Vegetation, Wildlife, and Protected Species Report

Merriam Junction Sands Mine
Scott County, Minnesota

Prepared for
Hunt Global Resources, Inc.

January 2012

BARR

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1.0 Introduction

Barr Engineering Company (Barr) prepared this report on vegetation, wildlife, and protected species in support of the environmental review of continued mining operations at the proposed Merriam Junction Sands Mine in Scott County, Minnesota. This report describes the results of field surveys to identify biological resources on the site.

Barr conducted the field surveys in accordance with a Natural Resources Survey Plan (Barr 2011a) submitted to the Minnesota Department of Natural Resources (MDNR) in June 2011. In an email response dated June 30, 2011, the MDNR requested that surveys include additional target species and communities for review and outlined specific requirements for field survey and reporting. Survey protocols follow those described in the survey plan and recommendations from the MDNR (Appendix A).

1.1 Project Description

The property encompasses approximately 954 acres within Louisville Township: T115N, R23W, Sec 16, 20-21, and 28-29, Scott County (Figure 1-1). Hunt Global Resources, Inc. is proposing to mine sandstone from the project area. The project will involve the continuation of the production of construction aggregates from the sand, gravel, and limestone deposits as well as mining silica sand associated with the Jordan Sandstone, which underlies the gravel and limestone deposits. The sandstone would be processed onsite to produce fracturing (or frac) sand for use in the development of natural gas and oil wells.

The proposed Merriam Junction Sands Mine project will occur in phases of development such that frac sand extraction will occur in some areas immediately after permitting authority is granted; whereas other portions of the site may not be developed for 10 or more years. Details on the phasing of this project will be described during the environmental review process.

During 2011, Barr conducted field surveys to identify and map land cover, vegetation, plant communities, and wildlife habitat; identify onsite wildlife; and survey for the presence of federally and state-listed threatened and endangered plant species. This report documents results of these surveys. Wetland delineations to determine the extent and location of wetlands on the site are described in separate documents (Barr 2011b; Svoboda Ecological Resources 2011).

1.2 Regulatory Framework

Endangered species regulations are designed to protect populations of threatened and endangered species ("protected species"). For projects that have a potential to adversely affect protected species, the project proposer must consult with appropriate state or federal agencies to demonstrate avoidance and minimization. If a project is likely to directly affect a protected species, a takings permit may be required.

Three federal laws provide protection of certain species and each is administered by the U.S. Fish and Wildlife Service for non-marine species. First, the Endangered Species Act (ESA) of 1973 (16 U.S.C. §1531) protects federally listed threatened or endangered species, which are designated under federal law (16 U.S.C. § 1532). Second, the Migratory Bird Treaty Act (MBTA) (16 U.S.C. §§ 703-711) is a treaty between the United States and other nations for the protection of birds that cross country borders during spring and fall migration. Third, the Bald and Golden Eagle Protection Act (16 U.S.C. §§ 668-668d) provides for the protection of eagles.

Another level of protection for certain species is administered by the MDNR. Minnesota's endangered species law (Minnesota Statutes, § 84.0895) and associated rules (Minnesota Rules, part 6212.1800 to 6212.2300 and 6134) protect plant and wildlife species designated as threatened or endangered.

2.0 Project Area Background

2.1 Site Description

The proposed project is located southeast of Gifford Lake and east of the Minnesota River. The western boundary roughly parallels the floodplain of the river, whichoccurs in alluvium deposits from the river. The elevation of the site rises steeply from the river floodplain to a river terrace on which the majority of the site occurs. Much of the southern portions have shallow depth to limestone bedrock overlain by fine-textured soils (mostly clay loam) with small areas of exposed bedrock in dry habitats, some of which are dominated by native prairie vegetation. Much of the property has been impacted by previous mining activities and development of horse training facilities and festival grounds.

2.2 Previous Survey Information

Many natural features are tracked by the MDNR in the Minnesota Natural Heritage Information System (NHIS). The NHIS has information on protected species as well as unlisted species, native plant communities, geological features, and other features that are uncommon in the state or have some importance for statewide conservation. The NHIS database was reviewed within approximately 1 mile of the Merriam Junction site (T115N; R23W; Sections 16, 20, 21, 28, and 29). Data from the NHIS indicates that several state-listed species may occur on or near the Merriam Junction site, including some species previously identified within the project boundaries. The letter from the MDNR summarizing the results of this database search and a list of rare features in the vicinity of the project is provided in Appendix B.

Native plant communities are mapped throughout the state by the Minnesota County Biological Survey (MCBS) and classified according to the Ecological Classification System (ECS). Each native plant community is assigned a unique code (e.g., FFs68a, MRn93a) under the ECS. The MCBS (2009a) assigns conservation status rankings to native plant communities to estimate the rarity and threat to each ECS community type (e.g., S1, S2, S3). These rankings are assigned to guide conservation and management of natural resources and do not confer any regulatory requirements. Within the project boundaries, there are two native plant communities with an S3 (vulnerable to extirpation within Minnesota) conservation ranking: Bulrush Marsh (Northern) (MRn93a) and Silver Maple – (Virginia Creeper) Floodplain Forest (FFs68a). Adjacent to the project site there are two mapped native plant communities, neither of which were mapped on the site: Dry Sand – Gravel Oak Savanna (Southern) (UPs14b) has a conservation ranking of S1S2 (critically imperiled to imperiled);

and Pin Oak – Bur Oak Woodland (FDs37b) has a conservation ranking of S3 (vulnerable to extirpation in Minnesota). The locations of these native plant communities are shown on MCBS map on Figure 2-1.

In addition, the MCBS (2009b) identifies and maps sites of biodiversity in the state and assigns ranking (e.g., outstanding, high) to these sites to estimate the statewide importance of the native biodiversity for each area. These rankings are also assigned to guide conservation and management of natural resources, but do not confer regulatory requirements. A Site of high biodiversity significance is adjacent to the southern project boundary but not located on the project site (Figure 2-1).

2.3 Land Use and Land Cover

Land use and land cover were mapped based on field surveys and aerial photo review of the Merriam Junction site. The existing cover at the sites includes the following cover types:

- Actively and previously mined quarries and rock processing facilities;
- Farmstead and commercial buildings;
- Minnesota Renaissance Festival and associated campground and facilities;
- Grasslands, shrublands, forests and woodlands; and
- Wetlands, most notably large wetlands associated with the Minnesota River.

Land cover definitions are generally based on Level 1 definitions for general growth patterns of the Minnesota Land Cover Classification System (MLCCS; MDNR 2004). Forest cover types have greater than or equal to 60 percent tree canopy, and woodland cover types have between 25 and 60 percent tree canopy. Where tree cover is less than 25 percent, and total vegetative cover is greater than 25 percent, areas are defined as shrubland or grassland, depending on the predominant plant growth form. Areas with less than 25 percent vegetation cover are shown as sparsely vegetated. Cover types were separated into broad categories consistent with Minnesota environmental review guidelines as specified in the Environmental Assessment Worksheet (EAW; Environmental Quality Board 2008). While land cover designations generally correspond to vegetation types and wildlife habitat discussed below in Sections 3 and 4, they are not identical because different criteria were used to describe vegetation and wildlife habitat.

Land cover types on the Merriam Junction site are shown on Figure 2-1 and summarized in Table 2-1. The most prevalent cover types are active mine areas, grasslands, and forests/woodlands.

Table 2-1 Land Cover on the Project Site

Cover Type	Acreage
Active Mine	170.2
Cropland	16.6
Farmstead	28.4
Forest	126.9
Grassland	193.8
Shrubland	95.9
Sparse	102.8
Water	27.8
Wetland	83.3
Woodland	108.0
Total	**953.5**

To the west and south of the project area, the land is largely undeveloped and includes the Gifford Lake portion of the Minnesota Valley State Recreation Area and the Louisville Swamp Unit of the Minnesota Valley National Wildlife Refuge. The north and east sides of the project area are bordered by more intensive land uses, including Highways 41 and 169, commercial and industrial facilities, and two landfills (a demolition debris landfill and a closed mixed solid waste landfill).

3.0 Plant Species and Communities

3.1 Methods

Methods for vegetation and plant surveys generally follow those described in the survey work plan (Barr 2011a). Based on its review of the work plan, the MDNR requested that additional plant communities and plant species be included in the survey as well as other minor modifications to the proposed survey methods (see Appendix A).

Walk over surveys were conducted on the proposed mine site to document plant communities and vegetation structure and composition, and to search for rare and protected plant species. Plant communities and land cover types were mapped and described. When native plant communities were identified, they were classified according to the ECS methods developed by the MDNR (2005). Native plant community searches specifically targeted prairie, wetland, and floodplain forest, which have previously been identified in this area.

Native plant community classification guidelines produced slightly different results from land cover mapping discussed above. Specifically, prairies can include communities with extensive prairie vegetation that has become dominated by shrubs and small trees. Plant communities were mapped in the field using Trimble® GPS with sub-meter accuracy and/or by digitizing aerial photograph signatures after ground-truthing. Vegetation maps were prepared using ArcMap® Version 10.0 GIS software.

Target species for rare plant surveys included federally and state-listed threatened, endangered, and special concern species as well as non-listed species that are tracked in the NHIS database and species proposed for state protection (MDNR 2007a, 2008, 2011). Prior to field studies, reviews were conducted of preferred habitats, plant associations, phenology, and key identifying characteristics of target species most likely to be in the area.

Particular emphasis was placed on species known from the vicinity of the project site based on information from the NHIS database (Appendix B), but surveys were not limited to only those species. No federally listed plant species are expected to occur on the project site. State-listed plant species previously documented in the vicinity of the project include:

- Wolf's spikerush (*Eleocharis wolfii*) – state endangered;
- Kitten-tails (*Besseya bullii*) – state threatened;

- Hill's thistle (*Cirsium hillii*) – state special concern;
- Sessile-flowered cress (*Rorrippa sessiliflora*) – state special concern;
- Water-hyssop (*Bacopa rotundifolia*) – state special concern; and
- Rough-seeded fameflower (*Talinum rugospermum*) – state endangered.

Field surveys used random-intuitive, qualitative search patterns to search the site for target species and to evaluate the site's potential for supporting target species. This type of search pattern is essentially a meandering traverse of the study area, focusing on the specific habitats and plant associations of the target species. The entire project site was surveyed with extra attention to habitats likely to support target species. A comprehensive list of all plant species observed was compiled.

When rare or protected plant species were located, they were documented using the following procedures:

- Sub-meter accurate GPS coordinates and standard quarter-quarter section legal descriptions were recorded;
- At least two digital photographs of each species were taken; and
- Habitat, associated species, population size, phenology, and other pertinent data were recorded.

The best times for accurate identification of rare and protected plants vary by species over the growing season. Therefore, site surveys were conducted throughout the summer and early fall. The majority of vegetation mapping work and initial rare plant species surveys occurred during the period of June 13-17, 2011. Subsequent surveys were conducted in mid-July (July 11, 12, 15, 19, and 22) and on September 13, 2011.

Surveys were completed by Daniel DeJoode, Ph.D. and Daniel Tix, Ph.D. of Barr. Both botanists have been approved by the MDNR for botanical surveys and have collection permits for obtaining plant specimens of state-listed species, although none were collected as part of this project.

3.2 Results

Summaries of vegetation, noteworthy plant species, and protected species observed on the project site are provided below. A list of plant species, including scientific names, identified on the project

site is provided in Appendix C. Select photographs of major plant communities and protected species are provided in Appendix D.

3.2.1 Vegetation and Plant Communities

Substantial portions of the project area have been disturbed and support non-native plant communities or highly degraded native plant communities. The location and extent of plant communities and vegetation are shown on Figures 3-1a and 3-1b. The areal extent of the various plant communities are provided in Table 3-1. The most common vegetation types are sparsely vegetated previously mined areas and improved grasslands.

Table 3-1 Plant Communities on the Project Site

Vegetation Type	Acres
Native Plant Communities (ECS Code)	
Dry prairie (UPs13b)	59.8
Dry prairie/altered (UPs13b)	3.8
Floodplain forest (FFs68)	1.7
Marsh (MRn93a)	46.7
Oak woodland (FDs37)	50.2
Oak woodland/altered (FDs37)	43.0
Shrub carr (WMs83)	14.4
Wet Meadow (WMs83)	3.8
Total native plant community acreage	*223.4*
Other Plant Communities	
Cropland	16.6
Grassland	220.2
Lake	27.8
Marsh	6.9
Saplings/shrubs	60.8
Seasonally flooded basin	0.2
Second growth forest	117.6
Shrub carr	3.5
Sparse	271.3
Wet forest	1.8
Wet meadow	2.1
Wet swale	1.6
Total other plant community acreage	*730.1*
Total Site Acreage	**953.5**

3.2.1.1 Native Plant Communities

Vegetation was designated as a native plant community when sufficient native species were present to allow classification based on the ECS communities (MDNR 2005). Frequently, these communities had a significant representation of non-native, exotic, or invasive species, but could still be classified as native plant community. Native plant communities are indicated on Figures 3-1a and 3-1b by inclusion of their ECS codes (e.g., UPs13b) and are described below.

Dry Prairie (UPs13b)

About 59.8 acres of Dry Sand-Gravel Prairie (Southern) (UPs13b) communities were mapped in the southern portion of the site; this community type has a conservation rank S2 (imperiled) (MCBS 2009a). One map unit is in the southwestern parcel and one in the southeast. The prairies occur in very well-drained clay loam soils over shallow bedrock. The landscape is gently undulating, with shallow knobs containing rock exposures and thin soil. It is presumed that these areas were never cultivated for agricultural crops but may have been managed for pasture or hay.

Each of the dry prairies is degraded and somewhat variable within each map unit. There are some shallow soil, droughty knobs and ridges dominated by native prairie species among dense patches of shrubs and scattered trees. The majority of the map units are dominated by shrubs and are considered a shrubland in the land cover and wildlife habitat sections

The condition of the native prairie communities were ranked according to the MCBS Upland Prairie System – Condition Ranking System (MDNR 2007b). These condition rankings provide an estimate of the presumed human-caused degradation from “A” (highest quality) to “D” (lowest quality). An “A-ranked” prairie is free of non-native species with a high diversity of native plants, including many species that are considered to be sensitive to cattle grazing, mowing, fertilizer, and other forms of disturbance. “D-ranked” prairies have enough native species to be recognizable as a particular native plant community, but typically have a predominance of non-native plant species and a low diversity native species, including few sensitive species. The prairie map units on the Merriam Junction site are considered D-ranked (poor condition) primarily because of the heavy invasion of woody plants (e.g., smooth sumac, red cedar, and prickly ash).

Dominant native grass species include big bluestem and Indian grass in a few of the openings on mesic soils. Many of the mesic soils support dominant non-native grasses, including smooth brome and Kentucky bluegrass with lesser amounts of quack grass and timothy. Drier soils typically support native grass species such side-oats grama and little bluestem. Grazing-sensitive species are present but uncommon, including purple prairie clover, false boneset, and dropseed. Other common native

species include bracted sedge, blue vervain, awl aster, field goldenrod, bird's foot violet, and wolfberry.

The western map unit is adjacent to the Dry Sand-Gravel Savanna (Southern) (UPs23b) community mapped on the Minnesota Valley National Wildlife Refuge located south of the site and is separated by a strip of trees and shrubs. This map unit is only about 11.0 acres and is in a gently undulating land surface with subtle variation in soil moisture. Kitten-tails (State threatened plant species) are present in scattered patches within this prairie unit, isolated within the openings of dense patches of prickly ash. This map unit is adjacent to a large area that was previously mined to the north and west.

The eastern map unit is the southern extent of what was once considered the "Shakopee Prairie" based on previous NHIS records shown to the north. This unit is about 47.5 acres and is characterized by several small rock exposures on top of small knobs. The knobs with shallow soil support short-grass prairie species such as plains muhly, hairy grama, and grooved yellow flax. The lower areas include some patches of native prairie species but many of the areas are predominantly smooth brome, with extensive patches of poison ivy and prickly ash.

One small area, about 1.4 acres, of altered/degraded dry prairie occurs on a rocky substrate without native soil excavated during previous mining activities. This area is about 3.8 acres in size and is shown as dry prairie/altered on Figure 3-1a. Species richness and cover is lower in this area of altered substrate compared to dry prairie discussed above, but the community is dominated by native prairie grasses and forbs rather than ruderal and exotic species.

Oak Woodland (FDs37)

Southern Dry-Mesic Oak (Maple) Woodland (FDs37) is generally found in the project area on steep uplands above the Minnesota River floodplain; this community type has a conservation rank S3 (vulnerable to extirpation) or S4 (apparently secure) (MCBS 2009a). About 50.2 acres of oak woodland occur on the site. The predominant canopy species is bur oak but northern pin oak and red oak are also present. Many oaks appear to be open-grown and have diameters at breast height of 18 to 24 inches. Typical smaller canopy and subcanopy trees include cottonwood, American elm, green ash, and occasionally hackberry, basswood, and hop hornbeam. The shrub and sapling layer is generally multi-layered with dense growth of smooth sumac, prickly ash and the invasive non-native species common buckthorn.. Under the densest shrub cover, herbaceous understory is sparse, but more open areas have native forbs and graminoids, including hog peanut, sweet cicely, wild ginger, Canada mayflower, lopseed, wild sarsaparilla, Pennsylvania sedge, large-leaf aster, and large-

flowered bellwort. Herbaceous non-native species indicative of ecological degradation are common and include Kentucky bluegrass, red fescue, dandelion, and clover.

This plant community is considered to be fire-dependent woodland that historically would have experienced regular ground fires and occasional catastrophic fires. The dense shrub and sapling growth and thick forest canopy of sub-dominant trees indicates that fire has been excluded from these woodlands for decades.

Two areas of oak woodland are shown on Figures 3-1a and 3-1b as "altered." These are communities with dominant oak canopies of varying density from which many canopy trees and understory plants have been removed. The groundcover has largely been replaced by planted grasses. This community type includes the grounds of the Renaissance Festival and associated campground. The presence of a bur oak in the canopy and proximity to less altered stands, allows recognition of this community as oak woodland, albeit significantly altered.

