

Non-Metallic Mining and Processing in Dunn County

Environmental Impacts and Regulatory Analysis
With Recommendations to Improve Industry Oversight

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Acknowledgements

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Impact Assessment of Industrial Sand Mining and Processing in Dunn County

1.0 Introduction

The recent increase in interest in non-metallic mining of silica sand (industrial sand mining) in Wisconsin is directly related to the increase in the use of a well stimulation technique called hydraulic fracturing. The hydraulic fracturing process uses explosives to create cracks in oil or gas rocks which are then filled with a mixture of water, sand, and chemicals by hydraulic pressure. Once the fluid is removed, the natural gas or crude oil recovery rate from these rocks is improved.

Lands in Dunn County, and many places in western Wisconsin, contain large volumes of sand that meet the narrow range of specifications needed for hydraulic fracturing. This has drawn the attention of sand mining operations and is why they are approaching communities and land owners in our area. Potential impacts from mining and processing operations to our region include: logging of hilltops and excavation of sandstone ridges and hills; loss of agricultural land; noise from related equipment; dust; exposure to respirable silica dust; groundwater use; additional potential sources of ground and surface water contamination; increased traffic (truck and rail).

On Wednesday, January 18, 2012, the Dunn County Board approved a six-month moratorium on non-metallic mining and processing. The moratorium applies to all unincorporated areas in the County regardless whether they have or have not adopted zoning.

A work group comprising of members of the Public Health Department, Environmental Services Department (Land Conservation, Planning, and Zoning Divisions), and Highway Department has been charged to study and analyze the potential impacts of non-metallic mining in regards to the health, safety, and welfare of Dunn County residents and to make recommendations to their respective governing committees and the County Board of Supervisors.

The work group has contracted with Cedar Corporation to assist them in providing this assessment to provide education, research of potential issues regarding silica mining and processing, and develop recommendations based on that research.

2.0 Regulatory Framework

The following identifies the various regulations that apply to non-metallic and/or sand mining in the State of Wisconsin.

2.1 Dunn County Ordinances and Plans

2.1.1 Non-Metallic Mining Ordinance (Chapter 20)

Dunn County Chapter 20 adopts Wis. Adm. Code NR 135 for purposes of requiring and permitting reclamation plans for all operators of nonmetallic mining sites within Dunn County except for nonmetallic mining sites located in a city, village or town within Dunn County that has adopted an ordinance pursuant to Section 295.14, Wisconsin Statutes, and Section NR 135.32(2), Wisconsin Administrative Code. This ordinance requires potential operators to submit an application, acquire a permit, provide a reclamation plan for county review, provide financial assurance, and provide a public information meeting.

2.1.2 Industrially Zoned Property with Special Exception Use Permit Zoning Ordinance

Each zoning district, as defined in a municipality's zoning code, has two types of uses.

- Permitted uses do not require additional review other than the zoning review for issuance of a building permit.
- Special Exceptions are those not permitted outright but may be allowed if certain standards and conditions are met and the municipality grants approval.
- In Dunn County and by a 2006 amendment, all new large non-metallic mining operations in zoned towns Dunn County require the property to be converted to or exist on property that is zoned industrial. Non-metallic mining operations are controlled through a Special Exception Permit in the zoned Townships.

Special Exceptions assure property owners that uses of adjacent properties will be as compatible as possible with established property uses in their neighborhood. Special Exceptions can address nuisance issues such as noise, lighting, dust, etc.

Towns may adopt the Dunn County Zoning Ordinance, develop their own ordinance, or choose to not have zoning.

2.1.3 Private Water Systems Ordinance (Chapter 11)

The purpose of this ordinance is to provide local authority to protect the drinking water and groundwater resources through the regulation of new private well

locations and well and drill hole abandonment under the provisions of Wis. Stats 59.70 and 280.21.

2.1.4 Public Health Ordinance (Chapter 1)

The Public Health Ordinance is created to protect the public health, safety, and general welfare and to maintain and protect the environment for the people and communities in Dunn County. The jurisdiction of this ordinance includes air, land, surface water, and groundwater.

2.1.5 Dunn County Comprehensive Land Use Plan 2010-2030

The purpose of the Comprehensive Land Use Plan is to provide information about the county's people and resources, its existing character, what the county wants look like, and how it intends to get there. The plan is to be used by the county in making decisions regarding its future growth and development.

2.1.6 Dunn County Comprehensive Bicycle and Pedestrian Pathways Plan

The Dunn County Comprehensive Bicycle and Pedestrian Pathways Plan addresses long range transportation and recreational issues over a twenty year period. The plan identifies preferred bicycle and pedestrian systems to safely and efficiently serve bicyclists and pedestrians in Dunn County. The plan provides direction for continued improvement of bicycle and pedestrian environments by identifying supporting facilities, bicycle/pedestrian education, and enforcement programs to promote safe bicycling and walking as well as the economic impacts and benefits to tourism in Dunn County.

2.1.7 Dunn County Outdoor Recreation Plan 2010-2015

The Dunn County Outdoor Recreation Plan promotes quality recreation experiences for residents and non-residents alike. The plan guides Dunn County and participating jurisdictions in the maintenance and development of outdoor recreation facilities.

2.1.8 Proposed Shoreland Wetland Zoning Ordinance and Chapter 15 Floodplain Ordinance

The shoreland zoning ordinance adopted by each county in Wisconsin provides development standards for shorelands in unincorporated areas to limit impacts on water quality, fish and wildlife habitat, recreation, navigation and natural scenic beauty. NR115 Wis. Adm. Code sets minimum standards for the local ordinances, but many counties have adopted standards that are more restrictive than the state minimum standards. Shoreland zoning pertains to lands within 1,000 feet of the ordinary high-water mark (OHWM) of a navigable lake, pond or flowage and lands within 300 feet or within the floodplain of a navigable river or stream, whichever distance is greater.

Each county's development standards may vary, but generally a permit or variance would be required for:

- Any "structure" within the shoreland zone
- Structures that are within 75 feet of the OHWM of a navigable waterway.
- A permit or vegetation management plan may be required.
- Filling, grading, lagooning, dredging, ditching or excavating in a shoreland zone
- Filling or grading within 300 feet of shoreland requires review and approval by Land Conservation Division and Zoning Division may require a special exception permit.
- A permit to fill any area that is a wetland. If there is a practicable alternative to filling the wetland, the permit may not be granted.

The floodplain ordinance also controls development in these areas.

2.2 WDNR Regulations

2.2.1 Nonmetallic Mining

- **NR 135:** Requires reclamation of nonmetallic mining sites. Reclamation is controlled through a reclamation permit issued by the county. Reclamation may occur contemporaneously with the development of new mining phases, especially in large surface mining projects, or upon the cessation of mining operations. In either case, reclamation proceeds according to an approved reclamation plan developed to achieve a specific post mining land use. Implementation of the reclamation plan is enforceable by the reclamation permit and guaranteed through the positing of a financial assurance instrument payable exclusively to the county.
- **NR 340:** Establishes consistency in the application of state statute chapter 30 to nonmetallic mining to avoid unnecessary adverse effects caused by nonmetallic mining in or near navigable waterways.

2.2.2 Air

- **NR 407:** Regarding operation permits and permit applications for direct stationary sources.
- **NR 415:** Categorizes particulate matter air contaminant sources and to establish emission limitations for these sources in order to protect air quality.
- **NR 440:** Enables the WDNR to implement and enforce standards for new stationary sources promulgated by the US EPA.

- **NR 445:** Establishes emission limitations for hazardous contaminants from stationary sources.

2.2.3 Groundwater and Drinking Water

- **NR 135:** Reclamation standards in NR 135.08, provide that site reclamation not adversely impact on groundwater quantity or quality, referencing NR 140. This provision often applies upon cessation of mining, in the typical limestone quarry (static in terms of its footprint throughout its operation), but may apply to various phases of on-going reclamation in large surface mines where areas are being opened up for mining while a previous mined-out phase is being contemporaneously reclaimed.
- **NR 140:** Establishes groundwater quality standards for substances detected in groundwater, specifies procedures for groundwater standards, monitoring, and WDNR response and procedures to request exemptions.
- **NR 141:** Establishes acceptable procedures for monitoring well construction, development, and abandonment as well as abandonment procedures for soil borings that do not intersect the water table and/or are deeper than 10 feet below surface.
- **NR 299:** Establishes procedures and criteria for the application, processing and review of state water quality certifications required by the provisions of the federal water pollution control act.
- **NR 809:** Establishes minimum standards and procedures for the protection of public drinking water.
- **NR 810:** Governs the operation and maintenance of all public water systems to provide safe drinking water to consumers.
- **NR 812:** Establishes uniform minimum standards and methods to extract groundwater for any purpose while protecting groundwater and aquifers from contamination, 812.09 references high capacity wells.
- **NR 815:** Prohibits the injection or discharge of fluids to any well including any bored, drilled or driven shaft, dug hole whose depth is greater than its largest surface dimension, improved sinkhole or subsurface fluid distribution system
- **NR 820:** Identifies requirements to avoid, minimize, and manage impacts from groundwater withdrawals.
- **NR 850:** Establishes annual fees for water withdrawals from the state.

