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Mr. Larry Konopacki
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Madison, WI 53701-1784

Subject: Final Report - Review of Nonmetallic Mine Operator's License Application
Northern Sands Wisconsin, LLC, Town of Howard, Chippewa County, Wisconsin

Dear Mr. Konopacki:

Attached is SCS Engineer's (SCS) final report for our review of the nonmetallic mining operator's license application prepared by Northern Sands Wisconsin, LLC (NSW). SCS reviewed the NSW application for compliance with the Town of Howard's Ordinance, Chapter 17-Nonmetallic Mine Operator's Licenses. Our final review comments and recommendations are based on the NSW license application dated May 24, 2018, additional documents as listed in our report, and the Town's comments on a preliminary version of this report as provided to SCS by the Town's legal counsel on October 2, 2018.

We suggest that if the Town decides to approve the application, the approval is granted subject to conditions as outlined in the attached report.

Thank you for the opportunity to provide environmental services to the Town of Howard. Please contact us at 608.224.2830 with any questions or comments.

Sincerely,



Betty J. Socha, PhD, PG
Senior Project Manager/Hydrogeologist
SCS Engineers



Leslie Busse, PE
Senior Project Manager/Engineer
SCS Engineers

LAB/BJS/lmh/SCC

Encl. Final Report - Review of Nonmetallic Mine Operator's License Application

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Final Report - Review of Nonmetallic Mine Operator's License Application

Northern Sands Wisconsin, LLC
Town of Howard
Chippewa County, Wisconsin

Prepared for:

Town of Howard
Chippewa County, Wisconsin

SCS ENGINEERS

25215120.01 | October 3, 2018

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INTRODUCTION

SCS Engineers (SCS) has reviewed the nonmetallic mining operator's license application prepared by Northern Sands Wisconsin, LLC (NSW) for compliance with the Town of Howard's Ordinance, Chapter 17-Nonmetallic Mine Operator's Licenses (hereafter the Ordinance). During our review, we identified areas where clarification and additional information may be helpful to the Town in evaluating the application. SCS provides recommendations for the following Ordinance requirements:

- **Demonstration of compliance with required permits and approvals.**
- **Plans for control of surface water, dust control, screening, conveyance methods, and other designs and operations elements.**
- **Monitoring and protection of groundwater quality, quantity, and impacts to surface water.**
- **Resource inventory maps and figures in the license application submittal.**

1 PERMITS

The Ordinance outlines requirements for demonstration of compliance with required permits and approvals (Section 17.07(1)(d)).

Blasting Permit – A blasting permit must be acquired before blasting can occur. The license application states that blasting is not required as the sandstone is highly friable. However, typically there is local variability of hardness within the sandstone, and during our meeting with NSW, Mr. Gapinske indicated that they may at some point during the life of the mine need to blast the sandstone.

Federal, State, Local Permits – NSW provides a list of all potential regulatory requirements in Table 3 of the license application and indicate that they will apply for, obtain, and submit to the Town copies of the permits.

The following is a list of permits or plans referenced in the NSW permit application. NSW will obtain these and others (resulting from the regulations in Table 3):

- Wisconsin Department of Natural Resources (WDNR) Construction Site Storm Water Discharge Permit
- Fugitive Dust Control Plan (WDNR Air Emission permit)
- High Capacity Well Permit (WDNR)
- Water Conservation Plan (Chippewa County)
- Wisconsin Pollutant Discharge Elimination System (WPDES) General Permit
- Storm Water Pollution Prevention Plan
- Spill Response Plan

Clarification of permit requirements is needed. If the Town decides to approve the license application, SCS recommends that the approval be contingent upon the following condition:

Condition #1

NSW will apply for, obtain, and provide a copy for the Town of all required permits.

2 DESIGN AND OPERATIONS

An intent of the Ordinance is to minimize or prevent adverse impacts from mine design and operations. The final design for the mining operations has not been completed and methods for control of surface water, screening design, conveyance methods, and other designs and operations elements are not detailed in the license application. Following are our comments regarding design and operations topics for which additional information is needed in order to assess and possibly minimize potential impacts to public safety and wellbeing:

Off-Site Trucking Routes – NSW states that there will be no off-site trucking. If that changes over time, the trucking routes should be evaluated with the Town.

