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MITIGATION PLAN FOR THE HILL ANNEX MINE PROJECT

Calumet , Itasca County, Minnesota

April 2025



MITIGATION PLAN FOR THE HILL ANNEX MINE PROJECT

Calumet, Itasca County, Minnesota

106 Group Project No. 3426

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1.0 OVERVIEW

From January through April 2025, 106 Group prepared this Mitigation Plan for the Hill Annex Mine Project (Project). The proposed Project includes the leasing of the Hill Annex Mine site to Calumet Reclamation Company (CRC) by the Minnesota Department of Natural Resources (MN DNR), which owns the property. As part of their proposed approach for lease of the property from the MN DNR and the Minnesota Department of Iron Range Resources and Rehabilitation (MN IRRR), the CRC is planning for the demolition of all buildings and structures within the Hill Annex Mine site, including the NRHP-listed Hill Annex Mine Historic District (District) (IC-GRN-00002), for the construction of a scram mining operation that includes new buildings, product stockpiles, and other infrastructure (Appendices A and B).

The District is listed in the NRHP. Therefore, the Project, proposed by MN DNR, MN IRRR, and CRC, must comply with applicable state mandates governing architectural history and archaeological resources, including the Minnesota Field Archaeology Act (MS 138.31), Minnesota Historic Sites Act (MS 138.661), and the Minnesota Private Cemeteries Act (307.08). The Project must also comply with the Programmatic Agreement between MN DNR and the Minnesota Historical Society (MNHS) from 2010, *Concerning the Resumption of Mining Activities at Hill-Annex Mine State Park*. No federal funding is anticipated. This mitigation plan was prepared through a contract with MN IRRR. The Project area on which this Mitigation Plan is focused is located in Sections 15, 16, 17, 20, 22, 23, 26, and 27 of Township 56 N, Range 23 W, Itasca County, Minnesota, in the Central Lakes Coniferous Archaeological Region (5c) (Figure 1 and Appendix A).

An appropriate Study Area for architectural history accounts for any physical, auditory, atmospheric, or visual impacts to historic properties. Based on the current Project plans, the architectural history Study Area includes the associated properties of the Hill Annex Mine Historic District and the District boundaries. The Hill Annex Mine Historic District includes approximately 619 acres (250.5 hectares [ha]) (Appendix A).

In order to provide an overview of archaeological potential for the entire Project, the Study Area for the archaeological literature review and assessment includes all areas of proposed construction activities or other potential ground disturbing activities associated with construction (project area). The total archaeology Study Area consists of 1,546 acres (626 ha). The Study Area for archaeology is based on the Project area identified in the CRC's Project Description (Appendix B).

As the Hill Annex Mine Historic District is listed in the NRHP, an assessment of effects study was also undertaken to assess potential effects of the Project on historic properties. 106 Group recommends that the Project will have an **adverse effect** on the District and, therefore, requires mitigation.

