIPMENT: Excavator
INSPECTOR: Matthew Dupee and Brian Milliman

DEPTH (ft)	DESCRIPTION OF SOIL	REMARKS
	Peat muck	
1.0	1.1'	
	Silty fine sand, mottled grey brown; orange stained	
2.0	2.2'	
	Silt, some fine sand; moist	
3.0		
	3.6'	
4.0	Medium sand; dry	
	4.2'	
	Silt, little clay; moist, stiff	
5.0		
	5.4'	Sample TP-1 5.0 - 5.4' (Submitted for sieve analysis and hydrometer)
6.0	Medium sand interlayered with silt; 3-5" layers	
	6.4'	
7.0	Medium sand, some fine sand; dry	
8.0		
	Silty clay, brown; wet	
9.0	TD= 8.5ft	

Z:\projects\2019\19100-19120\19120 - Medina Mine\3_0 Field Records\Core Logs and Geologic Information\Test Pit Log.cvx

NATURE'S WAY ENVIRONMENTAL
Consultants & Contractors, Inc.
3553 Crittenden Road
Alden, NY 14004
(716) 937- 6527
www.natureswayenvironmental.com

Hole Number: B - 1 - 14

DATE: 10/3/14 ELEVATION

PROJECT: Subsurface Investigation at Shelby Stone Quarry
10830 Blair Road, Medina, NY

PREPARED FOR: Shelby Crushed Stone Products, Inc.

BORING LOCATION:

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	WATER TABLE AND REMARKS
1	2						Extremely moist to wet, dark gray to black, mucky (SANDY-SILT) topsoil, loose		Mucky topsoil to 0.8 foot over coarse silty slack water sediment with little to some sand to 3.0 feet over water sorted and deposited sand with trace to little silt to 7.0 feet over silty lake sediment with little clay to 8.5 feet over coarse silty glacial till to 12.0 feet over fractured limestone rock to 12.4 feet over limestone bedrock to 22.5 feet over dolostone bedrock to 34.5 feet over dolostone bedrock with thin dolomitic shale layers to 40.0 feet over dolomitic shale bedrock with thin dolostone layers to end of coring
		4					0.9		
			4		8		Extremely moist, distinctly mottled, brown (SANDY-SILT) with little to some very fine size sand, loose, weakly thinly bedded	1.2'	
				5					
2	4								
		6							
			5		11				
				7					
3	2								
		4							
			4		8			1.5'	
				4					
4	2								
		6							
			8		14		7.0	1.5'	
				12			Extremely moist, brown (CLAYEY-SILT) with little clay, stiff, thinly laminated with very thin coarse silt lenses		
5	1						8.5		
		7					Wet, brown, gravelly (SANDY-SILT) with 15 to 25% gravel, little very fine size sand, compact, massive soil structure		
			10		17			1.2'	
				15					
							12.0		
6	50/2"	RUN	#1				Fractured Limestone rock, light gray, very hard, wet		
							12.4		
							Limestone bedrock, light gray, very hard, can be etched with a knife with effort, very thin to medium bedded, 1" to 8" thick, crystalline, calcareous	0.3'	
									▼ Lost Water Return at 14.2' BGS
		RUN	#2						

LOGGED BY: Dale M. Gramza / Senior Geologist

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Hole Number: B - 1 - 14

DATE: 10/3/14

ELEVATION

PROJECT: Subsurface Investigation at Shelby Stone Quarry
10830 Blair Road, Medina, NY

PREPARED FOR: Shelby Crushed Stone Products, Inc.

