



14 June 2019

Mr. Dan Masterpole
Chippewa County
Land Conservation and Forest Management
711 North Bridge Street
Chippewa Falls, Wisconsin 54729

Mr. Masterpole:

This letter report provides the Northern Sands Wisconsin LLC (NSW) response to the Chippewa County Land Conservation and Forest Management letter of 1 November 2018 that referred to additional requests for information in meeting Permit #2015-01.

Scope of Work

It is our understanding that to be compliant with the requirements of the permit, the following issues in meeting Permit #2015-01 must be adequately addressed:

- Hydrologic inventory of adjacent properties and reevaluation of the potential for mining operations to affect seeps, springs, wetlands, and surface waters
- Documentation of stratigraphy and nature of regional groundwater flow
- A sub-watershed delineation of each hydrologic feature or set of features to determine the water source and the approximate percent contribution from each water source to the feature
- Updated wetland assessment on adjacent properties identified by Chippewa County

Field Activities

Field activities were conducted by Ms. Ann Key, WDNR Professionally Assured Wetland Delineator with Wetlands and Waterways, LLC and Dr. J. Brian Mahoney PG, Geologist with Precision GeoSolutions, LLC on 13-14 May 2019. The 209 acres adjacent to the NSW Phase 1 permit area were assessed. The area assessed was consistent with the Chippewa County request in their letter dated 1 November 2018 (Figures 1, 2).

Hollow stem auger borings were completed to collect subsurface samples to assess the geologic setting and the potential for a significant restrictive layer near the 1100 ft above sea level (asl) as suggested by Chippewa County.

Regional Stratigraphy

Hollow stem auger borings (HAS-8, HAS-9, HAS-10) were completed on 14 May 2019 on the Jensen property (Figure 2; Appendix 1). Soil borings demonstrate that fine to medium grained sand of the Wonewoc Formation occurs above and below the 1100' contour (Figures 2, 3). Two of the soil borings were specifically located to test for the potential of a formation boundary at 1100 ft asl. Boring HSA 9 was spudded at ~ 1124 ft asl and bored to a depth of 26.5' (~1097.5 ft asl), with samples collected every 5 feet. Boring HSA 10 was spudded at ~1127 ft asl and bored to a depth of 15.5' (~1111.5 ft asl), with samples collected every 5 feet.



Figure 3: Photomicrograph of coarse grained sand from soil boring HSA 10 (10-11.5'). This sand is characteristic of the Wonewoc Formation and was collected ~17' above the 1100' contour. Similar sand may be sampled to an elevation of -1210-1250', which is the contact between the Wonewoc Formation and overlying Lone Rock Formation. Red scale bar is in millimeters.

Soil boring results indicate that the published stratigraphy in the area (Brown et al, 1988) incorrectly locates the contact between the Wonewoc Formation and overlying Lone Rock Formation at 1100 ft asl.

Recent mapping, soil borings and drill core indicate that the contact between the base of the Wonewoc Formation and the underlying Eau Claire Formation occurs at ~1010 to 1015 ft asl (Figure 4). The relatively impermeable strata of the fine-grained Eau Claire Formation apparently forms the base of the local surficial aquifer at the base of the Wonewoc Formation. The upper contact of the Wonewoc Formation below the overlying Lone Rock Formation of the Tunnel City Group occurs at ~1240 to 1250 ft asl. There is no contact between Paleozoic bedrock units at 1100 ft asl.

Boring	Collar Elevation (ft asl)	Depth of Penetration
HSA-8	1086	41.5'
HSA-9	1124	26.5'
HSA-10	1127	15.5'
HSA-11	1101	11.5'
HSA-12	1083	10.5'

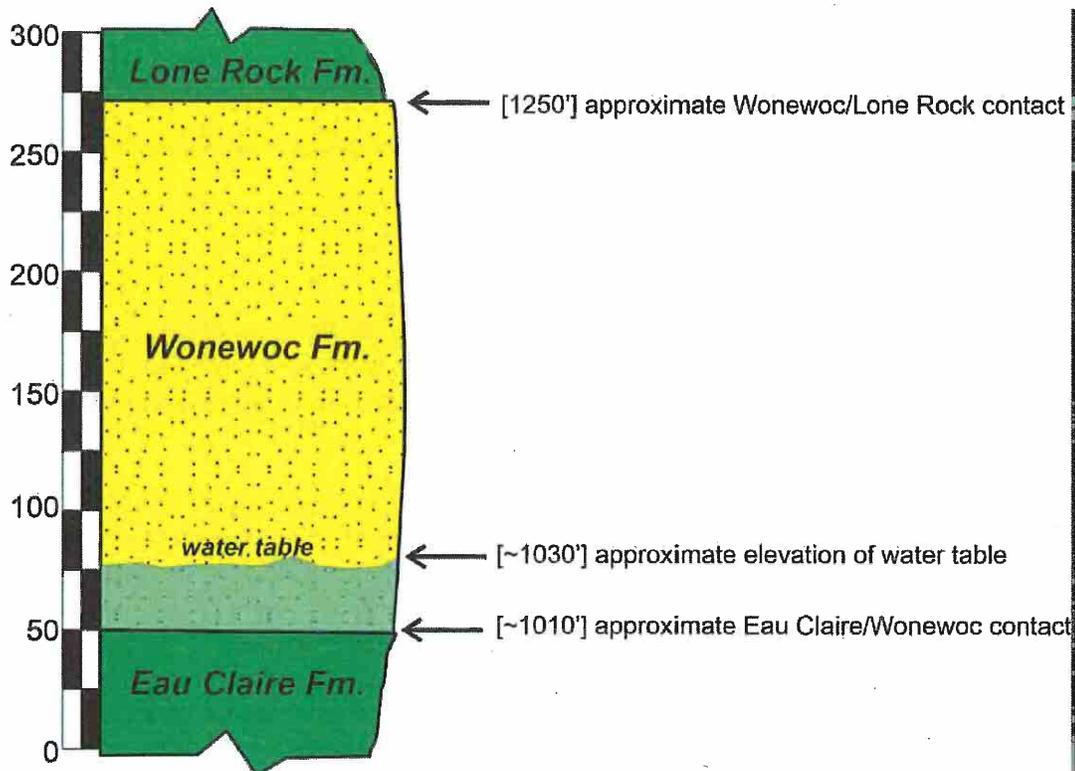


Figure 4: Schematic stratigraphic framework of Paleozoic strata and simplified hydrogeologic profile, Elk Creek drainage, western Chippewa County. Note position of Eau Claire/Wonewoc formations at base of regional aquifer. Note position of Wonewoc/Lone Rock formation contact at -1250' asl, corresponding the height of elongate ridges in area.

Regional Hydrologic Setting

Paleozoic bedrock in the region was weathered and eroded by post-glacial fluvial activity as the glacial ice of the Chippewa Lobe retreated about 12,000 years ago (Syverson, 2007). This erosion led to the valley and ridge topography that characterizes the Chippewa River watershed today. The ridges tend to be capped by lesser permeable units such as the Lone Rock Formation or strongly cemented sandstone of the upper Wonewoc Formation. Valleys have been eroded to just above the Wonewoc/Eau Claire formation contact, and the Eau Claire Formation tends to form an aquitard that controls the base of the local aquifer. Post-glacial meltwater activity resulted in the deposition of highly irregular (0-30'), lenticular, unstratified, poorly sorted clastic sediment known as the River Falls Formation unconformably above the Wonewoc Formation (Syverson, 2007; Figure 5). The River Falls Formation is generally restricted to the valley bottoms, at elevations at or below ~1120 ft asl.

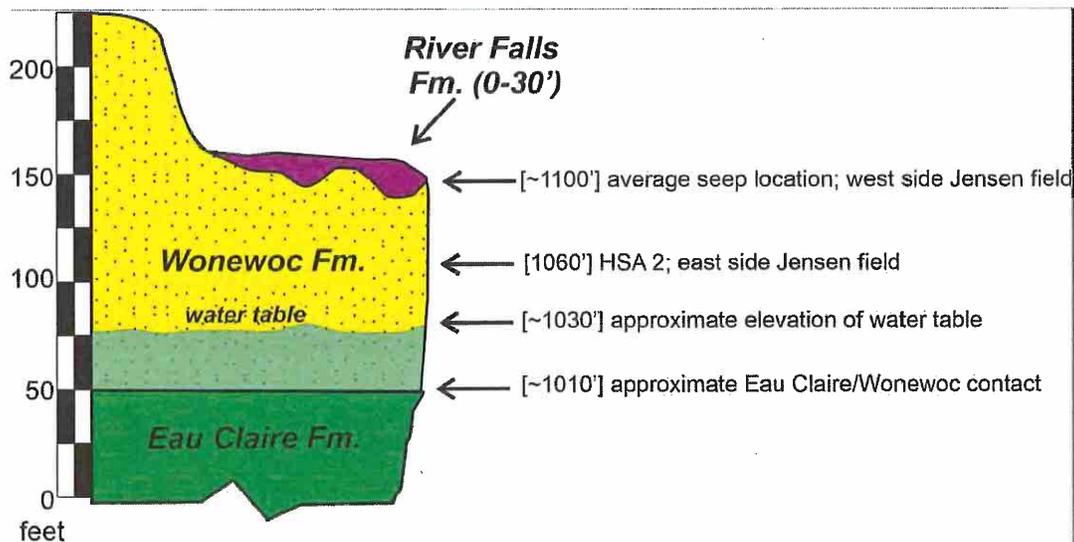


Figure 5: Schematic post-glacial topographic profile, stratigraphic setting and hydrogeologic profile, Elk Creek drainage, western Chippewa County. Note position of primary aquifer at the base of the Wonewoc Formation, relative to the impermeable zones and resultant seeps associated with the thin, lenticular mantle of River Falls Formation.

The medium to coarse grain size, well rounded and well sorted character of the Wonewoc Formation makes it highly porous and permeable, and, while minor discontinuous clay seams do exist, they are not significant aquitards, and meteoric water rapidly permeates into the subsurface. Conversely, the River Falls Formation contains a wide range of grain sizes (boulders to clay), tends to be rich in clay, and locally forms impermeable horizons that interrupt infiltration of meteoric water. These impermeable horizons are recognized by seeps that are localized above the contact between the River Falls Formation and the Wonewoc Formation at or below ~1120 ft asl. Seeps and wetlands are encountered within this general elevation, as typified by the occurrence of wetlands along the western boundary of Phase I (Figure 6).

Wetlands form as infiltration into the subsurface is slowed by impermeable layers such as the River Falls Formation and water and organic matter accumulate in low lying areas. These seeps form low, marshy areas that are generally wet in the spring and become dry during the summer. The flow volumes in these seeps are insufficient to be considered springs (<1 ft³/sec flow 80% of the time) by the Wisconsin Department of Natural Resources. Wetland protection and stormwater control are regulated by the Wisconsin Department of Natural Resources. Surface and sub surface flow will continue in response to rainfall and infiltration outside the mining area, and water moving onto the NSW property from higher elevations will continue as the site is developed. Water derived from surface and subsurface flow from both inside and outside the mine area will be controlled by a drainage system, with eventual infiltration to Elk Creek similar to the conditions as they currently exist. Mine development will not impact the upgradient intermittent seeps as this water flows downgradient to Elk Creek.