- **NR 856:** Establishes requirements for registering water withdrawals and collecting and reporting of accurate water withdrawal data to support management of the state's water resources.
- **State Statute Chapter 280:** Pure Drinking Water

2.2.4 Navigable Waters

- **NR 340:** Establishes consistency in the application of state statute chapter 30 to nonmetallic mining. The WDNR permit regulates both the operation and reclamation of nonmetallic mines. It is intended to avoid unnecessary adverse effects caused by nonmetallic mining near navigable waterways and to restrict excavation, dredging and grading where the adverse effects cannot be minimized or avoided.
- **State Statute Chapter 30:** Navigable Waters Harbors and Navigation
- **State Statute Chapter 31:** Regulation of Dams and Bridges Affecting Navigable Waterways
- **State Statute Chapter 281:** Water and Sewage.

2.2.5 Wetlands

- **NR 103:** Establishes water quality standards for wetlands
- **NR 299:** Establishes procedures and criteria for the application, processing and review of state water quality certifications required by the provisions of the federal water pollution control act.
- **NR 350:** Establishes standards for development, monitoring, and long term maintenance of wetland mitigation projects that are approved by the WDNR.
- **NR 351:** Identifies and incorporates by rule any federal regulation for determining whether certain activities in nonfederal wetlands are eligible for exemption state statute.
- **NR 352:** Designates the wetland delineation manual procedures to be used to delineate nonfederal wetlands.
- **NR 353:** Facilitates the regulation of projects whose purpose is wetland conservation.
- **State Statute Chapter 281:** Water and Sewage.

2.2.6 Stormwater

- **NR 216:** Regulates construction site erosion control, establishes acceptable storm water management procedures. Stormwater erosion and sedimentation at Non-Metallic Mining sites can be controlled through either a site specific permit or the Non Metallic Mining Operations General Permit -WPDES GP WI-0046515-4.

2.2.7 Wastewater

- **NR 216:** Regulates discharge of other wastewaters from a non-metallic mining operation through the General Non Metallic Mining WPDES permit. These wastewaters include waters generated from washing the sand, equipment washing and any non- contact cooling waters.

2.2.8 Endangered Resources

- **Chapter 29:** Wild Animals and Plants

2.2.9 Solid Waste

- **NR 500:** Provides definitions, submittal requirements, exemptions and other general information relating to solid waste facilities.
- **State Statute Chapter 287:** Solid waste reduction, recovery and recycling.
- **State Statute Chapter 289:** Solid waste facilities.

2.2.10 Hazardous Waste

- **NR 600:** Provides definitions, exemptions and requirements for the identification, management and disposal of solid wastes which are determined to be hazardous wastes.
- **State Statute Chapter 291:** Hazardous waste management.

2.2.11 Hazardous substances spills

- **NR 700- 749:** Establishes requirements for emergency and interim actions, public information, site investigations, design and operation of remedial action systems, and case closure.
- **State Statute Chapter 292.11:** Hazardous substances spill law.

2.2.12 Forestry

- **NR 48 and s. 28.11(11) Wis. Stats:** Establishes requirements and procedures for withdrawal of lands from the county forest law program prior to such lands being used for purposes contrary to the law. Commercial sand mining is a contrary purpose. Lands can only be withdrawn from the program if it can be exhibited a higher and better public benefit will result if removed from the program.
- **NR 46 and s. 77 Wis. Stats. subchapters I and VI:** Establishes requirements and procedures for withdrawal of lands designated under the Forest Cropland (FCL; subchapter I) and the Managed Forest Lands (MFL; subchapter VI) programs prior to such lands being used for purposes contrary to the law. Commercial sand mining is a contrary purpose. Withdrawal taxes and fees are assessed to the owner of record at the time of withdrawal.

2.2.13 WDNR Enforcement

With the multitude of regulations the WDNR may have over a nonmetallic mine, it is important to note that there are times when permits are either not acquired prior to an activity taking place, or permit conditions are not being followed. The most common violations with regard to nonmetallic mining are a lack of attention to erosion control or storm water management, and not obtaining the proper permits for the operation. Permitting is sometimes neglected either because of a lack of information, or because of changing conditions in the mine.

Enforcement options for violations can include use of the Department's stepped enforcement process, the issuance of civil citations, or a combination of the two.

2.3 Other State Permits Regulations

2.3.1 Department of Safety and Professional Services

- Regulates building construction (SPS 360-366) and any fuel storage tanks on mine or processing plant property (SPS 310) and blasting (SPS 307).

2.3.2 Department of Transportation

- DOT has authority on licensing truck drivers transporting the sand as well as truck safety, load limits, and size restrictions.

2.4 Federal Regulations

2.4.1 Clean Air Act, Clean Water Act, and Safe Drinking Water Act

- Wisconsin has the responsibility to implement the Federal Clean Air Act, the Federal Safe Drinking Water Act and the Federal Clean Water Act (with the exception of wetlands regulation which are jointly regulated by the WDNR and the US Army Corps of Engineers). If enforcement actions are necessary, the federal government may take its own action, or may work in conjunction with the state.

2.4.2 Section 7 of the Endangered and Threatened Species Act

- The previously mentioned Endangered and Threatened Species Act of 1973 is jointly administered by the Wisconsin DNR and the US Fish and Wildlife Service through a formalized cooperative agreement.

2.4.3 Mine Safety and Health Administration

- Has responsibility for worker health and safety when the mine is in production.

3.0 Dunn County Non Metallic Mining

3.1 Reclamation Plan Requirements

Currently, Chapter 20, Dunn County Non Metallic Mining Ordinance is in effect in the entire County. The purpose of the Ordinance is to establish a local program to ensure effective reclamation of nonmetallic mining sites on which nonmetallic mining takes place within the County. The Land Conservation Division of the Environmental Services Department administers this ordinance.

The ordinance applies to mining and processing areas located on the mine site but excludes separate processing and sand loading (transload) facilities.

Applicants are required to submit complete applications on the *Dunn County Chapter 20 New Permit Application Form - 2012* which can be found on the County's web site and in section 8.0.

Requirements of the complete Reclamation Plan include but are not limited to the following information:

1. Tax parcel number
2. Property address
3. Legal description
4. Township
5. Proposed starting date
6. Proposed ending date
7. Maps:
 - a. General location map
 - b. Current site characteristics, including any existing mining disturbances
 - c. Property boundaries
 - d. Aerial extent – proposed area to be mined (a plan revision will be needed if any site not located on this map is mined in the future)
 - e. Designated phases for mining/reclamation
 - f. Geologic composition and depth of deposit
 - g. Soils
 - h. Location of surface waters
 - i. Existing drainage patterns
 - j. Existing topography – Contour maps
 - k. Manmade features on or near site (homes, ponds, etc)
 - l. Final site topography – Contour maps
8. Site Information:
 - a. Acres affected by this mine
 - b. Current property land use
 - c. Surrounding property land use
 - d. Depth to groundwater

- e. Surface water on or near site
 - f. Nearby structures
 - g. Plant species
 - h. Endangered species
 - i. Soil types
 - j. Topsoil thickness
 - k. Description of mineral deposit
 - l. Depth of mineral deposit
 - m. Depth of proposed excavation
 - n. Estimated volume to be removed
 - o. Methods of extraction
 - p. Processing methods
9. Reclamation Measures:
- a. Proposed post mining land use
 - b. Description of phases and estimated time-frames
 - c. Handling of topsoil
 - d. Proposed slopes and grades
 - e. Description of grading methods *(Including equipment, methods, etc.)*
 - f. Proposed final features *(Including items such as ponds, wetlands, woodlands, etc.)*
10. Re-Vegetation Measures: *(Identify activities for re-vegetation of the property including grading, seed mixes, seeding rates, soil amendments, when seeding will occur, erosion control methods, etc.):*
- a. Seed mixes, seeding rates and schedule: *(Include discussion on proposed time frame for seeding to achieve best results. Seed mixes and rates may be submitted as an attachment)*
 - b. Seed bed preparation methods
 - c. Erosion control methods
11. Criteria for Assessing Reclamation: *(Identify what criteria will be used to determine that the reclamation is successful – including re-vegetation efforts. Examples include comparison to a reference plot, baseline data from photographs, and plant counts, etc.)*
12. Reclamation Cost Estimate
13. Certification by operator/owner/lessee that they concur and agree to implement the submitted reclamation plan.