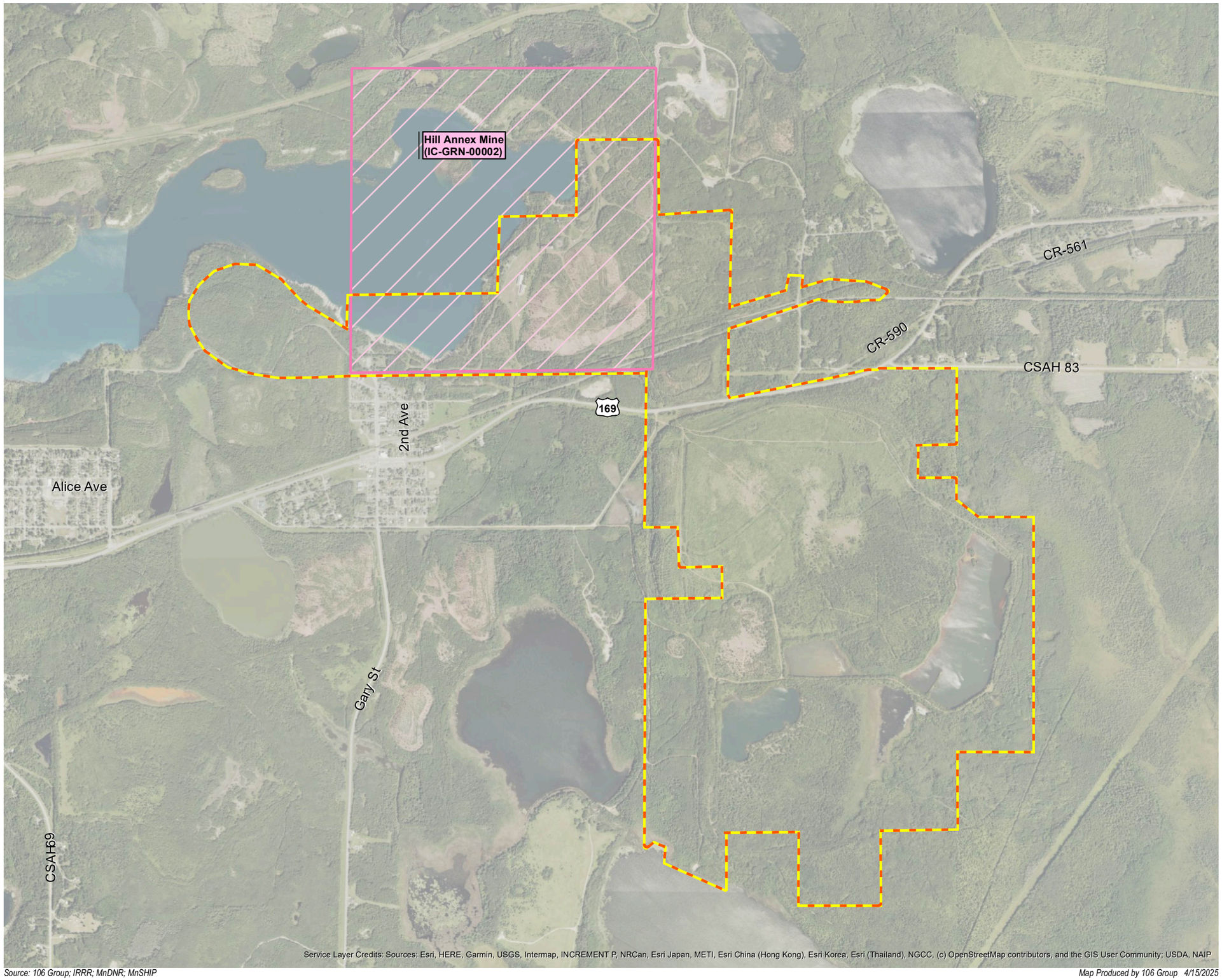
The following plan describes the regulatory context, site history, literature reviews and assessment, assessment of effects, and recommended mitigation strategies for the Project. A list of Project personnel can be found in Appendix D.