BORING LOCATION:

Depth	SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	WATER TABLE AND REMARKS
								See previous sheet		
			RUN	#3						
								22.5		
								Dolostone Bedrock, gray, hard, can be etched with a knife, thin to medium bedded, 3" to 8" thick, crystalline, with occasional dark gray shale and selenite partings		
			RUN	#4						
25										
			RUN	#5						
30										
								34.5		
			RUN	#6				Dolostone bedrock, gray, hard, can be etched with a knife, very thin to thinly bedded, 1" to 4" thick, with thin, medium gray, dolomitic shale layers throughout core		
35										
			RUN	#7				40.0		
40										

CORE DATA

Run #	Interval (ft)	Length (ft)	Rec (ft)	Rec %	RQD %
1	12.4 to 17.2	4.8	4.5	94	38
2	17.2 to 21.9	4.7	4.7	100	74
3	21.9 to 24.4	2.5	3.0	100	92
4	24.4 to 29.6	5.2	5.1	98	93
5	29.6 to 34.7	5.1	5.1	100	86
6	34.7 to 39.7	5.0	4.8	96	94
7	39.7 to 44.5	4.8	4.4	92	84
8	44.5 to 49.5	5.0	5.0	100	90
9	49.5 to 54.5	5.0	4.7	94	90

LOGGED BY: Dale M. Gramza / Senior Geologist

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3553 Crittenden Road
Alden, NY 14004
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www.natureswayenvironmental.com

Hole Number: B - 1 - 14

DATE: 10/3/14 ELEVATION

PROJECT: Subsurface Investigation at Shelby Stone Quarry
10830 Blair Road, Medina, NY

PREPARED FOR: Shelby Crushed Stone Products, Inc.

BORING LOCATION:

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	WATER TABLE AND REMARKS
							Dolomitic shale bedrock, medium gray, moderately hard, can be etched with a knife, thin to median bedded, 2" to 5" thick, with thin, gray, hard Dolostone layers 1" to 2" thick throughout core		
45		RUN	#8						
50		RUN	#9						
							54.5 Rock Core Completed at 54.5' BGS		
55									
60									

LOGGED BY: Dale M. Gramza / Senior Geologist

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3553 Crittenden Road
Alden, NY 14004
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www.natureswayenvironmental.com

Hole Number: B - 2 - 14

DATE: 10/7/14 ELEVATION

PROJECT: Subsurface Investigation at Shelby Stone Quarry
10830 Blair Road, Medina, NY

PREPARED FOR: Shelby Crushed Stone Products, Inc.

BORING LOCATION:

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	WATER TABLE AND REMARKS
1	1						Wet, dark gray to black, mucky (SILT) with trace very fine size sand, very loose with fine size roots 0.9		Topsoil to 0.9 foot over silty slack water sediment with trace sand to 4.0 feet over water sorted and deposited sand with little to some silt to 18.5 feet over limestone bedrock to 29.0 feet over dolostone bedrock to 47.7 feet over dolomitic shale bedrock to end of coring
		2			7		Wet, faintly mottled, brown (SILT) with trace very fine size sand, loose to compact, thinly bedded	1.5'	
			5						
				10					
2	4								
		5							
			8		13			1.8'	
				10			4.0		
3	5						Wet, grayish brown (SILTY-SAND) with very fine size sand, little to some silt, compact to loose, becoming very loose below 13.0', thinly bedded		
		11							
			12		23			2.0'	
				16					
4	WR								WR - Sampler penetration with weight of Rods
		3							
			5		8			1.9'	
				7					
5	WH								WH - Sampler penetration with weight of Rods and Hammer
		1							
			2		3			0.6'	
				2					
							18.5		
		RUN	#1				See Next Sheet		

LOGGED BY: Dale M. Gramza / Senior Geologist

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Hole Number: B - 2 - 14

DATE: 10/7/14 ELEVATION

PROJECT: Subsurface Investigation at Shelby Stone Quarry
10830 Blair Road, Medina, NY

PREPARED FOR: Shelby Crushed Stone Products, Inc.

BORING LOCATION:

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	WATER TABLE AND REMARKS
		RUN	#2				Limestone bedrock, light gray to gray, very hard, can be etched with a knife with effort, thin to medium bedded, 4" to 6" thick, with occasional dolomite crystal filled vugs, calcareous, crystalline		
25									
		RUN	#3						
							29.0		
							Dolostone bedrock, gray, hard, can be etched with a knife, thinly bedded, 4" to 8" thick, with dark gray shale partings and thin shale layers 1/4" to 1/2" thick spaced 4" to 8" apart, crystalline, slightly calcareous		
30									
		RUN	#4						
35									
		RUN	#5						
		RUN	#6						
40									