3.2 Non-Metallic and Metallic Mining Requirements

Currently 7.4.02 Non-metallic mining standards of the Dunn County Comprehensive Zoning Ordinance is in effect. As stated in 7.4.01 the purpose of these standards is to protect the public health, safety and general welfare, promote

aesthetic values and provide for environmentally sound reclamation of land disturbed by mining activities through an impartial series of standards and regulations governing the extraction of mineral aggregates, topsoil or other natural materials from the earth by excavating, stripping or any other mining process. The Zoning Division of the Environmental Services Department administers this ordinance.

(a) Non-metallic mineral extraction operations are special exception uses as regulated by Section 9.2 and upon approval, are permitted in the Industrial District. The application for a special exception use permit shall be accompanied by a plan which shall include the following information:

1. A map and/or aerial photograph and accompanying materials which indicates the following:
 - a. Boundaries of the affected land and abutting properties, including names of the owners of subject property and abutting property owners.
 - b. Surface drainage of the affected land.
 - c. Location and names of all streams, roads, railroads, utility lines and pipelines on and/or immediately adjacent to the area.
 - d. Location of all structures within 1,000 feet of the outer perimeter of the area; present owners and occupants of such structures and purposes for which each structure is used.
 - e. Proposed location, extent and depth of intended sand, gravel, and rock.
 - f. Proposed location of the waste dumps, ponds, sediment basins, stockpiles, including setbacks.
 - g. Estimated depth to groundwater.
2. A description of the excavation and processing equipment to be used.
3. A description of measures to be taken to control noise and vibrations from the operation.
4. A description of the proposed hours of operation.
5. A description of measures to be taken to screen the operation from view.
6. Proposed primary travel routes to be used to transport the excavated material to and from the property.
7. A statement in writing to indicate the timetable of the commencement, duration, and cessation of operations and such other information as may be necessary to determine the nature of operations, its conformance with this ordinance, and the effect of the operation on surrounding properties.
8. A transportation impact analysis.

(b) Non-metallic mineral extraction operations shall conform to the following requirements:

1. Unless waived in writing by the adjoining property owners, all sand, gravel and rock excavation operations shall be set back at least 200 feet from all right of way lines and at least 100 feet from all property lines and the excavation shall be at least 500 feet from any existing residence. The Board of Adjustment may allow the operator to stockpile overburden and construct berms within the setback distances, if such activity does not violate Section 9.2.03(c) of the Ordinance.
2. All excavation access roads shall be maintained with dust control measures and a stop sign shall be located where it intersects a public road. Such access roads shall be authorized by evidence of an access permit.
3. All equipment used for the production of rock and gravel shall be constructed, maintained and operated in such a manner as to eliminate, as far as practicable, noise, vibration or dust which are injurious or adversely affects persons living in the vicinity.
4. The Board of Adjustment may require screening and restrict the hours of operation if warranted by existing conditions.
5. Any water to be disposed of must be done so in a manner that will not adversely affect any surrounding property owners.
6. All blasting shall be done by state licensed and certified blasters.
7. All temporary structures, equipment, rubble or other debris shall be removed from the site within 90 days of final operational activities.

(c) The following are exempt from regulations and permits:

1. Excavations or grading when its use is exclusively for municipal, county or state highway construction.
2. Excavations or grading by a person solely for domestic or farm use at his or her residence or farm.
3. Excavations or grading conducted for the construction, reconstruction, maintenance or repair of a highway, railroad, airport facility or any other transportation facility if the excavation or grading is within the property boundaries, including easements, of the transportation facility.
4. Grading conducted for preparing a construction site or restoring land following a flood or natural disaster.
5. Excavations for building construction purposes, necessary for the construction of the building on the building site.
6. Nonmetallic mining site of less than one acre.

3.3 Impacts That Fall Under Other Jurisdictions

3.3.1 Wisconsin Administrative Code:

- Groundwater withdrawal rates and potential impacts on nearby water wells and surface waters. If source will be high capacity wells, then the number of wells, estimated location, depth, pumping rate, aquifer hydraulic conductivity, radius of influence of well(s) must be

permitted. Mining and/or process water usage – peak, normal, and minimum volumes need to be defined. Regulations include NR 800, NR 812, NR 340, NR 820

- Potential groundwater impacts from on-site sedimentation, storm water, or other treatment ponds NR 216, NR 140, NR 700
- Flocculent use in sedimentation ponds and company management of hazardous materials NR 216, NR 500, NR 600
- Alterations due to site operations and stormwater management and runoff patterns and potential impacts to groundwater and local stormwater drainage elements Chap. 30, SWPPP, NR 216
- Usage and/or storage of on-site chemical usage and/or storage for product mining, processing, and/or wastewater treatment SPCC, Emergency right-to-know, SPS 310, NR 700
- Bumping (blasting) operations - timing, frequency & compliance with blasting regulations SPS 307

4.0 Recommendations

After a review of existing regulations and discussion of potential issues regarding non-metallic mining, each department created a list of recommendations that range from requiring traffic impact analysis to reviewing the existing fee schedule for permits and 3rd party reviews. The following represent recommendations from each department involved with creating this Impact Assessment.

4.1 Dunn County Highway Department

4.1.1 Recommendations: Traffic Impact Analysis

Wisconsin's Department of Transportation Facility Development Manual (Procedure 7-35-10) and State Statutes (348 and 349) give County Highway Departments the tools to manage traffic impacts. The Facility Development Manual (FDM) pertains to Traffic Impact Analyses (TIAs) which is an engineering study that compares before and after traffic conditions on a roadway network due to a land change.

The Dunn County Highway Department should conduct a Traffic Impact Analysis (TIA) prior to consideration of a Roadway Access Permit to evaluate the impact of increased average daily traffic, sand volumes, and truck weights on County Trunk Highways. The TIA may include the identification of a truck route; an evaluation of existing roadway conditions; scientific analysis of the conditions of the roadway base and pavement; projection of increased average daily traffic, sand volumes, and truck weights; engineering recommendations road upgrades, turn lanes, and increased road width, and costs for the improvements.

Once a TIA recognizes that a new enterprise will have an adverse impact on Country roads, the County can enter into a Road Upgrade and Maintenance Agreement with that enterprise.

4.1.2 Recommendations: Road Upgrade and Maintenance Agreements

After the TIA is completed, improvements may have to be made to the roads that are part of the truck routes. The Dunn County Highway Department should enter into a County Road Upgrade and Maintenance Agreement between Dunn County and the new enterprise that would specify the long-term responsibility of the enterprise to be financially responsible for any road upgrades or road maintenance required because of new traffic generated by the enterprise. The Dunn County Highway Department would be responsible for determining what improvements or maintenance is needed and when. The generating enterprise would be responsible for the cost of said improvements or maintenance.

A Road Upgrade and Maintenance Agreement should include, but is not limited to, recitals; identification of terms and conditions; identification of the roadway routes to be used; identification of the owner and authorized representatives; identification of the County and authorized representatives; contain terms for payments of both roadway improvements and long term roadway maintenance; indicate cooperation and potential emergency actions; contain provisions for insurances, remedies and enforcement; contain severability clauses; discuss assignability; contain processes for modifications; and the process for termination.

4.1.3 Recommendations: Intergovernmental Cooperation

Notify surrounding Counties and Townships if truck routes are located on roads that are not under the jurisdiction of Dunn County.

4.2 Dunn County Health Department

4.2.1 Recommendations: Proper Abandonment of Drill Holes

As an agent of the DNR County Well Delegation program, Levels 1 and 5, the Health Department will expect drill holes that are greater than 10 feet in depth to comply with the standards for abandonment. The Health Department will work with the DNR, landowners and well drillers to ensure compliance with this requirement.

4.2.2 Regulation of High Capacity Wells

It is important for the public to know that the Health Department has no authority to regulate high capacity wells.

4.2.3 Recommendations: Monitoring Wells

Mining/processing sites should have monitoring wells and requirements for testing included in the Reclamation Plan as well as financial assurances linked to monitoring well quality. The reclamation plan should include inspection and testing of private wells by an independent, licensed, third party within the County's prescribed setback perimeter at the cost to the operator and also require the use of a certified laboratory for analysis and definition of impact parameters.

4.2.4 Recommendations: Use of Flocculants

Incorporate in the Special Exception Permit Conditions a rule or policy that any polyacrylamide flocculants used must meet the same requirements as flocculants used in municipal drinking water systems.

4.2.5 Recommendations: Fugitive Dust Control

Incorporate in the Special Exception Permit Conditions the use of industry best management practices regarding fugitive dust emissions.

4.2.6 Recommendations: Letter to the United States Environmental Protection Agency

The Board of Health requested by letter that the United States Environmental Protection Agency (EPA) promulgate rules to govern exposure to respirable crystalline silica with respect to non-occupational or ambient silica exposure.

4.2.7 Recommendations: Dunn County

The Dunn County Health Department will coordinate with Dunn County Zoning, Planning, and Land Conservation Divisions to ensure the inclusion of the above recommendations regarding monitoring wells and the use of flocculants are incorporated into the appropriate permits and policies.