Floodplain Forest (FFs68a)

A small area (4.1 acres) of Silver Maple – (Virginia creeper) Floodplain forest community (FFs68a) was mapped on the site in the western portion associated with the Minnesota River; this community type has a conservation rank S3 (vulnerable to extirpation) (MCBS 2009a). Much of the area was flooded, or had recently been flooded, at the time of the site visits in June and July. Therefore, the herbaceous layer in the community was essentially absent. Furthermore, the majority of the floodplain forest community occurs offsite to the west on the state recreation area land. Also, a narrow strip of this community occurs along the eastern fringe of Gifford Lake, though this was mapped as part of the lake community. There are few areas within the project boundaries that are fully characteristic of floodplain forest communities.

The forest canopy along the western boundary of the site is predominantly box elder, American elm, and green ash, but this grades into dominant large silver maples in the lower areas. River grape and Virginia creeper are common in these floodplain areas and the herbaceous layer, where present, is predominantly wood nettle.

Wet Meadow/Shrub Carr (WMs83)

A large wetland complex in the southern portion of the site includes about 3.8 acres of wet meadow and about 14.4 acres of shrub carr adjacent to floodplain wetland. The ECS community type is Southern Seepage Meadow/Carr (WMs83), which has a conservation rank S3 (vulnerable to extirpation) or S4 (apparently secure) (MCBS 2009a). The southern end of this wetland is higher in

elevation than the portions connected to the Minnesota River and is above the elevation of typical floodwaters from the river. Much of this southern end of the wetland is native-dominated sedge meadow or shrub-carr with hydrology supplied via groundwater seepage from the base of the adjacent slopes.

This wetland supports a large number of native wetland species, including tussock sedge, lake sedge, water sedge, prairie sedge, porcupine sedge, inland sedge, wire sedge, wooly sedge, bluejoint, cattails, American sweet flag, blue iris, spotted touch-me-not, marsh fern, marsh marigold, swamp milkweed, bugleweed, Joe-Pye-weed, and boneset. Native shrubs include pussy willow, Bebb's willow, sage willow, meadow willow, bog birch, and false indigo. Invasive species are limited in this wetland, with localized areas of common reed and scattered individuals of purple loosestrife. Many of the common graminoid and forb species occur throughout the wetland complex, but the varied shrub cover allows distinction of wet meadow and shrub carr portions.

Bulrush Marsh (MRn93a)

A large marsh (53.5 acres) is located on the Minnesota River floodplain near the center of the project area. The ECS community type is Northern Bulrush-Marsh (MRn93), which has a conservation rank S3 (vulnerable to extirpation) (MCBS 2009a). This wetland is subject to periodic flooding during high river flow. Dominant species include river bulrush and cattails, with substantial stands of common reed. A narrow stream channel passes through this marsh area and conveys water when this community is not flooded.

3.2.1.2 Other Plant Communities

Most of the project area, about 727.9 acres or 76 percent, was primarily vegetated by introduced species, either through deliberate management or indirectly as a result of previous agricultural and mining activities and other land disturbances. The following areas are classified by primary vegetative components, most of which are non-native species, though some native species are present in each area as minor components.

Grassland

A large portion of the project site (220.2 acres) contains improved grasslands, some of which are used for forage crop production. Other areas of introduced grasses have likely been established for ground cover after soil disturbance or have colonized disturbed areas. Typical grass species observed include smooth brome, Kentucky bluegrass, quack grass, red fescue, timothy, bentgrass, and reed canarygrass. Forbs associated with these communities include clovers, ragweeds, goldenrods, thistles, burdock, daisy fleabane, campion, and sweetclover.

Second Growth Forest

Approximately 115.2 acres of second growth hardwood forest occur on the project site. These forests appear to have established as early successional forests following land disturbance or as a result of fire exclusion from historic prairie and savanna. Eastern cottonwood trees are frequently present in the forest canopy or emergent above the main canopy. Other typical trees include box-elder and American elm; less common species include Siberian elm, chokecherry, and quaking aspen. Shrub growth is extremely dense in places, and is often comprised of common buckthorn, prickly ash, smooth sumac, and occasionally non-native honeysuckles. An understory of native species is generally lacking and many non-native grasses and forbs occur in these second growth forests.

Saplings/Shrubs

Sapling/shrub communities comprise about 60.8 acres of the site. These communities represent an intermediate successional stage after soil disturbance and before development of a mature second growth forest. These areas are dominated by non-native grasses and forbs, as well as saplings and shrubs. In more open locations, typically with rocky or sandy dry soil, red cedar is also common.

Sparsely Vegetated Lands

A large portion of the project site (about 271.2 acres) has little or no vegetative cover, either as a result of recent soil disturbance or from current and past mining activities. Previously mined areas have little or no soil, and the ground surface consists of gravel and rock. What little vegetation is present consists of ruderal and early successional grasses and forbs with occasional shrub and tree saplings. Localized depressional areas occur that temporarily pond water after precipitation events.

Wetlands

A total of about 83.6 acres of wetlands (not including Gifford Lake) occur on the project site and some have developed in areas of previous mining, soil disturbance, or mine ponds. These wetlands include wet forests, shrub carr, wet meadow, marsh, and seasonally flooded basins, dominated by ruderal and early successional species. Typical trees in wet forests include box elder and American elm. Shrub carr wetlands include box elder and elm saplings and willows, particularly sandbar willow. Herbaceous species include reed canarygrass, spike rushes, bulrushes, and tall scouring rush. Additional information on wetlands identified on the site is provided in separate wetland delineation reports (Barr 2011b, Svoboda Ecological Resources 2011).

3.2.2 Rare, Threatened, and Endangered Species

One state threatened plant species was found within the project area, kitten-tails (*Besseya bullii*, state threatened). The species was found in the southwest part of the project area (Figure 3-2). Portions of

this parcel have been excavated for mining in the past, but the kitten-tails were found in an area with no evidence of past soil disturbance. The plants were found in degraded dry prairie located near the savanna on the Minnesota Valley National Wildlife Refuge just to the south. The plants were found in June 2011, after flowering, in several scattered patches spread across an area approximately 1,000 feet long by approximately 400 feet wide. The total population size was greater than 1,000 plants, of which approximately 1/3 of plants had inflorescences, and the remaining 2/3 of the population occurred as basal rosettes of vegetative individuals. No specimens of kitten-tails were collected. Numerous digital photographs were taken of the plants to document species identity, thus avoiding the need for a specimen collection (Appendix D).

The kitten-tails occurs in dry prairie remnants (UPs13b), of which large portions are dominated by non-prairie grasses such as Kentucky bluegrass or smooth brome or overgrown by shrubs including smooth sumac and prickly ash. Shrub cover above kitten tails ranges from less than 10 percent to 100 percent, and individual shrubs are relatively low (often less than 3 feet high). Where shrub and sapling cover create dense shade from a multi-layer canopy, no kitten-tails were found. A datasheet for the observed population of kitten-tails has been filled out and submitted via email to the NHIS data coordinator, for inclusion in the next NHIS database update. A copy of the completed form is included in Appendix E.

No other protected or tracked plant species were found. No rock outcrops were located, defined as ROs12 by the MDNR (2005). Shallow rocky soils were observed at several locations in prairie remnants but lacked rock outcrop specialist species. No individuals of Hill's thistle (*Cirsium hillii* – state Special Concern) were found during the field surveys. Hill's thistle was documented previously (1972) within the project boundary, in an area that is now part of an active mine.

4.0 Wildlife and Habitat

4.1 Methods

The purpose of the wildlife surveys was to identify any wildlife species using the site and to assess wildlife habitats present on the project site. Methods for the wildlife surveys follow those described in the survey work plan (Barr 2011a).

Onsite surveys were conducted to map and document wildlife habitat, drawing on results of wetland and vegetation studies. Review of the NHIS database indicates several federally and state-listed wildlife species known from the project vicinity (Appendix B). One state-listed fish and several and federally and state-listed mussels are known from the nearby Minnesota River. Because the proposed mine project is not anticipated to adversely affect the river ecosystem, fish or mussel surveys were not conducted.

There are historical records of two state-listed Special Concern birds (bald eagle and cerulean warbler) and one state-listed Special Concern butterfly (regal fritillary) within a 1-mile-radius of the project site. Because these species have not been found on the project site and the majority of the site has been disturbed by past and present mining activities, no species-specific field surveys were performed; however, potential habitat for these species was assessed. In addition, general wildlife use of the project area, and onsite wildlife habitats, were documented by walk over surveys and literature review.

One record of a bat colony was identified in the NHIS database near the western property boundary along Gifford Lake. The little brown myotis (*Myotis lucifugus*) and the big brown bat (*Eptesicus fuscus*) are both proposed to be listed as species of special concern in Minnesota. Field surveys for bats were not specifically conducted, but general habitat conditions on the project site were assessed for these species.

Field surveys focused primarily on identifying these species onsite and/or evaluating the potential of onsite presence based on the availability of suitable habitat. For those species with the potential to occur within or near the project area, searches of the scientific literature were conducted to determine specific habitat requirements for each species.

All species positively identified onsite were noted and organized according to the habitat in which they were identified. Exact counts per species were not attempted, but generalities on overall species abundance were noted.

Wildlife habitats were assessed and mapped during field surveys. The classification of wildlife habitat types is based on vegetative community composition and physical structure to reflect wildlife ecology and functional usage of habitat. This classification sometimes differed from land cover and vegetation classification presented in Sections 2.0 and 3.0. Specifically, areas mapped as a dry prairie native plant communities are considered shrubland because of the predominance of shrubs.

Wildlife surveys were conducted on four dates: June 17, August 3, August 11, and September 9, 2011.

4.2 Results

A list of wildlife species observed onsite is presented in Appendix F with general frequency of observation and the type of habitats in which they were encountered.

4.2.1 General Wildlife

Many species of wildlife considered common and at low conservation risk were observed onsite. A total of forty species of birds, seven mammals, and nine reptiles and amphibians were identified. Birds commonly observed within the study area include wild turkey, American goldfinch, barn swallow, black-capped chickadee, chipping sparrow, mourning dove, and cedar waxwing. Mammal tracks and scat commonly found onsite, including in active mine areas, were that of deer, coyote, and raccoon. Northern leopard frogs were abundant and found in nearly every habitat type.

4.2.2 Threatened and Endangered Species

No state or federally-listed threatened or endangered wildlife species were found on the site.

4.2.3 Other Wildlife Species of Concern

Three species that are tracked by the MDNR in the NHIS database were documented on or near the site.

4.2.3.1 Bald Eagle (Special Concern)

One adult and three juvenile bald eagles were observed within floodplain forest along the eastern edge of Gifford Lake. These birds were observed congregating within a large tree located directly over the lake shore. No nest was observed in the vicinity. Figure 4-1 shows location of this

observation point. NHIS records indicate an active bald eagle nest approximately 1 mile west of the project.

4.2.3.2 Eastern Milk Snake (Tracked)

One eastern milk snake was observed onsite in the woodland in the northern part of the southwestern parcel. The species is typically found in grasslands, woodlands, and farmlands. Thus, potentially suitable habitat may be present throughout much of the site. Milk snakes are tracked by the MDNR in the NHIS, but are not protected species. A datasheet for the observed milk snake has been filled out and submitted via email to the NHIS data coordinator, for inclusion in the next NHIS database update. A copy of the completed form is included in Appendix E. The nearest documented observation of milk snakes in the NHIS is approximately 4 miles from the project.

4.2.3.3 Snapping Turtle (Special Concern; Proposed for Delisting)

Currently, the snapping turtle is listed as a special concern species in Minnesota, but it is proposed for delisting. One adult female snapping turtle was observed excavating a potential nest site within the sandy substrate of a field road. This location is shown on Figure 4-1, and photographic evidence is included in Appendix G. For inclusion in the next NHIS database, a datasheet for snapping turtle has been filled out and submitted via email to the NHIS data coordinator. A copy of the completed form is included in Appendix E.

4.2.3.4 Lark Sparrow (Proposed: Special Concern)

The lark sparrow is currently proposed for listing as Special Concern in Minnesota. Several lark sparrows were observed on two survey dates in the areas that have been previously mined in the southwestern portion of the project site. This area is shown on Figure 4-1, and photographic evidence is provided in Appendix G. For inclusion in the next NHIS database update, a datasheet for lark sparrow has been filled out and submitted via email to the NHIS data coordinator. A copy of the completed form is included in Appendix E.

4.2.4 Wildlife Assemblages

4.2.4.1 Bank Swallow Colonies

Two colonies of bank swallows were identified within the project area. Both colonies consist of hundreds of nesting pairs occupying the slopes of sand stockpiles located within a previously mined area. The nests were active during the June, July, and August site visits, but by the last site visit on September 9, 2011, swallows were no longer present and the nests had presumably been vacated

Bank swallows are not federally or state-listed species; however, they are protected under the federal Migratory Bird Treaty Act.

4.2.4.2 Bat Colony

In the NHIS database, a colony of little brown myotis and big brown bats was documented roosting along Gifford Lake near the western edge of the property. No bats were observed during the field surveys in the summer 2011 (which were conducted during daylight hours) but potentially suitable habitat for bats was observed throughout the project site. The forests and woodlands on the property are likely suitable for summer roosting sites and foraging habitat for both species. The bats may also utilize other habitats on the site for foraging, especially over the open water areas of Gifford Lake. Most of the suitable summer roosting sites likely occur along the western edges of the property within the floodplain of the Minnesota River or along the adjacent forested slopes. Both species of bats over-winter in caves, which are not present on the project site.

4.2.5 Species Previously Recorded On or Near the Site

4.2.5.1 Regal Fritillary (Special Concern)

A regal fritillary was observed onsite in 1975, according to records in the NHIS database. The record is from an area that is currently mined in the northern half of the eastern portion of the site. The record states that this species was observed in a prairie, present on the site, which was likely contiguous with the dry prairie mapped in the southeastern portion of the site as a shrubland wildlife habitat. Regal fritillaries occur in native prairies and utilize bird's foot violets (*Viola palmata* var. *pedatifida* or *V. pedata*) as a larval food source. The bird's foot violets (species uncertain) are present in both dry prairie communities mapped onsite (Figure 3-1a). However, these prairie communities are dominated by dense cover of native and non-native shrubs and non-native grasses, as described in Section 3.2.1.1. The native prairie habitat in which regal fritillaries once occurred is now much reduced in size and highly degraded, thus reducing its suitability for butterfly habitat.

4.2.5.2 Cerulean Warbler (Special Concern)

Cerulean warblers live in large, contiguous tracts of mature hardwood forests for breeding, foraging, and during migration. In southeastern Minnesota this species is typically known from forests associated with the floodplains and slopes of the Minnesota and Mississippi rivers. The forested portions of the project site may provide suitable habitat for the cerulean warbler, but this habitat is at the edges of a broad contiguous forest present along the Minnesota River valley. On-site wildlife surveys included focused reviews of the forested in search of the cerulean warbler. This area was surveyed at least once per survey day, but sometimes twice: once in the morning and again in the late

afternoon. No cerulean warblers were detected. The nearest NHIS record for the cerulean warbler is approximately 1 mile southwest of the project boundary alongside the Minnesota River from 1997.

4.2.6 Wildlife Habitats

Onsite wildlife habitats were mapped while conducting surveys for wildlife (Figure 4-2). Natural communities on the project site tend to be somewhat fragmented by developed areas and past and present mining activities. The majority of the contiguous natural habitat is along the western edges of the site, including the large wetland complex in the central part of the site. Shrublands, mapped as native prairie communities, in the southern portion of the site are contiguous with the oak savanna communities to the south and west on the Minnesota Valley National Wildlife Refuge, but habitat generally differs from the more open prairie and savanna communities managed on the refuge. Secondary growth in the previously mined areas in the southwestern part of the site, however, supports many wildlife species including grassland nesting birds.

4.2.6.1 Grasslands

Grasslands occur in areas previously mined, but have well-established dense vegetation with few patches of barren ground. Grasslands also include wet meadows and a field used for hay and as parking lot for the Renaissance Festival in late summers. Various bird species were observed in grasslands early in the summer before hay was cut, including native ground-nesting sparrows such as the lark sparrow.

4.2.6.2 Shrublands

Shrublands include areas with at least 10 percent cover of shrubs and less than 10 percent cover of canopy trees. Shrub species, regardless of height, and small trees up to 10 feet tall are included in this category. Shrublands include secondary growth, shrub carr wetlands, and upland shrub thickets. Shrubland areas with rather diverse wildlife species occur in the southernmost portion of the project site dominated by red cedar. This area is adjacent to the Minnesota Valley National Wildlife Refuge located south of the project site, portions were previously mined and portions are mapped as native prairie plant communities. None of the wildlife species tracked by the NHIS or others described above was found in the shrubland habitats.

4.2.6.3 Woodlands

The woodlands category is used to generally describe various forest types of secondary growth with mixed-age trees and a relatively open canopy between 10 percent and 80 percent areal coverage. The shrub layer is commonly dense with buckthorn or tree saplings. Common species in woodlands

include box elder, green ash, and quaking aspen. Many of the woodlands on the site are degraded and impacted to some degree by past mining, agriculture, or development. Many birds and small mammals were observed within woodland habitats, particularly those associated with edge habitats. The milk snake and snapping turtle were each observed within a woodland habitat on the site.

4.2.6.4 Hardwood Forest

Hardwood forests are generally mature forests with a closed canopy dominated by large diameter trees. This includes oak forests and floodplain forests along the Minnesota River. Canopy trees may include cottonwood, silver maple, American elm, northern pin oak, and bur oak. Many birds and small mammals were observed in the hardwood forests onsite though none of the wildlife species tracked by the NHIS were observed within these communities. Forest birds observed included the red-breasted nuthatch, black-and-white warbler, and the eastern wood pewee.

4.2.6.5 Marsh

Marsh habitats on the project site include the bulrush marsh within the large central wetland connected to the Minnesota River floodplain and some smaller communities in wet depressions, some of which occur in the active and previously mined areas. Vegetation in the bulrush marsh is dense, whereas the depressions in the mined areas are sparsely vegetated. Numerous reptiles and amphibians were documented from the marshes, though none of the wildlife species tracked by the NHIS were observed within these communities.

The bulrush marsh, as described in Section 3.2, is a mapped native plant community and may intermittently support some fish normally living in the Minnesota River. The bulrush marsh floods periodically. This summer, extensive standing water was present in the marsh area and carp and bullheads fish were observed along the banks. During periodic floods, various aquatic species may utilize portions of this wetland for spawning, foraging, or cover.

4.2.6.6 Sparse Vegetation

Sparse vegetation occurs in many areas previously mined and have since established some limited vegetative cover. These areas contain much bare ground and a very thin soil layer. Some areas have been colonized by forbs and grasses, as well as seedlings of various tree species. Several bird species were seen within these previously mined areas, including the lark sparrow and the colony of bank swallows. Portions of these habitats appear somewhat similar to dry prairie communities, including areas dominated little bluestem, though plant diversity is very low and vegetative cover is sparse.