CORE DATA

Run #	Interval (ft)	Length (ft)	Rec (ft)	Rec %	RQD %
1	18.5 to 23.3	4.8	4.7	98	90
2	23.3 to 26.0	2.7	2.5	93	67
3	26.0 to 31.1	5.1	5.1	100	90
4	31.1 to 36.2	5.1	5.1	100	92
5	36.2 to 39.3	3.1	3.0	97	94
6	39.3 to 44.2	4.9	4.8	98	94
7	44.2 to 49.5	5.3	5.2	98	91
8	49.5 to 52.3	2.8	2.7	96	86
9	52.3 to 57.2	4.9	4.8	98	83

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Hole Number: B - 2 - 14

DATE: 10/7/14

ELEVATION

PROJECT: Subsurface Investigation at Shelby Stone Quarry
10830 Blair Road, Medina, NY

PREPARED FOR: Shelby Crushed Stone Products, Inc.

BORING LOCATION:

SN	0/6	6/12	12/18	18/24	N	LITH	DESCRIPTION AND CLASSIFICATION	REC	WATER TABLE AND REMARKS
							Dolostone bedrock, gray, hard, can be etched with a knife, thinly bedded, 4" to 8" thick, with dark gray shale partings and thin shale layers 1/4" to 1/2" thick spaced 4" to 8" apart, crystalline, slightly calcareous		
		RUN	#7						
45									
							47.7 Dolomitic shale bedrock, gray, moderately hard, can be etched with a knife, thin to medium bedded, 2" to 6" thick, with thin dolostone layers 1" to 2" thick throughout core		
		RUN	#8						
50									
		RUN	#9						
55									
							57.2 Rock Coring Completed at 57.2' BGS		
60									

LOGGED BY: Dale M. Gramza / Senior Geologist

SHEET 3 OF 3

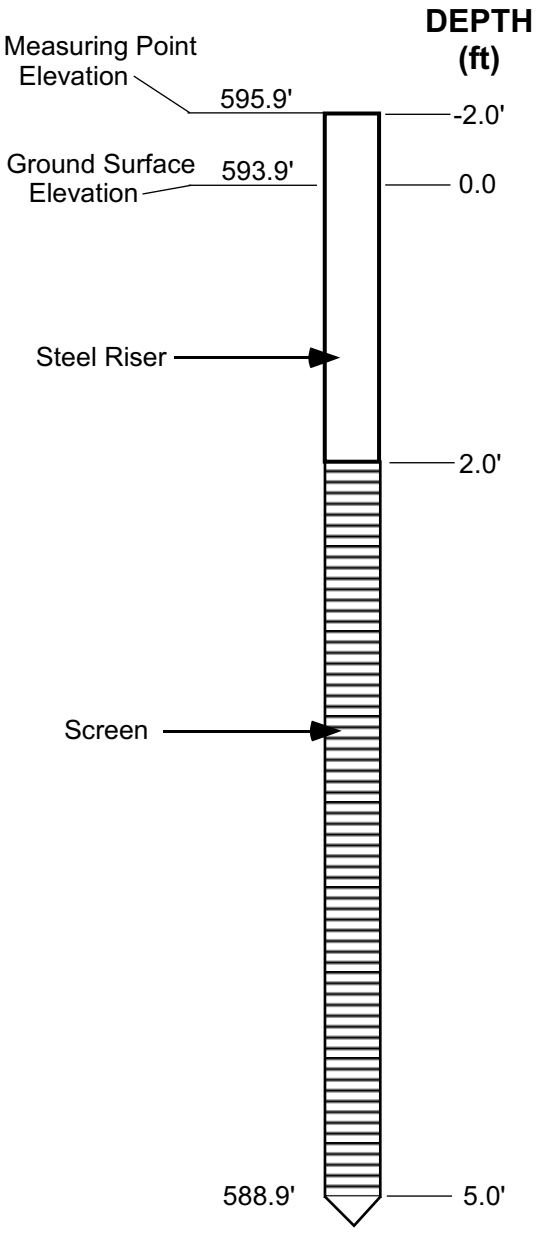
MONITORING WELL COMPLETION LOG

ALPHA GEOSCIENCE
679 Plank Road
Clifton Park, New York
(518) 348-6995
www.alphageoscience.com