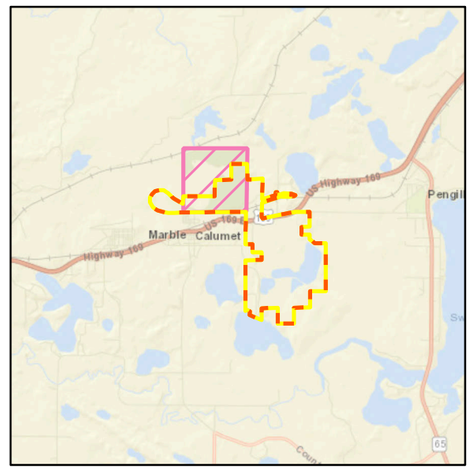
Hill Annex Mine Project
Mitigation Plan

Calumet, Itasca County, Minnesota

Project Location

NRHP-Listed Historic District





0 400 Meters

0 1,000 Feet

1:20,000

106GROUP

Project Location

Figure 1

Source: 106 Group; IRRR; MnDNR; MnSHIP

Map Produced by 106 Group 4/15/2025

2.0 REGULATORY CONTEXT

2.1 Minnesota Field Archaeology Act, 1963 (M.S. 138.31-138.42)

This Act established the Office of the State Archaeologist (OSA) and directs the OSA and Minnesota State Historic Preservation Office (SHPO) to make recommendations for the preservation of archaeological sites endangered by construction or development on non-federal public lands. The OSA and the MNHS issue licenses, in consultation with the Minnesota Indian Affairs Council (MIAC), for all archaeological investigations on non-federal public land. When a state archaeological site is known or suspected to exist on non-federal public land, the controlling agency must submit development plans to SHPO and OSA for review. The controlling agency, in consultation with SHPO and OSA, is responsible for taking actions to preserve such sites and is authorized to use its funds for such activities. If an area of proposed construction or activity overlaps an archaeological site, consultation with OSA and SHPO must take place before construction. If the site is related to American Indian history or religion, OSA must coordinate with MIAC for review and comment (State of Minnesota 2021a).

2.2 Minnesota State Historic Sites Act, 1965 (M.S. 138.661–138.669)

This Act creates a state register of properties "possessing historical, architectural, archaeological, and aesthetic values" for which adverse effects resulting from state-funded or licensed projects must be mitigated (State of Minnesota 2021b). Historic sites are defined as properties named in this Act or listed in the NRHP. Similar to federal regulations, any undertaking receiving funding or licensing by a state department or agency is covered by this Act (note: other political subdivisions are excluded from this clause). If the undertaking affects historic sites, as defined above, the state department or agency must consult with the SHPO to avoid or mitigate adverse effects. As the Project area includes the NRHP-listed Hill Annex Mine Historic District, this Act applies to this Project (State of Minnesota 2021b).

2.3 Minnesota Private Cemeteries Act, 1975 (M.S. 307.08)

This Act provides protection for marked and unmarked human burials and remains older than 50 years located outside of platted, recorded, or identified cemeteries, from unauthorized disturbance. This statute applies to burials on either non-federal public or private lands and waters. This Act designates the intentional destruction or removal of burial or human remains a crime. When American Indian burials are known or suspected to exist on public lands, the political subdivision controlling the land must submit development plans to the state archaeologist and MIAC for review before advertising bids (State of Minnesota 2021c, 2023).

2.4 Programmatic Agreement: Concerning the Resumption of Mining Activities at Hill-Annex Mine State Park (2010)

In 2010, the MN DNR entered into a Programmatic Agreement (PA) with the MNHS, which housed the SHPO at that time. The PA fulfilled the requirement of the Minnesota State Historic Sites Act, section 138.665. The primary goal of the PA was to facilitate collaboration between the two entities in "finding solutions that avoid, minimize, or mitigate possible adverse effects on historical resources that may result from resumption of mining at Hill-Annex Mine State Park" (MN DNR and MNHS 2010). The PA outlined responsibilities of both parties in the event that the then-state park site would be returned to mining use. MN DNR agreed to provide a plan of work for proposed mining activities, identifying mining activities and locations that could potentially affect the District. MNHS agreed to work cooperatively and in a timely manner to assess potential adverse effects to the historic property and collaborate on the development of mitigation strategies. As stated in the PA, these strategies could include documentation of the site and potential intepretation of its history. The development of this mitigation plan is in effort to meet the mutually agreed upon responsibilities of the MN DNR and SHPO (MN DNR and MNHS 2010).

3.0 PROPERTY OVERVIEW

3.1 Site History

3.1.1 Mining and the Hill Annex Mine, 1901-2025

Iron Ranges of Minnesota

There are three major iron ranges in Minnesota, as well as a fourth range that is technically a continuation of one of the three major ranges. The iron ranges, which are generally linear in form, run in a northeasterly direction from Crow Wing County in the north-central part of Minnesota, up to Cook County in the far northeastern corner of the state. The southwestern-most range is the Cuyuna Iron Range, followed by (from southwest to northeast), the Mesabi Iron Range, and the Vermilion Iron Range (Schaetzl 2017; Cannon 2011). Northeast of the Vermilion Iron Range, in Cook County, is the Gunflint Iron Range, a continuation of the formation that comprises the Mesabi Iron Range, which extends into Ontario, Canada (Jirsa and Fralick 2010:78).

