1.0 INTRODUCTION

In support of a 2010 Mining Permit Application with New York State Department of Environmental Conservation (NYSDEC) and related DEC comments, the following report describes a hydrogeologic study for the proposed operation of a sand and gravel pit operated by WD Malone Trucking & Excavating, Inc. The subject mine site is located north and east of the intersection of Johnson Road and Hanson Road in the Town of New Haven, Oswego County, State of New York (See Site Location Map.) The site is a portion of the 63.3 acre parcel and is approximately one mile west of the Village of Mexico. The site access is located along the western site boundary at Johnson Road. The proposed mining operations to be permitted involve a 36+/- acre Life of Mine (LOM) area that is to be mined in several Phases, beginning with a 10+/- acre Phase 1 focused around the existing gravel pit. The mining operations will involve the excavation/processing of sand and gravel resources found within the glacial outwash terrace extending along a northwest to southeast axis.

2.0 PURPOSE

The purpose of this hydrogeologic investigation is to assess and define any surface water and groundwater resources within the vicinity of the existing and proposed sand and gravel mine. This investigation included literature research including, but not limited to soil surveys, New York State (NYS) Museum Geological Surficial and Bedrock Maps, and the United States Geological Survey (USGS) Quadrangle Mapping for the New Haven Quadrangle – see Section 8.0 REFERENCES. Additionally, the investigation included field reconnaissance and the progression of five (5) deep soil test pits completed by track excavator.

This report documents the geologic sand and gravel source through both narrative and graphical review, including deep soil test pit logs and geologic cross sections. The results of this investigation will be used as a basis to determine whether the proposed sand and gravel mining activities will have any potential impacts to surface waters or groundwater resources of the area. Potential mitigation measures are also addressed.

3.0 GEOLOGIC SETTING

The primary material proposed to be mined consists of sand and gravel, glaciofluvial deposits formed within kame, terrace and remnant beach ridges of the AgA-Alton soil series, consisting of gravelly fine sandy loam. Additional sand and gravel resources are found within the IUD-Ira-Sodus soils consisting of very stony sand and gravel deposits. Although not encountered within the test pit maximum explored depth of 20 feet, the underlying bedrock is mapped as sedimentary rock of the Medina Group. The recent overburden topography is the result of the Wisconsian Glacier of the Pleistocene Age, occurring approximately 20,000 to 30,000 years ago.

The previously mined and proposed mine area is located along the existing terrace, which trends in a northwest to southeast direction. The mine terrace sits approximately 50 feet to 60 feet above the flatter, lower elevations of the Butterfly Creek and flanking NYSDEC Freshwater Wetland designated NH-16. The mine exists between elevations approximately 440 feet to 470+ feet,

while the adjacent stream and wetlands to the east are found at elevation 410+/- feet. Soil test pits have confirmed the sand and gravel deposits as described above. Generally, the sand and gravel surface topography of the mine area slopes to the east, northeast (See Appendix A-Photos.)

The mining operation is a surface unconsolidated mine for the purpose of extracting sand and gravel from an area containing intermingled glacial outwash deposits of the material. The sand and gravel mined is from the glacial outwash terrace and has been classified as Alton, Ira and Sodus Soils by the United States Department of Agriculture (USDA) Soil Conservation Service (See Appendix D-Soil Map-Oswego County).

The Alton series is described as "Deep, well drained to somewhat excessively drained, moderately coarse textured soils. These soils formed in glaciofluvial sand and gravel deposits derived mainly from red and gray sandstone. They are nearly level to rolling. They are terraces, plains and remnant beach ridges, eskers and kames. In a representative profile, the surface layer is dark brown gravelly fine sandy loam 8 inches thick. The subsoil extends to a depth of 48 inches. The upper part is strong brown very gravelly loamy sand 12 inches thick. The substratum, to a depth of 62 inches, is stratified sand and gravel. Permeability is moderately rapid in the surface layer and subsoil and rapid in the substratum."