4.3 Dunn County Environmental Services Department: Land Conservation Division

4.3.1 Recommendations: Land Reclamation Permits

Update the land reclamation permitting requirements to establish criteria to determine successful land reclamation.

4.3.2 Recommendations: Land Reclamation Permits

1. Require that a certified survey map is submitted of the property described in the Land Reclamation Permit application.
2. Clarify or define the Expedited Plan Review process
3. Update the Non Metallic Mining Reclamation Fee Schedule
4. Require all topsoil to remain on site
5. Establish specific criteria to be followed when returning mined areas to cropland
 - a. A and B horizon soils stored separately
 - b. C and D horizon soils stored separately
 - c. Require a nutrient Management Plan and Conservation Plan for future cropland operators, etc.
6. Require hard copy and electronic submittals of Reclamation Plans
7. Require a groundwater protection component for nonmetallic mining reclamation plans where mining in groundwater is proposed

8. Prohibit haul back material or processing waste from being placed in areas susceptible to ground water contamination

4.4 Dunn County Environmental Services Department: Planning Division

4.4.1 Recommendations: Protection of Environmental Corridors

Define Environmental Corridor.

Create an Environmental Corridor map.

Create development and land use standards to apply within the Environmental Corridor.

Create a process to implement/enforce Environmental Corridor standards.

4.4.2 Recommendations: Stormwater Ordinance

Create a Stormwater/Erosion Control Ordinance that does not duplicate existing WisDNR standards.

4.4.3 Recommendations: Intergovernmental Cooperation

Create a multi-county/multi-discipline Non-Metallic Mining consortium to review and make recommendations on non-metallic issues that impact two or more consortium members.

4.4.4 Recommendations: Intergovernmental Cooperation

Create and implement development standards within those groundwater recharge areas which have been designated and mapped as being highly susceptible to groundwater contamination.

4.4.5 Recommendations: Dunn County Comprehensive Land Use Plan 2010-2030

Evaluate the County's comprehensive plan to determine if plan amendments are necessary to address the silica sand mining industry. It's recommended that all nine elements of the Comprehensive Planning Law be evaluated.

4.4.6 Recommendations: Dunn County Comprehensive Bicycle and Pedestrian Pathways Plan

Evaluate the Dunn County Comprehensive Bicycle and Pedestrian Pathways Plan to determine if plan amendments are necessary to the address any impacts silica sand mining truck routes have on designated bike/pedestrian routes. It's

recommended that these activities be coordinated with the Dunn County Highway Department.

4.4.7 Recommendations: Dunn County Outdoor Recreation Plan 2010-2015

Evaluate the Dunn County Outdoor Recreation Plan to determine if plan amendments are necessary to address the impacts that silica sand mining operations have on sites adjacent to or near County recreational facilities. It's recommended that lands identified as future parks and/or open space be included in the evaluation.

4.5 Dunn County Environmental Services Department: Zoning Division

4.5.1 Recommendation: General Considerations for Non-Metallic Mining Applications

1. Review and revise setbacks from property lines to be consistent with existing regulations.
2. Consider collecting baseline data on existing surrounding wells (depth, etc.) up to ½ mile of a proposed industrial sand mining site.
3. Required screening should consider the uppermost canopy of trees, etc. to help with dust, air, noise, etc.
4. Require respirable silica dust management when emerging technologies can accurately identify cause.
5. Review proposed mining plan to ensure consistency with all existing Dunn County planning documents.
6. Consider a third-party review of withdrawal rates and potential impacts on nearby water wells and surface waters be considered when a high-capacity well is proposed
7. A pre-application meeting should be required for applicant, staff, etc. to gather information on proposed project. Township would sign off as having reviewed the project prior to special exception permit being issued.
8. Consider the control of logging and burning of wooded areas in the NMM land clearing process.
9. Review and revise fee structure for permits, 3rd party review, etc. with the mine operator cover all related costs.
10. Consider creating a non-metallic mining district or overlay district within the new proposed Dunn County Comprehensive Zoning Ordinance for all non-metallic mining sites.

4.5.2 Recommendation: Standards for Non-metallic mining operations in Dunn County

1. Require concrete liners for sedimentation ponds.
2. Require “bumping” rather than single, large-charge blasting in mining operations.
3. Require verification of existing groundwater through site specific monitoring wells which would include depth, perched aquifers, quality, flow direction, groundwater monitoring of mining areas, and proposed processing ponds
4. Establish a standard set of rules, such as Monday-Friday 6:00 a.m. until 9:00 p.m., Saturday 7:00 a.m. to 3:00 p.m.; no Sundays or holidays, and refrain from hauling during school bus hours, etc. No mining during off hours with the exception of maintenance of equipment would be allowed.
5. Gather baseline data for property valuations, etc. prior to start of operation within ½ mile of a proposed industrial sand mining site. For property evaluations, the property owner and mining company must negotiate and bring to the Board Of Adjustment before a decision is made.
6. Complete an environmental assessment worksheet for industrial sand mines. The mining company to pay a 3rd party engineer to complete the assessment.
7. If within 300’ of a road, all entrances to the mine must be paved to help control dust. Wash racks or an equivalent must be used within the mine site.
8. Require a digital submission of the application along with hard copies for distribution.
9. Require a 50’ setback of undisturbed area from property lines.
10. Ensure stormwater/erosion control standards are in place.
11. No mining within 10’ of groundwater.
12. Property survey of proposed mining site required.

These items can be disclosed in a Site Operations Plan provided by the Non-Metallic Mining (NMM) operator. Dependent on the type of permit application, it may not be required to submit these documents to the County or Township involved. Thus, knowledge of the various issues and proposed control mechanisms may not be widely distributed. Therefore, it is proposed that the County or Town require NMM operators to submit a NMM Site Operations Plan for all NMM Reclamation Plan approved permits.

4.5.3 Recommendation: Consider Additional Requirements for Board of Adjustment Special Exception Permits

1. Consider limiting mining in a areas with a high susceptibility to groundwater contamination.

2. Consider requiring annual reports on tonnage with review of operation every 3-5 years as part of a re-permitting process.
3. Address potential site lighting and potential obtrusive lighting issues
4. The County should consider the impacts of adjacent and/or nearby existing Special Exception Uses. Cumulative effects of similar land uses in certain areas will have an increased impact on these areas.
5. Require a sign erected at the proposed mining site notifying public of the proposed project (4' x 8' sign with map).

5.0 Glossary of Non-Metallic Mining and Oil Well Stimulation Terms

Acrylamide	A chemical used to manufacture polyacrylamide flocculent. Acrylamide is a toxin, carcinogen, mutagen, and a teratogen. Researchers have tested various grades of polyacrylamide and found small percentages of acrylamide in the poorer grades of polyacrylamide which are not reported or required to be reported on MSDS as the compound is part of the manufacturing process and not part of the final product. Acrylamide readily leaches through soil and migrates with groundwater. In aerobic (surface and near surface) condition it has an approximate 2 week half-life. Sub-surface half-life is assumed to be relatively short, but is dependent on oxygen.
Bumping	Blasting using “small” charges. The method used to loosen sandstone so it can be readily moved to the crusher by a loader or other mechanical means.
Conductivity*	A measure of the ability of a formation to transmit fluids or vapors through the various pores and fractures within the formation. Mathematically it is the product of fracture permeability times fracture width for a finite-conductivity fracture or the permeability of the ‘pack’ (fracture pack) times its width. Expressed in milli-Darcy’s per ft.
Flocculent	A chemical coagulant that is distributed into water to bind fine grained particles in suspension and precipitate them out of the treated liquid (sometimes called floc). In water treatment it removes the silts, clays, and fine particulate in suspension which results in the discoloration (aka turbidity). These fine grained materials may cause damage to pumping and piping equipment and are therefore undesirable in processing. Typical coagulants contain polyacrylamide.
Frac sand	Quartz (silica) grains used to keep fractures open in oil and gas producing rock typically sized from 16 to 100 mesh. Sand grains must be rounded and meet strength criteria in addition to size. Frac sand is mixed with fluids and pressure injected into fractured rock as part of the hydraulic fracturing process. The sand grains hold the fractures open after the hydraulic pressure is released.
Fracing	Slang term for hydraulic fracturing. A process used to increase rock permeability (aka conductivity or porosity) to improve water, oil, and/or natural gas production from source wells. Frac sand is used in the process.

Grain Size Equivalent Diameters

Grain Size	Inches	Millimeters	Microns
20 Mesh	0.033	0.85	850
40 Mesh	0.017	0.425	425
60 Mesh	0.010	0.25	250
80 Mesh	0.008	0.2125	212
100 Mesh	0.006	0.15	150
Human hair	0.006	0.15	150
Silt grain	0.0025	0.0625	62.5
Respirable silica dust	0.00016	0.004	4

GRAS Generally Regarded as Safe – term used by NSF to determine a substance is generally acceptable for human consumption.