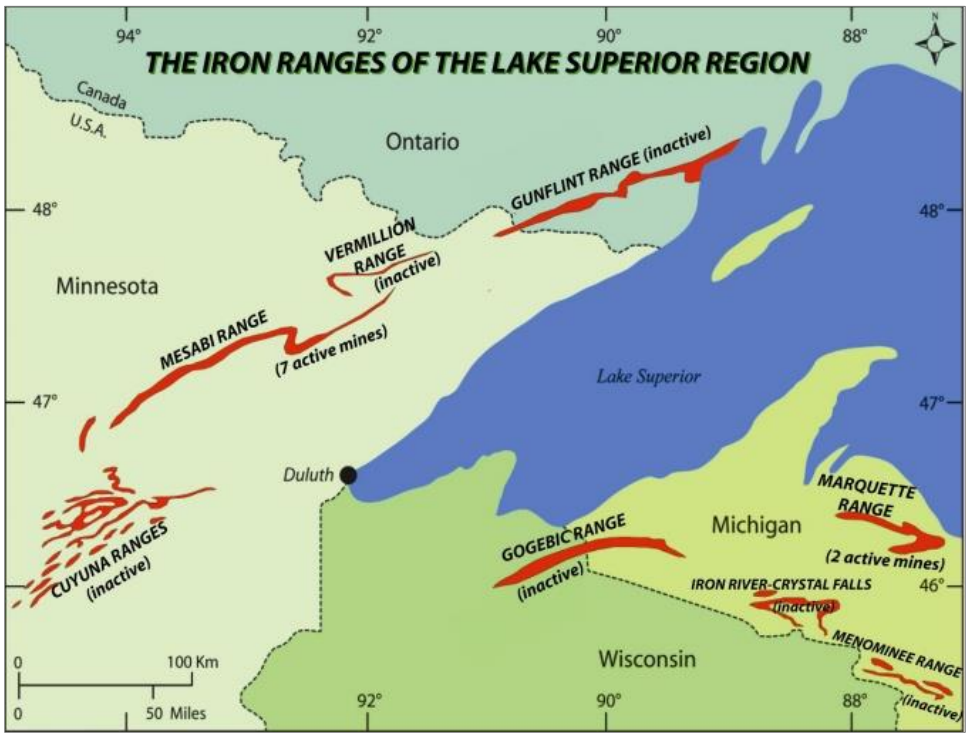


Figure 2. Iron Ranges of the Lake Superior Region (Cannon 2011)

The connection between the Mesabi and Gunflint Iron Ranges was broken by the intrusion of the Duluth Complex, a composite of gabbro and troctolite rocks, approximately one billion years ago (Ojakangas 2009:2, 13). Iron was first discovered on the Mesabi Iron Range in 1866, on the Vermilion Iron Range in 1882, and on the Cuyuna Iron Range in 1904; currently, only the Mesabi Iron Range is actively mined (Cannon 2011; Minnesota Department of Natural Resources [MN DNR] 2015). The Giants Range batholith, a massive body of granite, is located immediately north of the Mesabi Iron Range and results in

the topographic relief that forms the Laurentian Divide and portions of the Mesabi Iron Range (Miller et al. 2011:34; Allison 1925:488).

Each of Minnesota's three major iron ranges has its own unique geological and geographic characteristics, which in turn has determined the types of mining possible within each landscape. The Cuyuna Iron Range has steeply angled iron ore overlaid by thick glacial drift. As a result, early mining efforts were reliant on underground mines, until technological developments enabled efficient removal of the thick glacial overburden, allowing for the transformation of underground mines into open pit mines. Both hematite (high-grade iron ore) and manganese were mined on the Cuyuna Iron Range, which was active from 1904 to 1984 (Ojakangas 2009:163-165; Rosemore 2014). Like the Cuyuna, the Vermilion Iron Range has steeply angled iron ore, the result of the folding of the iron deposits, but unlike the Cuyuna, the Vermilion Iron Range lacks a deep glacial overburden, and iron-formation outcrops are present. Mining of hematite began on the Vermilion Iron Range in 1882 with the Soudan Mine, "Minnesota's first and deepest iron ore mine" (Ojakangas 2009:107). When the mine first began, it was open pit to take advantage of the high-grade iron ore near the surface, but by 1892 the mining continued underground to follow the steeply sloping iron deposits (Ojakangas 2009:107). The Vermilion Iron Range was active from 1882 until the closure of the Pioneer Mine in the Ely area in 1967 (Ojakangas 2009:107-109; Riebe 2015; Ely Echo 2017).