It is important to note that there is no Lone Rock Formation (Tunnel City Group) in Phase 1 below an elevation of 1210' asl, and that no Lone Rock Formation will be removed during the mining process. Land parcels adjacent to Phase I are not part to the NSW permit and land use in these parcels are beyond

the control of NSW. Seeps, spring, wetlands and surface waters on the properties west of Phase 1 (Wagner, Frisch and Stahl properties) are either topographically above proposed mining activity in Phase 1, or are in a different drainage basin, and will not be impacted by mine activity (Figure 5). Seeps, spring, wetlands and surface waters on the Smit property are outside of proposed mining activity and are in a different sub-subwatershed and will not be impacted (Figure 2). Seeps, spring, wetlands and surface waters on the Roger Lemler and Gary Lemler properties southeast of the Phase 1 are localized near the Wonewoc Formation/Eau Claire Formation contact and will not be impacted by proposed mining activity in Phase 1 (Figures 2).

Sub-watershed Delineation

A watershed is the upslope area that contributes flow to a common outlet as concentrated drainage. There are a variety of scales of watersheds, from the Mississippi River watershed to 1st order minor tributaries called subbasins. The State of Wisconsin bases watershed analysis on the federal Watershed Boundary Dataset, which is a hierarchical system of nested hydrologic units at various scales called hydrologic unit codes (HUC). HUCs are delineated and georeferenced to U.S. Geological Survey 1:24,000 scale topographic base maps.

Baseline data for the sub-subwatershed analysis was derived from the Wisconsin Department of Natural Resources (WDNR) Subwatershed (12 digit) 6th level (HUC 12) hydrologic unit boundary layer for the State of Wisconsin. The Northern Sands Wisconsin Phase 1 study area is within the Big Elk Creek-Elk Creek subwatershed, which is an area of ~30,137 acres at the headwaters of Big Elk Creek and Elk Creek in western Chippewa County and eastern Dunn County (Figure 1).

The sub-subwatershed area relevant to the Northern Sands Wisconsin project area was derived from the Big Elk Creek-Elk Creek HUC 12 database by calculating the intersection between a ½ mile buffer from the permitted area and WDNR 1:24K digital elevation data (Figure 6). The boundaries of the sub-subwatershed area within this area were derived from the WDNR 24 K Hydro geodatabase. This area encompasses approximately 957 acres. A 2-foot topographic contour interval was derived within the boundaries of the sub-subwatershed and superimposed on a map of landowners within and adjacent to the mine permit area (Figure 6). This sub-subwatershed is separated from adjacent watersheds by drainage divides, and is (by definition) internally drained, with a common outlet crossing 90th Ave. (Peterson Rd) along the southeast border discharging to Elk Creek.

Delineation of internal drainage patterns within the defined sub-subwatershed was accomplished utilizing the Watershed hydrology tool within the Spatial Analyst tool in ArcGIS Pro 2.3.2. This spatial analysis function determines the area of sub-sub-subwatersheds by analysis of the digital elevation model, determination of the flow direction and subsequent calculation of the local catchment area (Figure 7, Table 1). Each sub-sub-subwatershed is defined by flanking drainage divides, and each has a common outlet, or pour point, which allows hydrologic flow paths to be determined (Figure 8). The percent contribution of surface and subsurface water to the overall water budget is assumed proportional to the acreage within each sub-sub-subwatershed.

Of the 115 sub-sub-subwatersheds identified within the sub-subwatershed area, 17 (4.7%, 44.9 acres) are fully within the Phase I permitted area, and 36 (22.9%, 219.2 acres) are outside of the permitted area. The remaining 62 sub-sub-subwatershed intercept the Phase 1 boundary and occupy 692.9 acres or 72.4%. Fully 95.3% of sub-sub-subwatersheds outside of the Phase I permit area flow into the Phase I area. Adjacent properties to the west (Wagner, Frisch and Stahl properties) drain entirely into the Phase 1 project area. Adjacent properties to the south (Smit) drainage into the sub-subwatershed to the south with the exception of 2.5 acres in the northwest corner that drains to the north. The entire sub-subwatershed,

including sub-sub-subwatersheds both within and exterior to the Phase I project area drain into Elk Creek, and through the adjacent properties to the southeast (Lemler). ***There is therefore no possibility for mining operations to affect seeps, wetlands and surface waters on adjacent properties to the west, north and east of the mine area, as these areas are upgradient, and represent a source of surface and subsurface water into the mine area (Figure 8).***

No projected mining activities will impact the adjacent properties to the southeast (Gary and Betty Lemler) for the reasons cited above. The adjacent property to the southeast (Rodger Lemler) contains the downstream continuation of the wetland at the head of Elk Creek delineated in the initial environmental assessment submitted in support of Permit #2015-01. Potential impacts to this adjacent wetland area will be avoided or minimized by optimizing the site layout, including modifying the footprint, slopes and staging considerations as per permit stipulations.

It is important to note that surface and subsurface water flow in the project area has already been impacted by development. Surface water flow in and around Phase 1 has been altered by the construction of 13th St. (Fraser Rd), and the railroad bed that impeded flow to Elk Creek. The north- south running town road bisects flow from the hills west of the Dunn County/Chippewa County boundary and during precipitation events restricts flow as it exits through the culvert. Standing water has been observed in the field west of 13th St. Surface flow east of the current railroad bed exits through a culvert before entering a wetland and then Elk Creek. The railroad bed intercepts water from the headwaters of Elk Creek and likely contribute to the wetland complex in the Gary Lemler and Rodger Lemler parcels.

Off-site Wetland Assessment

Per the request of Chippewa County Land Conservation and Forest Management, an off-site general wetland and surface water assessment has been conducted on select neighboring parcels located adjacent to Phase I of the Northern Sands Wisconsin, LLC frac sand mine site. The wetland assessment was conducted on May 13 and 14, 2019 by Ms. Ann Key, WDNR Professionally Assured Wetland Delineator with Wetlands and Waterways, LLC. Ms. Key was accompanied by Dr. J. Brian Mahoney PG, Geologist with Precision GeoSolutions, LLC, as well as consultant contracted by neighboring landowners to monitor the field assessment.

The intent of the wetland and surface water assessment was to conduct a baseline inventory of these resources on the specified parcels located adjacent to Phase I. The assessment involved review and research of available maps and aerial photos prior to the site visit, as well as review of other available supporting data and previous evaluations conducted on some of the properties by Dr. Mahoney and Northern Sands Wisconsin, LLC.

The specific properties requested for off-site assessment include the following parcels (Figure 2):

- Rodger A. Lemler Property - Part of the NW ¼-SW ¼, Sec. 29, T29N, R10W, Town of Howard, Chippewa County (24.5 acres)
- Gary D. & Betty J. Lemler Property - Part of the NW ¼-SW ¼, Sec. 29, T29N, R10W, Town of Howard, Chippewa County (15.5 acres)
- Smit Family Properties, LLC – NE ¼-SW ¼, Sec. 30, T29N, R10W, Town of Howard, Chippewa County (40.0 acres)
- Randy R. Dreger Property, 5.0 Acres – Part of the SE ¼-NW ¼, Sec. 30, T29N, R10W, Town of Howard, Chippewa County (5.0 acres)
- Northern Sands Wisconsin, LLC Property – Part of the SE ¼-NW ¼, Sec. 30, T29N, R10W, Town of Howard, Chippewa County (3.7 acres)

- Dennis L. & Karen M. Wagner Property – Part of the NE ¼-NE ¼ and All of the SE ¼-NE ¼, Sec. 25, T29N, R11W, Town of Colfax, Dunn County (75.0 acres)
- James R. & Cheryl A. Frisch Property – Part of the NE ¼-NE ¼, Sec. 25, T29N, R11W, Town of Colfax, Dunn County (5.0 acres)
- Leon B. Boland & Katherine R. Stahl Property – NE ¼-SE ¼, Sec. 25, T29N, R11W, Town of Colfax, Dunn County (40.0 acres)

A field visit was then conducted during the 2019 growing season to assess the approximate locations, extents and classifications of the resources. For purposes of conducting a general assessment as opposed to an official delineation of the resources, wetlands were identified based on observations of hydrophytic vegetation, surficial hydrology indicators, topographic position and best professional judgment. The areas of primary focus included those areas identified on the Wisconsin Department of Natural Resources (WDNR) Wisconsin Wetland Inventory (WWI) maps as wetland or wetland indicator soils, as well as areas previously identified by Dr. Mahoney as having seeps (Figures 9, 10). The WWI map with wetland indicator soils is shown on Figure 5 and in the Appendix. Areas identified as wetlands and/or surface water were conservatively located with a sub-meter accuracy Global Position System. Areas identified as seeps were previously mapped by Dr. Mahoney and no new seeps or springs were discovered in the May 15, 2019 reconnaissance.

Nine (9) wetlands were identified during the site visits (Figure 10). The identified wetlands, community types and noted features are discussed in further detail below:

Wetland 1A was identified on the Rodger A. Lemler Property, extending southward from Wetland 1 of the NSW Phase I property in 2018. The area is identified on the WWI maps as an E1Kg (Emergent/Wet Meadow, Persistent, Wet Soil, Palustrine, Grazed) community to the north, transitioning into a T3/S3K (Forested, Broad-Leaved Deciduous/Scrub-Shrub, Broad-Leaved Deciduous, Wet Soil, Palustrine) community. The site visit indicates the WWI maps are relatively accurate, although the northern portion of the wetland does not appear to be currently grazed. Dominant species observed throughout the wetland community included *Scirpus cyperinus* (Wool Grass), *Impatiens capensis* (Orange Jewelweed), *Lonicera tatarica* (Tartarian Honeysuckle), *Populus tremula* (Quaking Aspen), *Acer rubrum* (Red Maple), *Alnus incana ssp. rugosa* (Speckled Alder), *Ulmus americana* (American Elm), *Caltha palustris* (Marsh Marigold) and *Calamagrostis canadensis* (Canada Bluejoint) with various *Carex ssp.* (Sedges) just beginning to emerge. Soils are mapped as Fordum Loam, 0 to 2% slopes (Hydric). Surficial hydrology indicators observed included Surface Water (A1), Sediment Deposits (B2), Drift Deposits (B3), Water-Stained Leaves (B9), Drainage Patterns (B10) and Geomorphic Position (D2).

The WDNR Surface Water Data Viewer (SWDV) indicates an intermittent stream flowing through this wetland community. The waterway was also observed during the site visit. The primary waterway flows southward along the east side of the abandoned railroad grade, which runs north to south through Wetland 1 and can be clearly seen on historic aerial photos. This waterway was approximately 3 to 4 feet in width, had approximately 2 to 3 inches of flowing water and ordinary high water mark (OHWM) was estimated at approximately 12 to 16 inches in depth. Another intermittent waterway was observed along the west side of the abandoned railroad grade. This waterway was approximately 5 feet in width, had approximately 3 to 4 inches of water with minimal flow observed in a few locations and an OHWM depth of approximately 16 to 20 inches.

Wetland 2A was identified on the east edge of the Smit Family Properties, LLC, adjacent to 13th Street. A culvert located under 13th Street connects this wetland to Wetland 12, delineated on the NSW

Phase I property in 2018. The area is identified on the WWI maps as an E1Kf (Emergent/Wet Meadow, Persistent, Wet Soil, Palustrine, Farmed) community. The site visit indicates the WWI maps are relatively accurate, although this portion of the wetland does not appear to be currently farmed. Dominant species observed throughout the wetland community included *Scirpus cyperinus* (Wool Grass), *Juncus tenuis* (Soft Rush), *Onoclea sensibilis* (Sensitive Fern), *Rubus ideaus* (Red Raspberry) and *Typha latifolia* (Broad-Leaf Cattail). Soils are mapped as Lows Loam, 0 to 2% slopes (Hydric). Surficial hydrology indicators observed included Surface Water (A1), Water-Stained Leaves (B9) and Geomorphic Position (D2).