4.2.6.7 Farmland/Commercial and Active Mining Areas

Farmland/commercial and active mining areas are present on the project site and have low quality habitat for wildlife, though some wildlife observations were made in each. Most of the site has been affected to some degree by these land use activities in the past 40 to 50 years.

5.0 References

Barr Engineering Company. 2011a. Natural Resources Survey Plan. Prepared for Merriam Junction Sand Mine. Dated June 24, 2011. Minneapolis, MN.

Barr Engineering Company. 2011b. Wetland Delineation Report: Portions of Merriam Junction Sands Mine, Scott County, Minnesota. Prepared for Hunt Global Resources. Dated October, 2011. Minneapolis, MN.

Environmental Quality Board (EQB). 2008. Environmental Assessment Worksheet, Version 8/08rev. Minnesota Department of Administration, Office of Geographic and Demographic Analysis. St. Paul, MN. Available online at http://www.eqb.state.mn.us.

MCBS. 2009a. Conservation Staus (sic.) Ranks for Native Plant Community Types and Subtypes. August 31, 2009. Available at URL: http://www.dnr.state.mn.us/npc/classification.html. Accessed December 20, 2011.

MCBS. 2009b. Guidelines for assigning Statewide Biodiversity Significance Ranks to Minnesota County Biological Survey Sites. Available at URL: http://www.dnr.state.mn.us/eco/mcbs/biodiversity_guidelines.html. Accessed 12/23/2011.

Minnesota Department of Natural Resources (MDNR). 2004. Minnesota Land Cover Classification System User Manual, Version 5.4. St. Paul, MN. Available online at http://www.dnr.state.mn.us/mlccs/index.html.

Minnesota Department of Natural Resources (MDNR). 2005. Field Guide to the Native Plant Communities of Minnesota: The Eastern Broadleaf Forest Province. Ecological Land Classification Program, Minnesota County Biological Survey, and Natural Heritage and Nongame Research Program. St. Paul, MN.

Minnesota Department of Natural Resources (MDNR). 2007a. Minnesota's List of Endangered, Threatened and Special Concern Species Tracked Species and Species Assemblage Elements. Effective July 1, 1996; updated November 13, 2007. St. Paul, MN. Available online at http://files.dnr.state.mn.us/natural_resources/ets/endlist.pdf.

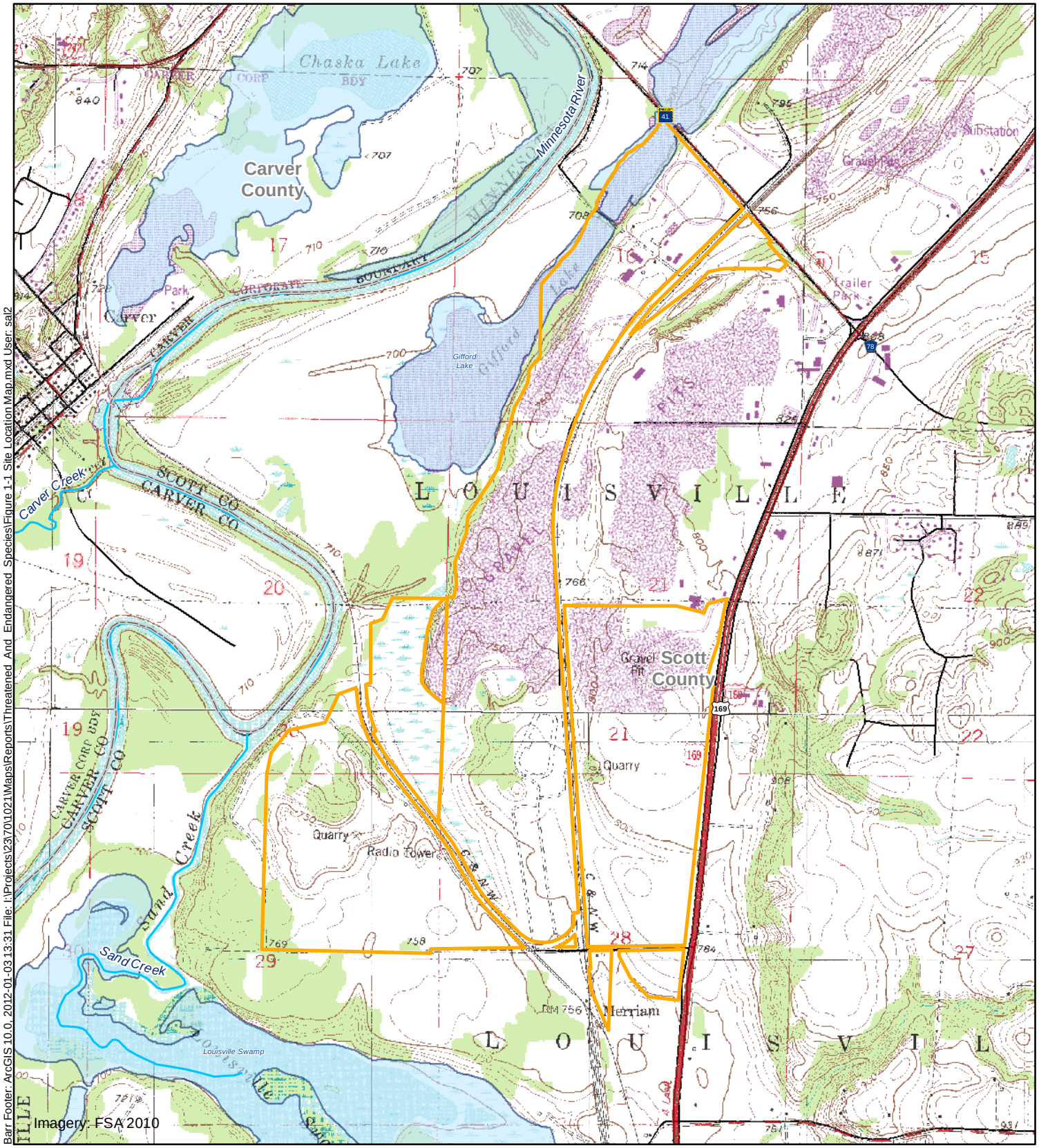
Minnesota Department of Natural Resources (MDNR). 2007b. Upland Prairie System – Condition Ranking Guidelines, Minnesota County Biological Survey. Issued 1994 with revisions through March 9, 2007. St. Paul, MN.

Minnesota Department of Natural Resources (MDNR). 2008. Minnesota Tracked Species and Species Assemblage Elements. May 1, 2008. St. Paul, MN.

Minnesota Department of Natural Resources (MDNR). 2011. Draft Proposed Changes to Minnesota Rules, Chapter 6134 (Endangered, Threatened and Special Concern Species). April 26, 2011. St. Paul, MN.

Svoboda Ecological Resources. 2011. Wetland Classification, Identification, and Delineation Report (on portions of the property owned by Malkerson Sales Inc.), Merriam Junction Sands Mine, Scott County, MN. Prepared for Hunt Global Resources. Dated October 7, 2011.

Figures



Property Boundary

County Boundaries

PWI Watercourses

PWI Basins

N

Feet

2,000 0 2,000

Meters

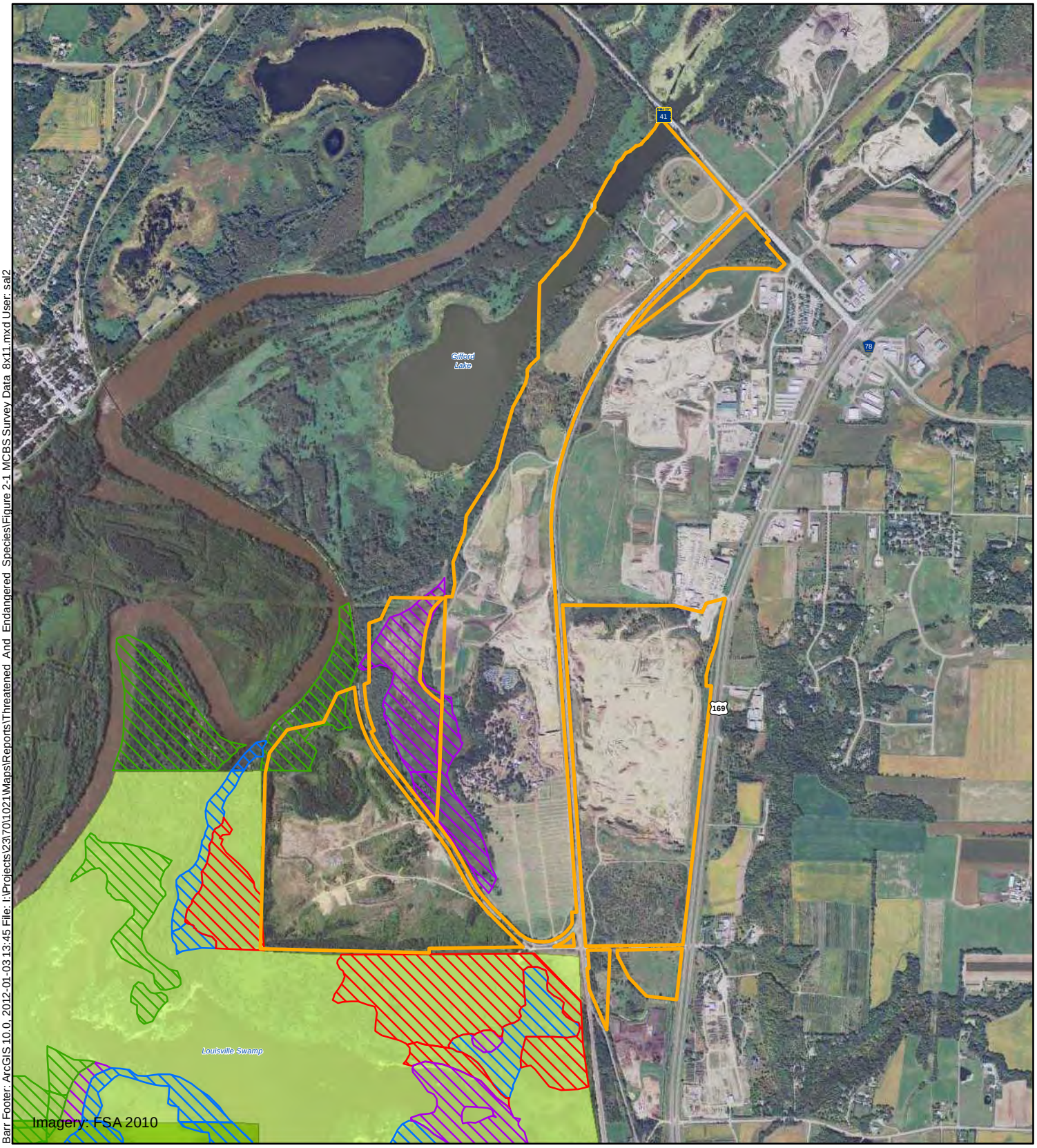
600 0 600

BARR

Figure 1-1

SITE LOCATION MAP
Merriam Junction Sands
Hunt Global Resources, Inc.
Scott County, Minnesota

Barr Footer: ArcGIS 10.0, 2012-01-03 13:31 File: I:\Projects\23\70\1021\Maps\Reports\Threatened_And_Endangered_Species\Figure 1-1 Site Location Map.mxd User: sal2



Barr Footer: ArcGIS 10.0, 2012-01-03 13:45 File: I:\Projects\23\70\1021\Maps\Reports\Threatened And Endangered Species\Figure 2-1 MCBS Survey Data 8x11.mxd User: sal2

Property Boundary

MCBS Native Plant Communities

- Bulrush Marsh (Northern)
- Dry Sand - Gravel Oak Savanna (Southern)
- Pin Oak - Bur Oak Woodland
- Silver Maple - (Virginia Creeper) Floodplain Forest

MCBS Sites of Biodiversity Significance

- Outstanding
- High

N

Feet

2,000 0 2,000

Meters

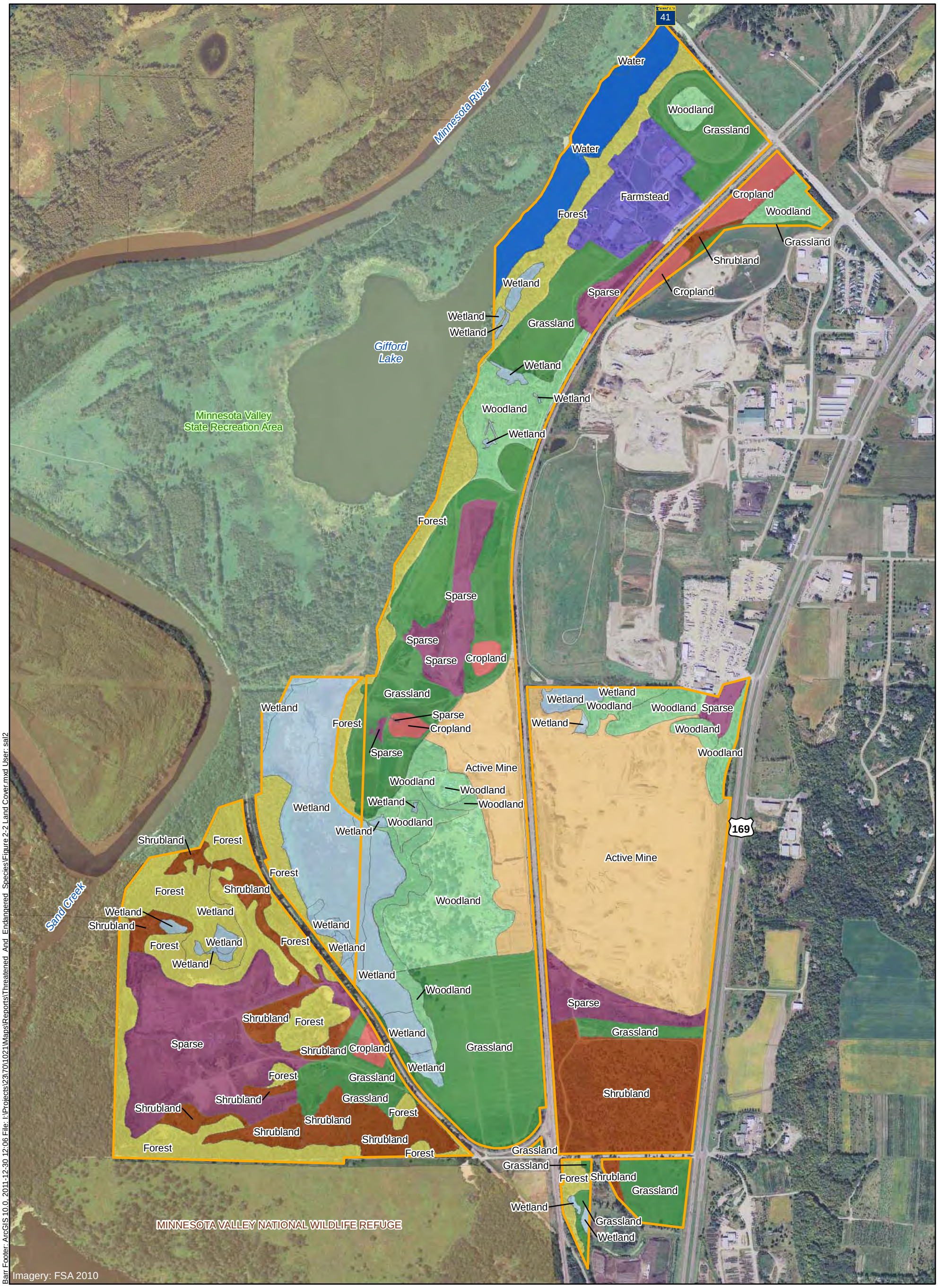
600 0 600

BARR

Figure 2-1

MCBS SURVEY DATA
Merriam Junction Sands
Hunt Global Resources, Inc.
Scott County, Minnesota

The Minnesota County Biological Survey (MCBS) is managed by the Minnesota Department of Natural Resources.