Well PZ-1
Project Shelby Crushed Stone - Medina Mine Expansion
Project No. 19120
Client Shelby Crushed Stone
Date Drilled 10/5/19
Date Developed Not Applicable - Dry

WELL CONSTRUCTION DETAILS

NOT TO SCALE



INSPECTION NOTES

Geologist Matt Dupee
Drilling Contractor None - installed by Alpha
Type of Well Water Level Monitoring
Static Water Level Dry Date 10/5/19; 11/5/19
Measuring Point PVC
Total Well Depth 5' below grade

Riser Pipe
Material PVC Diameter 1.25"
Length 2.0' + 2.0' stickup Joint Type Threaded

Screen
Material steel Diameter 1.25"
Slot Size _____ Length 3 ft
Stratigraphic Unit Screened sand & gravel

Packing
Sand _____ Gravel _____ Natural X
Amount -- Interval 0-5

Seal
Type NA Interval _____
Type NA Interval _____

Notes:

Z: 19120 - Medina Mine\Field Records\Piezometer Logs.cvx

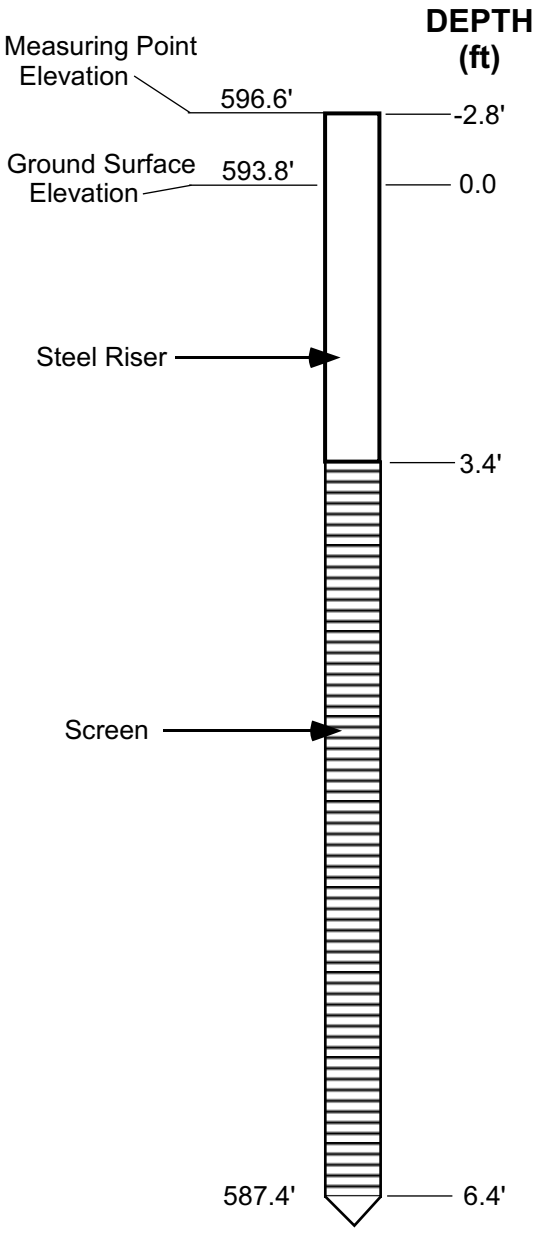
MONITORING WELL COMPLETION LOG

ALPHA GEOSCIENCE
679 Plank Road
Clifton Park, New York
(518) 348-6995
www.alphageoscience.com

Well PZ-2
Project Shelby Crushed Stone - Medina Mine Expansion
Project No. 19120
Client Shelby Crushed Stone
Date Drilled 10/5/19
Date Developed Not Applicable - Dry

WELL CONSTRUCTION DETAILS

NOT TO SCALE



INSPECTION NOTES

Geologist Matt Dupee
Drilling Contractor None - installed by Alpha
Type of Well Water Level Monitoring
Static Water Level Dry Date 10/5/19; 11/5/19
Measuring Point PVC
Total Well Depth 6.4' below grade