Hydraulic fracturing*

The borehole or well stimulation procedure routinely performed on oil and gas wells in low-permeability reservoirs. Specially engineered fluids are pumped at high pressure and rate into the reservoir interval to be treated, causing a vertical fracture to open. The wings of the fracture extend away from the wellbore in opposing directions according to the natural stresses within the formation. Proppant, such as grains of sand of a particular size, is mixed with the treatment fluid to keep the fracture open when the treatment is complete. Hydraulic fracturing creates high-conductivity communication with a large area of formation and bypasses any damage that may exist in the near-wellbore area.

The process of pumping into a closed wellbore with powerful hydraulic pumps to create down hole pressure in fractured formations opening the fractures and creating micro-fractures. Simultaneous injection of a proppant (natural frac sand, ceramic beads, resin coated sand, etc.) into the formation creates zones of higher-permeability which allows fluids (gas and oil) to flow from the rock. As the pressure is eased, the proppant remains in place keeping the fractures open and increasing well yield.

Mesh A soil analysis term that references the size of the screen (mesh) in the sieves used to fraction sands and gravels into specific sizes. Usually referenced with a number such as 20 mesh.

Micron Also referred to as a micrometer in metric measurement. There are 25,400 microns to the inch; 10,000 microns to the centimeter. The dot (period) at the end of this sentence is 615 microns wide (1/64 of an inch).

NSF	National Sanitation Foundation
NSPS	New Source Performance Standard – Air emission management term referring to a “new fixed air pollution source.”
Polyacrylamide	The chemical coagulants used in water treatment (from public water consumption to waste water treatment including non-metallic mining sedimentation ponds). Non-toxic compound manufactured from acrylamide and is considered environmentally safe. Certain manufactured polyacrylamides are used in public drinking water treatment to reduce suspended solids. These have been certified as GRAS (Generally Regarded as Safe) under Standard 60 of the NSF (National Sanitation Foundation).
Processing	The washing, sorting, screening, stockpiling (intermediate and final), drying, coating, and/or loading of sand at a facility or facilities that may or may not be located at a non-metallic mining site.
Resin	A chemical mixture used to “coat” sand grains. Similar to chemical resin mixtures (such as epoxy) there is minimal if any waste or residual chemical. Coated frac sand is used in a small percentage of production wells where a “higher compressive strength” product is needed. Resin coating waste is a solid waste, and normally inert. Any hazardous waste generated is controlled through EPA and NR 600, Wis. Adm Codes, solid wastes through NR 500, Wis. Adm. Code.
Respirable silica dust (RSD)	Ultra-fine grains of silica that are 3 – 4 microns in diameter. Researchers claim freshly fractured RSD is more harmful than more rounded RSD when considering ability to damage lung tissue. Hence the implication that tillage dust is not as harmful as fresh fractured sandstone dust.
Silicosis	Lung disease as a result of over exposure to silica dust. Disease is well documented by CDC, MSHA, and OSHA and work places where the potential exposure may occur require special handling, personal protective measures, and inspection.
St. Peter, Jordan, Wonewoc	Geologic names of the principal sandstone formations in Wisconsin and Minnesota that are the primary sources of frac sand.

Stimulation (well)*	A treatment performed to restore or enhance the productivity of a well. Stimulation treatments fall into two main groups, hydraulic fracturing treatments and matrix treatments. Fracturing treatments are performed above the fracture pressure of the reservoir formation and create a highly conductive flow path between the reservoir and the wellbore. Matrix treatments are performed below the reservoir fracture pressure and generally are designed to restore the natural permeability of the reservoir following damage to the near-wellbore area. Stimulation in shale gas reservoirs typically takes the form of hydraulic fracturing treatments.
Trans load	Term to describe a transportation loading point. A collection or distribution point in material shipping where a product is loaded or unloaded to or from rail cars or barges from or to conveying or trucking systems.
Treatment fluid*	The fluid designed and prepared to resolve a specific wellbore or reservoir condition (including hydraulic fracturing). Treatment fluids are typically prepared at the well site for a wide range of purposes, such as stimulation, isolation or control of reservoir gas or water. Every treatment fluid is intended for specific conditions and should be prepared and used as directed to ensure reliable and predictable performance.
Wet sand	The name of the material in the frac sand manufacture process after washing and some sorting before drying occurs.

6.0 Environmental Impacts - Air

The environmental impacts of a sand mining facility will vary by location and type of operation. This section summarizes the types of impacts that could occur.

6.2.1 Air Impacts

Nonmetallic mining sites and frac sand processing facilities have two types of air emissions. The first is from dust that may be emitted during the mining and handling of sand. The second is from various pollutants emitted from equipment used to mine, handle, and/or process the sand (typically from combustion of fuels – LP, not natural gas, diesel, gasoline).

Each mine and/or processing plant may differ within the industry. Non-metallic mines may consist of the following operations and/or equipment:

- Blasting
- Overburden Removal and Excavation
- Backfilling
- Crushers
- Pumps
- Washing
- Stockpiles
- Conveyors
- Loading/Unloading
- Mobile Equipment Traffic
- Generators (Electrical Generating Units)

The processing of sand may consist of the following operational equipment, which could also include those processes identified above for mining operations:

- Conveyors
- Dryers
- Screening
- Storage Bins/Silos
- Loading/Unloading

The following subsections evaluate and explain of air emissions and potential regulations as it applies to each part of the construction phase or operation.

6.2.2 Construction Impacts

No major air impacts are expected during site development. Excavation and earth work is anticipated for planned new facilities. Fugitive dust during construction is minimized by BMPs which include paving or placing gravel on access roads and watering down roads or work areas with tanker trucks as

needed. Diesel emissions from construction equipment are considered temporary and minor.

6.2.3 Operational Impacts

6.2.3.1 Blasting

- Usually performed intermittently at mining sites.
- Air pollution emissions are considered fugitive and insignificant, and may be controlled through various methods.
- Mining operators are required to maintain a fugitive dust prevention plan, whereby methods to minimize fugitive dust emissions resulting from blasting operations would be described and followed.
- Materials used in blasting are also regulated by the department or the department of safety and professional services.

6.2.3.2 Overburden Removal, Excavation, and Crushers

- The removal and protection of topsoil and subsoils that lie above the target sandstone is typically required through NR 135 reclamation permits when a new mine or phase of a mine is opened during mine expansion. This work may be accomplished by using hydraulic excavators, trucks, dozers, and scrapers.
- Air pollution resulting from this activity includes minor combustion emissions from equipment and fugitive dust (particulate).
- Combustion emissions are typically considered insignificant per s. NR 407.05(4)(c)9.f. Wis. Adm. Code. Those emissions may be minimized through routine maintenance of equipment to operate most effectively and efficiently.
- Water trucks or recycled water from the pumps and slurry system (washing operations) may be used to eliminate fugitive dust concerns during removal and excavation.
- Water bars or other wetting techniques may be used to minimize dust from crusher units.
- Soil stockpiles are seeded and mulched for revegetation as soon as the season's work is complete, which helps minimize and eliminate fugitive dust.
- Therefore, it is uncommon for fugitive dust to escape off-site except during periods of strong winds and dry conditions. BMPs and fugitive dust control plans are utilized to minimize fugitive dust. These practices or plans are requirements under NR 415 Wis. Adm. Code, with specific requirements for industrial sand mines under s. NR 415.075(6), Wis. Adm. Code, for mines that produce 2,000 tons per month or more. Facilities that implement such practices and/or plans reduce potential impacts to public health, and are subject to review and approval by the WDNR and may be made available to the public upon request.

- Any NMM facility that operates a crusher unit is subject to the New Source Performance Standards (NSPS) under s. NR 440.688, Wis. Adm. Code. These units would be subject to a limitation of no greater than 15% opacity. Since most crushers do not utilize any capture system associated with their operation/emissions, the unit is considered a fugitive source of emissions. Beyond the requirements of the NSPS, the unit would also be covered by the fugitive dust prevention plan (previously discussed above).

6.2.3.3 Pumps and Washing

- Minimal air emissions once slurry is formed.

6.2.3.4 Stockpiles

- Fugitive dust (particulate). Operators are required to maintain and follow a fugitive dust prevention plan. Depending on the processing steps taken prior to stockpiling, the grain size of the sand in the stockpiles are typically larger than PM (PM, or particulate matter, is defined as any airborne finely divided solid or liquid material smaller than 100 micrometers).

6.2.3.5 Loading/Unloading – Mining Operations

- Unloading typically is done in the open environment as a fugitive source and need to follow a fugitive dust prevention plan.