Barr Footer: ArcGIS 10.0, 2011-12-30 12:06 File: I:\Projects\23\70\1021\Maps\Reports\Threatened And Endangered Species\Figure 2-2 Land Cover.mxd User: sal2

Property Boundary

MN State Park

USFWS National Wildlife Refuge

Land Cover

Active Mine

Cropland

Farmstead

Forest

Grassland

Shrubland

Sparse

Water

Wetland

Woodland

N

Feet

1,000 0 1,000

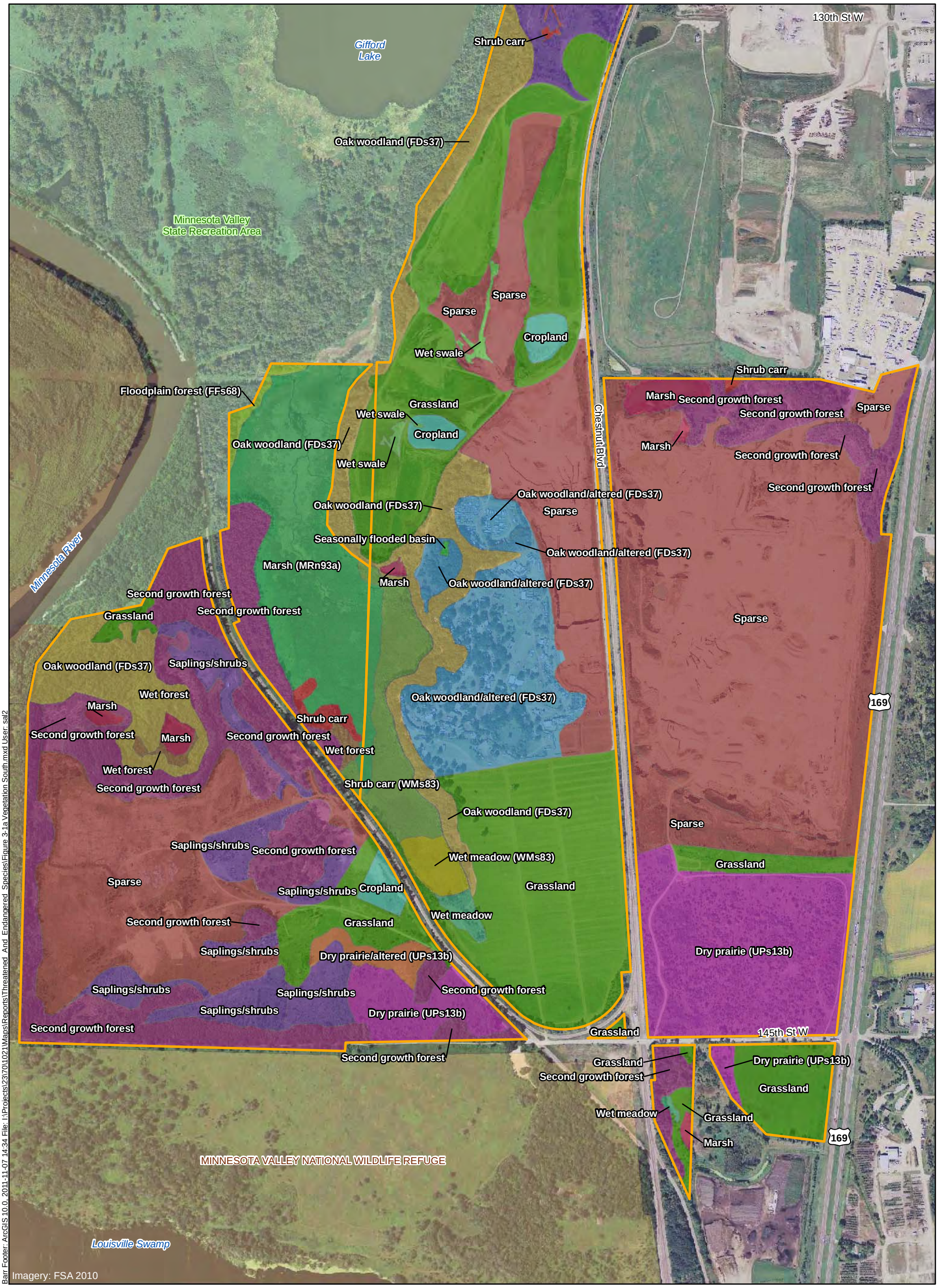
Meters

300 0 300

BARR

Figure 2-2

LAND COVER
Merriam Junction Sands
Hunt Global Resources, Inc.
Scott County, Minnesota



Barr Footer: ArcGIS 10.0, 2011-11-07 14:34 File: I:\Projects\23\70\1021\Maps\Reports\Threatened_And_Endangered_Species\Figure 3-1a Vegetation South.mxd User: sal2

- Property Boundary
- MN State Park
- USFWS National Wildlife Refuge

Vegetation

- Cropland
- Dry prairie (UPs13b)
- Dry prairie/altered
- Floodplain forest (FFs68)
- Grassland
- Improved grassland
- Lake
- Marsh
- Marsh (MRn93a)
- Oak woodland (FDs37)
- Oak woodland/altered
- Saplings/shrubs
- Seasonally flooded basin
- Second growth forest
- Shrub carr
- Shrub carr (WMs83)
- Sparse
- Wet meadow (WMs83)
- Wet forest
- Wet meadow
- Wet swale

N

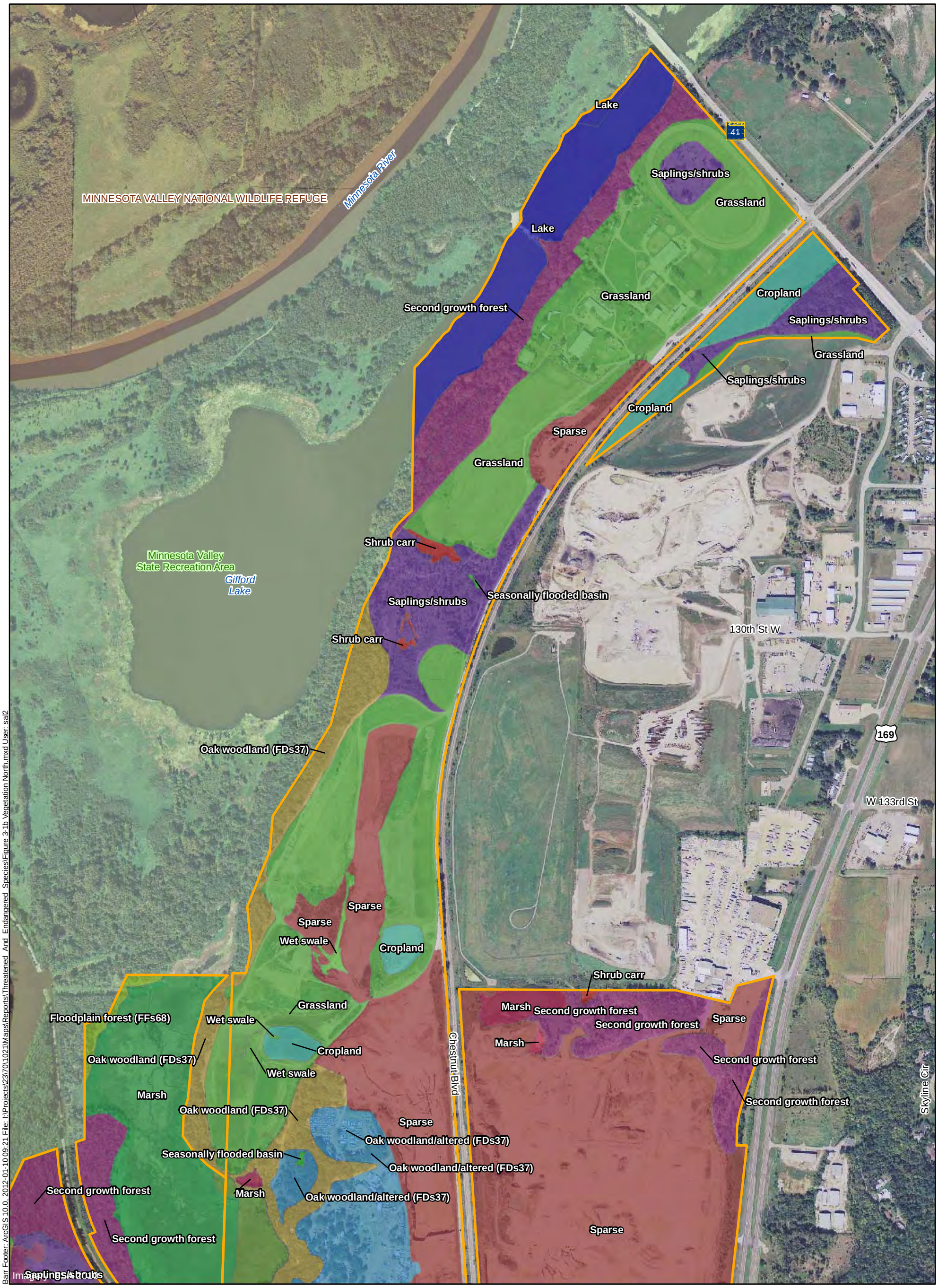
Feet
500 0 500 1,000

Meters
200 0 200

BARR

Figure 3-1a

VEGETATION - SOUTH
Merriam Junction Sands
Hunt Global Resources, Inc.
Scott County, Minnesota



Barr Footer: ArcGIS 10.0, 2012-01-10 09:21 File: I:\Projects\23\70\1021\Maps\Reports\Threatened And Endangered Species\Figure 3-1b Vegetation North.mxd User: sal2

- Property Boundary
- MN State Park
- USFWS National Wildlife Refuge

Vegetation

- Cropland
- Dry prairie (UPs13b)
- Dry prairie/altered
- Floodplain forest (FFs68)
- Grassland
- Improved grassland
- Lake
- Marsh
- Marsh (MRn93a)
- Oak woodland (FDs37)
- Oak woodland/altered
- Saplings/shrubs
- Seasonally flooded basin
- Second growth forest
- Shrub carr
- Shrub carr (WMs83)
- Sparse
- Wet Meadow (WMs83)
- Wet forest
- Wet meadow
- Wet swale

N

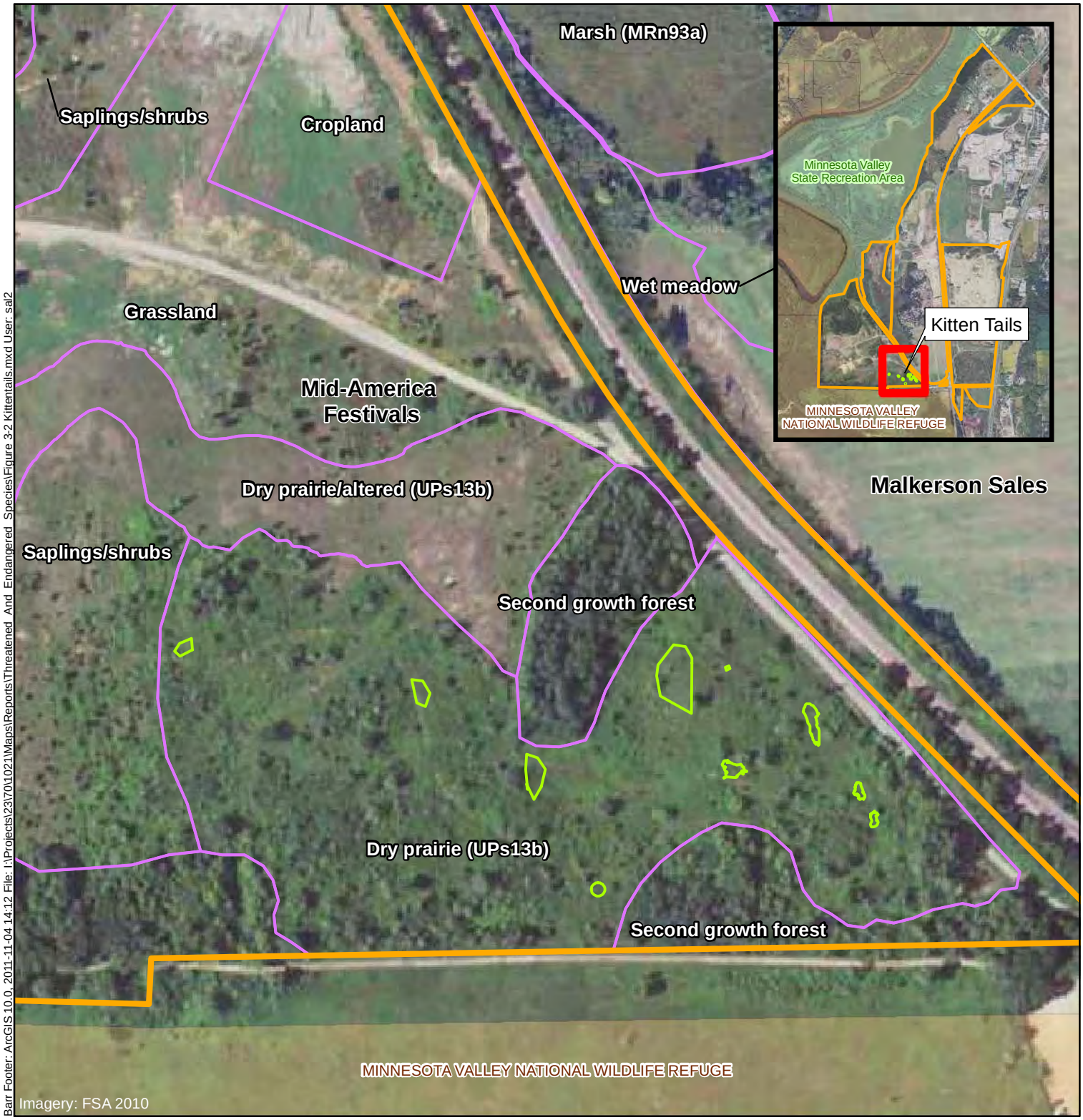
Feet
500 0 500 1,000

Meters
200 0 200

BARR

Figure 3-1b

VEGETATION - NORTH
Merriam Junction Sands
Hunt Global Resources, Inc.
Scott County, Minnesota



Barr Footer: ArcGIS 10.0, 2011-11-04 14:12 File: I:\Projects\23\70\1021\Maps\Reports\Threatened And Endangered Species\Figure 3-2 Kittentails.mxd User: sal2

Property Boundary

Kitten Tails Patches

Vegetation Types

MN State Park

USFWS National Wildlife Refuge

N

Feet

200 0 200

Meters

50 0 50

BARR

Figure 3-2

KITTEN TAILS LOCATIONS
Merriam Junction Sands
Hunt Global Resources, Inc.
Scott County, Minnesota

Barr Footer: ArcGIS 10.0, 2011-10-03 12:17 File: I:\Projects\23\70\1021\Maps\Wetlands\Figure 4-1.mxd User: gmh

Property Boundary

Wildlife Observations

- Bald eagle family
- Bank swallow nesting colony
- Call station
- Lark sparrow
- Milksnake
- Snapping turtle

N

Feet

1,000 0 1,000

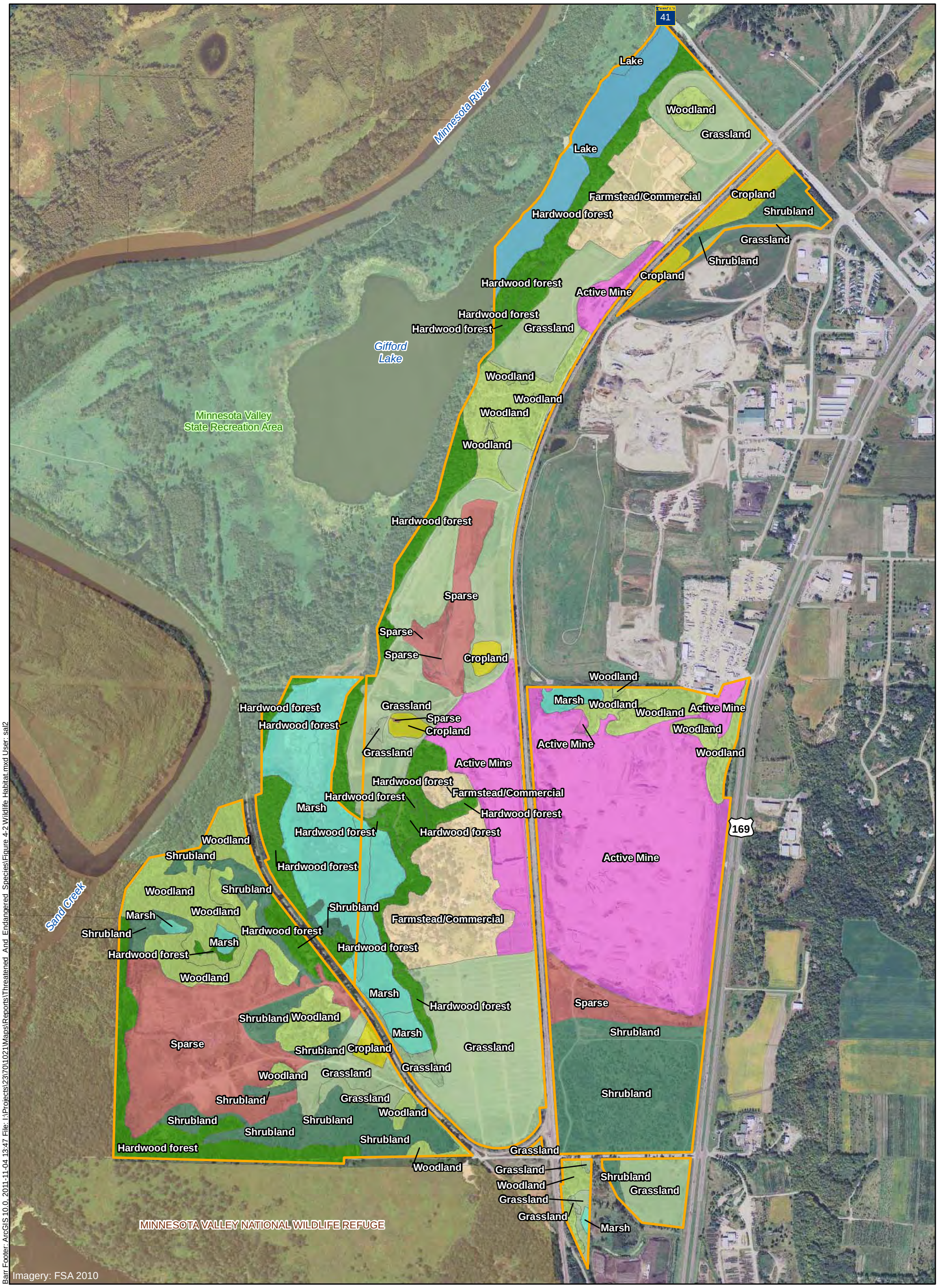
Meters

300 0 300

BARR

Figure 4-1

WILDLIFE
Merriam Junction Sands
Hunt Global Resources, Inc.
Scott County, Minnesota



Barr Footer: ArcGIS 10.0, 2011-11-04 13:47 File: I:\Projects\23\70\1021\Maps\Reports\Threatened And Endangered Species\Figure 4-2 Wildlife Habitat.mxd User: sal2

Property Boundary

MN State Park

USFWS National Wildlife Refuge

Habitat

Active Mine

Cropland

Farmstead/Commercial

Grassland

Hardwood forest

Lake

Marsh

Shrubland

Sparse

Woodland

N

Feet

1,000 0 1,000

Meters

300 0 300

BARR

Figure 4-2

WILDLIFE HABITAT
Merriam Junction Sands
Hunt Global Resources, Inc.
Scott County, Minnesota

Appendices

Appendix A

MDNR Correspondence Regarding Survey Work Plan

Daniel M. Tix

From: Daniel M. Tix
Sent: Thursday, July 21, 2011 3:24 PM
To: lisa.joyal@state.mn.us
Cc: Baker, Richard (DNR); Smith, Welby R (DNR); Doperalski, Melissa (DNR); Texler, Hannah L (DNR); Larson, Krista (DNR); Randy E. Duncan
Subject: FW: Merriam Junction Natural Resources Survey Work Plan

Lisa,
Thank you for your response and prompt attention to our Natural Resources Survey Work Plan for the Merriam Junction Sands project. We have completed many of the plant surveys described in the work plan. These surveys included searches for the Bedrock Outcrop communities that you requested in your response email. The results of these surveys will be described in our final report.

Regarding the bat colony previously observed adjacent to Gifford Lake northwest of the project site, the wildlife habitat assessment will include an evaluation of general suitability of habitat on the project site for bat species. Since the species of bats that were observed in the colony are not state or federally protected species and the proposed mining project would generally not impact the wooded area in the vicinity of this bat colony, species-specific surveys for bats are not proposed to be conducted on the project site.