The Ira series is described as "Deep, moderately well drained, moderately coarse textured soils that have a fragipan. These soils formed in glacial till derived mainly from sandstone. They are nearly level to moderately steep. They are on ridges and knolls and on the sides and tops of elongated hills on the till plain. In representative profile, the surface layer is dark grayish brown gravelly fine sandy loam 8 inches thick. The upper part of the subsoil is yellowish brown, very friable fine sandy loam 5 inches thick. This is underlain by a leached layer of light yellowish brown gravelly fine sandy loam 7 inches thick that has distinct mottles. The lower part of the subsoil is a very firm, dense fragipan of brown, mottled gravelly fine sandy loam 20 inches thick. The substratum, to a depth 50 inches, is a grayish brown gravelly fine sandy loam. Permeability is moderate above the fragipan and slow in the fragipan and substratum."

The above soil conditions were corroborated through the progression of five (5) deep, soil test pits labeled TP-1 to TP-5 as shown on the Mining Plan and Cross-Sections (See Appendix B-Test Pits and Appendix C-Geologic Cross Sections.) The test pits were progressed by track excavator and witnessed by the soils engineer from this office on November 14, 2011. These investigations revealed a typical soil profile of 12 inches of dark brown gravelly sandy loam (topsoil), over 0-18 inches of dark brown/red gravelly sand, overlying varying amounts of brown/gray sand and gravel extending to the maximum explored depth of 20 feet. Test pits TP-1 and TP-4 had some fused layers indicative of fragipan, but dug by excavator. With the exception of TP-2, along the lower elevations over the east slope and having some moist, gray silt at the extreme bottom of excavation, none of the explorations had any indicators of substantial mottling or groundwater surface. The elevation survey revealed that if conservatively using the wet soils at the bottom of TP-2 the groundwater would be approximately 5 feet above stream elevation or elevation 415 feet. The soils tend to be more sand and gravel to the north and south respectively.

4.0 MINING OPERATIONS

The mining plans call for continued mining of the sand and gravel beginning within the existing pit and extending north and south as reserves are depleted. Continued excavation will consist of removal-stockpiling of topsoil/overburden and then excavation of the sand and gravel. Elevations range from the current mine floor at an average elevation of 450-460 +/- feet to the high point at Johnson Road elevation 480+/- feet and lower elevations along the wetlands/stream to the east at elevation 410+/- feet. The Mining Plan calls for the mine floor to be lowered to approximate elevation 425 +/- feet.

No surface or groundwater resources have been intercepted by the existing mining operation (See Appendix A – Photos). Likewise, the proposed MLUP has been designed so as not to conflict with either any surface or groundwater features of the area.

5.0 SURFACE WATER

Currently, the major drainage patterns of the site are characterized by sheet flow and shallow concentrated runoff flow from the high points on the west side of the site at Johnson Road to the lower elevations to the east. Some of the runoff is currently directed internally into the existing gravel pit where it infiltrates into the permeable materials within the mine floor. The MLUP proposes to maintain the existing hydrologic balance of the site by continuing to direct runoff internally to the existing gravel pit and ultimately to the proposed settling pond on the mine floor for subsurface infiltration. Even though there is limited runoff due to the high permeability of the sand/gravel soils (Hydrologic Soil Group-HSG-A), this pond has also been designed to meet the requirements listed below by providing storage capacity for the 100-year storm event.

All drainage will remain 100% internal throughout the life of this mining operation. All drainage and water control features shall be constructed to the extent necessary to achieve this performance standard. There will be no discharge of waters to any area outside the limits of the lands to be affected by mining over the life of this mining operation. Surface water will not be allowed to drain in such a manner that siltation and/or sediment is carried outside the limits of the life of mine boundary, offsite onto neighboring properties or into any wetlands, streams, rivers or other water bodies

There are no surface waters within the existing/proposed LOM. A minimum protection buffer of 100 feet and 250 feet will be maintained between all mining activities and NYS FWW NH-16 and Butterfly Creek respectively.