6.2.3.6 Mobile Equipment Traffic (Fugitive Particulate & Diesel Particulate)

- The WDNR does not account for mobile equipment emissions off-site, but has regulations for the minimization of fugitive dust that may apply to any transportation minor combustion emissions from equipment and fugitive dust (particulate).
- Roadway fugitive dust emissions, associated with truck traffic, may be controlled through BMPs included within a fugitive dust prevention plan. Control measures may include: (1) paving roadways, (2) spraying of water on dusty roads or sweeping of dust laden roadways, (3) utilization of a wheel wash or tire bath at the entrance/exit of the facility, (4) posting and maintenance of a low speed limit on paved or unpaved roads or other areas used by haul trucks inside the facility's property line, and (5) covering, treatment or securing of materials likely to become airborne from haul trucks during transport, prior to any transportation off site from the quarry or mine (precautions to prevent particulate matter from becoming airborne, according to s. NR 415.075(2)(a), Wis. Adm. Code).

- Diesel exhaust emissions off-site are not regulated by stationary source air pollution control permits. Onsite emissions are considered background.

6.2.3.7 Generators (Electrical Generating Units)

- Some operations include electrical generators that combust diesel fuel.
- Most units do not operate year round and when operated at a location within the mine within a timeframe established by the operator and WDNR, will attain and maintain ambient air standards.

6.2.3.8 Conveyors

- Conveyors are used throughout the mine and processing plant to transport sand short distances to different operations on the sites or to stockpile material.
- Air pollution resulting from this activity is managed by a fugitive dust prevention plan.

6.2.3.9 Dryers

- Prior to sand being sized and stored as a final product, it typically goes through a drying process to reduce the moisture content.
- Air pollution resulting from this activity includes combustion emissions and particulate.
- Emissions from the dryer are subject to the new source performance standards (NSPS) in s. NR 440.73, Wis. Adm. Code. Particulate matter and PM₁₀ (particles smaller than 10 microns) emissions from the drying process are limited to 0.057 grams per dry standard cubic meter (g/dscm), according to s. NR 440.73(3)(a), Wis. Adm. Code. Emissions are also subject to a visible emissions limit of 10 percent opacity, per s. NR 440.73(3)(b), Wis. Adm. Code.

6.2.3.10 Screening

- Sand is transferred from dry storage bins or directly from the dryer and then passed through vibrating screens.
- Air pollution resulting from this activity includes particulate, stack, and/or fugitive emissions.
- The screening process and individual emission points may be subject to the NSPS in s. NR 440.688, Wis. Adm. Code if the processing plant has a capacity greater than 25 tons per hour.

6.2.3.11 Storage Bins/Silos

- Storage bins or silos are located throughout the processing plant to store raw materials or final product.
- Air pollution resulting from this activity includes particulate, stack, and/or fugitive emissions.
- The storage bins/silos may be subject to the NSPS in s. NR 440.688, Wis. Adm. Code, if the processing plant has a capacity greater than 25 tons per hour.

6.2.3.12 Loading/Unloading – Processing Plant Operations

- A processing plant located at a mine will not have unloading operations, whereas a processing plant that is located in a different location than the mine(s) will have truck or rail unloading of raw materials. The processing plant will have loading operations regardless of its location relative to a mine.
- Unloading operations typically consist of a dump station that may be enclosed to capture most fugitive emissions.
- Loading operations typically consist of a conveyor system which may be enclosed to capture particulate or minimize fugitive particulate dust.
- Air pollution resulting from this activity include particulate matter from either stacks or fugitive sources.

6.2.4 Potential Emissions, Ambient Air Dispersion Modeling and Risk Analysis

- The WDNR uses dispersion modeling (computer based mathematical models) to evaluate the ambient air impact of air pollution sources.
- Dispersion modeling incorporates information about a facility, such as source/stack parameters, facility layout information and emission rates, along with 5-30 years of meteorological data in order to predict concentrations of pollutants in the vicinity of the facility.
- All modeling completed in the State of Wisconsin for use by WDNR is conducted in accordance with these WDNR procedures using the present EPA approved dispersion model is AERMOD.
- The air quality analysis (air dispersion modeling) uses the worse-case maximum potential emissions from the facility. Those emissions are based on several factors, including: fuel type and characteristics, emission factors, operational design and control equipment, and any enforceable operational and/or emission limitations.

6.2.4.1 Ambient Air Dispersion Modeling for Mining and Processing Operations

- An air analysis may include analysis of point (stack) and fugitive sources, soil and vegetation impacts, or visibility impairment.
- Fugitive based particulate emissions, including PM₁₀ and PM_{2.5}, from truck traffic onsite may be included in the model as a volume source.
- Any facility emitting SO₂, PM/PM₁₀, and/or NO_x may have a potential adverse impact on visibility through atmospheric discoloration or reduction of visual range due to increased haze.

6.2.4.2 Inhalation Risk and Non-Carcinogenic Effects Screening for Hazardous Air Pollutant Emissions

- Depending on project specific conditions and proposals, an inhalation risk and screening analysis may be conducted. Hazardous air pollutant (HAP) emissions are known to occur from sand mining and processing operations.
- Crystalline silica is not currently a regulated HAP under Federal or State regulations. However, crystalline silica emissions from these operations are regulated as particulate matter type.

6.2.5 Cumulative Air Impacts

The WDNR considers cumulative air impacts and includes impacts generated by the project in addition to those from the nearby local industries.

6.2.6 Conclusion for Air Impacts

Wisconsin Administrative Code requires sand and gravel and sand mine operations operating under the State of Wisconsin be covered under either site specific or General Permit G-20 to control the emissions of particulate, Volatile Organic Compounds, and other compounds produced and or stored on site.

6.2.7 Non-Metallic Mining General Permit

The GENERAL AIR PERMIT FOR CRUSHERS - August, 2007 contains standard requirements that apply to the non-metallic mining industry and are available to all portable and most stationary facilities. The General Construction Permit for new crushers covers the primary crusher and all ancillary equipment associated with the crushing spread. For the purposes of the permit, a crusher is any facility that identifies 1422 as a primary Standard Industrial Classification (SIC) code or 212312 as a primary North American Industry Classification System (NAICS) code for operations at the facility.

<ul style="list-style-type: none"> • IC engines (gen-sets) rated 600 brake horsepower or less may not use more than 30 gallons of fuel per hour, or emit more than 1.31 pounds of particulate matter per hour. Table 1: Crushers 	
General Permit Limits	
Pollutant/Synthetic Minor Condition	Limitation
Particulate Matter or PM10	<ul style="list-style-type: none"> • 250,000 tons/month, 12 month rolling average for aggregate processed
Nitrogen Oxides/Attainment Area	<ul style="list-style-type: none"> • 20,000 gallons of fuel/month, 12 month rolling average
Nitrogen Oxides/Ozone Non-attainment Area	<ul style="list-style-type: none"> • 6,870 gallons of fuel/month, 12 month rolling average
Asbestos	<ul style="list-style-type: none"> • No recycling/crushing of asbestos containing materials
Section 112(b) Hazardous Air Pollutants	<ul style="list-style-type: none"> • Fuel sulfur content not to exceed 15 ppm sulfur content • Tier 2 emission standards for stationary sources

Any NMM facility exceeding these limits is required to obtain a site specific permit.

The Wisconsin Administrative Code establishes a standard of 150 micro-grams per cubic meter for suspended particulate (dust, processing fines, etc. less than 100 microns in diameter) applicable at the operations (mining and/or processing) property boundary.

6.3 Environmental Impacts to Water Resources

A sand mine can have multiple interactions with water. The site may be located near a river, stream, or wetland; or groundwater may be encountered as the site is excavated.

Water may also be used during the mining or processing stages. Material will be washed to remove fines. Washing may require the installation of a high capacity well. Wash water may be reused or discharged after washing to the ground surface, surface or surface waters depending on the volume and design of the operation. Sand excavated from below the water table may be saturated with water. As this material is stockpiled the water will run off the pile and leach into the ground or may be directed to on-site settling ponds. In addition, if the mine has buildings on-site a well may be present to supply water for cleaning, cooking, drinking, or sanitation.

6.3.1 Groundwater

5.3.1.1 Process Water

- Silica sand mining and processing plants are expected to use water from 420,500 gallons per day to 2 million gallons per day (292-1380 gpm)
- Open-loop systems that do not recycle process water could use 2000-3700 gpm.
- All of these wells are classified as high capacity wells, subject to state permit requirements.