Welcome back to work!
-Dan

Daniel M. Tix

Wetland Ecologist
Minneapolis office: 952-832-2918
cell: 952.540.7848
DTix@barr.com
www.barr.com

resourceful. naturally. BARR

From: Joyal, Lisa (DNR) [mailto:lisa.joyal@state.mn.us]
Sent: Thursday, June 30, 2011 10:33 AM
To: Daniel M. Tix
Cc: Baker, Richard (DNR); Smith, Welby R (DNR); Doperalski, Melissa (DNR); Texler, Hannah L (DNR); Larson, Krista (DNR)
Subject: RE: Merriam Junction Natural Resources Survey Work Plan

Thank you for submitting the proposed rare species survey plan for the Merriam Junction Sand Mine. The DNR has the following comments:

- The target list of native plant communities should include Bedrock Outcrop.

- Any native prairie or rock outcrop native plant communities within the project boundary should be identified and, if feasible, be considered avoidance areas. Any delineated prairie or rock outcrop habitat that is not included in the MCBS Native Plant Communities layer should be submitted to the DNR as a GIS polygon shapefile. Please see the attached prairie ranking documents. July through mid-September is the best time to rank the conditions of prairies. Please see the attached Draft Recommendations for Evaluating and Mapping

Native Prairie in Minnesota. Botanical surveys will need to be conducted in any native prairie or rock outcrops that will be impacted by the proposed project.

- Searches for rough-seeded fameflower should be conducted when the flowers are conspicuous (late afternoon from June to mid-July).

- If any rock outcrops will be impacted, the primary target species list should include water-hyssop (*Bacopa rotundifolia*), state-listed as special concern and proposed to be listed as threatened. However, it may be too late to survey for this species this year, as the best time to search is typically during the last two weeks of May and the first week of June.

- The 2007 list of proposed changes to the state list of protected species is outdated. Please refer to the attached 2011 proposed changes.

- If rare plants are discovered, please follow the guidelines in the attached Guidance on Documenting & Collecting Rare Plants ("Rare Plant Guidance" in the zip file). The attached zip file also contains several other documents regarding data collection and data reporting: Rare Species Survey Reports Memo, Rare Feature Reporting Forms, List of State-listed Species, Proposed Changes to State List, and Species Tracked by the DNR. You may already have received these under separate cover.

- Survey reports should include a completed Rare Feature Reporting Form for each state-listed or tracked species, or a statement that the data has been submitted electronically to Karen Cieminski, NHIS Data Manager. If you will be submitting the data electronically, please obtain the spreadsheet template and GIS shapefile template before the field surveys are conducted. Review this spreadsheet to familiarize yourself with the type of information that should be collected. Spreadsheet and shapefile templates are available from Karen Cieminski at Karen.Cieminski@state.mn.us.

- Please send me a report of the survey results when completed. The report should include the photographic vouchers, if any, and a statement that a specimen was collected or a statement why a specimen was not collected. Specimens, if any, will need to be submitted to Welby Smith prior to DNR concurrence with the findings of the report.

- Will there be any effort to collect more information regarding the possible bat colony within/near the project site?

- The purpose of these surveys is to provide information to adequately describe in the EIS the potential effects to rare features from the proposed mine, and to make a determination regarding the takings of state-listed species.

Please feel free to contact me if you would like to discuss any of the above in more detail.

Thank you,

Lisa Joyal

~~~~~~

Lisa Joyal
Natural Heritage Review Coordinator
NHIS Data Distribution Coordinator
Division of Ecological and Water Resources
Minnesota Department of Natural Resources
500 Lafayette Road, Box 25
~~~~~~

St. Paul, MN 55155

phone: 651-259-5109
lisa.joyal@state.mn.us
www.mndnr.gov/eco

Appendix B

MDNR Natural Heritage Review

Minnesota Department of Natural Resources
Division of Ecological and Water Resources, Box 25
500 Lafayette Road
St. Paul, Minnesota 55155-4025
Phone: (651) 259-5109 E-mail: lisa.joyal@state.mn.us

June 21, 2011 **Correspondence # ERDB 20110462**

Mr. Nick Monserud
Sunde Engineering
10830 Nesbitt Avenue South
Bloomington, MN 55437

RE: Natural Heritage Review of the proposed Merriam Junction Non-Metallic Mine;
T115N R23W Sections 16, 20, 21, 28, & 29; Scott County

Dear Mr. Monserud,

As requested, the Minnesota Natural Heritage Information System has been queried to determine if any rare species or other significant natural features are known to occur within an approximate one-mile radius of the proposed project. Based on this query, rare features have been documented within the search area (for details, see the enclosed database reports; please visit the Rare Species Guide at http://www.dnr.state.mn.us/rsg/index.html for more information on the biology, habitat use, and conservation measures of these rare species). Please note that the following **rare features *may* be adversely affected** by the proposed project:

- The Minnesota County Biological Survey (MCBS) has identified a Bulrush Marsh and a Silver Maple – (Virginia Creeper) Floodplain Forest within the project boundary (see enclosed map; these two native plant communities are not listed on the enclosed database reports). Both of these native plant communities have a state rank of 3, indicating that they are vulnerable to extirpation within Minnesota. Any impacts to these ecologically significant areas will need to be addressed.

- The Minnesota County Biological Survey has identified a Site of High Biodiversity Significance adjacent to the southern portion of the project boundary. Sites of Biodiversity Significance have varying levels of native biodiversity and are ranked based on the relative significance of this biodiversity at a statewide level. Sites ranked as High contain very good quality occurrences of the rarest species, high quality examples of the rare native plant communities, and/or important functional landscapes. This particular Site may contain Dry Sand – Gravel Oak Savanna, a native plant community that is critically imperiled or imperiled in Minnesota. Potential indirect impacts, including the introduction or spread of invasive species, to this ecologically significant site should be also addressed in the EIS.

- Rare plants in the vicinity of the project are associated with rock outcrops and native prairie. It should be determined whether either of these native plant communities exists within the project boundary. If so, a botanical survey should be conducted in any rock outcrops or native prairie that may be impacted by this project. The purpose of the survey would be to reduce the likelihood of an inadvertent taking of a state-protected plant, and to provide information to adequately describe the environmental impact of the proposed project. P**lease contact me before**

any survey work is initiated, as the DNR would like the opportunity to provide feedback on surveyor qualifications and survey protocol. Please note that botanical surveys need to be conducted during the appropriate portion of the growing season, which may be limited.

- There is likely a bat colony located within the project boundary along Gifford Lake. Both the little brown myotis (*Myotis lucifugus*) and the big brown bat (*Eptesicus fuscus*) have been documented here. These two species are proposed to be listed as species of special concern in Minnesota.

- Several rare fish have been documented in the Minnesota River. If the project has the potential to impact the water quality or hydrology of the Minnesota River, impacts to these rare species will need to be addressed.

- Potential impacts to rare features should be included in the scoping EAW as an issue that will be addressed in the EIS. The EIS should address whether the proposed project has the potential to adversely affect the above rare features and, if so, the EIS should describe any measures that will be taken to avoid, minimize, or mitigate impacts.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. However, the NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. Therefore, ecologically significant features for which we have no records may exist within the project area.

The enclosed results include an Index Report and a Detailed Report of records in the Rare Features Database, the main database of the NHIS. To control the release of specific location information, which might result in the destruction of a rare feature, both reports are copyrighted.

The Index Report provides rare feature locations only to the nearest section, and may be reprinted, unaltered, in an environmental review document (e.g., EAW or EIS), municipal natural resource plan, or report compiled by your company for the project listed above. If you wish to reproduce the index report for any other purpose, please contact me to request written permission. **The Detailed Report is for your personal use only as it may include specific location information that is considered nonpublic data under *Minnesota Statutes*, section 84.0872, subd. 2. If you wish to reprint or publish the Detailed Report for any purpose, please contact me to request written permission.**

For environmental review purposes, the Natural Heritage letter and database reports are valid for one year; they are only valid for the project location (noted above) and the project description provided on the NHIS Data Request Form. Please contact me if project details change or if an updated review is needed.

Please note that locations of the gray wolf (*Canis lupus*), federally-listed as threatened and state-listed as special concern, and the Canada lynx (*Lynx canadensis*), federally-listed as threatened, are not currently tracked in the NHIS. As such, the Natural Heritage Review does not address these species.

Furthermore, the Natural Heritage Review does not constitute review or approval by the Department of Natural Resources as a whole. Instead, it identifies issues regarding known occurrences of rare features and potential effects to these rare features. Additional rare features for which we have no data may be present in the project area, or there may be other natural resource concerns associated with the proposed project. For these concerns, please contact your DNR Regional Environmental Assessment Ecologist (contact information available at http://www.dnr.state.mn.us/eco/ereview/erp_regioncontacts.html). Please be aware that additional site assessments or review may be required.

Thank you for consulting us on this matter, and for your interest in preserving Minnesota's rare natural resources. An invoice will be mailed to you under separate cover.

Sincerely,

Lisa Joyal

Lisa Joyal
Natural Heritage Review Coordinator

enc. Rare Features Database: Index Report
Rare Features Database: Detailed Report
Rare Features Database Reports: An Explanation of Fields
Map

cc: Melissa Doperalski
Hannah Texler
Krista Larson

Links: MCBS Sites of Biodiversity Significance
http://www.dnr.state.mn.us/eco/mcbs/biodiversity_guidelines.html
MCBS Native Plant Communities
http://www.dnr.state.mn.us/npc/index.html

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ERDB #20110462 - Merriam Junction
T115N R23W Sections 16, 20, 21, 28, & 29
Scott County

Rare Features Database:

Element Name and Occurrence Number	Federal Status	MN Status	State Rank	Global Rank	Last Observed Date	EO ID #
Vertebrate Animal						
Cycleptus elongatus (Blue Sucker) #4 T115N R23W S21, T115N R23W S29, T115N R23W S20; Carver, Scott County		SPC	S3	G3G4	1989-07-25	15746
Dendroica cerulea (Cerulean Warbler) #73 T115N R23W S29, T115N R23W S31, T115N R23W S30, T115N R23W S32; Carver, Scott County		SPC	S3B	G4	1997-06-21	22505
Haliaeetus leucocephalus (Bald Eagle) #1678 T115N R23W S30; Carver County		SPC	S3B,S3N	G5	1999	2796
Haliaeetus leucocephalus (Bald Eagle) #2277 T115N R23W S30; Scott County		SPC	S3B,S3N	G5	2005	31126
Polyodon spathula (Paddlefish) #4 T27N R24W S23, T115N R23W S16, T115N R23W S17, T115N R38W S28, T [...]; Blue Earth, Brown, Carver, Chippewa, [...] County		THR	S2	G4	2004-12-04	16501
Scaphirhynchus platorynchus (Shovelnose Sturgeon) #2 T115N R23W S10, T115N R23W S9; Carver, Scott County		NON	S4	G4	1987-06-05	16499
Scaphirhynchus platorynchus (Shovelnose Sturgeon) #3 T115N R23W S18, T115N R23W S20, T115N R23W S19, T115N R23W S17; Carver, Scott County		NON	S4	G4	1982-08-19	16498
Scaphirhynchus platorynchus (Shovelnose Sturgeon) #5 T114N R23W S6, T115N R23W S31, T115N R23W S32; Carver, Scott County		NON	S4	G4	1990-10-04	16482
Scaphirhynchus platorynchus (Shovelnose Sturgeon) #73 T115N R23W S10, T115N R23W S9; Carver, Scott County		NON	S4	G4	1999-09-30	26563
Invertebrate Animal						
Actinonaias ligamentina (Mucket) #91 T115N R23W S17, T115N R23W S31, T115N R23W S9, T115N R23W S1; Carver, Scott County		THR	S2	G5	1989-Pre	17125
Actinonaias ligamentina (Mucket) #92 T115N R23W S17; Carver, Scott County		THR	S2	G5	1989-08-17	17130
Actinonaias ligamentina (Mucket) #164 T115N R23W S20; Carver, Scott County		THR	S2	G5	1999-09-29	26440

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Rare Features Database:

Element Name and Occurrence Number	Federal Status	MN Status	State Rank	Global Rank	Last Observed Date	EO ID #
Invertebrate Animal						
Alasmidonta marginata (Elktoe) #67 T115N R23W S17; Carver, Scott County		THR	S2	G4	1989-08-16	29490
Arcidens confragosus (Rock Pocketbook) #18 T115N R23W S17, T115N R23W S2, T115N R23W S31, T115N R23W S20, T [...]; Carver, Scott County		END	S1	G4	1989-Pre	26442
Arcidens confragosus (Rock Pocketbook) #26 T114N R25W S35, T109N R29W S7, T109N R30W S12, T114N R24W S30, T [...]; Blue Earth, Brown, Carver, Dakota, [...] County		END	S1	G4	2006-11-PRE	33200
Cyclonaias tuberculata (Purple Wartyback) #66 T115N R23W S17; Scott County		THR	S2	G5	2006-08-PRE	34191
Ellipsaria lineolata (Butterfly) #45 T115N R23W S17; Carver, Scott County		THR	S2	G4	2003-Pre	31483
Elliptio crassidens (Elephant-ear) #9 T115N R23W S31, T115N R23W S17; Carver, Scott County		END	S1	G5	1999-Pre	26432
Elliptio dilatata (Spike) #222 T115N R23W S17; Carver, Scott County		SPC	S3	G5	2003-10-13-PRE	33836
Fusconaia ebena (Ebonyshell) #7 T115N R23W S31, T115N R23W S17; Carver, Scott County		END	S1	G4G5	1989-08-17	17120
Lampsilis higginsi (Higgins Eye) #9 T115N R23W S17; Carver, Scott County	LE	END	S1	G1	1989-PRE	15416
Lampsilis teres (Yellow Sandshell) #8 T115N R22W S4, T115N R23W S31, T116N R22W S32, T116N R22W S33, T [...]; Carver, Hennepin, Scott County		END	S1	G5	1989-Pre	17143
Lampsilis teres (Yellow Sandshell) #10 T109N R27W S36, T111N R26W S22, T111N R26W S21, T115N R23W S20, T [...]; Blue Earth, Brown, Carver, Dakota, [...] County		END	S1	G5	1989-10-09	17146
Lasmigona costata (Fluted-shell) #50 T115N R23W S17; Carver, Scott County		SPC	S3	G5	1989-08-17	17114

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Element Name and Occurrence Number	Federal Status	MN Status	State Rank	Global Rank	Last Observed Date	EO ID #
Invertebrate Animal						
Ligumia recta (Black Sandshell) #93 T115N R23W S17; Carver, Scott County		SPC	S3	G5	1989-08-17	17160
Ligumia recta (Black Sandshell) #470 T115N R23W S17; Carver, Scott County		SPC	S3	G5	2003-10-13-PRE	33920
Megalonaias nervosa (Washboard) #18 T115N R23W S17; Carver, Scott County		THR	S2	G5	2003-Pre	31487
Obovaria olivaria (Hickorynut) #55 T115N R23W S17; Carver, Scott County		SPC	S3	G4	1989-08-16	29489
Obovaria olivaria (Hickorynut) #135 T115N R23W S17, T115N R23W S31; Carver, Scott County		SPC	S3	G4	2003-10-PRE	33652
Plethobasus cyphyus (Sheepnose) #8 T115N R23W S17; Carver, Scott County	C	END	S1	G3	2003-10-PRE	31379
Pleurobema coccineum (Round Pigtoe) #74 T115N R23W S17; Carver, Scott County		THR	S2	G4G5	1989-08-16	29491
Pleurobema coccineum (Round Pigtoe) #80 T115N R23W S20, T115N R23W S31, T115N R23W S17; Carver, Scott County		THR	S2	G4G5	1999-PRE	26441
Quadrula fragosa (Winged Mapleleaf) #16 T115N R23W S17; Carver, Scott County	LE	END	S1	G1	2003-10-Pre	31383
Quadrula metanevra (Monkeyface) #24 T115N R23W S17, T115N R23W S31; Carver, Scott County		THR	S2	G4	2003-10-Pre	17117
Quadrula metanevra (Monkeyface) #25 T115N R23W S17; Carver, Scott County		THR	S2	G4	1989-08-17	17118
Quadrula nodulata (Wartyback) #7 T115N R23W S2, T115N R23W S17, T115N R23W S31, T115N R23W S9, T [...]; Carver, Scott County		END	S1	G4	2000-09-20	17140
Speyeria idalia (Regal Fritillary) #41 T115N R23W S21, T115N R23W S28; Scott County		SPC	S3	G3	1975-07-06	23535

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Rare Features Database:

Element Name and Occurrence Number	Federal Status	MN Status	State Rank	Global Rank	Last Observed Date	EO ID #
Invertebrate Animal						
Tritogonia verrucosa (Pistolgrip) #25 T115N R23W S17, T115N R23W S31; Carver, Scott County		THR	S2	G4G5	2003-10-PRE	17153
Tritogonia verrucosa (Pistolgrip) #26 T115N R23W S17; Carver, Scott County		THR	S2	G4G5	1989-08-17	17152
Animal Assemblage						
Bat Colony (Bat Concentration) #41 T115N R23W S16; Carver, Scott County		N/A	SNR	GNR	2000-06-08	29684
Bat Colony (Bat Concentration) #42 T115N R23W S29; Scott County		N/A	SNR	GNR	1997-09-27	29685
Colonial Waterbird Nesting Area (Colonial Waterbird Nesting Site) #862 T115N R23W S33, T115N R23W S32; Scott County		N/A	SNR	GNR	1992	15646
Vascular Plant						
Alopecurus carolinianus (Carolina Foxtail) #34 T115N R23W S32; Scott County		NON	SNR	G5	2004-05-19	24420
Bacopa rotundifolia (Water-hyssop) #16 T115N R23W S32; Scott County		SPC	S3	G5	2004-06-24	24421
Besseya bullii (Kitten-tails) #3 T115N R23W S21, T115N R23W S28; Scott County		THR	S2	G3	1979-05-05	3766
Besseya bullii (Kitten-tails) #25 T115N R23W S28, T115N R23W S29; Scott County		THR	S2	G3	1993-06-20	3788
Besseya bullii (Kitten-tails) #98 T115N R23W S32, T115N R23W S31; Scott County		THR	S2	G3	2004-05-19	21523
Besseya bullii (Kitten-tails) #122 T115N R23W S33, T115N R23W S32; Scott County		THR	S2	G3	2003-05-23	31638
Cirsium hillii (Hill's Thistle) #13 T115N R23W S21, T115N R23W S28; Scott County		SPC	S3	G3	1972-07-12	4179