Wetland 3A was identified on the north edge of the Dennis L. & Karen M. Wagner Property, adjacent to 90th Avenue. The area is not identified on the WWI maps as a wetland, nor is the area identified as having wetland indicator soils. However, based on observations of hydrophytic vegetation, surficial hydrology indicators, wetness indicators on aerial photos and a brief evaluation of soils, the area was identified as wetland for this assessment. This wetland is connected to Wetland 11, delineated on the NSW Phase I property in 2018. The wetland is primarily an E1K (Emergent/Wet Meadow, Persistent, Wet Soil, Palustrine) community. A small excavated open-water pond dominated by *Typha latifolia* (Narrow-Leaf Cattail) is located along the west edge of the identified wetland area. The majority of the wetland, with exception of the pond, appears to be mowed or hayed in most years. Dominant species observed throughout the wetland community included *Phalaris arundinacea* (Reed Canary Gras), *Juncus tenuis* (Soft Rush) and *Trifolium ssp.* (Clover). Soils are mapped as Kevilar Sandy Loam, 2 to 6% slopes (Non-Hydric). Surficial hydrology indicators observed included Surface Water (A1), Saturation Visible on Aerial Imagery (C9) and Geomorphic Position (D2).

Wetland 4A was identified on the east edge of the Dennis L. & Karen M. Wagner Property. The area is identified on the WWI maps as a small wetland (< 2 acres in size) and as having wetland indicator soils. This wetland is connected to Wetland 10, delineated on the NSW Phase I property in 2018. The wetland is primarily an E1K (Emergent/Wet Meadow, Persistent, Wet Soil, Palustrine) community. Dominant species observed throughout the wetland community included *Phalaris arundinacea* (Reed Canary Gras) and *Barbarea vulgaris* (Yellow Rocket). Soils are mapped as Merrilan Fine Sandy Loam, Loamy Subsoil, 0 to 3% slopes (Predominantly Non-Hydric). Surficial hydrology indicators observed included Surface Water (A1) and Geomorphic Position (D2).

Wetland 5A was identified in the southern 40 acres of the Dennis L. & Karen M. Wagner Property and extends from the east property line westward across the parcel. The area is not identified on the WWI maps as having wetlands present but is mapped as having wetland indicator soils. This wetland is connected to Wetland 9, delineated on the NSW Phase I property in 2018. The wetland is located within a pine plantation and is classified primarily as a T5K (Forested, Needle-Leaved Evergreen, Wet Soil, Palustrine) community with narrow areas of E1K (Emergent/Wet Meadow, Persistent, Wet Soil, Palustrine) communities throughout. Dominant species observed throughout the wetland community included *Pinus resinosa* (Red Pine), *Osmunda claytoniana* (Interrupted Fern), *Dryopteris intermedia* (Evergreen Wood Fern) and *Onoclea sensibilis* (Sensitive Fern). Soils are mapped as Merrilan Fine Sandy Loam, Loamy Subsoil, 0 to 3% slopes (Predominantly Non-Hydric) with smaller areas of Veedum Muck, 0 to 2% slopes (Predominantly Hydric) identified on the WWI wetland indicator soil layer. Surficial hydrology indicators observed included Surface Water (A1), Drainage Patterns (B10) and Geomorphic Position (D2).

Wetland 6A was identified in the southern 40 acres of the Dennis L. & Karen M. Wagner Property and extends from the east property line westward into the parcel. The WWI maps identify a small wetland (< 2 acres in size) and an excavated pond in the area of this wetland. The area is also identified

as having wetland indicator soils. This wetland is connected to Wetland 9, delineated on the NSW Phase I property in 2018. The wetland consists primarily of an S3K (Scrub-Shrub, Broad-Leaved Deciduous, Wet Soil, Palustrine) community with an excavated pond and associated excavated channel along the east and north edges. Dominant species observed throughout the wetland community included *Acer rubrum* (Red Maple), *Populus tremula* (Quaking Aspen), *Acer negundo* (Box Elder), *Onoclea sensibilis* (Sensitive Fern) and *Rubus ideaus* (Red Raspberry). Soils are mapped as Veedum Muck, 0 to 2% slopes (Predominantly Hydric). Surficial hydrology indicators observed included Surface Water (A1), Water-Stained Leaves (B9), Drainage Patterns (B10) and Geomorphic Position (D2).

Wetland 7A was identified in the south-central portion of the southern 40 acres of the Dennis L. & Karen M. Wagner Property. The WWI maps do not identify any wetlands in this area but identify the northeastern portion of the identified wetland as having wetland indicator soils. The wetland extends into the pine plantation and consists primarily of a T5K (Forested, Needle-Leaved Evergreen, Wet Soil, Palustrine) community with the southern tip of the wetland being classified primarily as an E1K (Emergent/Wet Meadow, Persistent, Wet Soil, Palustrine) community. Dominant species observed throughout the wetland community included *Pinus resinosa* (Red Pine), *Osmunda claytoniana* (Interrupted Fern), *Dryopteris intermedia* (Evergreen Wood Fern), *Onoclea sensibilis* (Sensitive Fern), *Impatiens capensis* (Orange Jewelweed) and *Scirpus cyperinus* (Wool Grass). Soils are mapped as Merrillan Fine Sandy Loam, Loamy Subsoil, 0 to 3% slopes (Predominantly Non-Hydric) in the northeastern portion and as Hayriver and Elevasil Fine Sandy Loams, 6 to 12% slopes, moderately eroded (Non-Hydric) throughout the southwestern portion. Surficial hydrology indicators observed included Surface Water (A1), Drainage Patterns (B10) and Geomorphic Position (D2).

Wetland 8A was identified in the northwest edge of the Dennis L. & Karen M. Wagner Property, adjacent to 90th Avenue. The area is not identified on the WWI maps as a wetland, nor is the area identified as having wetland indicator soils. However, based on observations of hydrophytic vegetation, surficial hydrology indicators, wetness indicators on aerial photos and a brief evaluation of soils, the area was identified as wetland for this assessment. The wetland is primarily an E1K (Emergent/Wet Meadow, Persistent, Wet Soil, Palustrine) community. The majority of the wetland appears to be mowed or hayed in most years. Dominant species observed throughout the wetland community included *Phalaris arundinacea* (Reed Canary Gras), *Juncus tenuis* (Soft Rush) and *Barbarea vulgaris* (Yellow Rocket). Soils are mapped as Kevilar Sandy Loam, 2 to 6% slopes (Non-Hydric). Surficial hydrology indicators observed included Surface Water (A1), Saturation Visible on Aerial Imagery (C9) and Geomorphic Position (D2).

Wetland 9A was identified in the north edge of the Dennis L. & Karen M. Wagner Property, adjacent to 90th Avenue. The area is not identified on the WWI maps as a wetland, nor is the area identified as having wetland indicator soils. However, based on observations of hydrophytic vegetation, surficial hydrology indicators, wetness indicators on aerial photos and a brief evaluation of soils, the area was identified as wetland for this assessment. The wetland is primarily an E1K (Emergent/Wet Meadow, Persistent, Wet Soil, Palustrine) community. The majority of the wetland appears to be mowed or hayed in most years. Dominant species observed throughout the wetland community included *Phalaris arundinacea* (Reed Canary Gras) and *Juncus tenuis* (Soft Rush). Soils are mapped as Kevilar Sandy Loam, 2 to 6% slopes (Non-Hydric). Surficial hydrology indicators observed included Surface Water (A1), Saturation Visible on Aerial Imagery (C9) and Geomorphic Position (D2)T

This general assessment of wetlands and surface waters indicates that in general, the WWI and waterway mapping available is relatively accurate although more wetlands were observed during the site evaluation than were identified per available mapping.

Conclusions

The objective of this letter is to address additional requests for information pertaining to Permit #2015-01. The following items have been addressed:

1. Stratigraphy of the area, including formational contacts, has been verified through geologic mapping, soil borings and drill core.
2. Seeps and wetlands on the western side of Phase 1 are localized along the Wonewoc/River Falls formation boundary and are not associated with a contact with the Tunnel City Group.
3. Nature of surface and subsurface water flow has been documented through a hydrologic inventory, geologic mapping and topographic analysis of digital elevation models (DEM) with specialized hydrologic mapping tools in ArcGIS.
4. A sub-sub-watershed delineation has been documented using a 2 foot DEM in order to determine the water source and approximate percent contribution from each sub-sub-subwatershed.
5. A hydrologic inventory and wetland assessment has been completed on adjacent properties identified by Chippewa County.
6. It has been demonstrated that mining operations will not affect seeps, wetlands and surface waters on adjacent properties to the west, north and east of the mine area, as these areas are upgradient, and represent a source of surface and subsurface water into the mine area.
7. Surface and subsurface water flow results in discharge into the headwaters of Elk Creek southeast of Phase I. Mining operations will not alter this natural flow pattern and potential impacts to this adjacent wetland area will be avoided or minimized by optimizing the site layout, including modifying the footprint, slopes and staging considerations as per permit stipulations.

Respectfully submitted by:



Dr. J. Brian Mahoney, PG
Precision GeoSolutions LLC



Ann Key, PSS, PWS, CST
Wetland and Waterway, LLC

Cc: Northern Sands Wisconsin LLC

Table 1
Wetland Feature Contribution Area
 Sub Sub Subwatershed (Sub^3)
 June, 2019

Identified Wetland Features		Wetland Area (acres)	Sub^3 Watershed ID**	Total Sub ^3 Watershed (acres)	Wetland Area/Total Sub^3 Watershed
1	Phase 1 Delineation 7-18	9.33	22,56,15,81,108,101,110,48,44,54	117.20	7.96%
2	Phase 1 Delineation 7-18	0.55	24	20.76	2.65%
3	Phase 1 Delineation 7-18	1.18	40	15.81	7.46%
4	Phase 1 Delineation 7-18	17.17	outside hydro 24k Phase 1		
5	Phase 1 Delineation 7-18	0.2	outside hydro 24k Phase 1		
6	Phase 1 Delineation 7-18	0.27	41	15.73	1.72%
7	Phase 1 Delineation 7-18	0.92	55,41	27.98	3.29%
8	Phase 1 Delineation 7-18	0.08	93	6.29	1.27%
9	Phase 1 Delineation 7-18	2.57	100,42,51	33.63	7.64%
10	Phase 1 Delineation 7-18	0.23	31,8	19.42	1.18%
11	Phase 1 Delineation 7-18	0.02	1	49.09	0.04%
12	Phase 1 Delineation 7-18	0.17	outside hydro 24k Phase 1		
13	Phase 1 Delineation 7-18	0.98	33	18.27	5.36%
14	Phase 1 Delineation 7-18	0.03	33	18.27	0.16%
15	Phase 1 Delineation 7-18	0.02	outside hydro 24k Phase 1		
1a	Adjacent Parcels Assessment 5-19	0.57	44,76,112,109,43,3,18	101.61	0.56%
2a	Adjacent Parcels Assessment 5-19	0.57	outside hydro 24k Phase 1		
3a	Adjacent Parcels Assessment 5-19	1.61	1	49.09	3.28%
4a	Adjacent Parcels Assessment 5-19	0.3	31	18.83	1.59%
5a	Adjacent Parcels Assessment 5-19	3.11	4,100,16	68.17	4.56%
6a	Adjacent Parcels Assessment 5-19	0.62	42	15.20	4.08%
7a	Adjacent Parcels Assessment 5-19	0.49	42,83	22.84	2.15%
8a	Adjacent Parcels Assessment 5-19	0.48	1	49.09	0.98%
9a	Adjacent Parcels Assessment 5-19	0.11	1	49.09	0.22%