Riser Pipe
Material PVC Diameter 1.25"
Length 3.4' + 2.8' stickup Joint Type Threaded

Screen
Material steel Diameter 1.25"
Slot Size _____ Length 3 ft
Stratigraphic Unit Screened sand & gravel

Packing
Sand _____ Gravel _____ Natural X
Amount -- Interval 0-6.4

Seal
Type NA Interval _____
Type NA Interval _____

Notes:

Z: 19120 - Medina Mine\Field Records\Piezometer Logs.cvx

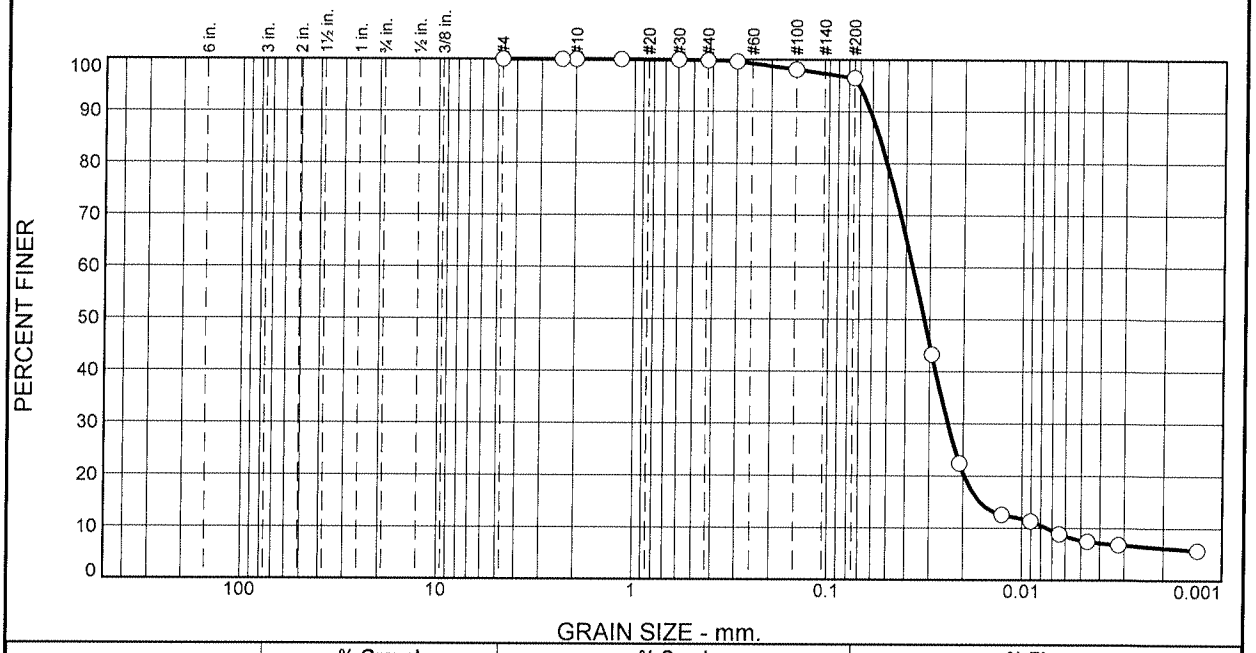
ATTACHMENT 3

Laboratory Results of Grain Size Analyses

ATLANTIC TESTING LABORATORIES

WBE certified company

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	0	0	4	88	8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC (X)
#4	100		
#8	100		
#10	100		
#16	100		
#30	100		
#40	100		
#50	100		
#100	98		
#200	96		

* (no specification provided)

Soil Description

TP-1 (5.0-5.4')

Atterberg Limits

PL= --- LL= --- PI= ---

Coefficients

D_{85}= 0.0554 D_{60}= 0.0369 D_{50}= 0.0320
D_{30}= 0.0240 D_{15}= 0.0164 D_{10}= 0.0075
C_u= 4.92 C_c= 2.08