Sand Conveyance – Design of conveyance methods is not yet complete. The application states that material transport will be via mechanical or fluidized conveyor with no specific information given.

Surface Water Runoff and Compliance with NR 216 and 151 – NSW will hire outside parties for design and installation of surface water management systems. These designs, as well as the Storm Water Pollution Prevention Plan and WPDES General Permit, should be provided.

Screening – NSW will screen the operations by creating berms, maintaining setbacks, and through elevation differences. No design is in place for the berms at this time. We recommend that the berms height be the height of the eaves of residential homes or similar screening design.

Night Lighting – NSW states they will comply with the ordinance requirements. However, the berms NSW intends to construct to aid in control of night lighting are not designed. That design should be done and reviewed.

Off-Site Noise – NSW states they will monitor and keep the noise level below 60 decibels as required by the ordinance. Some additional methods to maintain/reduce noise include mufflers on mining equipment, and proper ongoing maintenance of all equipment/machinery.

Dust Control and Air Monitoring – The ordinance requires use of all relevant dust control methods outlined in NR 415.075. Only wetting of the on-site gravel roads is noted in the NSW application under this section of the ordinance. Other measures recommended in NR 415.075 include use of maximum speed of 10 mph, covering of trucks, wet drilling, wet conveyance, etc.

In other parts of the permit application, NSW states additional measures that will aid in controlling dust, including: stockpiled topsoil and berms will be stabilized, material transport will be via mechanical or fluidized conveyor, the dry plant is enclosed in a building with negative pressure dust handling and bag filter, access driveways will be paved 100 feet from the town road and will be swept as needed, and there will be no off-site trucking. A Dust Control Plan is required prior to construction.

NSW will monitor for total suspended particles (TSP) per the ordinance and will provide the appropriate reports. NSW states they will not exceed the limits for TSP. They will apply for and obtain an Industrial Air Permit and they will comply with the permit requirements and the contingency plan associated with the permit.

Hours of Operation – NSW has included in the license application a request to operate the processing plant on a 24-hour basis. If the exception for hours of operating for the processing and equipment maintenance is not acceptable to the Town, require that the Ordinance be followed.

If the Town decides to approve the license application, SCS recommends that the approval be contingent upon submittal of additional design and operational information as identified above.

Condition #2

NSW shall submit to the Town plans for:

- Design and installation of surface water management system, to document compliance with Section 17.07(2)(a)
- Design of process flow and conveyance systems, as required for the application under Section 17.06(3)(b)
- Design of berms for screening of operations showing compliance with Section 17.07(2)(d)
- Design of berms for control of lighting, showing compliance with Section 17.07(2)(g)
- Dust Control Plan and Contingency Plan listing best management practices (BMPs) to employ as in the Industrial Air Permit and to maintain compliance with Section 17.07(2)(i)

If some elements, such as berms, are designed on a phase-by-phase basis, NSW should submit updated plans outlining construction of each phase. If NSW decides on operations different than what is approved, NSW should submit revised information to the Town.

3 GROUNDWATER QUALITY AND QUANTITY & IMPACTS TO SURFACE WATER

The Chippewa County Reclamation Plan has requirements for groundwater monitoring that establishes the actual groundwater elevation at the mine site and for monitoring changes to the groundwater elevation and chemistry through time. These are also requirements of the Town's Ordinance and are needed to protect groundwater quality and quantity.

The Reclamation Plan stipulates that the mine floor and excavation limits will be no lower than 1025 feet MSL and that a minimum 10-foot separation distance between the mine floor and regional water table be maintained at all times. The 10-foot separation is needed to prevent impacts to groundwater quality. Risks to groundwater depend on how close the mining operations are to the water table. Risks include potential leaks and spills of fuels, lubricant oils, flocculants, and other chemicals. Removal of soil and rock above the water table removes the materials that naturally filter the water, and creates a potential pathway for chemicals and bacteria to reach the groundwater. Groundwater chemistry maybe affected by removal of overburden materials, causing metals like arsenic, lead, iron, and manganese to dissolve at higher concentrations. Removal of large quantities of groundwater has the potential to lower the water table such that private wells do not supply enough water, and surface water bodies are lowered or dry up.