Mesabi Iron Range

The largest iron formation in the Lake Superior Region is the Biwabik Iron Formation of Minnesota's Mesabi Iron Range; the formation measures approximately 100 miles long and 600 feet thick (Ojakangas 2009:13). The Biwabik formation consists of four layers: the upper slaty, the upper cherty, the lower slaty, and the lower cherty. The formation is overlaid by Virginia slate, and above that, glacial till (see **Error! Reference source not found.**). Below the four layers of the Biwabik formation is a layer of quartzite, and below that, Giants Range granite (EMC 1969:4). Like the Vermilion Iron Range, the Mesabi Iron Range exhibits topographic relief and iron-formation outcrops, including taconite outcrops. However, the iron beds of the Mesabi Iron Range slope gently, about 10 degrees, rather than steeply as do those of the Vermilion Iron Range (Ojakangas 2009:74). Iron was first discovered on the Mesabi Iron Range in 1866 by Minnesota State Geologist Henry H. Eames (Severson et al. 2010:16). The Hill Annex Mine is located in the Mesabi Iron Range.

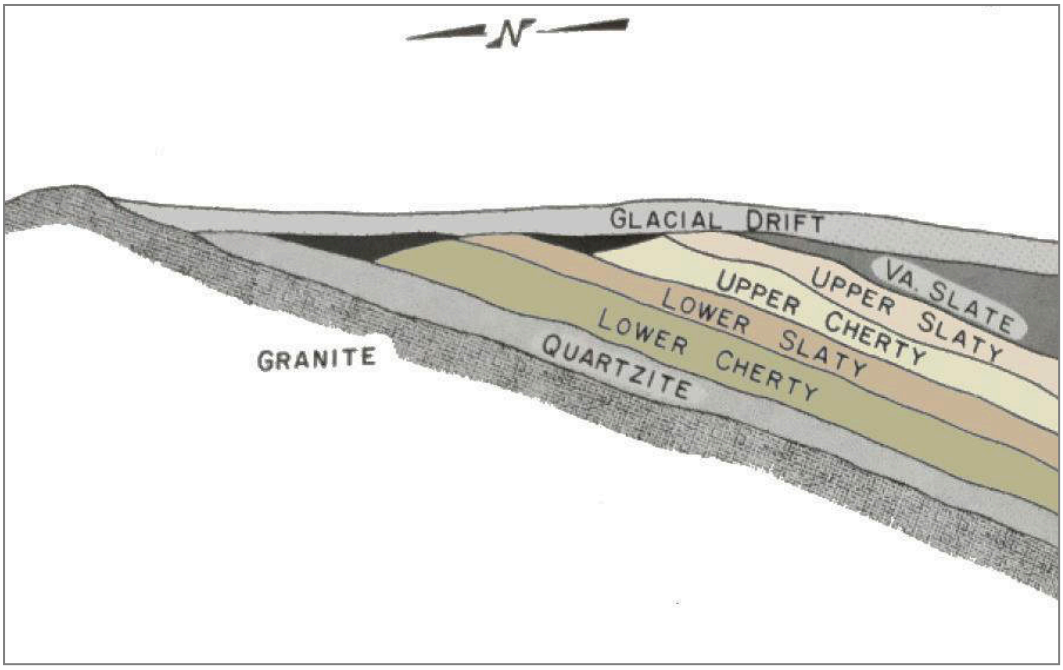


Figure 3. Biwabik Iron Formation (EMC 1957:2)

The first mining company on the Mesabi Iron Range was the Mountain Iron Company, organized by several members of the Merritt family in 1890. In 1890, the company opened its first mine. The incorporation of additional companies soon followed (Van Brunt 1921:398; Cannon 2011). In 1892, the Mountain Iron Company, which by this time operated several active mines, organized the Duluth, Missabe & Northern Railway Company (DM&N) to meet its transportation needs. The rail line, completed in 1893, ran between the Mountain Iron Company's mines on the Mesabi Iron Range and Duluth, where the company had built ore docks. That same year, Leonidas Merritt and John D. Rockefeller consolidated their interests into the Lake Superior Consolidated Mines Company. Although the Merritts lost their interests in the company only a year later, their early efforts laid the groundwork for the extensive rail network that would crisscross between Duluth's harbor and the Mesabi Iron Range to profitably transport iron ore (DeCarlo 2014).