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Element Name and Occurrence Number		Federal Status	MN Status	State Rank	Global Rank	Last Observed Date	EO ID #
Vascular Plant							
Eleocharis wolfii (Wolf's Spike-rush) #4 T115N R23W S32; Scott County			END	S1	G3G4	2004-06-24	24422
Gymnocladus dioica (Kentucky Coffee-tree) #12 T115N R23W S32, T115N R23W S31; Carver, Scott County			NON	SNR	G5	1996-09-27	22711
Myosotis verna (Forget-me-not) #13 T115N R23W S32; Scott County			NON	SNR	G5	2004-05-19	24419
Myosurus minimus (Mousetail) #34 T115N R23W S32; Scott County			NON	S4	G5	2004-05-19	24418
Rorippa sessiliflora (Sessile-flowered Cress) #2 T115N R23W S16, T115N R23W S17, T115N R23W S9, T115N R23W S10, T [...]; Carver County			SPC	S3	G5	1891-07	5464
Talinum rugospermum (Rough-seeded Fameflower) #24 T115N R23W S32; Scott County			END	S1	G3G4	2004-06-24	24680
Native Plant Community (This may not represent a complete list. Also see MCBS Native Plant Communities at http://deli.dnr.state.mn.us.)							
Dry Sand - Gravel Oak Savanna (Southern) Type #5 T115N R23W S32, T115N R23W S31; Scott County	(NPC Code: UPs14b)		N/A	S2	GNR	1995-08-03	1207
Dry Sand - Gravel Oak Savanna (Southern) Type #7 T115N R23W S33, T115N R23W S32, T115N R23W S28, T115N R23W S29; Scott County	(NPC Code: UPs14b)		N/A	S2	GNR	2001-Pre	1206
Dry Sand - Gravel Prairie (Southern) Type #231 T114N R23W S4, T115N R23W S33; Scott County	(NPC Code: UPs13b)		N/A	S2	GNR	1996-09-09	17667
Native Plant Community, Undetermined Class #664 T115N R23W S33, T115N R23W S32; Scott County	(NPC Code:)		N/A	SNR	GNR	1995-10-02	21526
Silver Maple - (Virginia Creeper) Floodplain Forest Type #43 T115N R23W S33, T115N R23W S28; Scott County	(NPC Code: FFs68a)		N/A	S3	GNR	1995-10-02	21525
Silver Maple - (Virginia Creeper) Floodplain Forest Type #62 T115N R23W S32, T115N R23W S30, T115N R23W S31; Carver, Scott County	(NPC Code: FFs68a)		N/A	S3	GNR	1996-09-27	23498

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Rare Features Database:

Element Name and Occurrence Number	Federal Status	MN Status	State Rank	Global Rank	Last Observed Date	EO ID #
Native Plant Community (This may not represent a complete list. Also see MCBS Native Plant Communities at http://deli.dnr.state.mn.us.)						
Southern Bedrock Outcrop Class #22 (NPC Code: ROs12) T115N R23W S29, T115N R23W S32; Scott County		N/A	SNR	GNR	1995-08-03	21537
Other (Ecological)						
Sedimentary structure (ordovician) #9 T115N R23W S33, T115N R23W S32, T114N R23W S4, T114N R23W S5; Scott County		N/A	SNR	GNR	1972	130
Sedimentary unit or sequence (ordovician) #26 T114N R23W S5, T115N R23W S33, T115N R23W S32, T114N R23W S4; Scott County		N/A	SNR	GNR	1972	222

Records Printed = 64

Minnesota's endangered species law (*Minnesota Statutes*, section 84.0895) and associated rules (*Minnesota Rules*, part 6212.1800 to 6212.2300 and 6134) prohibit the taking of threatened or endangered species without a permit. For plants, taking includes digging or destroying. For animals, taking includes pursuing, capturing, or killing.

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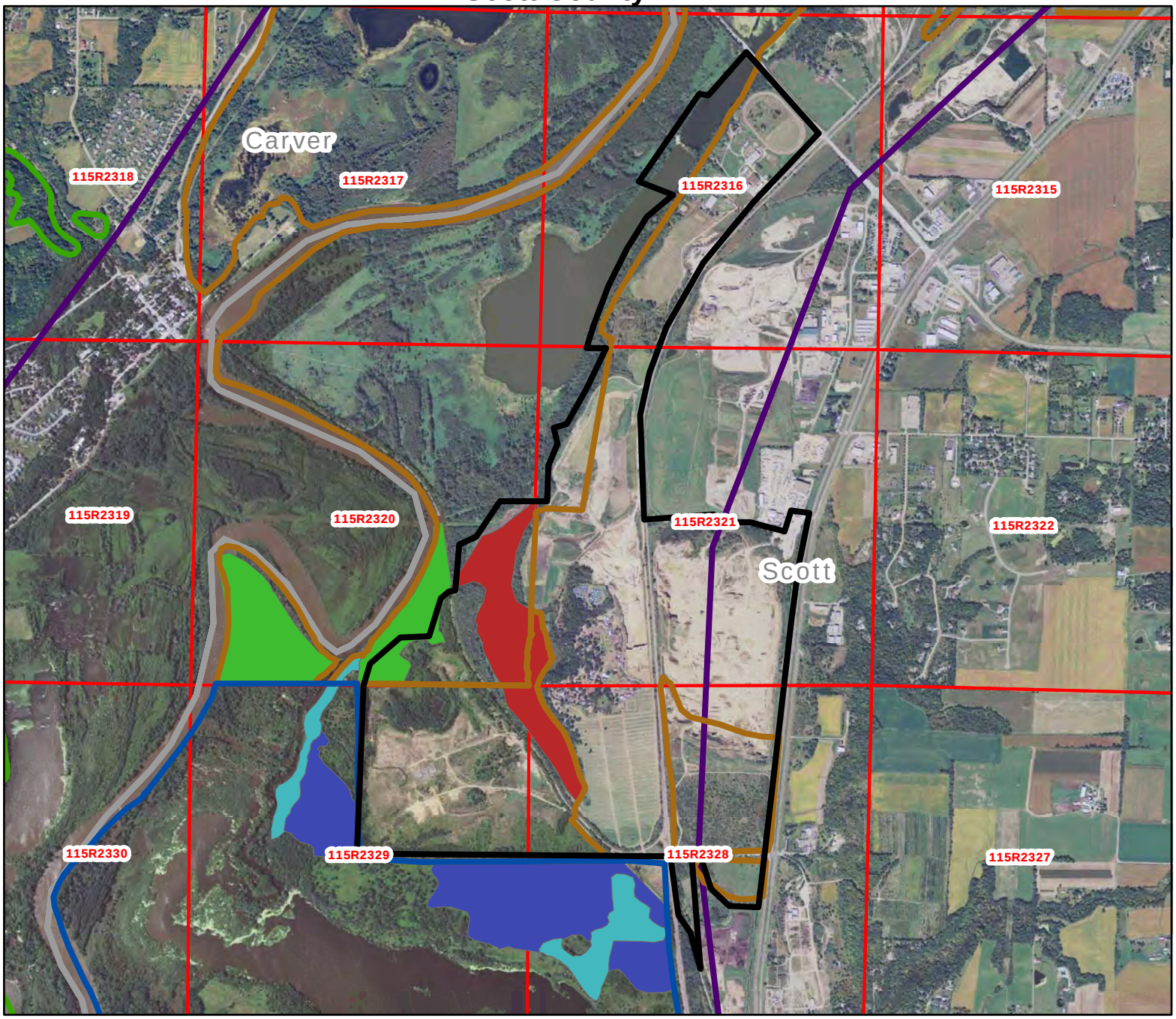

Legend

- 20110462

Sites of Biodiversity

- Outstanding
- High
- Moderate
- Below

Native_Plant_Communities

- Bulrush Marsh (Northern)
- Dry Sand - Gravel Oak Savanna (Southern)
- Pin Oak - Bur Oak Woodland
- Silver Maple - (Virginia Creeper)
- MN Bird Areas

0 0.125 0.25 0.5 Miles

N

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Rare Feature, Prairie Railroad Survey, Native Plant Community, and Sites of Biodiversity Significance data are from the Division of Ecological Resource's Natural Heritage Information System. The absence of rare features for a particular location should not be construed to mean that the Division is confident rare features are absent from that location.

Appendix C

List of Plant Species Observed

Appendix C. Merriam Junction Sand Mine List of Plant Species Observed		
FAMILY	**Species**	**Common Name**
Acoraceae	*Acorus americanus*	American Sweet flag
Alismataceae	*Alisma triviale*	Ordinary water-plantain
Alismataceae	*Sagittaria latifolia*	Broad-leaved arrowhead
Alliaceae	*Allium canadense*	Wild garlic
Alliaceae	*Allium stellatum*	Prairie wild onion
Anacardiaceae	*Rhus glabra*	Smooth sumac
Anacardiaceae	*Rhus typhina*	Staghorn sumac
Anacardiaceae	*Toxicodendron rydbergii*	Western Poison ivy
Apiaceae	*Cicuta maculata*	Spotted water-hemlock
Apiaceae	*Daucus carota*	Queen Anne's lace
Apiaceae	*Osmorhiza claytonii*	Clayton's sweet cicely
Apiaceae	*Osmorhiza longistylis*	Anise-root
Apiaceae	*Pastinaca sativa*	Wild parsnip
Apiaceae	*Sanicula* sp.	Black Snakeroot
Apiaceae	*Zizia aurea*	Golden alexanders
Apocynaceae	*Apocynum sibiricum*	Clasping dogbane
Apocynaceae	*Asclepias incarnata*	Swamp milkweed
Apocynaceae	*Asclepias syriaca*	Common milkweed
Apocynaceae	*Asclepias tuberosa*	Butterfly-weed
Apocynaceae	*Asclepias verticillata*	Whorled milkweed
Araceae	*Lemna minor*	Lesser duckweed
Araceae	*Spirodela polyrhiza*	Greater duckweed
Araliaceae	*Aralia nudicaulis*	Wild sarsaparilla
Aristolochiaceae	*Asarum canadense*	Wild ginger
Asteraceae	*Achillea millefolium*	Yarrow
Asteraceae	*Ambrosia artemisiifolia*	Common ragweed
Asteraceae	*Ambrosia psilostachya*	cumin ragweed
Asteraceae	*Ambrosia trifida*	Great ragweed
Asteraceae	*Antennaria plantaginifolia*	Plantain-leaved pussytoes
Asteraceae	*Arctium minus*	Common burdock
Asteraceae	*Artemisia ludoviciana*	Western mugwort
Asteraceae	*Carduus nutans*	Nodding thistle
Asteraceae	*Centaurea stoebe*	Spotted knapweed
Asteraceae	*Cirsium arvense*	Canada thistle
Asteraceae	*Cirsium discolor*	Field thistle
Asteraceae	*Cirsium flodmanii*	Prairie thistle
Asteraceae	*Cirsium vulgare*	Bull thistle
Asteraceae	*Conyza canadensis*	Horseweed
Asteraceae	*Coreopsis palmata*	Stiff tickseed
Asteraceae	*Crepis tectorum*	Yellow hawk's-beard
Asteraceae	*Erigeron annuus*	Daisy fleabane
Asteraceae	*Erigeron strigosus*	Daisy fleabane
Asteraceae	*Eupatorium maculatum*	Spotted Joe-pye weed
Asteraceae	*Eupatorium perfoliatum*	Common boneset
Asteraceae	*Eupatorium rugosum*	Common snakeroot
Asteraceae	*Eurybia macrophylla*	big-leaf aster
Asteraceae	*Helianthus pauciflorus*	stiff sunflower
Asteraceae	*Kuhnia eupatorioides*	False boneset
Asteraceae	*Leucanthemum vulgare*	ox-eye daisy

FAMILY	Species	Common Name
Asteraceae	*Liatris aspera*	Rough blazing star
Asteraceae	*Liatris punctata*	Dotted blazing star
Asteraceae	*Oligoneuron rigidum*	Stiff goldenrod
Asteraceae	*Ratibida pinnata*	Gray-headed coneflower
Asteraceae	*Senecio* sp.	Ragwort
Asteraceae	*Silphium perfoliatum*	Cup-plant
Asteraceae	*Solidago canadensis*	Canada goldenrod
Asteraceae	*Solidago gigantea*	Giant goldenrod
Asteraceae	*Solidago nemoralis*	Gray goldenrod
Asteraceae	*Sonchus arvensis*	Field sow-thistle
Asteraceae	*Sonchus oleraceus*	Common sow-thistle
Asteraceae	*Symphyotrichum ericoides*	white heath aster
Asteraceae	*Symphyotrichum laeve*	smooth blue aster
Asteraceae	*Symphyotrichum oolentangiense*	skyblue aster
Asteraceae	*Taraxacum officinale*	Common dandelion
Asteraceae	*Tragopogon dubius*	Yellow goat's-beard
Balsaminaceae	*Impatiens capensis*	Spotted touch-me-not
Betulaceae	*Betula pumila*	Bog birch
Betulaceae	*Ostrya virginiana*	Hop hornbeam
Boraginaceae	*Lithospermum canescens*	Hoary puccoon
Boraginaceae	*Lithospermum caroliniense*	Carolina pucoon
Boraginaceae	*Myosotis arvensis*	Field forget-me-not
Brassicaceae	*Alliaria petiolata*	Garlic-mustard
Brassicaceae	*Arabis hirsuta*	Rock-cress
Brassicaceae	*Berteroa incana*	Hoary alyssum
Brassicaceae	*Cardamine bulbosa*	Spring cress
Brassicaceae	*Hesperis matronalis*	Dame's rocket
Brassicaceae	*Lepidium virginicum*	Virginia pepper-grass
Brassicaceae	*Thlaspi arvense*	Penny-cress
Campanulaceae	*Campanula aparinoides*	Marsh bellflower
Campanulaceae	*Campanula rotundifolia*	Harebell
Caprifoliaceae	*Lonicera tatarica*	Tatarian Honeysuckle
Caprifoliaceae	*Lonicera x bella*	Pretty honeysuckle
Caprifoliaceae	*Symphoricarpos occidentalis*	Wolfberry
Caprifoliaceae	*Triosteum aurantiacum*	orange-fruit horse-gentian
Caryophyllaceae	*Lychnis alba*	White campion
Caryophyllaceae	*Saponaria officinalis*	Bouncing bet
Caryophyllaceae	*Silene vulgaris*	Bladder campion
Celastraceae	*Celastrus scandens*	Climbing bittersweet
Colchicaceae	*Uvularia grandiflora*	Yellow bellwort
Commelinaceae	*Tradescantia bracteata*	Bracted spiderwort
Cornaceae	*Cornus racemosa*	Gray dogwood
Cornaceae	*Cornus rugosa*	Round-leaved dogwood
Cornaceae	*Cornus sericea*	Red-osier dogwood
Cupressaceae	*Juniperus virginiana*	Red cedar
Cyperaceae	*Carex aquatilis*	Water sedge
Cyperaceae	*Carex aurea*	Golden fruited sedge
Cyperaceae	*Carex bebbii*	Bebb's sedge
Cyperaceae	*Carex blanda*	Charming sedge
Cyperaceae	*Carex hystericina*	Porcupine sedge
Cyperaceae	*Carex interior*	Inland sedge

FAMILY	Species	Common Name
Cyperaceae	*Carex lacustris*	Lake-sedge
Cyperaceae	*Carex lasiocarpa*	Wire-sedge
Cyperaceae	*Carex muehlenbergii*	Muhlenberg's sedge
Cyperaceae	*Carex normalis*	Right-angle sedge
Cyperaceae	*Carex pellita*	Woolly sedge
Cyperaceae	*Carex pensylvanica*	Pennsylvania sedge
Cyperaceae	*Carex prairea*	Prairie sedge
Cyperaceae	*Carex rosea*	Stellate sedge
Cyperaceae	*Carex scoparia*	Pointed-broom sedge
Cyperaceae	*Carex sprengelii*	Sprengel's sedge
Cyperaceae	*Carex stipata*	Awl-fruited sedge
Cyperaceae	*Carex stricta*	Tusssock-sedge
Cyperaceae	*Carex tenera*	Marsh-straw sedge
Cyperaceae	*Carex vulpinoidea*	Fox-sedge
Cyperaceae	*Eleocharis palustris*	Common spike-rush
Cyperaceae	*Eleocharis smallii*	Small's spike-rush
Cyperaceae	*Eriophorum angustifolium*	Narrow-leaved cotton-grass
Cyperaceae	*Schoenoplectus fluviatilis*	River bulrush
Cyperaceae	*Scirpus atrovirens*	Dark green bulrush
Cyperaceae	*Scirpus hattorianus*	Hattorian bulrush
Cyperaceae	*Scirpus tabernaemontani*	soft-stem bulrush
Equisetaceae	*Equisetum hyemale*	Tall scouring-rush
Euphorbiaceae	*Euphorbia corollata*	Flowering spurge
Euphorbiaceae	*Euphorbia esula*	Leafy spurge
Fabaceae	*Amorpha canescens*	Lead-plant
Fabaceae	*Amorpha fruticosa*	False indigo
Fabaceae	*Amphicarpaea bracteata*	Hog-peanut
Fabaceae	*Apios americana*	Groundnut
Fabaceae	*Coronilla varia*	Crown-vetch
Fabaceae	*Dalea purpurea*	Purple prairie-clover
Fabaceae	*Desmodium canadense*	Canadian tick-trefoil
Fabaceae	*Lathyrus palustris*	Marsh vetchling
Fabaceae	*Lespedeza capitata*	Round-headed bush-clover
Fabaceae	*Lotus corniculatus*	Bird's-foot trefoil
Fabaceae	*Medicago lupulina*	Black medick
Fabaceae	*Medicago sativa*	Alfalfa
Fabaceae	*Melilotus alba*	White sweet clover
Fabaceae	*Pediomelum argophyllum*	silver-leaf scurf-pea
Fabaceae	*Trifolium hybridum*	Alsike clover
Fabaceae	*Trifolium pratense*	Red clover
Fabaceae	*Trifolium repens*	White clover
Fabaceae	*Vicia americana*	American vetch
Fagaceae	*Quercus ellipsoidalis*	Northern pin oak
Fagaceae	*Quercus macrocarpa*	Bur oak
Fagaceae	*Quercus rubra*	Red oak
Gentianaceae	*Gentiana andrewsii*	Closed gentian
Grossulariaceae	*Ribes cynosbati*	Prickly gooseberry
Hydrophyllaceae	*Hydrophyllum virginianum*	Virginia waterleaf
Iridaceae	*Iris pseudacorus*	Yellow flag
Iridaceae	*Iris virginica*	Southern blue flag
Iridaceae	*Sisyrinchium campestre*	Field blue-eyed grass