(**from Figure 7)

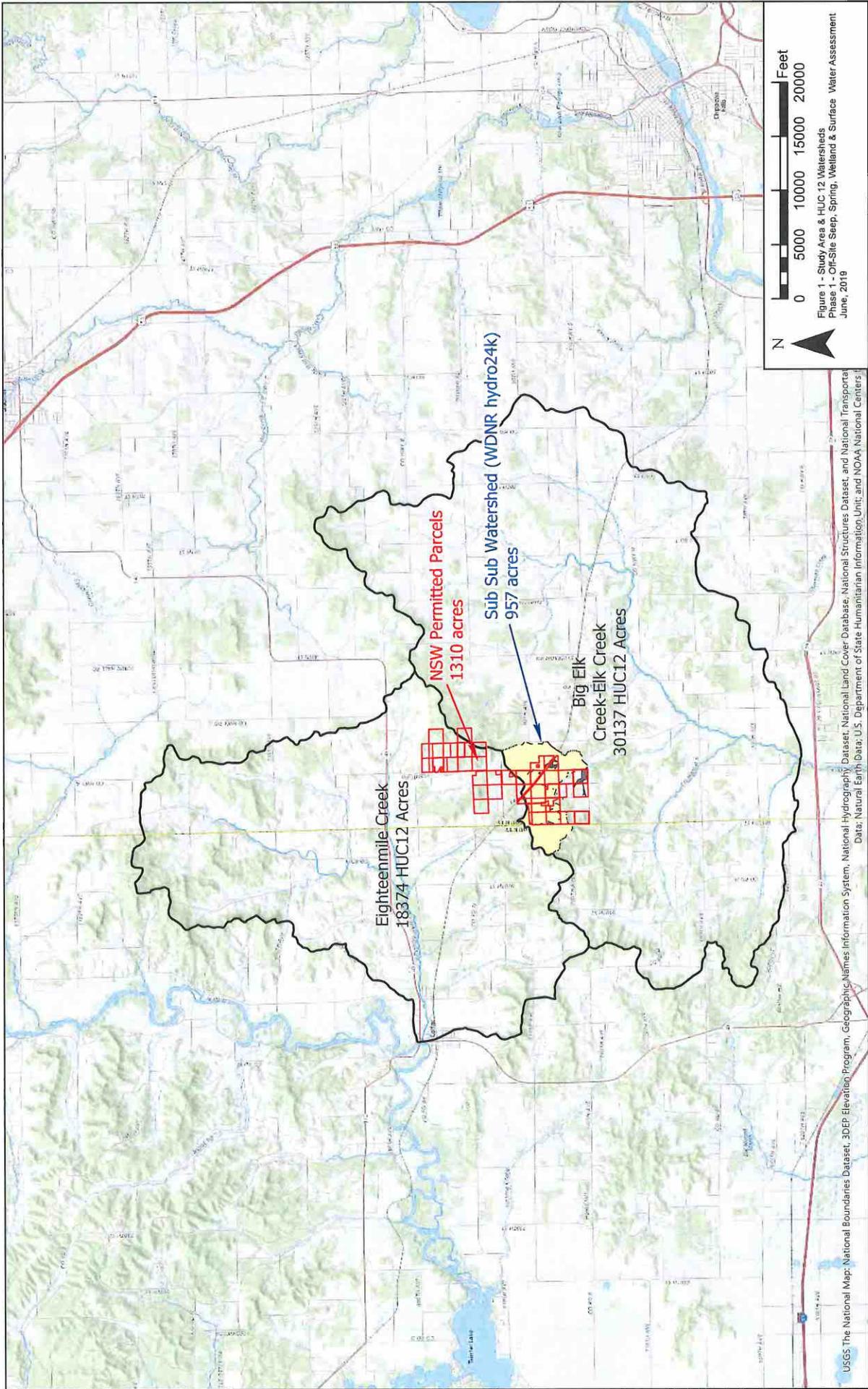
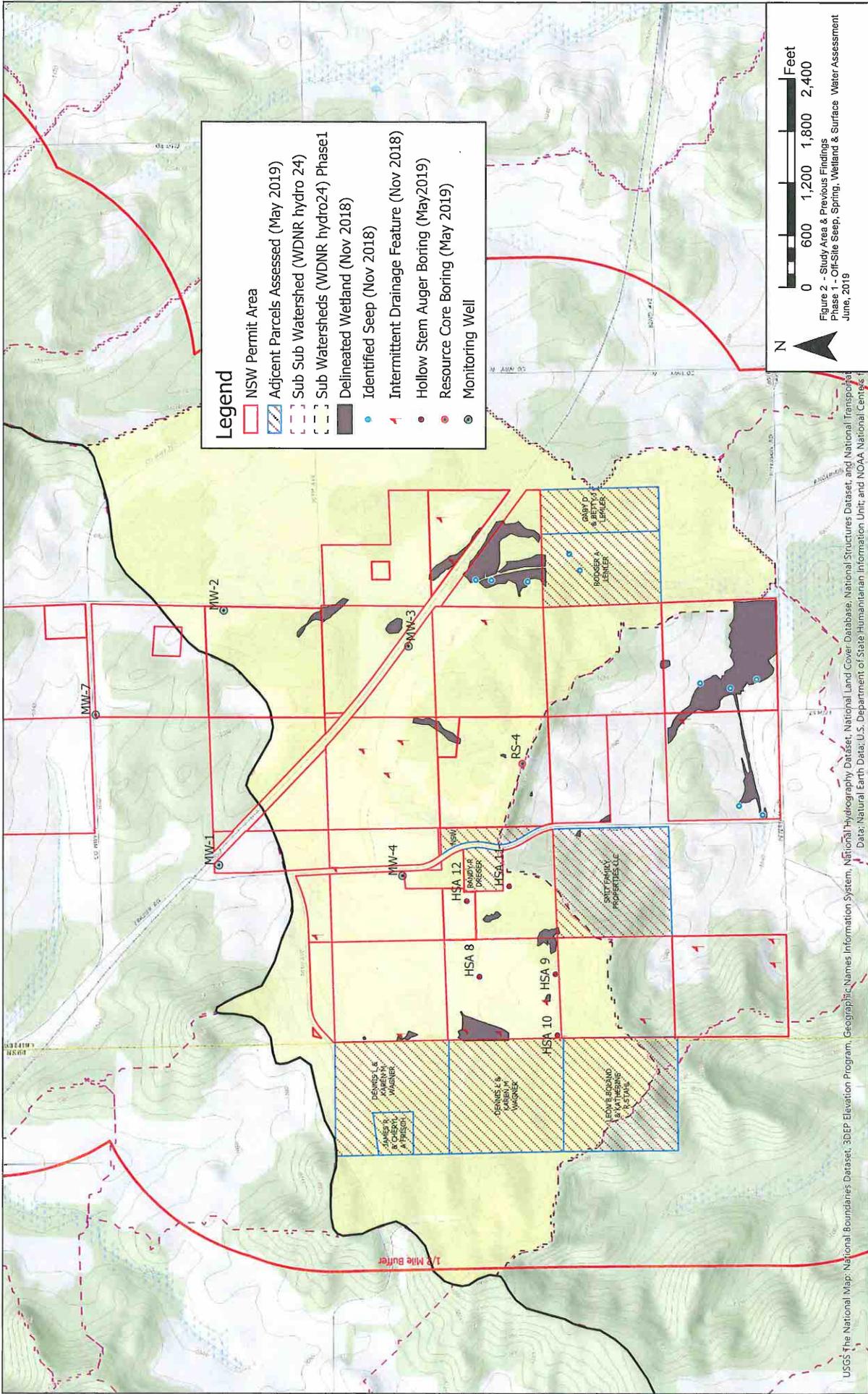
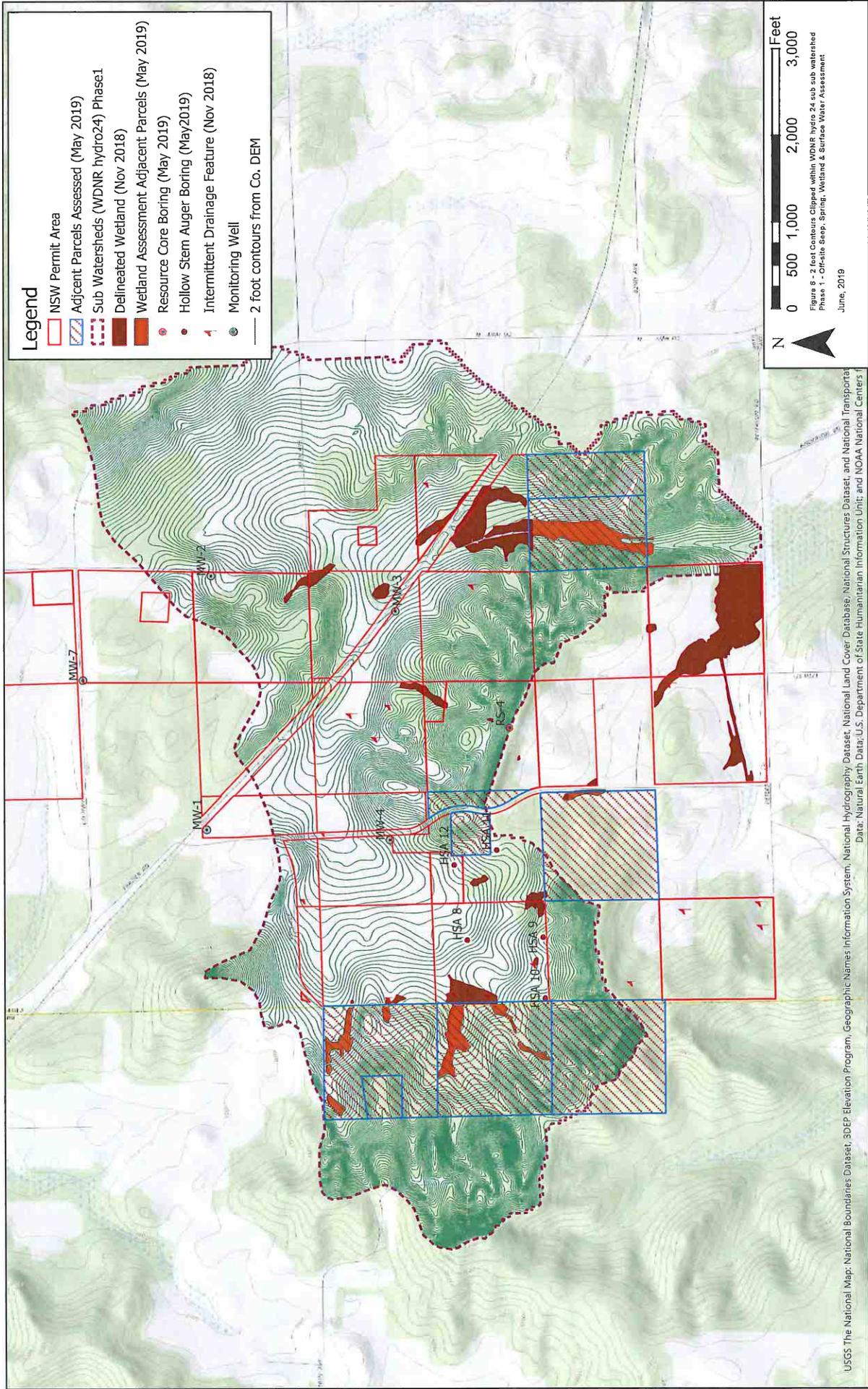


Figure 1 - Study Area & HUC 12 Watersheds
 Phase 1 - Off-Site Seep, Spring, Wetland & Surface Water Assessment
 June, 2019

USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information





Legend

- NSW Permit Area
- Adjacent Parcels Assessed (May 2019)
- Sub Watersheds (WDNR hydro24) Phase 1
- Delineated Wetland (Nov 2018)
- Wetland Assessment Adjacent Parcels (May 2019)
- Resource Core Boring (May 2019)
- Hollow Stem Auger Boring (May 2019)
- ▲ Intermittent Drainage Feature (Nov 2018)
- Monitoring Well
- 2 foot contours from Co. DEM

N

 0 500 1,000 2,000 3,000 Feet

Figure 6 - 2 foot Contours Clipped within WDNR hydro 24 sub watershed Phase 1 - Offsite Seep, Spring, Wetland & Surface Water Assessment June, 2019

USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Data, Natural Earth Data, U.S. Department of State Humanitarian Information Unit, and NOAA National Centers for

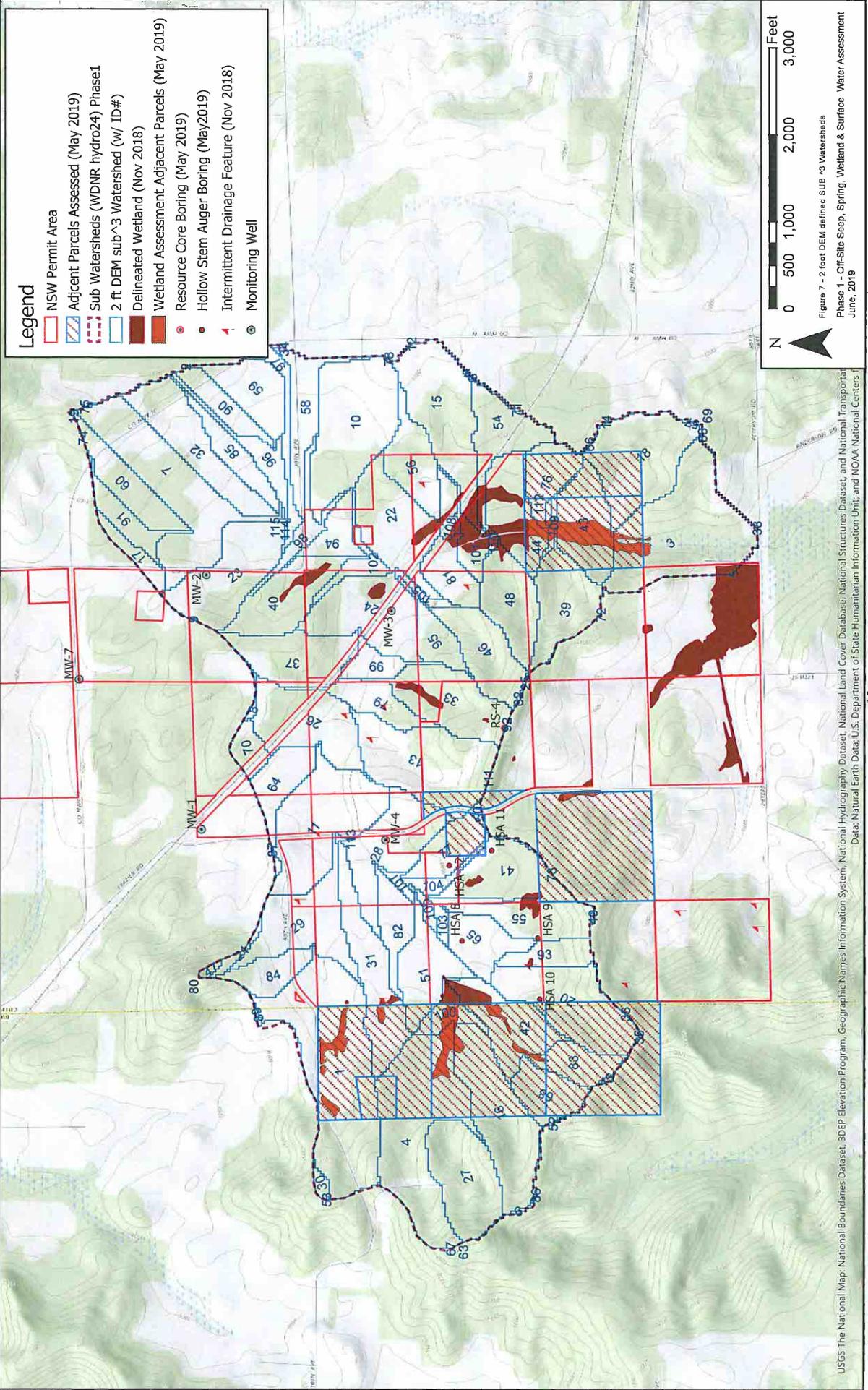
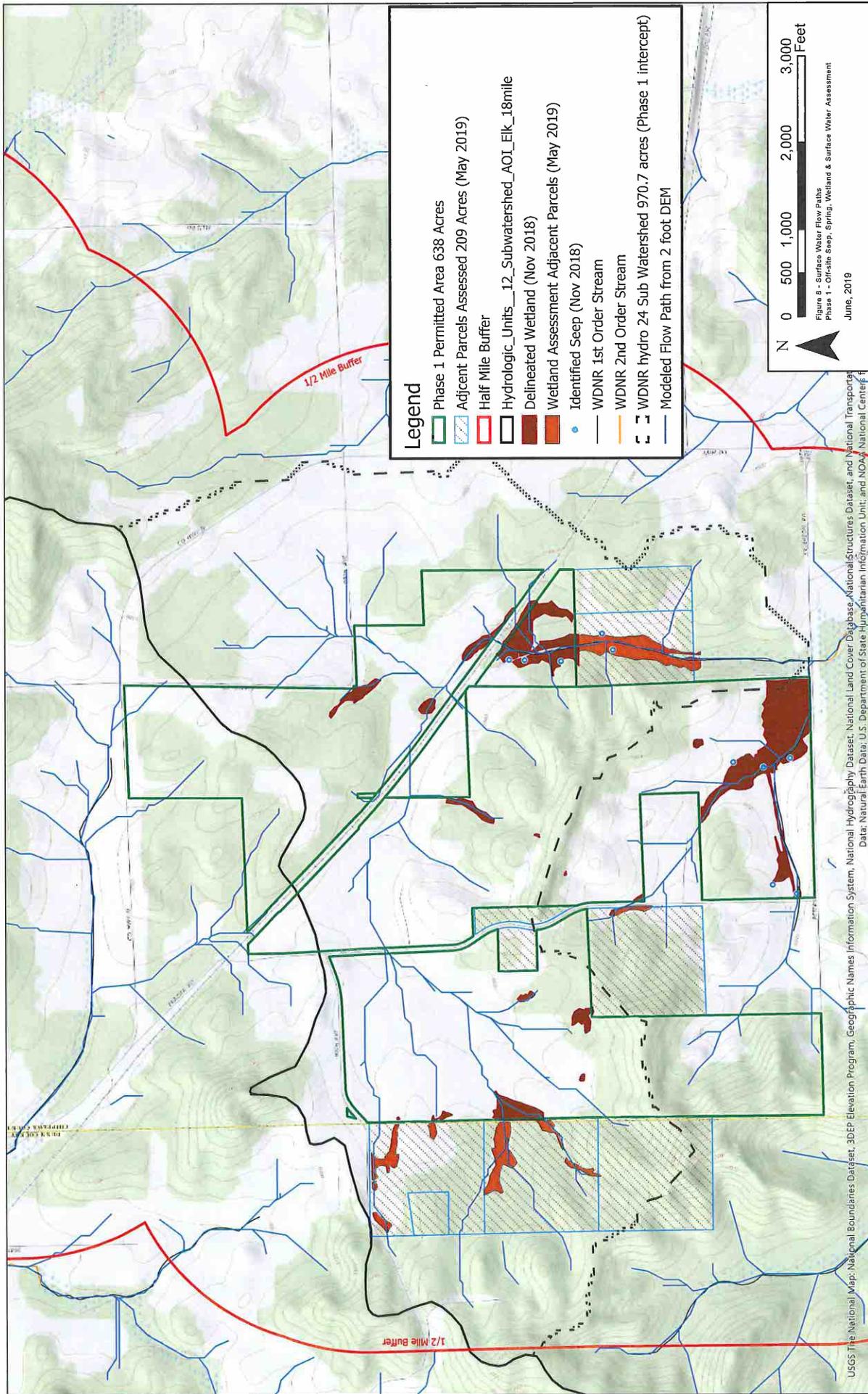


Figure 7 - 2 foot DEM defined sub^3 Watersheds
 Phase 1 - Off-Site Seep, Spring, Wetland & Surface Water Assessment
 June, 2019

USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Data, Natural Earth Data: U.S. Department of State Humanitarian Information Unit, and NOAA National Centers



USGS The National Map; National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Center for

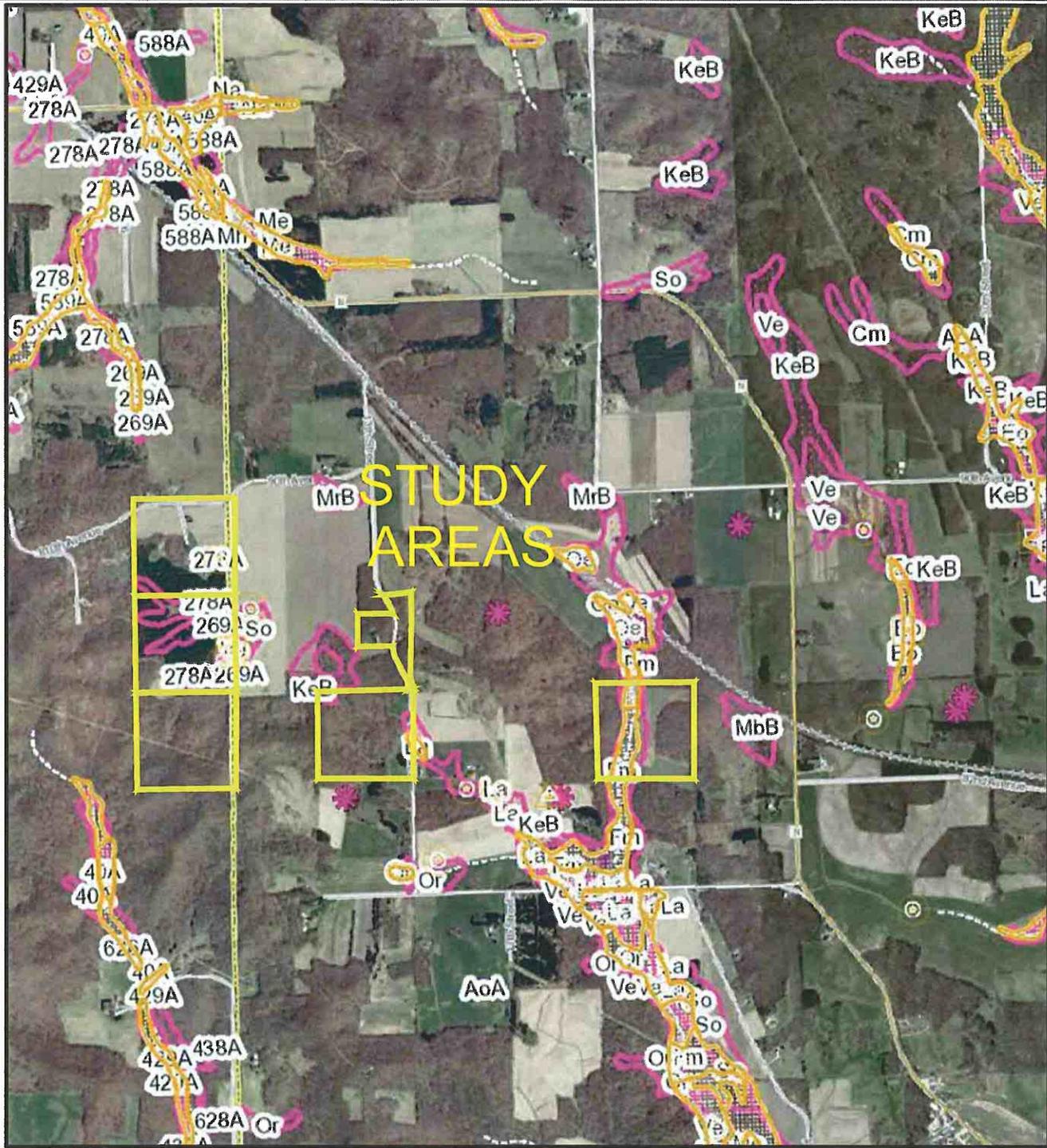


Figure 9: Wisconsin Wetland Inventory map of the Elk Creek and Eighteen Mile drainage basins. Note location of off-site properties being evaluated.