The groundwater monitoring program should address these concerns related to potential impacts from the mining operation.

Following are comments regarding the groundwater monitoring plan implemented or proposed to be implemented by NSW:

Installed Monitoring Wells – NSW has installed four water table monitoring wells in Phase 1. NSW states in the license application “Phase 1 groundwater flow is coincident with the surface topography represented by the apparent divide transecting the processing/transload area. More groundwater observation locations and ongoing recording will track....direction and elevation fluctuations.” Per the Chippewa County Non-Metallic Mining permit (NMM permit), a minimum of seven wells are required to be installed prior to mining. Three additional wells were installed in June 2018 (after the license application was submitted to the Town). Information from the three new wells should be provided to the Town.

Groundwater Divide – Based on the water table contours on the WG&NHS Chippewa County map, the four Phase 1 monitoring wells are located in the area of a groundwater divide. The wells are on the order of a half mile apart. The spacing of the wells is not optimal for defining the position of the groundwater divide. Because of the divide, it would be beneficial to have more wells to estimate the flow direction in Phase 1.

Geologic Logs – Geologic logs providing information on geologic stratigraphic unit or units monitored by the monitoring wells were not provided by NSW. Although the mining industry may consider this information proprietary, submittal of basic geologic information is standard practice in groundwater studies. The logs need not contain any specific information regarding the economic sandstone deposits, only basic information to evaluate the position of the well in the geologic column. The well screens need to be placed in the appropriate strata so that the water level measurements and water quality data are of the most use in monitoring the groundwater.

Piezometers – Piezometers are not included in NSW’s monitoring plan but would be helpful to provide information about the vertical component of groundwater flow. Piezometers are commonly used in groundwater studies and could aid in determining the mine floor elevation.

Monitoring Plan – Per the NMM permit, the monitoring plan is to be prepared by a Professional Engineer (PE) or Professional Geologist (PG). The plan should provide well locations on a large scale map, and include drilling method, well construction, and other information such as field documentation, geologic logs, well development, etc. Submittal of additional information for the groundwater monitoring program being implemented would be helpful.

Laboratory Certification – The laboratory performing analysis of the groundwater samples collected from the monitoring wells should have Wisconsin certification to perform analysis for all of the parameters analyzed.

Groundwater Level in Mining Area – All the monitoring wells are designated as “Life of Mine” wells and as such are located outside the actual area to be mined. To accurately determine the elevation of the mine floor, SCS recommends that monitoring wells (to monitor groundwater level only) be installed within the area to be mined.

High Capacity Well – NSW plans to install a high capacity well in the Mt. Simon aquifer and conduct a pumping test to determine the effect of pumping on the shallower bedrock aquifer.

Baseline Hydrologic Inventory – Per the NMM permit requirement and as stated in the March 13, 2018, review letter from Chippewa County, NSW is required to provide a baseline hydrologic inventory by October 1, 2018. The Ordinance also requires that NSW provide a hydrologic inventory map showing the location of seeps, springs, wetlands, and surface water within the mine and adjacent properties, and that NSW identify and depict on the map streams with beds and banks. This submittal should use a base map with adequate scale and detail to allow field location and identification of the mapped features, and be based on available resources and field data to verify the information.

Wetland Delineation – Per the NMM permit requirement and as stated in the March 13, 2018, review letter from Chippewa County, NSW is required to provide a delineation of all wetlands in Phase 1. The wetland delineation report was provided to the County on July 22, 2018, and will be reviewed by the County and WDNR.

The mine is located on a surface water divide. Groundwater elevations are needed to determine the position of the groundwater divides and establish groundwater flow directions so that groundwater can be monitored to evaluate impacts to quality associated with mining activities.