FAMILY	Species	Common Name
Juglandaceae	*Carya cordiformis*	Bitternut hickory
Juglandaceae	*Juglans nigra*	Black walnut
Juncaceae	*Juncus alpinoarticulatus*	Alpine rush
Juncaceae	*Juncus tenuis*	Path rush
Lamiaceae	*Agastache foeniculum*	Blue giant-hyssop
Lamiaceae	*Leonurus cardiaca*	Lion's ear
Lamiaceae	*Leonurus sibiricus*	Motherwort
Lamiaceae	*Lycopus americanus*	Cut-leaved bugleweed
Lamiaceae	*Monarda fistulosa*	Wild bergamot
Lamiaceae	*Nepeta cataria*	Catnip
Lamiaceae	*Scutellaria parvula*	Prairie skullcap
Linaceae	*Linum sulcatum*	Grooved yellow flax
Lobeliaceae	*Lobelia spicata*	Rough-spiked Lobelia
Lythraceae	*Lythrum salicaria*	Purple loosestrife
Malvaceae	*Tilia americana*	Basswood
Menispermaceae	*Menispermum canadense*	Canada moonseed
Moraceae	*Morus alba*	White mulberry
Myrsinaceae	*Lysimachia thyrsiflora*	Tufted loosestrife
Nyctaginaceae	*Mirabilis nyctaginea*	Heart-leaved four-o'clock
Oleaceae	*Fraxinus pennsylvanica*	Green ash
Onagraceae	*Calylophus serrulatus*	Toothed evening primrose
Onagraceae	*Circaea lutetiana*	Canada enchanter's nightshade
Ophioglossaceae	*Botrychium virginianum*	Rattlesnakefern
Papaveraceae	*Sanguinaria canadensis*	Bloodroot
Phrymaceae	*Phryma leptostachya*	Lopseed
Pinaceae	*Pinus resinosa*	Red pine
Plantaginaceae	*Besseya bullii*	Kitten-tails
Plantaginaceae	*Plantago major*	Common plantain
Plantaginaceae	*Plantago patagonica*	Pursh's plantain
Poaceae	*Agrostis gigantea*	Redtop
Poaceae	*Agrostis stolonifera*	spreading bent
Poaceae	*Andropogon gerardii*	Big bluestem
Poaceae	*Bouteloua curtipendula*	Side-oats grama
Poaceae	*Bouteloua hirsuta*	Hairy grama
Poaceae	*Bromus inermis*	Smooth brome
Poaceae	*Bromus pubescens*	Hairy brome
Poaceae	*Bromus tectorum*	Cheatgrass
Poaceae	*Calamagrostis canadensis*	Bluejoint
Poaceae	*Danthonia spicata*	Poverty grass
Poaceae	*Dichanthelium leibergii*	Leiberg's panicgrass
Poaceae	*Elymus canadensis*	Canada wild rye
Poaceae	*Elymus trachycaulus*	Slender wheatgrass
Poaceae	*Elymus virginicus*	Virginia wild rye
Poaceae	*Elytrigia repens*	Quack grass
Poaceae	*Eragrostis spectabilis*	Purple lovegrass
Poaceae	*Festuca rubra*	Red fescue
Poaceae	*Glyceria grandis*	Tall manna-grass
Poaceae	*Hesperostipa comata*	needle-and-thread grass
Poaceae	*Hordeum jubatum*	Foxtail barley
Poaceae	*Koeleria macrantha*	June-grass
Poaceae	*Leersia oryzoides*	Rice cut grass

FAMILY	Species	Common Name
Poaceae	*Muhlenbergia cuspidata*	Plains muhly
Poaceae	*Panicum capillare*	Witch grass
Poaceae	*Panicum virgatum*	Switchgrass
Poaceae	*Phalaris arundinacea*	Reed canary-grass
Poaceae	*Phleum pratense*	Cultivated timothy
Poaceae	*Phragmites australis*	Common reed
Poaceae	*Poa pratensis*	Kentucky bluegrass
Poaceae	*Schizachyrium scoparium*	Little bluestem
Poaceae	*Setaria* sp.	Bristly Foxtail
Poaceae	*Sorghastrum nutans*	Indian grass
Poaceae	*Sporobolus heterolepis*	Prairie dropseed
Polemoniaceae	*Phlox pilosa*	Prairie phlox
Polygonaceae	*Polygonum amphibium*	Water smartweed
Polygonaceae	*Polygonum lapathifolium*	Nodding smartweed
Polygonaceae	*Rumex crispus*	Curly dock
Polygonaceae	*Rumex orbiculatus*	Great water dock
Ranunculaceae	*Actaea rubra*	Red baneberry
Ranunculaceae	*Anemone canadensis*	Canada anemone
Ranunculaceae	*Anemone cylindrica*	Candle amemone
Ranunculaceae	*Aquilegia canadensis*	Columbine
Ranunculaceae	*Caltha palustris*	Swamp marsh-marigold
Ranunculaceae	*Clematis virginiana*	Virgin's bower
Ranunculaceae	*Thalictrum dasycarpum*	Tall meadow-rue
Rhamnaceae	*Rhamnus cathartica*	Common buckthorn
Rosaceae	*Crataegus* sp.	Hawthorn species
Rosaceae	*Geum triflorum*	Prairie smoke
Rosaceae	*Potentilla arguta*	Tall cinquefoil
Rosaceae	*Potentilla norvegica*	Rough cinquefoil
Rosaceae	*Prunus serotina*	Black cherry
Rosaceae	*Prunus virginiana*	Chokecherry
Rosaceae	*Rosa arkansana*	Prairie rose
Rosaceae	*Rosa blanda*	Smooth wild rose
Rosaceae	*Rubus occidentalis*	Black raspberry
Rubiaceae	*Galium aparine*	Cleavers
Rubiaceae	*Galium boreale*	Northern bedstraw
Rubiaceae	*Hedyotis longifolia*	Bluets
Ruscaceae	*Maianthemum canadense*	Canada mayflower
Ruscaceae	*Polygonatum biflorum*	giant solomon's-seal
Rutaceae	*Zanthoxylum americanum*	Prickly ash
Salicaceae	*Populus deltoides*	Cottonwood
Salicaceae	*Populus tremuloides*	Quaking aspen
Salicaceae	*Salix bebbiana*	Bebb's willow
Salicaceae	*Salix candida*	Sage-leaved willow
Salicaceae	*Salix discolor*	Pussy willow
Salicaceae	*Salix exigua*	Sand-bar willow
Salicaceae	*Salix nigra*	Black willow
Salicaceae	*Salix petiolaris*	Meadow willow
Santalaceae	*Comandra umbellata*	Bastard toad-flax
Sapindaceae	*Acer negundo*	Box elder
Sapindaceae	*Acer saccharinum*	Silver maple
Saxifragaceae	*Heuchera richardsonii*	Alum-root

FAMILY	Species	Common Name
Scrophulariaceae	*Verbascum thapsus*	Common mullein
Smilacaceae	*Smilax herbacea*	Tendriled carrion-flower
Solanaceae	*Physalis virginiana*	Ground-cherry
Sparganiaceae	*Sparganium eurycarpum*	Giant bur-reed
Thelyperidaceae	*Thelypteris palustris*	Northern marsh-fern
Typhaceae	*Typha angustifolia*	Narrow-leaved cat-tail
Typhaceae	*Typha latifolia*	Broad-leaved cattail
Typhaceae	*Typha x glauca*	Hybrid cattail
Ulmaceae	*Celtis occidentalis*	Hackberry
Ulmaceae	*Ulmus americana*	American elm
Ulmaceae	*Ulmus pumila*	Siberian elm
Urticaceae	*Boehmeria cylindrica*	False nettle
Urticaceae	*Laportea canadensis*	Wood-nettle
Urticaceae	*Urtica dioica*	Stinging nettle
Verbenaceae	*Verbena stricta*	Hoary vervain
Violaceae	*Viola pubescens*	Yellow violer
Violaceae	*Viola sp.*	Violet
Vitaceae	*Parthenocissus vitacea*	Virginia creeper
Vitaceae	*Vitis riparia*	Wild grape

Appendix D

Plant Community and Rare Plant Photographs

Dry Prairie – 6/13/11.

Dry Prairie – 9/13/11. Exposed rock with short grass prairie species.

Dry Prairie – 9/13/11.

Dry Prairie– 9/13/11. Prairie vegetation on substrate altered by previous mining.

Oak Woodland – 6/14/11.

Oak Woodland – 6/14/11.

Floodplain Forest – 7/19/11.

Floodplain Forest – 7/15/11.

Wet Meadow – 6/16/11.

Wet Meadow – 6/16/11.

Shrub Carr – 6/16/11.

Bulrush Marsh – 6/16/11.

Grassland – 6/17/11.

Grassland – 6/17/11.

Second Growth Forest – 6/17/11.

Second Growth Forest – 8/03/11.

Sparsely Vegetated – 6/14/11. Previously mined area.

Sparsely Vegetated – 6/14/11. Previously mined area.

Kitten tails (*Besseya bullii*) – 6/13/11. Several plants with inflorescences.

Kitten tails (*Besseya bullii*) – 6/13/11. Rosettes of basal leaves.

Kitten tails (*Besseya bullii*) – 6/13/11.

Kitten tails (*Besseya bullii*) – 6/13/11.

Kitten tails (*Besseya bullii*) – 6/13/11.

Kitten tails (*Besseya bullii*) – 6/13/11. Plant locations indicated by pin flags in moderately open dry prairie remnant.

Kitten tails (*Besseya bullii*) – 6/13/11. Plant locations indicated by pin flags in dry prairie remnant with thick shrub encroachment.

Kitten tails (*Besseya bullii*) – 6/13/11. Plant locations indicated by pin flags in dry prairie remnant with thick shrub encroachment.

Appendix E

Rare Features Reporting Forms

Minnesota Natural Heritage Information System

Rare Feature Reporting Form – Short Form

FOR DATABASE PERSONNEL USE ONLY
EO_ID: _____ Occ#: _____
SF_ID(s): _____ _____
_____ _____
_____ _____
Parent EO#: _____
Transcriber _____ Date _____
Mapped _____ _____ Map QC _____
Entered _____ _____ Data QC _____

* Scientific Name: __*Bessey bullii*_____

Common Name: __Kitten-tail_____

* Survey Date: _____6/13/11_____ Time: ___9 AM_____

* Observer(s): ___Daniel Tix, Daniel DeJoode_____

_____

LOCATION

* Map: *The map may be a photocopy of a USGS 7.5 min. topographic quadrangle and a hand drawn shape, or in electronic format such as a pdf or shapefile. Draw a dashed line around the area searched, if applicable.*

Directions/comments/description of location *(include distances from permanent landmarks)*: **Population found in degraded prairie remnant approx ½ miles west of Hwy 169, in parcel immediately north of parking area for USFWS wildlife refuge. The site is adjacent to extensive abandoned mine areas to the north and west.**

* County: __Scott_____ State: __MN_____

* Lat./Long ***or*** UTM ***or*** PLS: -provide one of the three, either below or in a shapefile

_x____ Location information is provided in the included shapefile, named _Kitten_tails_patches.shp_____

or

_____ Location information is provided below (attach additional sheet if more space is needed).

Latitude Deg.	Min.	Sec.	Longitude Deg.	Min	Sec.	Accuracy (in meters)	UTM Northing	Easting	Accuracy (in meters)	PLS Twp.	Rng.	Sec.
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	Zone _____ *(Zone 15 preferred!)*			_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	NAD83___ or NAD27___			_____	_____	_____
(provide degrees, minutes, and seconds)							*(NAD83 preferred!)*			_____	_____	_____

Location Comments:

* Location(s) obtained via GPS: Y__x_ /N___ If no, describe how you obtained location information (*e.g. "plotted the estimated location in GIS and obtained UTM for that point," or "recorded PLS from USGS map."*): _____

_____

Digitizing/Mapping comments (*e.g. "drew polygon around points that were GPS'ed in the field," or "used 2004 aerial photo to delineate boundary of field where rare feature was observed."*):

recorded points and polygons on GPS unit, points were later digitized to create polygons in GIS.

* Estimated accuracy of location(s) (*mark all that apply*): 6-25m_x__ 25-50m___ 50-100m___ 100-200m___ other:____m
(you may omit this section if you provide an accuracy measurement for each location, either above or in a shapefile)

Accuracy Comments (*e.g "accuracy values were obtained from GPS unit at beginning and end of survey," or "GPS accuracy not recorded, but accuracy is high because exact location can be seen on aerial photo."*):

GPS units had sub-meter accuracy.

SURVEY INFO. If the species was searched for but not found, check here: ___ Revisit needed? Y___/ N___ When? _____

* Nature of obs.: trapped__ found dead__ sight record__ song/call__ tracks__ other (describe): _____

Survey type / description: walkover, meander search throughout prairie remnants

_____

BIOLOGY

Number	Sex	Age/Developm't Stage	#Counted or Estimate of Total?		Plants Only (check all that apply) Leaves	Flowers & Fruit	
_350__	___	_____	**Count_x_**	Est. __	dormant __	dormant	__
__650	_ _	_____	**Count_x__**	Est. ___	budding __	budding	__
_____	_____	_____	Count___	Est. ___	new leaf __	in flower	__
_____	_____	_____	Count___	Est. ___	full **leaf _x_**	**fruiting**	**x__**
_____	_____	_____	Count___	Est. ___	leaf fall __	dispersing seed __	

Evidence of reproduction (if any): **Approximately 1000 plants were found, approximately 1/3 had inflorescences and had recently flowered and were now developing fruit. The remaining 2/3 of plants were observed as basal rosettes of leaves.**

HABITAT

General Description (topography, moisture, light, plant community, soils): **well drained shallow clay loam soils over shallow bedrock. Topography is slightly undulating but generally flat. Kitten-tails are found in degraded prairie remnant with extensive woody plant encroachment. Relatively few areas without shrub cover. Kitten-tails does occur under low shrub canopies but where shrubs and saplings create dense shade of a multi-layer canopy, the plant is absent.**

CONSERVATION / PROTECTION

Disturbances and threats: **Fire exclusion, encroachment of woody plants and non-native grasses**.

Landowner: **Mid-America Festivals**

* **IDENTIFICATION / DOCUMENTATION**

Specimen collected?: Y___ /N_x__ Collector: _____ Coll. #: _____ Coll. Date: _____

Collector's address, phone: _____

Repository: _____ Accession #: _____

Specimens submitted to the NHNRP/MCBS will be accessioned into the U. Minn. Herbarium in St. Paul unless the collector requests another repository.

Photo/slide taken?: Y_x__ /N___ Comments (location, storage): _____

Basis for ID (list manuals, keys, experts, etc. consulted, if applicable): **DNR rare species guide online, Gleason and Cronquist; Ladd and Oberle, 2005, Tallgrass prairie wildflowers, Falcon Guides.**

FOR DATABASE PERSONNEL USE ONLY
Verified by: _____ Repository: _____ Date sent: _____ Accession #: _____

COMMENTS

Approximately 10 patches of kitten-tails were observed, most consisting of several dozen plants, but some had several hundred plants. Dry prairie (UPs13b) remnants with very limited openings, due to significant encroachment of shrubs particularly *Rhus glabra* and *Zanthoxylum americanum*. Dominant native grasses include *Andropogon gerardii* and

Sorghastrum nutans*, but non-native grasses are also abundant and include *Poa pratensis* and *Bromus inermis*. Other associated species include *Elytrigia repens, Phleum pratense, Dalea purpurea, Verbena stricta, Symphoricarpos occidentalis, Ratibida pinnata, Amorpha canescens, Pediomelum argophyllum, Lithospermum canescens, Hedyotis longifolia, Asclepias tuberose, Asclepias verticillata, Melilotus alba, Medicago lupulina, Monarda fistulosa, Commandra umbellata.