6.0 GROUNDWATER

As witnessed through observation of the deep soil test pits, no groundwater was encountered within the maximum explored depth of 20 feet. Some gray, moist silt soils were found within the bottom of TP-2 (elevation 415 feet), which is indicative of the water table at this elevation. This elevation corresponds well with the adjacent Butterfly Creek elevation of 410+/- feet.

6.1 TEST PIT SUMMARY

As described in Section 3.0 above, five (5) deep soil test pits were conducted throughout the proposed LOM. TP-2 was the only pit location to indicate any signs of groundwater and had some damp soil at its bottom (elevation 415+/- feet).

6.2 GROUNDWATER LEVELS

Based on the test pits, the groundwater table within the proposed mine area was determined to slightly above the elevation of Butterfly Creek, which is approximately elevation 410+/- feet. The test pit data has been plotted on Cross-Sections labeled A-A and B-B (See Appendix C).

6.3 SURROUNDING WELL INVENTORY

An inventory of neighboring wells surrounding the mine was not performed. However, a few shallow dug or tile wells were observed within the neighboring yards along Hanson Road.

Based on these observations, the majority of the surroundings shallow wells are formed within the lower surface elevations of the sand/gravel and rely on a combination of shallow groundwater and surface water.

7.0 POTENTIAL IMPACTS

7.1 SURFACE WATER

As described above, the potential impacts to surface water from the proposed mining activities are minimal. There are **no** surface water bodies within the proposed LOM.

This prevailing hydrologic balance of the site area will be maintained as any surface runoff will be diverted around the mine site or managed internally through infiltration.

7.1.1 SURFACE WATER MITIGATION

As stated above, the prevailing hydrologic balance of the site area will be maintained through the perimeter diversion ditch and on-site stormwater infiltration.

There shall be no release of sediment laden runoff from the site and all Erosion & Sediment Control measures, including perimeter vegetated earth berms shall be employed for the site. Any topsoil/overburden removal or stockpiling shall be protected by perimeter silt fencing and immediately stabilized by seeding and mulching. Even though there are no surface water features within the LOM, further surface water mitigation includes 100 feet and 250 feet protection buffers to the FWW N-16 and Butterfly Creek respectively.

7.2 GROUNDWATER

As shown within the deep soil test pits logs, there is **no** groundwater within the proposed mining depths. The LOM has been designed so as to maintain a mine floor elevation at a minimum of 5 feet above the groundwater table at all times. It is not proposed to mine below the groundwater table.

Since any neighboring wells are presumed to be founded in the sand/gravel aquifer (el 400+/- feet) at elevations below the proposed mine and generally are of substantial distance from the mining activities, any potential impacts to groundwater from mining are minimal. Likewise, any shallow wells relying on collection of surface water will remain isolated from the mine site and will not be impacted by the proposed mining activities.

7.2.1 GROUNDWATER MITIGATION

All mining shall be conducted at least 5 feet above the mean annual groundwater table. The Permittee must dig occasional test holes in the mine floor at least 5 feet deep in order to confirm compliance with this requirement.

The prevailing hydrogeologic balance of the mine and vicinity will be maintained throughout mining activities. Any surface runoff within the mine will continue to be managed internally through infiltration within the mine floor. As described above, it has been proven through on-site deep soil test pit excavations, GPS survey and cross-sections that minimal groundwater exists within the mine area, including all tests progressed in the mine floor showing no groundwater.

8.0 REFERENCES

1. Donald H. Cadwell et.al, NYS Geological Survey, “Surficial Geologic Map of New York”, Finger Lakes Sheet, dated 1986.
2. Donald W. Fisher et.al, NYS Museum and Science Service, SUNY, “Geologic Map of New York”, Finger Lakes Sheet, dated 1970.
3. USGS Quadrangle: “New Haven Quad”
4. Continental Placer Inc., “9-39R, RFM, Carver Sand & Gravel, LLC, Geologic Source Report, 2008-2012, Cyclically Updated Module”, dated January 23, 2008.

APPENDIX A

PHOTOGRAPHS

APPENDIX B

TEST PIT LOGS

APPENDIX C

GEOLOGIC CROSS SECTIONS

APPENDIX D

SOIL MAP-OSWEGO COUNTY