QUADRANGLE LOCATION

BASE MAP SOURCE: WISCONSIN WETLAND INVENTORY MAP

WISCONSIN WETLAND INVENTORY MAP NORTHERN SANDS MINE CHIPPEWA & DUNN COUNTY, WISCONSIN	APPROVED BY: AMK	THIS DRAWING AND ALL INFORMATION CONTAINED THEREON IS THE PROPERTY OF WETLANDS & WATERWAYS LLC, AND SHALL NOT BE COPIED OR USED EXCEPT FOR THE PURPOSE FOR WHICH IT IS FURNISHED.	PROJECT NUMBER: 525
	DRAWN BY: NLB		FIGURE NO.
DATE: 5-7-19	SCALE: NONE		

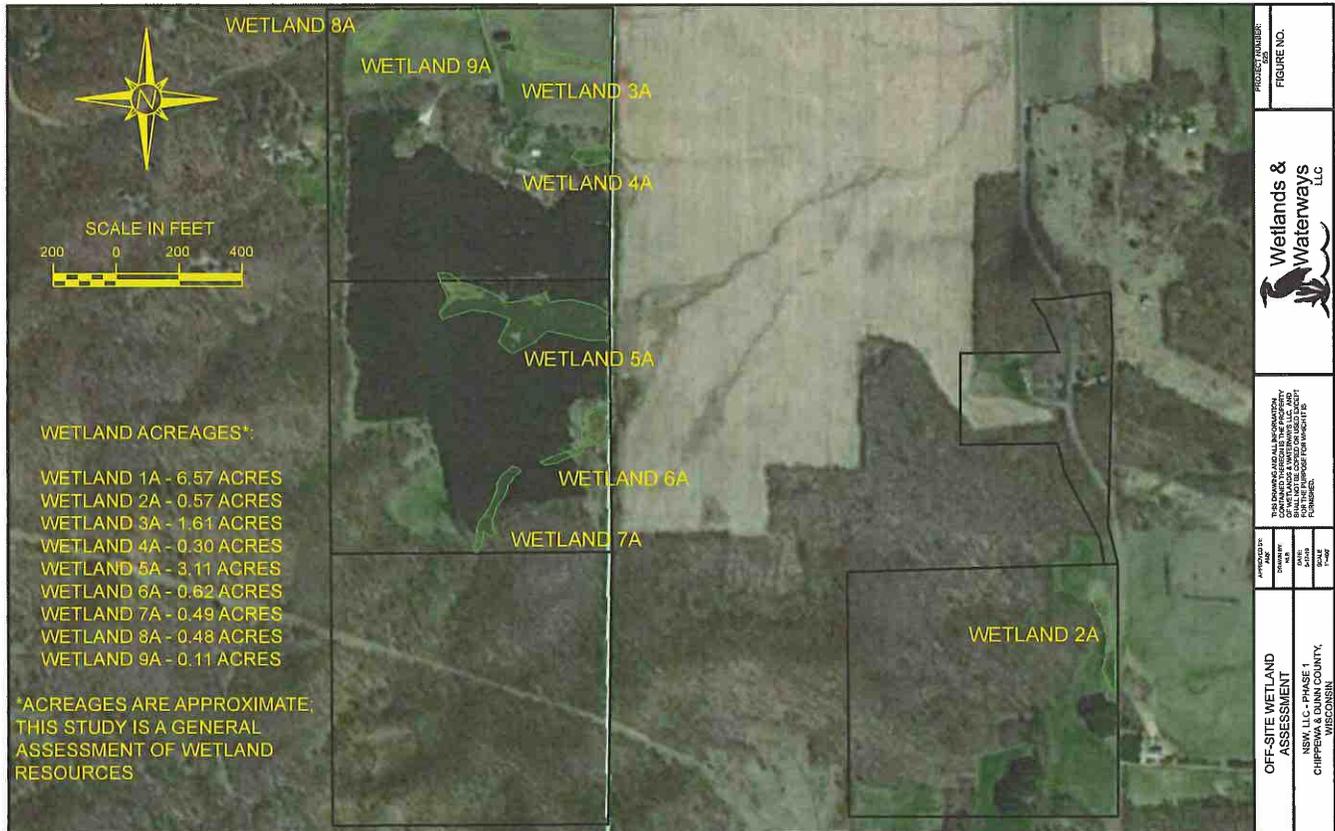


Figure 10: General assessment of wetland resources of properties adjacent to the Phase 1 project area. Compare with wetland areas within Phase 1, shown on Figure 1, and with the sub-sub-subbasin hydrology illustrated in Figure 8.

Appendix 1



SOIL BORING LOG: HSA-8

Project: Northern Sands Soil Sampling

Project No.: 951054

Location: Howard, Wisconsin

Drill Date: May 13, 2019

DEPTH/EL. (feet)	VISUAL SOIL CLASSIFICATION GROUND SURFACE ELEVATION:	SAMPLE NO.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	REMARKS
1 2 3 4 5	Blind drilled to 5 Feet						
6 7 8 9 10	Dark olive to brown SAND, with gravel, damp	1-SS	26			14	
11 12 13 14 15	Brown CLAY, with sand, moist	2-SS	31	1.25		16	
16 17 18 19 20	Brown SAND, trace small gravel and silty sand layers, damp	3-SS	56			8	
21 22 23 24 25		4-SS	21			4	
26 27 28 29 30	Light olive to greenish brown WEATHERED SANDSTONE, with silt, damp to moist	5-SS	33			10	
31 32 33 34 35		6-SS	18			11	▼
36 37 38 39 40	Brown WEATHERED SANDSTONE, trace silt, wet	7-SS	20			17	
41 42	END OF BORING @ 41.5± FEET	8-SS	21			18	
WATER LEVEL OBSERVATIONS: Water Level during drilling: 35.0± feet below ground surface (EL ±) ▼ Water Level upon completion: Not Encountered ▼ Caved at upon completion: 34.0± feet below ground surface (EL ±) Delay Time: N/A Water Level delayed: N/A Caved at delayed: N/A		ADDITIONAL COMMENTS:					

Note: Lines of stratification represent an approximate boundary between soil types. Variations may occur between sampling intervals and/or boring locations. Transitions may also be gradual.



SOIL BORING LOG: HSA-9

Project: Northern Sands Soil Sampling

Project No.: 951054

Location: Howard, Wisconsin

Drill Date: May 14, 2019

DEPTH/EL. (feet)	VISUAL SOIL CLASSIFICATION GROUND SURFACE ELEVATION:	SAMPLE NO.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	REMARKS
1 -1.0	Blind drilled to 5 Feet						
2 -2.0							
3 -3.0							
4 -4.0							
5 -5.0							
6 -6.0	Rusty brown to olive WEATHERED SANDSTONE, with silt, moist	1-SS	15			14	
7 -7.0							
8 -8.0							
9 -9.0							
10 -10.0							
11 -11.0	Tan WEATHERED SANDSTONE, intermixed thin clay seams, moist	2-SS	50/3"			8	
12 -12.0							▼
13 -13.0							
14 -14.0							
15 -15.0							
16 -16.0	Tan WEATHERED SANDSTONE, wet	3-SS	53			9	
17 -17.0							
18 -18.0							
19 -19.0							
20 -20.0							▼
21 -21.0	Tan WEATHERED SANDSTONE, trace silt, wet	4-SS	50/5"			15	
22 -22.0							
23 -23.0							
24 -24.0							
25 -25.0							
26 -26.0	END OF BORING @ 26.5± FEET	5-SS	502.5"			17	
27 -27.0							
28 -28.0							
29 -29.0							
30 -30.0							
31 -31.0							
32 -32.0							
33 -33.0							
34 -34.0							
35 -35.0							
FIELD OBSERVATIONS:		ADDITIONAL COMMENTS:					
Water Level during drilling: 20.0± feet below ground surface (EL ±) ▼ Water Level upon completion: 13.0± feet below ground surface (EL ±) ▼ Caved at upon completion: 18.0± feet below ground surface (EL ±) Delay Time: N/A Water Level delayed: N/A Caved at delayed: N/A		Possible perched water zones					

Note: Lines of stratification represent an approximate boundary between soil types. Variations may occur between sampling intervals and/or boring locations. Transitions may also be gradual.



SOIL BORING LOG: HSA-10

Project: Northern Sands Soil Sampling

Project No.: 951054

Location: Howard, Wisconsin

Drill Date: May 14, 2019

DEPTH/EL. (feet)	VISUAL SOIL CLASSIFICATION GROUND SURFACE ELEVATION:	SAMPLE NO.	N' (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	REMARKS
1	-1.0						
2	-2.0						
3	-3.0						
4	-4.0						
5	-5.0						Blind drilled to 5 feet
6	-6.0	1-SS	8	0.75		16	Brown CLAY, with sand, moist
7	-7.0						Brown SAND, moist
8	-8.0						
9	-9.0						
10	-10.0						White to tan WEATHERED SANDSTONE, moist to wet
11	-11.0	2-SS	21			17	
12	-12.0						
13	-13.0						
14	-14.0						
15	-15.0	3-SS	50/4.5"			14	
16	-16.0						END OF BORING @ 15.5± FEET
17	-17.0						
18	-18.0						
19	-19.0						
20	-20.0						
21	-21.0						
22	-22.0						
23	-23.0						
24	-24.0						
25	-25.0						

FIELD OBSERVATIONS:

Water Level during drilling: 10.0± feet below ground surface (EL ±) ▼

Water Level upon completion: 5.0± feet below ground surface (EL ±) ▼

Caved at upon completion: 9.0± feet below ground surface (EL ±)

Delay Time: N/A

Water Level delayed: N/A

Caved at delayed: N/A

ADDITIONAL COMMENTS:

Possible perched water zones

Note: Lines of stratification represent an approximate boundary between soil types. Variations may occur between sampling intervals and/or boring locations. Transitions may also be gradual.