- Any smaller-volume wells must meet state well construction standards.
- All wells must meet construction requirements and designed to prevent pollutants at the land surface from entering the underlying aquifer and to protect the quality of the water being discharged from the wells (Ch 281.17 Wis. Stats., and is specifically described in NR 812 Wis. Adm. Code).
- The WDNR may specify more stringent well location, well construction, and pump installation requirements when deemed necessary for the protection of public safety, safe drinking water, and the groundwater resource.
- The WDNR may deny, grant a limited approval, or modify an approval under which the location, depth, pumping capacity or rate of flow and ultimate use is restricted so that the supply of water for any public utility will not be impaired.
- Process water may not be discharged to any well including any bored, drilled or driven shaft, dug hole whose depth is greater than its largest surface dimension, improved sinkhole or subsurface fluid distribution system (NR 815, Wis. Adm. Code.)
- All high capacity wells are routinely screened for potential impacts to waters of the state including trout streams, outstanding resource waters, exceptional resource waters, or other waters of the state permits will contain additional conditions designed to prevent significant adverse impacts.
- High capacity wells proposed near springs will be reviewed to determine if the spring will be affected.
- During the high capacity well screening process, the WDNR will attempt to identify nearby private wells where significant groundwater drawdowns could occur.
- The WDNR recommends that private well owners establish baseline information on static water levels and water quality parameters such as arsenic, nitrate, and iron.
- In reclamation planning NR 135.08 requires protection of groundwater and the County Generalized Groundwater flow map is normally used to identify depth to water and groundwater movement for a particular site.
- “Generalized” maps have presented misleading interpretations of groundwater elevation and flow direction, particularly in rough terrain.
- Installation of ground water table observation (monitoring) wells could be used to assure the actual onsite depth to groundwater and groundwater flow direction. These wells could also provide a Point of Standards Application for groundwater quality testing and provide a baseline for comparison with future tests to determine groundwater impacts. This well network can also be used to define those private water supply wells that are in the "down gradient" position from the

mine/processing operations which could also be sampled to ensure they are not impacted by the mine/processing operation.

- Ground water quality monitoring could include:
- Suspended solids - to evaluate any changes in groundwater aquifer formation due to mining activity
- Petroleum volatile organic compounds - for possible fuel or lubricant spills
- Mono and Poly-acrylamide analyses if flocculent agents are used on site
- BOD₅ – to check for evidence of biological activity as a result of aerobic decomposition
- Arsenic, total - to address potential changes in metals content in groundwater as a result of onsite leaching through exposed sandstone bedrock. Arsenic concentrations at or above Wisconsin Administrative Code NR 140 Table 1 PAL and ES have been observed in water supply wells in Dunn County.
- Monitoring wells are required to be documented by soil boring logs, well construction, well development, and well abandonment (NR 141).

6.3.1.2 Dewatering Water

- If sand mining operations are performed below the water table, they may require significant additional groundwater pumping in order to dewater the active mining area. This can lead to an increased potential for impacts to groundwater and surface water resources. The majority of sand mining in Wisconsin is done above the level of the water table where no dewatering is required.

6.3.1.3 Drinking Water

Any new well will, at a minimum, be subject to construction standards found in NR 812, Wis. Adm. Code (Well Construction and Pump Installation). If any of these new wells are determined to be a public system, then construction standards of NR 812, Wis. Adm. Code, and operation standards and maintenance of public water systems of NR 810, Wis. Adm. Code, will also apply.

6.3.2 Surface Water Resources

With numerous wetlands and streams present in the County, combined with the rapid expansion of sand mining, impacts to Wisconsin surface water resources are possible.

6.2.2.1 Permit Jurisdiction In or Near Surface Waters

A number of environmental regulations are in place to restrict mining activities and protect waters of the state including:

- Wisconsin Pollutant Discharge Elimination System (WPDES) Storm Water Permits
- Ch. 30 and 31 Wis. Stats. waterway permits
- NR 340

NR 340 applies to any sand mines where an activity regulated by Ch. 30 or Ch. 31 Wis. Stats. is proposed. For typical sand mines, this includes activities such as:

- Substantially restricts the mining of sand and aggregates from within stream channels and from the immediate banks of Wisconsin's navigable streams.
- Assume that excavation from stream channels and immediate banks shall be avoided where reasonable alternatives exist.
Ponds within 500 feet or connected to navigable water
- Grading on or near the bank of a navigable water (distance varies based on the waterway)
- Realignment of a navigable stream
- Dredging from streams and lakes
- The construction of culverts or bridges on navigable waterways

6.3.2.2 Cranberry Exemption

Ch. 94.26, exemption from portions of Chapters 30 and 31, Wis. Stats., for cranberry culture is not applicable to non-metallic mining sites or 216, Wis. Adm. Code, stormwater permit is required.

6.3.3 Wetlands

Adverse impacts to wetlands related to a sand mine site can be classified as either direct or indirect. Direct impacts are caused by the physical alteration of a wetland by the discharge of fill material or excavation within the wetland to mine the sand deposit.

Indirect impacts typically involve changes to the landscape that affect the local hydrology by altering surface drainage patterns as well as changing groundwater levels.

6.2.3.3 Wetland Permitting

- The excavating or placement of any material in wetlands requires a WDNR approval known as a Water Quality Certification (Chapters NR 299 and NR 103, Wis. Adm. Code).
- State regulations require that wetland impacts be avoided if possible.
- The US Army Corps of Engineers may assert jurisdiction over a wetland that is connected to a federal navigable waterway and a Corps permit under section 404 of the Clean Water Act is required.

6.3.4 Storm Water/Wastewater Management

- Water generated by or contaminated with sediment as a result of frac sand operations is handled primarily with two general WPDES permits: the Nonmetallic Mining Operations Permit (NMM) (Permit No. WI-0046515-05) and the Construction Site Storm water Discharge Permit (Permit No. WI-S067831-3).
- Mining activity for the purposes of the NMM begins the first time ground is broken at a mine site. This negates the need for an operator to obtain a duplicative construction site storm water discharge permit for the same area.
- The NMM permit is considered an operations permit and regulates discharges of storm water and wastewater from the mine sites from the initial commencement of site development and lasts until the site has been reclaimed.
- The NMM permit can also be used to cover adjacent/proximal processing facilities where wet and dry sorting may occur.

6.3.4.1 Storm Water

If the site discharges storm water offsite and/or to surface waters of the state, the operator is required to prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) that will specify the use of standard Best Management Practices (BMPs) to be installed to control sediment in storm water runoff (defined as externally drained). If the site does not discharge offsite or to surface waters of the state, meaning all storm water runoff is directed into seepage areas where there is enough storage for the 10-year/24-hour rain event, no SWPPP is required and storm water requirements are minimal (defined as internally drained).

6.3.4.2 Wastewater

- The WDNR regulates discharges of pit dewatering (regardless of whether the water results from precipitation or groundwater) and wash water generated from mine processes.
- Primary pollutant being regulated is sediment in suspension.

- As limited time is available for more frequent DNR site inspections, the Town or County could request the stormwater management design and calculations and conduct an independent engineering review show the phases of operation and how these proposed future operations will meeting the new runoff standards.

6.2.4.3 Construction Site Storm Water and Erosion Control

- Required only for operations where a stand-alone processing plant is being constructed or for the construction of rail spurs to service mines or processing plants.

6.4 Fisheries Impacts

Nonmetallic mining has not had significant negative impacts to fisheries resources in the past. But, the recent boom in frac sand mining the number of nonmetallic mines throughout the state has increased and may have fisheries impacts.

6.5 Solid Waste Management/ Spills Handling

- Existing solid waste regulations are applicable to NMM operations.
- Existing hazardous waste regulations are applicable to NMM operations.
- Facilities which utilize a wet process to wash the sand will generate nonmetallic mineral fines as a waste product. Section NR 500.08(2)(b), Wis. Adm. Code, exempts disposal of spoils from sand, gravel or crushed stone quarry operations and nonmetallic earth materials from most solid waste regulations. Use of these fines for mine reclamation, provided their use is consistent with the mines reclamation plan approved by the respective county under NR 135, Wis. Adm. Code, is acceptable to the WDNR.

6.6 Recreation and Managed Lands

Proximity of mining operations to state-owned and managed lands may be of concern due to potential impacts to Nature Based Outdoor Activities (NBOA's) such as hunting, trapping, fishing, hiking and cross-country skiing, as well as other "quiet" outdoor recreational pursuits (e.g., nature study, biking, etc.).

Specific impacts to consider include:

6.6.1 Noise

- No applicable standards for noise generated by ongoing outdoor industrial operations exists. However, surrounding states have established noise levels for various sand and gravel operations. In Minnesota the night time standard for maximum noise levels at the operations property boundary is 50 dB; in Illinois the standard for nighttime operations in a quarry is 43 dB as measured at the

nearest residential boundary. The Town or County could establish an acceptable noise standard (for example 60 dB - the noise level equal to that of ordinary conversations) at the operations property boundary.

- Operating Equipment Alarms: OSHA required alarms on operating equipment can be common complaints particularly at night. The site operator could be encouraged to propose alternate back up signals.

Trucking: The County recognizes the desire to produce a certain tonnage of sand per year. Mining operation and hauling schedules need to be developed that are cognizant of nearby neighbors.

6.6.2 Lighting

Sand mines operating at night may require lighting (site and vehicle) that could negatively impact neighbors and nearby park or recreation area user's experience.