Many of the early mines on the Mesabi Iron Range, including Hill Annex Mine, were open pit, concentrated on pockets of soft, high-grade iron ore below a shallow layer of glacial debris. However, several of the early mines were underground, and some mines employed both underground and open-pit methods (Iron Range Resources and Rehabilitation Board 2017; Denton 1897:357, 360; Leith 1903:280). Open pit mines were excavated using steam shovels, which stripped off the glacial overburden and then loaded the iron ore onto railcars; the average depth of overburden removed was 20 to 40 feet (Leith 1903:280). Railroad tracks were built directly onto the ore deposits to facilitate moving the ore from the deposit to the railcar. Ore then continued to be stripped "in a series of terraces or levels from the central part of the deposit toward the edges" (Leith 1903:280). In addition to steam shovel stripping, blasting and milling techniques were also employed to mitigate the soft texture of the Mesabi ores, as well as underground techniques such as caving and slicing (in which glacial drift is removed in slices, with planks set below it to avoid mixing with the ore underneath) (Leith 1903:282-283).

High-grade iron ore was also referred to as “direct shipping” or “merchantable” ore because it did not require additional processing or beneficiation before being extracted and shipped to blast furnaces (Great Northern Iron Ore Properties [GNIOP] 2017; Schaetzl 2017). Direct-shipping ore typically averaged about 51 percent iron (The President’s Materials Policy Commission 1952:42). The mining of high-grade iron ore on the Mesabi Iron Range proved to be a profitable undertaking from the earliest mines in the 1890s through World War II. From 1940 to 1955, the Mesabi Iron Range supplied between 59 and 66 percent of the country’s total iron ore production (Witzig 1957:50, 51).

High-grade iron ore underwent large-scale depletion during World War II, and in the post-war expansion years that followed, both on the Mesabi and other iron ranges in the Upper Midwest. Hays notes “the reserves of both direct shipping and concentrate ores were declining at such a rapid rate during the second world war and immediately thereafter that the future of the Mesabi range and mining activities in [the] Northeastern Minnesota region were in question” (Hays 1971:110). Meanwhile, world demand for iron ore was increasing (Mancke 1969:21).

Hill Annex Mine, 1901-2025

In the late 1890s, Louis W. Hill, the son of Great Northern Railway magnate James J. Hill, began acquiring iron ore-rich land on the Mesabi Range. He purchased approximately 17,000 acres in the area (James J. Hill House 2025). Hill had a keen interest in the potential for both production and transportation of iron ore (Monroe 2019:7). Due to the Hepburn Act of 1906, which prohibited railroad companies from hauling commodities they produced, the Great Northern Railway transferred their mining interest to a separate trust known as the Great Northern Ore Properties (Monroe 2019:7). Hill took over management of the Great Northern Railway in 1904-1905 and succeeded his father as president in 1907 and chairman in 1912 (James J. Hill House 2025).

However, the acquisition of what would become Hill Annex Mine was not so straightforward. Long before railroads and mining in the area, “The North West [*sic*] Ordinance of 1787 provided that sections 16 & 36 of each township of the North West [*sic*] Territory should be retained by the state for educational uses and would not be available for homesteading” (SHPO and Anderson 1985:8). Located in Section 16, the land on which the Hill Annex Mine sits could not be purchased, only leased. For Hill Annex Mine, this meant that that royalties would be paid to the State’s School Trust Fund (Monroe 2019:8). The land was held by various lease holders from 1882 until 1900, when the first 50-year lease was acquired by William Robinson (Iron Range Resources and Rehabilitation Board [IRRRB] 1986:6). The original lease established that royalties would be paid to the School Trust Fund based on the “quality of the ore mined and shipped” from the property (IRRRB 1986:6).