SOIL BORING LOG: HSA-11

Project: Northern Sands Soil Sampling

Project No.: 951054

Location: Howard, Wisconsin

Drill Date: May 14, 2019

DEPTH/EL. (feet)	VISUAL SOIL CLASSIFICATION GROUND SURFACE ELEVATION:	SAMPLE NO.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	REMARKS
1 -1.0	Blind drilled to 5 Feet						
2 -2.0							
3 -3.0							
4 -4.0							
5 -5.0							
6 -6.0	Dark tannish brown SAND, damp	1-SS	29			8	
7 -7.0	Tan to orange WEATHERED SANDSTONE, with thin gray clay seams, damp						
8 -8.0							
9 -9.0							
10 -10.0							
11 -11.0		2-SS	50/4.5"			14	
12 -12.0	END OF BORING @ 11.5± FEET						
13 -13.0							
14 -14.0							
15 -15.0							

FIELD OBSERVATIONS:

Water Level during drilling: Not Encountered

Water Level upon completion: Not Encountered

Caved at upon completion: 9.0± feet below ground surface (EL ±)

Delay Time: N/A

Water Level delayed: N/A

Caved at delayed: N/A

ADDITIONAL COMMENTS:

Note: Lines of stratification represent an approximate boundary between soil types. Variations may occur between sampling intervals and/or boring locations. Transitions may also be gradual.



SOIL BORING LOG: HSA-12

Project: Northern Sands Soil Sampling

Project No.: 951054

Location: Howard, Wisconsin

Drill Date: May 14, 2019

DEPTH/EL. (feet)	VISUAL SOIL CLASSIFICATION GROUND SURFACE ELEVATION:	SAMPLE NO.	N (bpf)	Qp (tsf)	Qu (tsf)	MC (%)	REMARKS
1 -1.0	Blind drilled to 5 Feet						
2 -2.0							
3 -3.0							
4 -4.0							
5 -5.0							
6 -6.0		1-SS	23			12	▼
7 -7.0	Brown WEATHERED SANDSTONE, damp						
8 -8.0							
9 -9.0							
10 -10.0	White WEATHERED SANDSTONE, moist to wet						▼
		2-SS	50/5.5"			9	
11 -11.0	END OF BORING @ 10.5± FEET						
12 -12.0							
13 -13.0							
14 -14.0							
15 -15.0							
FIELD OBSERVATIONS: Water Level ^{during drilling} : 10.0± feet below ground surface (EL ±) ▼ Water Level ^{upon completion} : 5.5± feet below ground surface (EL ±) ▼ Caved at ^{upon completion} : 6.0± feet below ground surface (EL ±) Delay Time: N/A Water Level ^{delayed} : N/A Caved at ^{delayed} : N/A		ADDITIONAL COMMENTS:					

Note: Lines of stratification represent an approximate boundary between soil types. Variations may occur between sampling intervals and/or boring locations. Transitions may also be gradual.

Northern Sands Wisconsin, LLC
923 S Hastings Way #310
Eau Claire WI 54701
(651) 472-2468



September 13, 2019

Chippewa County
Land Conservation and Forest Management
711 North Bridge St.
Chippewa Falls, WI 74729-1876

Attn: Ethan J. Hau
Land Resource Technician

RE: Northern Sands Wisconsin LLC Permit #2015-1
Clarification Response to Chippewa Co LCFM letter August 7, 2019
Addendum to June 14, 2019 Follow-up Baseline Report

Dear Ethan:

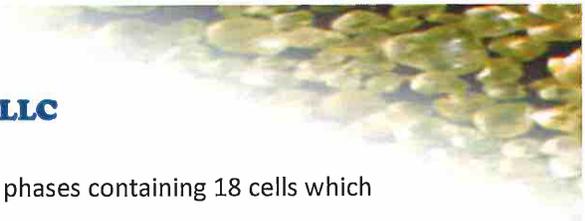
This letter provides information Chippewa County LCFM requested within its letter dated August 7, 2019 following their review of the Northern Sands Wisconsin LLC (NSW) June 14, 2019 follow-up baseline report.

Northern Sands Wisconsin LLC (NSW) acquired this development from Northern Sands LLC and transferred the Chippewa County permit on March 7, 2018. NSW is not using the "Albertville Valley Mine" name for any description or public identifier going forward.

The June 14, 2019 NSW submittal fulfilled some of the requirements as Chippewa County LCFM details in their letter dated August 7, 2019. These are:

- 1) Full hydrologic inventory of all Phase 1 adjacent properties
- 2) Phase 1 sub-watershed delineation discharging to Elk Creek watershed
- 3) General wetland assessment of Phase 1 neighboring parcels

NSW permitted site encompasses 1310 acres which extends to the property boundary of the parcels identified in the NR 135 application. This includes the required boundary setbacks, material processing and transload area, rail yard and excavation area (designated as cells). Areas to be mined are subdivided into cells. The cells to be excavated are combined into three mining phases. Each phase identifies specific cells to be staged in compliance with the contemporaneous reclamation approach promoted by



Northern Sands Wisconsin, LLC

County and State regulations. There are 465.6 acres within the three phases containing 18 cells which will be incrementally disturbed during the life of the mine.

Recent Geologic Exploration and Definition

NSW completed additional geologic drilling south of Phase I at the highest accessible surface elevation within the permit area. Lithology documentation and core samples were continuously recovered using sonic drilling methods. The recovered samples were then reviewed by Dr. Brian Mahoney, PG (Precision Geosolutions LLC) and a geologic description was developed.

Generally, the Wonewoc formation is present at or near the surface and extends to approximate elevation 1,000 feet above sea level (ft asl) where transition to the Eau Claire formation is encountered. Throughout the Wonewoc formation, isolated thin bedded glauconitic quartz arenite intercalated with minor clay laminae was encountered. These laminae are the result of changing sea levels during deposition. Surface drainage features are the predominate control for the localized wetland development and do not originate from any continuous subsurface feature or layer. This subsurface exploration corroborated the geologic description provided in the June 14, 2019 submittal.

Phase 1 – Cell 1a & Cell 1b General Layout

Phase 1 mine cell excavation match the permitted plan as presented with the 2015 NR 135 application. The anticipated mine floor is proposed 10 feet above the ground water table with a depth no greater than 1025 ft asl as required within Permit #2015-1. The ground water table elevation is monitored from the existing network of monitoring wells.

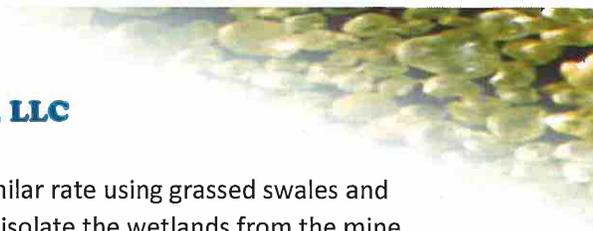
Mining activity and material excavation as presented within the NR 135 application is planned in this area and designated as Phase 1 which contains two smaller subdivision identified as cell 1A and cell 1B. The area to be excavated are shown within the NR135 application and the attached figures.

The mining area remains consistent at this time with the original NR135 application. There may be some slight adjustments to the cell layout as the wetlands were not delineated at the time of the original application.

Delineated wetlands location in proximity to the Phase 1 cell 1a & cell 1b are shown on Figure 1 & Figure 2. The mine cell 1a and 1b mining boundaries are consistent with the NR 135 permit application approved November 2015 and shown on Figure 1 and Figure 2. Wetlands delineated (November 2018) near the Phase 1 western boundary are generally assumed to be part of the wetland complex on the adjacent parcels assessed in May 2019. Wetland ID # 11 near 90th Ave. may be isolated and distinct from #3A(5-19) as this could be the exception.

Separation distances and surface elevation are highlighted on the figures. Contour elevations are also shown and were created from raster interpretation of the Chippewa Count Digital Elevation Model (DEM). Wetlands along the western permitted area discharge to the east toward 13th St. and the down gradient elevations are labeled along with the elevation of the Cell 1a and Cell 1b boundary closest to the wetland.

NSW will avoid disturbance of these wetlands and their discharge will be maintained at the current rate by maintaining the area and existing discharge elevation. The viability of these wetlands is principally dependent on land use of adjacent parcels west of the NSW permitted area. The area between the mine



Northern Sands Wisconsin, LLC

cells and the wetlands will be used to reroute surface runoff at a similar rate using grassed swales and berms. This will prevent runoff from impacting the mined area and isolate the wetlands from the mine impacts.

The NR135 applications states a minimum of 75 ft separation distance (buffer) from wetlands (section 2.1 Area and Setbacks p. 14). Wetland ID # 9 (7-18) delineation may cause the 1B cell western boundary to be adjusted to maintain the minimum 75 feet set back distance following review of the construction survey and staking.

Wetland #6A (5-19) has some area of surface water. This is likely the result of landowner disturbance and excavation to create a pond which may have occurred around 2010 based on historic aerial photos. The Wisconsin Department of Natural Resources (WDNR) surface water viewer does not recognize this as a surface water feature and NSW will consider this artificial surface water feature as part of the wetland.

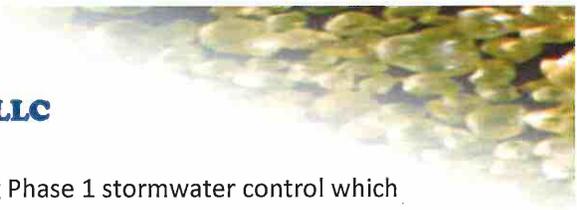
Wetland mitigation and permitting is regulated by the Wisconsin Department of Natural Resources (WDNR) and the US Corp of Engineers (provided wetland complex intersects federal waterways). Current permitted mine configuration within Phase 1 does not include the necessity to disturb or mitigate wetlands.

General Phase 1 Stormwater Controls

Considerable overland flow occurs during rainfall events and snow melt from the hills west of Phase 1 flowing easterly toward the culvert beneath 13th St. Over time, drainage ways have developed and enhanced with grassed swales to improve the ability to farm this acreage.

Runoff entering the permitted Phase 1 area will be diverted to avoid surface water from entering Cell 1a and Cell 1b excavations. Using vegetated swales and berms, off site runoff will be routed around the mine excavation. The existing topography will be enhanced to manage most of this runoff north toward 90th Ave and exit Phase 1 using a culvert under 13th St. Some storm water will be diverted and controlled similarly along the eastern boundary of Phase 1 and discharged to the culvert beneath 13th St. This is the current discharge point as the runoff continues toward Elk Creek. Existing flow paths are shown on Figure 1 and Figure 2. These flow paths were calculated using the Chippewa County DEM and the hydrology toolset within ArcGIS Pro. Some flow paths are isolated as the DEM was not corrected for topographic sinks.

This routing will avoid storm water retention within the excavation and be incorporated in the stormwater controls at the south end of the processing area prior to Elk Creek. The goal is to reduce total suspended solids (TSS) discharge and provide infiltration opportunities. The design of the stormwater management facilities will be developed in accordance with NR 151, Runoff Management, for peak discharge and protective area requirements (located a minimum of 50 ft from wetlands). Detailed modeling for TSS removal and infiltration will be completed and submitted to the WDNR in support of the required Wisconsin Pollutant Discharge Elimination system (WPDES) general permit application. This application will be submitted by a professional engineer and follow the development of detailed grading and construction drawings.



Northern Sands Wisconsin, LLC

Cooper Engineering has completed preliminary engineering regarding Phase 1 stormwater control which was included in the 2015 NR135 application. Their plan was incorporated into the mine cell sequencing that include infiltration ponds (Figure 11a NR135 application).

Phase 1 Wetland Preservation

Wetland disturbance and mitigation will be avoided as part of our Phase 1 mine plan. Preservation will be managed by isolating these identified wetlands from disturbance. During operations, flagging, fencing and signage will identify these protected features.

Wetland discharge will be managed and controlled by the preservation of the discharge elevation using a hydrologic control berm. Details will be incorporated into the engineered grading plan and provided to the WDNR as part of the storm water construction application.