*indicates a required section or field

Return to: Data Manager, Natural Heritage and Nongame Research Program, Minn. DNR, 500 Lafayette Rd. Box 25, St. Paul, MN 55155
Form may also be sent via email to sharron.nelson@dnr.state.mn.us - emailed forms MUST be accompanyed by a map of the observation, either in shapefile, pdf, or some other widely viewable format.
Form 23 July 2007

Minnesota Natural Heritage Information System

Rare Feature Reporting Form – Short Form

FOR DATABASE PERSONNEL USE ONLY
EO_ID: _____ Occ#: _____
SF_ID(s): _____ _____
_____ _____
_____ _____
Parent EO#: _____
Transcriber _____ Date _____
Mapped _____ _____ Map QC _____
Entered _____ _____ Data QC _____

* Scientific Name: __*Chelydra serpentina*_____

Common Name: __Common snapping turtle_____

* Survey Date: ___06-17-2011_____ Time: ____09:00_____

* Observer(s): __Genesis Mickel_____

_____

LOCATION

* Map: *The map may be a photocopy of a USGS 7.5 min. topographic quadrangle and a hand drawn shape, or in electronic format such as a pdf or shapefile. Draw a dashed line around the area searched, if applicable.*

Directions/comments/description of location *(include distances from permanent landmarks)*: _Female snapping turtle (possibly gravid) observed in field road consisting of loose sand. Turtle was excavating a cavity in the sand, presumably speculating for nest site locations. Map attached. _____

_____

* County: _____Scott County_____ State: _____MN_____

* Lat./Long ***or*** UTM ***or*** PLS: -provide one of the three, either below or in a shapefile

_____ Location information is provided in the included shapefile, named _____

or

__X__ Location information is provided below (attach additional sheet if more space is needed).

Latitude Deg.	Min.	Sec.	Longitude Deg.	Min	Sec.	Accuracy (in meters)	UTM Northing	Easting	Accuracy (in meters)	PLS Twp.	Rng.	Sec.
44_	45_	47.967	93_	35_	49.514_	__10___	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	Zone _____ *(Zone 15 preferred!)*			_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	NAD83___ or NAD27___			_____	_____	_____
(provide degrees, minutes, and seconds)							*(NAD83 preferred!)*			_____	_____	_____

Location Comments:

* Location(s) obtained via GPS: Y __ /N_X__ If no, describe how you obtained location information (*e.g. "plotted the estimated location in GIS and obtained UTM for that point," or "recorded PLS from USGS map."*): __Located observation point in the office via review of aerial photography of site. Recorded with GIS point._____

Digitizing/Mapping comments (*e.g. "drew polygon around points that were GPS'ed in the field," or "used 2004 aerial photo to delineate boundary of field where rare feature was observed."*): ___Used 2010 aerial imagery and familiarity with the site to located observation point in the office. _____

* Estimated accuracy of location(s) (*mark all that apply*): 6-25m_X__ 25-50m___ 50-100m___ 100-200m___ other:____m
(you may omit this section if you provide an accuracy measurement for each location, either above or in a shapefile)

Accuracy Comments (*e.g "accuracy values were obtained from GPS unit at beginning and end of survey," or "GPS accuracy not recorded, but accuracy is high because exact location can be seen on aerial photo."*): ____GPS accuracy not recorded, but accuracy is high because exact location can be seen on aerial photo._____

SURVEY INFO. If the species was searched for but not found, check here: ___ Revisit needed? Y___/ N_X_ When? _____

* Nature of obs.: trapped__ found dead__ sight record_X_ song/call__tracks__ other (describe): _____

Survey type / description: ___Qualitative wildlife survey, Merriam Junction Sands_____

BIOLOGY

Number	Sex	Age/Developm't Stage	#**Count**ed or **Est**imate of Total?		Plants Only (check all that apply) Leaves	Flowers & Fruit	
___1__	__F__	___gravid adult_____	Count_X__	Est. ___	new leaf __	in flower	__
_____	_____	_____	Count___	Est. ___	full leaf __	fruiting	__
_____	_____	_____	Count___	Est. ___	leaf fall __	dispersing seed	__

Evidence of reproduction (if any): ____excavating a hole with back feet. Possibly seeking a suitable nest location _____

HABITAT

General Description (topography, moisture, light, plant community, soils): ____Sandy field road surrounded by dense secondary growth forest. Gifford Lake, nearest waterbody, a few hundred feet to the west. _____

CONSERVATION / PROTECTION

Disturbances and threats: __TBD. Species proposed for delisting from SSC to unlisted._____

Landowner: __Bruce Malkerson_____

* IDENTIFICATION / DOCUMENTATION

Specimen collected?: Y___ /N_X__ Collector: _____ Coll. #: _____ Coll. Date: _____

Collector's address, phone: _____

Repository: _____ Accession #: _____

Specimens submitted to the NHNRP/MCBS will be accessioned into the U. Minn. Herbarium in St. Paul unless the collector requests another repository.

Photo/slide taken?: Y_X__ /N___ Comments (location, storage): __photo attached_____

Basis for ID (list manuals, keys, experts, etc. consulted, if applicable): ___basic wildlife identification_____

_____

FOR DATABASE PERSONNEL USE ONLY
Verified by: _____ Repository: _____ Date sent: _____ Accession #: _____

COMMENTS

_____

_____

_____

*indicates a required section or field

Return to: Data Manager, Natural Heritage and Nongame Research Program, Minn. DNR, 500 Lafayette Rd. Box 25, St. Paul, MN 55155

Form may also be sent via email to sharron.nelson@dnr.state.mn.us - emailed forms MUST be accompanyed by a map of the observation, either in shapefile, pdf, or some other widely viewable format.

Form 23 July 2007

Minnesota Natural Heritage Information System

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FOR DATABASE PERSONNEL USE ONLY
EO_ID: _____ Occ#: _____
SF_ID(s): _____ _____
_____ _____
_____ _____
Parent EO#: _____
Transcriber _____ Date _____
Mapped _____ _____ Map QC _____
Entered _____ _____ Data QC _____

* Scientific Name: __ *Chondestes grammacus* _____

Common Name: __Lark sparrow_____

* Survey Date: ___06-17-2011_____ Time: ____11:00_____

* Observer(s): __Genesis Mickel_____

_____

LOCATION

* Map: *The map may be a photocopy of a USGS 7.5 min. topographic quadrangle and a hand drawn shape, or in electronic format such as a pdf or shapefile. Draw a dashed line around the area searched, if applicable.*

Directions/comments/description of location *(include distances from permanent landmarks)*: Map attached.

_____

* County: _____Scott County_____ State: _____MN_____

* Lat./Long ***or*** UTM ***or*** PLS: -provide one of the three, either below or in a shapefile

_____ Location information is provided in the included shapefile, named _____

or

__X__ Location information is provided below (attach additional sheet if more space is needed).

Latitude Deg.	Min.	Sec.	Longitude Deg.	Min	Sec.	Accuracy (in meters)	UTM Northing	Easting	Accuracy (in meters)	PLS Twp.	Rng.	Sec.
_44_	44_	31.572_	_93_	_36_	42.628_	__200*___	_____			T115N_	23W_	29_
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	Zone _____ *(Zone 15 preferred!)*			_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	NAD83___ or NAD27___			_____	_____	_____
(provide degrees, minutes, and seconds)							*(NAD83 preferred!)*			_____	_____	_____

Location Comments:

* Location(s) obtained via GPS: Y _X_ /N___ If no, describe how you obtained location information (*e.g. "plotted the estimated location in GIS and obtained UTM for that point," or "recorded PLS from USGS map."*):

__*Coordinate provided is general centerpoint of all lark sparrow observations_____

Digitizing/Mapping comments (*e.g. "drew polygon around points that were GPS'ed in the field," or "used 2004 aerial photo to delineate boundary of field where rare feature was observed."*): ___Used GPS points recorded in the field.

_____

* Estimated accuracy of location(s) (*mark all that apply*): 6-25m_X__ 25-50m___ 50-100m___ 100-200m___ other:____m

(you may omit this section if you provide an accuracy measurement for each location, either above or in a shapefile)

Accuracy Comments (*e.g "accuracy values were obtained from GPS unit at beginning and end of survey," or "GPS accuracy not recorded, but accuracy is high because exact location can be seen on aerial photo."*): ____Not every lark sparrow seen was GPSed or photographed._____

SURVEY INFO. If the species was searched for but not found, check here: ___ Revisit needed? Y___/ N_X_ When? _____

* Nature of obs.: trapped__ found dead__ sight record_X_ song/call__tracks__ other (describe): _____

Survey type / description: ___Qualitative wildlife survey, Merriam Junction Sands_____

BIOLOGY

Number	Sex	Age/Developm't Stage	#Counted or Estimate of Total?		Plants Only (check all that apply) Leaves	Flowers & Fruit	
___5-6_	__?__	___adults/subadults?__	Count_X__	Est. ___	new leaf __	in flower	__
_____	_____	_____	Count___	Est. ___	full leaf __	fruiting	__
_____	_____	_____	Count___	Est. ___	leaf fall __	dispersing seed	__

Evidence of reproduction (if any): ____Observed a pair in a tall shrub. Found an unoccupied nest in an abutting shrub. Unknown if nest belonged to the pair. Other solitary individuals observed vocalizing elsewhere._____

HABITAT

General Description (topography, moisture, light, plant community, soils): ____Previously mined area with sparse vegetation (ruderal herbaceous vegetation and saplings); surrounding shrublands along margins. Soils sparse or absent, rocky/gravelly. Full sun exposure, fairly xeric._____

CONSERVATION / PROTECTION

Disturbances and threats: __TBD. Species proposed for listing to SSC._____

Landowner: __Mid-America Festival_____

* **IDENTIFICATION / DOCUMENTATION**

Specimen collected?: Y___ /N_X__ Collector: _____ Coll. #: _____ Coll. Date: _____

Collector's address, phone: _____

Repository: _____ Accession #: _____

Specimens submitted to the NHNRP/MCBS will be accessioned into the U. Minn. Herbarium in St. Paul unless the collector requests another repository.

Photo/slide taken?: Y_X__ /N___ Comments (location, storage): __Photo attached_____

Basis for ID (list manuals, keys, experts, etc. consulted, if applicable): ___confirmed with bird identification field guides_____

_____

FOR DATABASE PERSONNEL USE ONLY
Verified by: _____ Repository: _____ Date sent: _____ Accession #: _____

COMMENTS

_____

_____

_____

*indicates a required section or field

Return to: Data Manager, Natural Heritage and Nongame Research Program, Minn. DNR, 500 Lafayette Rd. Box 25, St. Paul, MN 55155

Form may also be sent via email to sharron.nelson@dnr.state.mn.us - emailed forms MUST be accompanyed by a map of the observation, either in shapefile, pdf, or some other widely viewable format.

Form 23 July 2007

Minnesota Natural Heritage Information System

Rare Feature Reporting Form – Short Form

FOR DATABASE PERSONNEL USE ONLY
EO_ID: _____ Occ#: _____
SF_ID(s): _____ _____
_____ _____
_____ _____
Parent EO#: _____
Transcriber _____ Date _____
Mapped _____ _____ Map QC _____
Entered _____ _____ Data QC _____

* Scientific Name: __ *Lampropeltis triangulum* _____

Common Name: __Milk snake_____

* Survey Date: ___6-14-2011_____ Time: ____2:30pm_____

* Observer(s): __Daniel Tix_____

_____

LOCATION

* Map: *The map may be a photocopy of a USGS 7.5 min. topographic quadrangle and a hand drawn shape, or in electronic format such as a pdf or shapefile. Draw a dashed line around the area searched, if applicable.*

Directions/comments/description of location *(include distances from permanent landmarks)*: _ Map attached.

_____

* County: _____Scott County_____ State: _____MN_____

* Lat./Long ***or*** UTM ***or*** PLS: -provide one of the three, either below or in a shapefile

_____ Location information is provided in the included shapefile, named _____

or

__X__ Location information is provided below (attach additional sheet if more space is needed).

Latitude Deg.	Min.	Sec.	Longitude Deg.	Min	Sec.	Accuracy (in meters)	UTM Northing	Easting	Accuracy (in meters)	PLS Twp.	Rng.	Sec.
__44_	44___	48.6522	_-93____	36__	34.632	__50_____	_____	_____	_____	T115N,	R23W	20
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	Zone _____ *(Zone 15 preferred!)*			_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	NAD83___ or NAD27___			_____	_____	_____
(provide degrees, minutes, and seconds)							*(NAD83 preferred!)*			_____	_____	_____

Location Comments:

* Location(s) obtained via GPS: Y _X=_ /N_X__ If no, describe how you obtained location information (*e.g. "plotted the estimated location in GIS and obtained UTM for that point," or "recorded PLS from USGS map."*):__Plotted the location point in the office using GIS. _____

Digitizing/Mapping comments (*e.g. "drew polygon around points that were GPS'ed in the field," or "used 2004 aerial photo to delineate boundary of field where rare feature was observed."*): ___GIS point created in the office, based upon 2010 aerial photography and familiarity with the site. _____

* Estimated accuracy of location(s) (*mark all that apply*): 6-25m___ 25-50m_X_ 50-100m___ 100-200m___ other:____m
(you may omit this section if you provide an accuracy measurement for each location, either above or in a shapefile)

Accuracy Comments (*e.g "accuracy values were obtained from GPS unit at beginning and end of survey," or "GPS accuracy not recorded, but accuracy is high because exact location can be seen on aerial photo."*): ____Accuracy of point may be a little off. GIS point created based on observer's field map and description._____

SURVEY INFO. If the species was searched for but not found, check here: ___ Revisit needed? Y___/ N_X_ When? _____

* Nature of obs.: trapped__ found dead__ sight record_X_ song/call__ __ other (describe): _____

Survey type / description: ___Qualitative wildlife survey, Merriam Junction Sands_____

BIOLOGY

Number	Sex	Age/Developm't Stage	#**Count**ed or **Est**imate of Total?		Plants Only (check all that apply) Leaves	Flowers & Fruit	
__1__	__?__	__adult_____	Count_X_	Est. ___	dormant __	dormant	__
__	_ _	__ _____	Count___	Est. ___	budding __	budding	__
____	____	_____	Count_ __	Est. ___	new leaf __	in flower	__
_____	_____	_____	Count___	Est. ___	full leaf __	fruiting	__
_____	_____	_____	Count___	Est. ___	leaf fall __	dispersing seed	__

Evidence of reproduction (if any): ____None observed._____

HABITAT

General Description (topography, moisture, light, plant community, soils): ____Along the edge of a dry grassy opening in a disturbed oak woodland._____

CONSERVATION / PROTECTION

Disturbances and threats: __Nearby previous mining activities, potentially more in future.

Landowner: __Mid-America Festival_____

* IDENTIFICATION / DOCUMENTATION

Specimen collected?: Y___ /N_X__ Collector: _____ Coll. #: _____ Coll. Date: _____

Collector's address, phone: _____

Repository: _____ Accession #: _____

Specimens submitted to the NHNRP/MCBS will be accessioned into the U. Minn. Herbarium in St. Paul unless the collector requests another repository.

Photo/slide taken?: Y_X__ /N___ Comments (location, storage): __photo attached _____

Basis for ID (list manuals, keys, experts, etc. consulted, if applicable): ___confirmed with snake identification field guides_____

_____

FOR DATABASE PERSONNEL USE ONLY
Verified by: _____ Repository: _____ Date sent: _____ Accession #: _____

COMMENTS

___Snake was found under plywood and discarded lumber at edge of wooded area; aggressively defended itself___

_____

_____

*indicates a required section or field

Return to: Data Manager, Natural Heritage and Nongame Research Program, Minn. DNR, 500 Lafayette Rd. Box 25, St. Paul, MN 55155

Form may also be sent via email to sharron.nelson@dnr.state.mn.us - emailed forms MUST be accompanyed by a map of the observation, either in shapefile, pdf, or some other widely viewable format.

Form 23 July 2007

Appendix F

List of Wildlife Species Survey Observed

Appendix F. Merriam Junction Sand Mine List of Wildlife Species Observed

BIRDS									
Common Name	**Scientific Name**	**Grassland**	**Hardwood Forest**	**Woodlands**	**Shrubland**	**Marsh**	**Farmland/ Commercial**	**Previously Mined**	**Active Mining**
American crow	*Corvus brachyrhynchos*				x				
American goldfinch	*Spinus tristis*	xx			xx		xx	x	
American robin	*Turdus migratorius*		x	x	x		x		
Bald eagle	*Haliaeetus leucocephalus*		x						
Bank swallow	*Riparia riparia*							xx	xx
Barn swallow	*Hirundo rustica*	xx					x		
Black-and-white warbler	*Mniotilta varia*		o						
Black-capped chickadee	*Poecile atricapillus*		xx		x				
Blue jay	*Cyanocitta cristata*		x		x				
Bobolink	*Dolichonyx oryzivorus*	x							
Brown thrasher	*Toxostoma rufum*				o				
Brown-headed cowbird	*Molothrus ater*				x			x	
Cedar waxwing	*Bombycilla cedrorum*		x		xx			x	
Chipping sparrow	*Spizella passerina*	xx					x		
Clay-colored sparrow	*Spizella pallida*	x							
Common yellowthroat	*Geothlypis trichas*				o				
Dickcissel+	*Spiza americana*	x							
Eastern bluebird	*Sialia sialis*				x				
Eastern kingbird	*Tyrannus tyrannus*				x			x	
Eastern phoebe	*Sayornis phoebe*			x	x		x		
Eastern wood-pewee+	*Contopus virens*		x						
Field sparrow+	*Spizella pusilla*	x			x			x	
Gray catbird	*Dumatella carolinensis*		x	x	x				
Hairy woodpecker	*Picoides villosus*			x	x				
House sparrow	*Passer domesticus*	x					x		
Indigo bunting	*Passerina cyanea*				x				
Belted kingfisher	*Megaceryle alcyon*		x						
Lark sparrow	*Chondestes gammacus*				x			x	
Mallard	*Anas platyrhynchos*		x						
Mourning dove	*Zenaida macroura*				xx		x	x	
Northern cardinal	*Cardinalis cardinalis*			x	x				
Northern flicker	*Colaptes auratus*				x				
House finch	*Carpodacus mexicanus*				x		x		
Red-breasted nuthatch+	*Sitta canadensis*		o						
Red-tailed hawk	*Buteo jamaicensis*	x					x	x	
Rose-breasted grosbeak	*Pheucticus ludovicianus*			x	x				
Sharp-shinned hawk	*Accipiter striatus*				o				
Turkey vulture	*Cathartes aura*	x			x			x	
White-breasted nuthatch+	*Sitta carolinensis*		x						
Wild turkey	*Meleagris gallopavo*		x	x	x			x	
MAMMALS									
Coyote+	*Canis latrans*	x	x						x
Gray squirrel	*Sciurus carolinensis*		x						
Thirteen-lined ground squirrel	*Spermophilus tridecemlineatus*						o		

Scientific Name	Common Name	Grassland	Hardwood Forest	Woodlands	Shrubland	Marsh	Commercial	Previously Mined	Active Mining
Woodchuck	*Marmota monax*						o		
Raccoon+	*Procyon lotor*		x					x	
River otter+	*Lontra canadensis*					x			
White-tailed deer	*Odocoileus virginianus*		x	x				x	x
HERPETOFAUNA									
American toad	*Bufo americanus*		x						
Bullfrog	*Rana catesbeiana*					x			
Common garter snake	*Thamnophis sirtalis sirtalis*		x		x			x	x
Green frog	*Rana clamitans*		x						
Northern leopard frog	*Rana pipiens*	x	xx	x		xx		x	
Common map turtle	*Graptemys geographics*			o					
Eastern milk snake	*Lampropeltis triangulum triangulum*			o					
Common snapping turtle	*Cheldra serpentina*			o					
Eastern gray treefrog	*Hyla versicolor*		o						
FISH									
Common carp	*Cyprinus carpio*					o			
Bullhead	*Ameiurus* spp.					o			

Key:

x = common (at least one individual observed at every survey event)

xx = abundant (dozens to hundreds observed at every survey event)

o = uncommon (seen only once or twice during entire survey season; not intended to suggest a rare species)

+ = indirect observation/s only (scat, tracks, vocalizations)

Appendix G

Wildlife Photographs

Milksnake discovered under plywood

Snapping turtle excavating in sand

Bank swallows in previously mined area

Bank swallows in active mining area

Lark sparrows observed in shrubland and previously mined habitat

Appendix G

WILDLIFE PHOTOGRAPHS
Merriam Junction Sands
Hunt Global Resources, Inc.
Scott County, MN