Arthur Iron Mining Company: 1901-1917

In 1901, Louis Hill leased the land for what would become the Hill Annex Mine from William Robinson, acquiring four 40-acre leases within Section 16 (Monroe 2019:7). Hill then reassigned his leases to the Arthur Iron Mining Company, the Great Northern Ore Properties’ mining subsidiary (Monroe 2019:8). Curiously, the Aurthur Mining Company granted the Oliver Mining Company, a subsidiary of U.S. Steel, a drilling option on the property, which confirmed the presence of high-grade iron ore in 1904. This

verification was done through a series of holes drilled 300 feet apart on the ore body (Monroe 2019:9). Despite this, the Oliver Mining Company chose not to pursue mining at the site, likely due to existing leases on more promising mining areas nearby (Monroe 2019:8). The reasons for Oliver's involvement in the testing process remain unclear, but their sale of equipment and tracks used in the process left a significant advantage for the Arthur Iron Mining Company, who would later develop the site (The Duluth News Tribune 1915 May 3:10). The Oliver Mining Company went on to operate the Hill Mine, to the immediate west of what would become Hill Annex Mine, from 1910 to 1916 (Monroe 2019:9).

In 1912, eight years after confirmation of the iron ore, the Arthur Iron Mining Company began development of the mine at the northeast quarter of the property (Monroe 2019:8). In 1913, an underground, concrete-lined shaft was started at the center of the property. However, 1914 was the first truly momentous year for the mine, with the removal of the first 5,681 tons of iron ore from the newly constructed mine shaft and the start of full-scale stripping operations (IRRRB 1986:6, Monroe 2019:11). A. Guthrie and Company of St. Paul, a leading mining and railroad contractor, had been contracted that year (Monroe 2019:8,11; The Duluth News Tribune 1914 December 13:11). Stripping included the removal of the overburden of sand, gravel and boulders. This was no small task as there were 60 feet of overburden on the northern section of the land that was first mined; in areas of the mine to the south, that layer was nearly twice as deep, up to 115 feet (IRRRB 1986:17).

The iron ore removed was not immediately processed. A wash plant had not yet been constructed, so it was only after the Great Northern Railway completed a new spur that the small stockpile of iron ore could be sent northeast to the Hawkins Wash Plant at O'Brien Lake for processing (IRRRB 1986:6; The Duluth News Tribune 1914 October 11:4). Once processed, the washed iron ore was not immediately shipped—in 1914, no iron ore was shipped and in 1915, only 16 tons were shipped (Monroe 2019:11).

Initially, equipment was hauled on to the mine site by horse, but steam-powered machinery soon followed (IRRRB 1986:6). An impressively large, track-mounted, five-yard steam shovel allowed for the removal of the overburden and started the mainline approach (Monroe 2019:11). Over the course of two years, from 1912 to 1914, the limit of the ore body was determined, and additional surface stripping and pit development continued (IRRRB 1986:6).

Stripping dumps were created on the north and east sides of the pit, and at property's south side, next to the direct shipyards (Monroe 2019:12). The stripped dirt would be dumped from the side of specially constructed trestles, then spread and leveled, to build up piles. The tracks would then be moved and the process repeated until the initial ore body was exposed (Monroe 2019:12). The rail yard was constructed close to the approach pit, while also leaving room for rail connection to the shop buildings (Monroe 2019:12).

Early on, several buildings were constructed to support the growing mining operation. IRRRB documentation and records indicate that the first building onsite was constructed in 1911, though it is unknown to which building this refers (Hill Annex Mine State Park N.D.). Construction work on the mine's power plant, camps, blacksmith shop, and dry house (changing room for miners) began in the fall

of 1913 and was nearly complete by spring of 1914 (GNIOP 1914:19; The Virginia Enterprise 1914 August 14:1). An early, undated photo (Figure 4) shows the metal headframe of the mine shaft in close proximity to a group of six buildings; all are non-extant. The building with the large chimney is likely the power plant (boiler and engine house), the other buildings the shops and dry house. The camps necessary to house the growing workforce of miners were likely located on the south side of what would become the open pit.

The initial years of Hill Annex Mine's operation were marked by intense activity. Within just five years, the site transformed from solid earth into a bustling open-pit mine, complete with expanding stockpiles of iron ore, an ever-growing network of rail lines, and a developing complex of shops, outbuildings, and accommodations for workers.