Classification

USCS= AASHTO=

Remarks

Material delivered by client on 10/7/19
ASTM D 422 with hydrometer

Source of Sample: Shelby Job # 19120 **Depth:** N/A
Sample Number: AT2874S39

ATLANTIC TESTING LABORATORIES, LIMITED
Albany, New York

Client: Alpha Geoscience
Project: Laboratory Analysis

Report No: AT2874SL-39-10-19 **Date:** 10/22/19

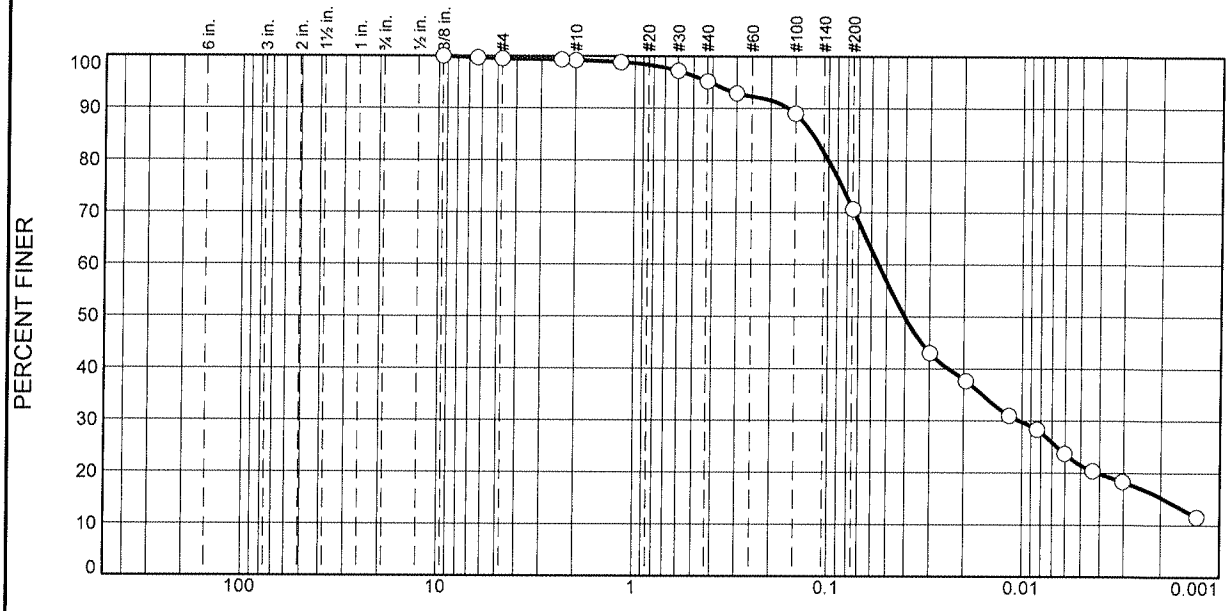
Tested by: RL Date: 10/17/19

Reviewed by: RAF Date: 10/22/19

ATLANTIC TESTING LABORATORIES

WBE certified company

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	0	1	4	24	50	21

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	OUT OF SPEC (X)
.375	100		
.25	100		
#4	100		
#8	99		
#10	99		
#16	99		
#30	97		
#40	95		
#50	93		
#100	89		
#200	71		

* (no specification provided)

Soil Description

Shelby B1-14 R18 2-6-8-12 S4 6-8

Atterberg Limits

PL= --- LL= --- PI= ---

Coefficients

D_{85}= 0.1214 D_{60}= 0.0551 D_{50}= 0.0402
D_{30}= 0.0103 D_{15}= 0.0019 D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Material delivered by client on 10/7/19
ASTM D 422 with hydrometer

Source of Sample: Shelby Job # 19120 **Depth:** N/A
Sample Number: AT2874S38

ATLANTIC TESTING LABORATORIES, LIMITED
Albany, New York

Client: Alpha Geoscience
Project: Laboratory Analysis

Report No: AT2874SL-38-10-19 **Date:** 10/22/19

Tested by: GRL Date: 10/17/19
Reviewed by: GREF Date: 10/22/19