In addition to the groundwater evaluation that has been performed, SCS suggests that additional groundwater information be provided to the Town. SCS recommends that the approval be contingent upon the following conditions:

Condition #3a

NSW shall submit to the Town a plan for groundwater monitoring and well installation that includes:

- Determining the depth to groundwater and the directions of groundwater flow including the vertical components of flow in the area of the mine.
- Evaluating groundwater quality in the sandstone unit being mined and in the aquifer being used for water supply.
- Defining the position of the groundwater divide.
- Determining the elevation of the water table in the areas to be excavated.

The plan should be prepared by or under the direct supervision of a Wisconsin Professional Geologist who is a hydrogeologist.

The following are recommended components of the plan:

- Documentation for the wells installed to date including fully completed well construction diagrams, well development forms, and basic geologic boring logs.
- An evaluation of the placement of existing monitoring wells for evaluation of groundwater impacts from the mining activities. Identify which wells are upgradient and which wells are downgradient of areas to be excavated and sand processing areas.
- Groundwater contour maps based on the high and low water levels measured at the seven existing monitoring wells and elevations of springs, seepage areas, and streams and intermittent streams, and surface topography. The maps should show the location of areas to be excavated, the process areas, and private wells at a scale of no less than 1" = 1,000 feet.
- Geologic cross-sections showing major geologic units, monitoring wells locations and screened intervals, the position of the water table, the location of nearby private wells and their construction, the proposed limits of excavation, and the location of

process areas. Show locations of the cross sections on a map that also shows the location of areas to be excavated, the process areas, and private wells at a scale of no less than 1" = 1,000 feet.

- Proposed locations for water table wells in areas to be mined a (minimum of 3 wells per phase would allow triangulation for groundwater flow direction).
- Proposed location for piezometers adjacent water table wells in areas to be mined (recommended minimum of 1 piezometer per phase) would allow evaluation of the vertical component groundwater flow and aid in determining the floor of the mine.
- Proposed locations for water table sentinel wells downgradient of each phase and downgradient of the process areas, as needed in addition to the seven current wells.
- Tabulated groundwater elevation and depth to water for the seven monitoring wells since their installation and a discussion of observed trends in groundwater fluctuations.
- Tabulated groundwater quality data from the seven monitoring wells and a discussion of general water quality.
- Well construction forms for private wells within 200 feet of the mine property, and a discussion of the geologic units used as the local aquifer.

Condition #3b

NSW shall implement the plan for groundwater monitoring and well installation for wells installed in Phase 1, and submit a groundwater monitoring report documenting the work. The additional Phase 1 wells will be installed following the Town's approval of the plan. The additional wells installed in Phase 1 for the monitoring program should include:

- Water table wells and a piezometer (recommended) in the area to be mined.
- Wells downgradient of the process area and downgradient of the area to be mined.

4 APPLICATION SUBMITTAL

Existing site information such as the location of water supply wells, surface water bodies, wetlands, and buildings and other structures is required in the license application. The Ordinance requires that these resources be inventoried within certain distances from the mine boundary. The Town may want to ask NSW for updated maps to verify scales and legends. Certified survey maps are required by the Ordinance and have not been provided in the license application.

Condition #4

Should the Town ask NSW for revised maps and figures information, NSW will revise the maps and figures (scales, legends, etc.) and submit the revised versions to the Town with a corresponding application narrative revised as appropriate. Prior to commencement of any mining or construction activity, Certified Survey Maps for the properties shall be provided to the Town.

SUMMARY OF RECOMMENDATIONS/CONDITIONS

SCS Engineers recommends that if the Town of Howard decides to approve the Northern Sands Wisconsin, LLC license application, the approval be granted subject to conditions being met by a date (or dates) established by the Town.

The recommended conditions are as follows:

Condition #1 – Permits

NSW shall apply for, obtain, and submit to the Town a copy of all required permits.