6.6.3 Forests

- Forest cover must be removed to accommodate active mining as well as overburden storage. Forest products can be recovered and marketed.
- Forest loss and the loss of associated habitats may be temporary and could be restored through mine reclamation after mining ceases.
- But, it is likely that it would be different from the original forest.

6.7 Endangered and Threatened Species and Habitats

- Wisconsin's Endangered Species Law requires the protection of our state's endangered and threatened.
- Applicants have to complete an Endangered Resources Review (ER Review).

6.7.1 Incidental Take

The Wisconsin Endangered Species Law allows the WDNR to authorize the taking of state endangered or threatened species if the taking is only incidental to, the carrying out of an otherwise lawful activity, and will not jeopardize the continued existence of the species in the state (<http://dnr.wi.gov/org/land/er/take/>).

6.8 Archeological and Historic Impacts

- Under provisions of Wisconsin statutes, state agencies (including WDNR) are directed to cooperate with the Wisconsin Historical Society (WHS) in order to identify and protect any WHS-recorded archaeological sites, historic structures, and other cultural resources which may be adversely impacted by agency actions such as permitting.

6.9 Socio-Economic Impacts

- Impacts may include: noise from mining and transport operations, increase in traffic and road deterioration, visual impacts, light disturbance from night mining, and property value impacts.
- Mines are eventually closed and reclaimed involving replacement of the stockpiled topsoil and either a conversion to or a return to agricultural use.
- Reclamation can be into prairie or oak savannah and provide wildlife habitat.

6.10 Transportation Impacts

- Vehicular traffic on local roads will have an impact on the service life and condition of the roads.
- Most of the processing facilities are being located near or adjacent to existing rail lines.

6.10.1 Traffic Analysis

To be provided by Dunn County Highway Department. Other documents that should be consulted are the Dunn County or individual Township Comprehensive Plans and the Dunn County Comprehensive Bicycle and Pedestrian Pathways Plan.

6.10.2 Acrylamide

Mines that clean or process sand commonly use polyacrylamides as a flocculent to remove unwanted minerals and fines from the sand. Acrylamide may be present in frac sand wash water if they are using polyacrylamide as a flocculent in their wash operations. Acrylamide is used to manufacture polyacrylamide. Acrylamide is a toxin, while polyacrylamide is not. The concern is that polyacrylamide products are produced at different grades and some grades may contain a small amount of acrylamide which poses the potential for contamination. It does appear that acrylamide is biodegradable in aerated soils. As a result, unless polyacrylamide levels are very high in the wash wastewater there may not be a great potential for acrylamide to contaminate groundwater at sand wash water storage/discharge sites.

The types of ponds and the minerals removed may also affect the potential for groundwater impacts. Sealed ponds have less potential for groundwater impacts. Unsealed ponds are expected to seal themselves with the fines that are removed from the frac sand. Removal of the sludge from these ponds could result in leakage if the seals are damaged by equipment use.

Dewatering water may not be discharged to any well including any bored, drilled or driven shaft, dug hole whose depth is greater than its largest surface dimension, improved sinkhole or subsurface fluid distribution system (NR 815, Wis. Adm.

Code.) More research is needed to determine concentrations of acrylamides in frac sand wash water when mines are using polyacrylamide polymer flocculation products.

The US Environmental Protection Agency (EPA) has set a Maximum Contaminant Level Goal (MCLG) of zero for acrylamides in public drinking water. Wisconsin does not have groundwater standards for acrylamide under NR 140, Wis. Adm. Code. Because of the difficulty of testing for such compounds at very low levels, EPA limits the amount of acrylamide in the polymeric coagulant aids used by public drinking water systems to 0.05% by weight and the dosage of polymeric coagulant aid which can be added to raw water to remove particulates, to 1ppm. Some people who drink water containing high levels of acrylamide over a long period of time could have problems with their nervous system or blood, and may have an increased risk of getting cancer.

6.10.3 Respirable Silica Dust

This fraction of the sand mining and processing has received great attention in recent months. How much and how widespread the distribution of RSD will be has not been satisfactorily predicted. The following needs to be considered:

1. RSD is considered to be less than 4 microns in diameter, almost 40 times smaller than the finest useful frac sand.
2. RSD will be provided from sandstone in two forms:
 - a. As part of the cement in the sandstone;
 - b. As “fractured” quartz grains produced during mining and/or processing.
3. Emissions of RSD are minimal in a wet wash process plant as the “fines” are controlled by the wash water and are trapped by flocculants.
4. Emissions of RSD are minimal from a process dryer as the emissions are controlled by a baghouse or similar emission control device.
5. Stockpiles of “processed sand” have had the significant volume of RSD removed during washing. Some RSD will be present in the processed sand stockpile. Under dry and windy conditions, these stockpiles may be wetted as part of the Fugitive Dust Control Plan.
6. RSD emissions are possible at the mine face during blasting or mining or inside dry processing facilities.

7.0 References

6.1 Internet Links

- Silica sand in Wisconsin <http://wisconsin Geological Survey.org/silica-sand.htm>
- [Frac sand mining would add jobs in Wood County, study finds](http://www.wisconsinrapidtribune.com/article/20111014/WRT0101/110140662/Frac-sand-mining-would-add-jobs-Wood-County-study-finds?odyssey=tab%7Ctopnews%7Cimg%7CFRONTPAGE)
<http://www.wisconsinrapidtribune.com/article/20111014/WRT0101/110140662/Frac-sand-mining-would-add-jobs-Wood-County-study-finds?odyssey=tab%7Ctopnews%7Cimg%7CFRONTPAGE>
- [Centers for Disease Control paper on silicosis](http://www.cdc.gov/niosh/docs/2004-108/pdfs/2004-108.pdf)
<http://www.cdc.gov/niosh/docs/2004-108/pdfs/2004-108.pdf>
- [Frac sand sites \(map\)](http://www.wisconsinwatch.org/wp-content/uploads/2011/07/Frac-sand-sites.pdf)
<http://www.wisconsinwatch.org/wp-content/uploads/2011/07/Frac-sand-sites.pdf>
- [More information on fracking](http://www.wisconsinwatch.org/2011/07/31/explainer-what-is-fracking/)
<http://www.wisconsinwatch.org/2011/07/31/explainer-what-is-fracking/>
- [Study on the economic impacts of frac sand mining](http://centralwisconsinhub.wausaudailyherald.com/assets/pdf/U01805151013.PDF)
<http://centralwisconsinhub.wausaudailyherald.com/assets/pdf/U01805151013.PDF>
- [Wikipedia page on Hydraulic Fracturing](http://en.wikipedia.org/wiki/Hydraulic_fracturing)
http://en.wikipedia.org/wiki/Hydraulic_fracturing
- [Article on Hydraulic Fracturing](http://www.heatingoil.com/articles/hydraulic-fracturing-hydrofracking-the-risks-and-rewards-of-the-controversial-drilling-technique1130/)
<http://www.heatingoil.com/articles/hydraulic-fracturing-hydrofracking-the-risks-and-rewards-of-the-controversial-drilling-technique1130/>
- [WDNR Silica Study](http://dnr.wi.gov/air/pdf/finalsilicareport.pdf) <http://dnr.wi.gov/air/pdf/finalsilicareport.pdf>
- A Guide to Preparing and Reviewing Financial Assurance for the Reclamation of Nonmetallic Mining Sites.
<http://dnr.wi.gov/org/aw/wm/publications/mining/NonmetFinAssure.pdf>
- Silica Sand Mining; WDNR Jan. 2012
- Non-Metallic Mining PUBL-WA-834-2002
- A Guide to Developing Reclamation Plans for Nonmetallic Mining Sites in Wisconsin PUBL-WA-834 2002
<http://dnr.wi.gov/topic/Mines/documents/NonmetRecPlan.pdf>

8.0 Dunn County Chapter 20 New Permit Application Form - 2012

DUNN COUNTY

2012 FEE SCHEDULE

NON-METALLIC MINING RECLAMATION

Mine Size in Unreclaimed Acres (Rounded to the Nearest Whole Acre)	Annual & New Fees
1-5 Acres	\$210.00
6-10 Acres	\$420.00
11-15 Acres	\$605.00
16-25 Acres	\$800.00
26-50 Acres	\$920.00
51 Acres or Larger	\$985.00
Inactive	\$20.00 + \$5.00/Acre

Acres (Rounded to the Nearest Whole Acre)	New Regular Plan Review Fee	New Expedited Plan Review Fee
1-25 Acres	\$1045.00	\$2090.00
26-50 Acres	\$1400.00	\$2800.00
51 or More Acres	\$1750.00	\$3500.00

Acres (Rounded to the Nearest Whole Acre)	Modification Plan Review Fee
1-25 Acres	\$785.00
26-50 Acres	\$1050.00
51 or More Acres	\$1310.00

Approved by the Dunn County Planning, Resources and Development Committee on March 22, 2011.