NSW has utilized a conservative approach to isolating these wetlands. Setback distances between the area of disturbance and the delineated wetlands are beyond the requirements of the WDNR. NSW has employed the 75 feet (NR 151.125(1)(f) and 151.245(1)(f), Wis. Adm. Code) setback for "highly susceptible" classification even though the identified wetlands are degraded and/or artificial in geomorphology. Except for Wetland ID # 9 (7-18), Phase 1 western boundary wetlands are setback from the mine cells by a factor of 2 to 3 times the setback distance from WDNR classified "highly susceptible" wetlands. This is a conservative measure of protection even though these wetlands do not meet the requirement for "highly susceptible" classification.

Phase 1 mine cell development or excavation does not necessitate wetland mitigation or "taking".

NSW appreciates the opportunity to clarify these details as part of the baseline requirements of permit #2015-1.

Sincerely,

Northern Sands Wisconsin LLC



Tom Gapinske
President

Precision GeoSolutions LLC



Dr. J. Brian Mahoney, PG
Consultant

Cc: Susan Haake Town of Howard

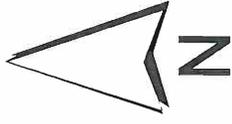
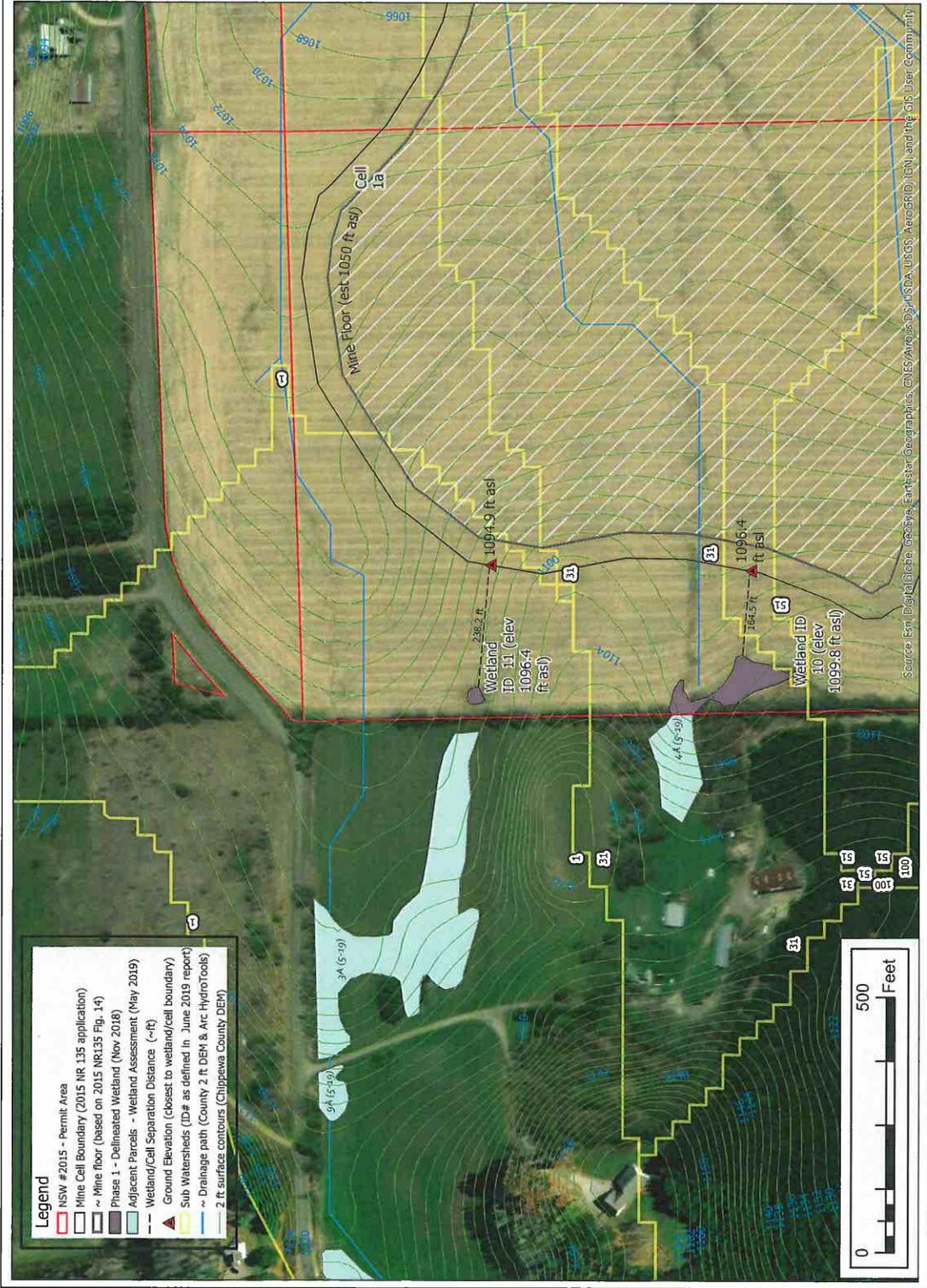


Figure 1

Phase 1
 Mine Cell 1a
 Wetland # 11&10
 Watershed # 1 & 31
 Chippewa County - Chapter 17
 Permit # 2015-1

Northern Sands Wisconsin LLC
 Chippewa County, WI
 Town of Howard
 September, 2019



Northern Sands Wisconsin, LLC
923 S Hastings Way #310
Eau Claire WI 54701
(651) 472-2468

September 19, 2019

Chippewa County
Land Conservation and Forest Management
711 North Bridge St.
Chippewa Falls, WI 54729-1876

Attn: Ethan J. Hau

Re: Northern Sands Wisconsin LLC
Chippewa County Permit #2015-1
Corrected/Revised Figure 2
September 18, 2019 Chippewa Co. LCFM letter

Dear Ethan:

Northern Sands Wisconsin LLC (NSW) is providing this updated Figure 2 (revised). Based on the September 18, 2019 Chippewa County LCFM letter, this update incorporates the wetland separation distances as required in Permit #2015-1. Figure 2 (revised) shows mine cell 1b modified to account for the 100-foot buffer from Wetland ID 9. This updated cell layout will provide the required 100-foot buffer.

Please contact me should you have questions or require additional information.

Sincerely,
Northern Sands Wisconsin LLC



Tom Gapinske
President

Cc: Susan Haake – Town of Howard

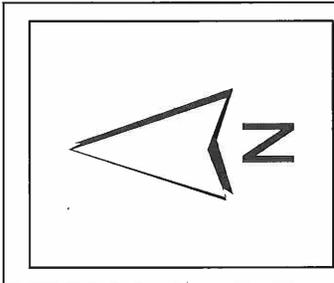
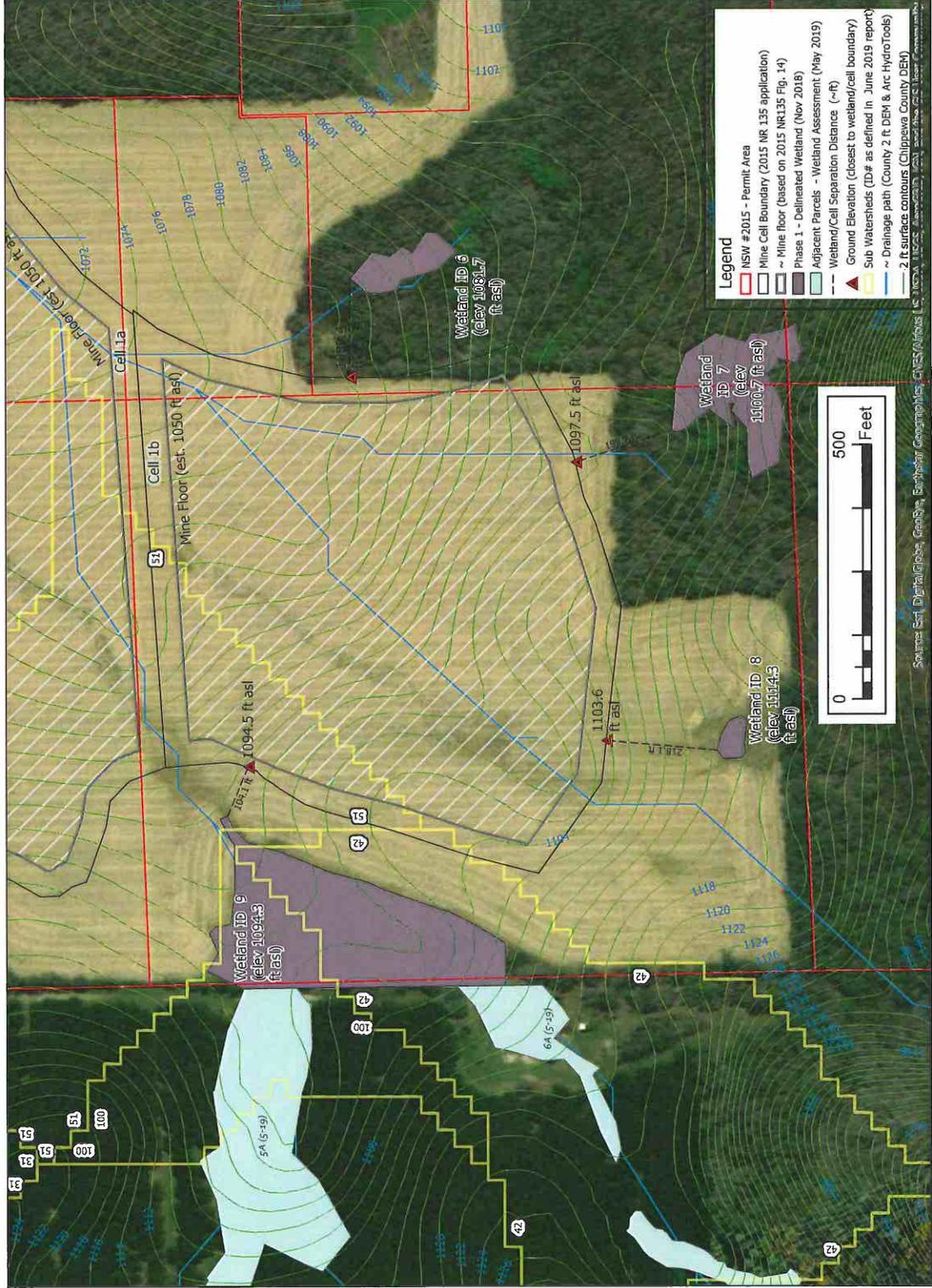
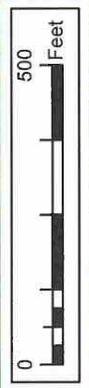


Figure 2 (revised)

Phase 1
 Mine Cell 1b (revised 9/19/19)
 Wetland # 6 - 9
 Watershed # 42, 51, 100
 Chippewa County - Chapter 17
 Permit #2015-1

Northern Sands Wisconsin LLC
 Chippewa County, WI
 Town of Howard
 September, 2019

- Legend**
- NSW #2015 - Permit Area
 - Mine Cell Boundary (2015 NR 135 application)
 - Mine Floor (based on 2015 NR135 Fig. 14)
 - Phase 1 - Delineated Wetland (Nov 2018)
 - Adjacent Parcels - Wetland Assessment (May 2019)
 - Wetland/Cell Separation Distance (~ft)
 - Ground Elevation (closest to wetland/cell boundary)
 - Sub Watersheds (ID# as defined in June 2019 report)
 - Drainage path (County 2 ft DEM & Arc HydroTools)
 - 2 ft surface contours (Chippewa County DEM)



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DCS, Swire, HeliBird, and the IGN, SIA, and Swire