Condition #2 – Engineering Plans

NSW shall submit to the Town plans for:

- Design and installation of surface water management system, to document compliance with Section 17.07(2)(a)
- Design of process flow and conveyance systems, as required for the application under Section 17.06(3)(b)
- Design of berms for screening of operations showing compliance with Section 17.07(2)(d), suggested berm height equivalent to the height of residential homes
- Design of berms for control of lighting, showing compliance with Section 17.07(2)(g)
- Dust Control Plan and Contingency Plan listing BMPs to employ as in the Industrial Air Permit and to maintain compliance with Section 17.07(2)(i)

If some elements, such as berms, are designed on a phase-by-phase basis, NSW shall submit updated plans outlining construction of each phase. If NSW decides on operations different than what is approved, NSW shall submit revised information to the Town.

Condition #3a – Groundwater Monitoring Plan

NSW shall submit to the Town a detailed plan for groundwater monitoring and well installation that includes:

- Determining the depth to groundwater and the directions of groundwater flow including the vertical components of flow in the area of the mine.
- Evaluating groundwater quality in the sandstone unit being mined and in the aquifer being used for water supply.
- Defining the position of the groundwater divide.
- Determining the elevation of the water table in the areas to be excavated.

The plan should be prepared by or under the direct supervision of a Wisconsin Professional Geologist who is a hydrogeologist and include the components recommended by the Town's engineering consultant.

Condition #3b – Phase 1 Groundwater Monitoring Plan Implementation

NSW shall implement the plan for groundwater monitoring and well installation for wells installed in Phase 1, and submit a groundwater monitoring report documenting the work. The additional Phase 1 wells will be installed following the Town's approval of the plan. The additional wells installed in the Phase 1 monitoring program shall include:

- Water table wells and a piezometer (recommended) in the area to be mined.
- Wells downgradient of the process area and downgradient of the area to be mined.

Condition #4

Should the Town ask NSW for revised maps and figures information, NSW will revise the maps and figures (scales, legends, etc.) and submit the revised versions to the Town with a corresponding application narrative revised as appropriate. Prior to commencement of any mining or construction activity, Certified Survey Maps for the properties shall be provided to the Town.



Appendix A
List of Documents Reviewed by SCS

LIST OF DOCUMENTS REVIEWED BY SCS

SCS reviewed the following documents in conjunction with the:

2018, May 24, Town of Howard, Chapter 17, Nonmetallic Mine Operator's License, License Application submitted by Northern Sands Wisconsin, LLC.

2018, July 22, Wetland Delineation Report, Northern Sands Wisconsin LLC, Northern Sands Wisconsin – Phase 1 Mine, Town of Howard, Chippewa County, Wisconsin; prepared by Ann M. Key, WDNR Professionally Assured Wetland Delineator, Wetland & Waterways, LLC.

2018, June 26, Round 2 – Groundwater Monitoring Wells, Northern Sands Wisconsin LLC; letter signed by Dr. J. Brian Mahoney, PhD, PG, Precision GeoSolutions LLC.

2018, March 13, Review of benchmark report required by Permit #2015-01; letter to Northern Sands Wisconsin, LLC, from Chippewa County Conservation and Forest Management, Engineering, Christien W. Huppert, PE.

2017, December 14, Northern Sands Wisconsin Mine – Reclamation Plan Supplement, prepared by Weslie Engineering Group (unsigned) for Northern Sands Wisconsin, LLC.

2016, August 8, Nonmetallic Mining Reclamation Administrative Permit Amendment, Northern Sands, LLC, Operator, Permit #2015-01, Chippewa County, Wisconsin.

2016, February 4, Nonmetallic Mining Reclamation Permit Addendum, Northern Sands, LLC, Operator, Permit #2015-01, Chippewa County, Wisconsin.

2015, November 18, Nonmetallic Mining Reclamation Permit, Northern Sands, LLC, Operator, Permit #2015-01, Chippewa County, Wisconsin.

2015, November 10, Addendum to the Reclamation Plan for the Northern Sands Albertville Valley Non-Metallic Mine, Howard Township, Chippewa County, Wisconsin; prepared for the Red Flint Group, LLC, by Applied Ecological Services (unsigned), Brodhead, Wisconsin.

2015, June 17, Howard Township Properties; Nonmetallic Mine Reclamation Plan, Northern Sands, LLC, Howard Township, Chippewa County, Wisconsin; prepared by Summit Envirosolutions, Inc., St. Paul, Minnesota, contact John Dustman.