Figure 4. Early View of Hill Annex Mine, ICHS collection (Monroe 2019:7)

An *Iron Trade Review* article from 1915 further describes the early mining complex buildings: “The principal structure is a blacksmith shop, machine shop, and carpenter shop under one roof, 200 feet long and 51 feet wide. The smith shop is equipped with a circular crane and will be provided with four forges, a steam hammer, punches, shears, etc. The machine shop will be provided with the customary tool equipment. Adjacent to this building, a 40 x 80 foot warehouse and a boiler and engine house have been erected. The buildings are fireproof throughout with steel frames and brick walls” (Estep 1915:75-76). The principal structure described above may be the extant Railroad Equipment Repair Shop (circa 1919), located east of the open pit, though the current building, which does not appear to have additions, is roughly 80 feet wide rather than 51 feet as described in the 1915 article. The warehouse and boiler and engine house described in the 1915 article are no longer extant, demolished between 1958 and 1966 (Monroe 2020:14-15). See more detailed building history in section 3.1.2.

The 1915 *Iron Trade Review* article also note that "18 dwelling houses have been built for the mine employees" (Estep 1915:76). These non-extant dwellings were likely located south of the open pit, where the residential section of the mine was later known to be located. Around that same time, the mine's first office building, later called the Calumet Community Clubhouse, was constructed. In addition to mining offices on the first floor, there were rooming accommodations for mine employees on the second floor (Hunner 1917). The construction of a school building, just south of what would become the residential section, was started in 1915 (Johnson 1974 March 24:17). See more detailed building history in section 3.1.2.

The earliest aerial photograph from 1939 is not clear enough to identify the individual buildings; however, a group of non-extant buildings located between the Mine Manager Office (circa 1930) and the Railroad Equipment Repair Shop (circa 1919) are likely the aforementioned warehouse, dry house, and powerplant. Aerial photographs show that this grouping was demolished between 1958 and 1966 (MN DNR 1939; Monroe 2020b:14-15).

Interstate Iron Company and A. Guthrie and Company: 1917-1930

With more than 30 years left on the 50-year lease, the Interstate Iron Company, a mining affiliate of Jones & Laughlin Steel Cooperation, subleased the mine from the Arthur Iron Mining Company in 1917 (Monroe 2019:8; Hill Annex Mine State Park N.D.; Skillings' Mining Review 1919:8). It is not clear why Interstate took over the sublease, but the Guthrie Company, who was contracted in 1914, continued their work seemingly uninterrupted (Hill Annex Mine State Park N.D.).

The Guthrie Company used the latest in strip mining technology and techniques at the Hill Annex Mine. They laid 10 miles of railway track and employed 12 large, heavy, Baldwin locomotives to run it. These locomotives were larger than the previous cars and engines employed in the mine (Hill Annex Mine State Park N.D.). State-of-the-art shovels were used to remove overburden, which included three Marion shovels, two with four-yard dipper capacities, and a 135-ton Paddy Shield shovel, which was the largest available at the time (Hill Annex Mine State Park N.D.). Finally, a Jordan Spreader, powered by the Baldwin locomotives, used the wing of a flange to efficiently clear dirt that collected between tracks at the edge of a dump, a task that was previously done manually. Due to this new technology and heavy machinery, the mine could operate at full capacity with only 345 men (Hill Annex Mine State Park N.D.).

As mining operations expanded, so did the need for proper housing for its workers. The Gutherie Company is credited with the construction of the Hill Annex Mine's permanent residential quarters south of the open pit around 1917. The earlier mining camp was made into a permanent residential subdivision, complete with modern conveniences and hygiene facilities. (Hill Annex Mine State Park N.D.). Following the construction of the mining office (Calumet Community Clubhouse), which included second-floor sleeping rooms for office staff, and 18 rooming and boarding houses, two 120-bed bunk houses were constructed for the mine laborers (Monroe 2019:14; Estep 1915:75-76). Stand-alone bathing and dining facilities, which included a kitchen and icehouse, were constructed near the bunk houses. A modern sewage and septic system was also laid out. Accommodations for livestock were also provided, including a barn for draft animals and a hog barn for 60 to 70 pigs (Hill Annex Mine State Park N.D.).

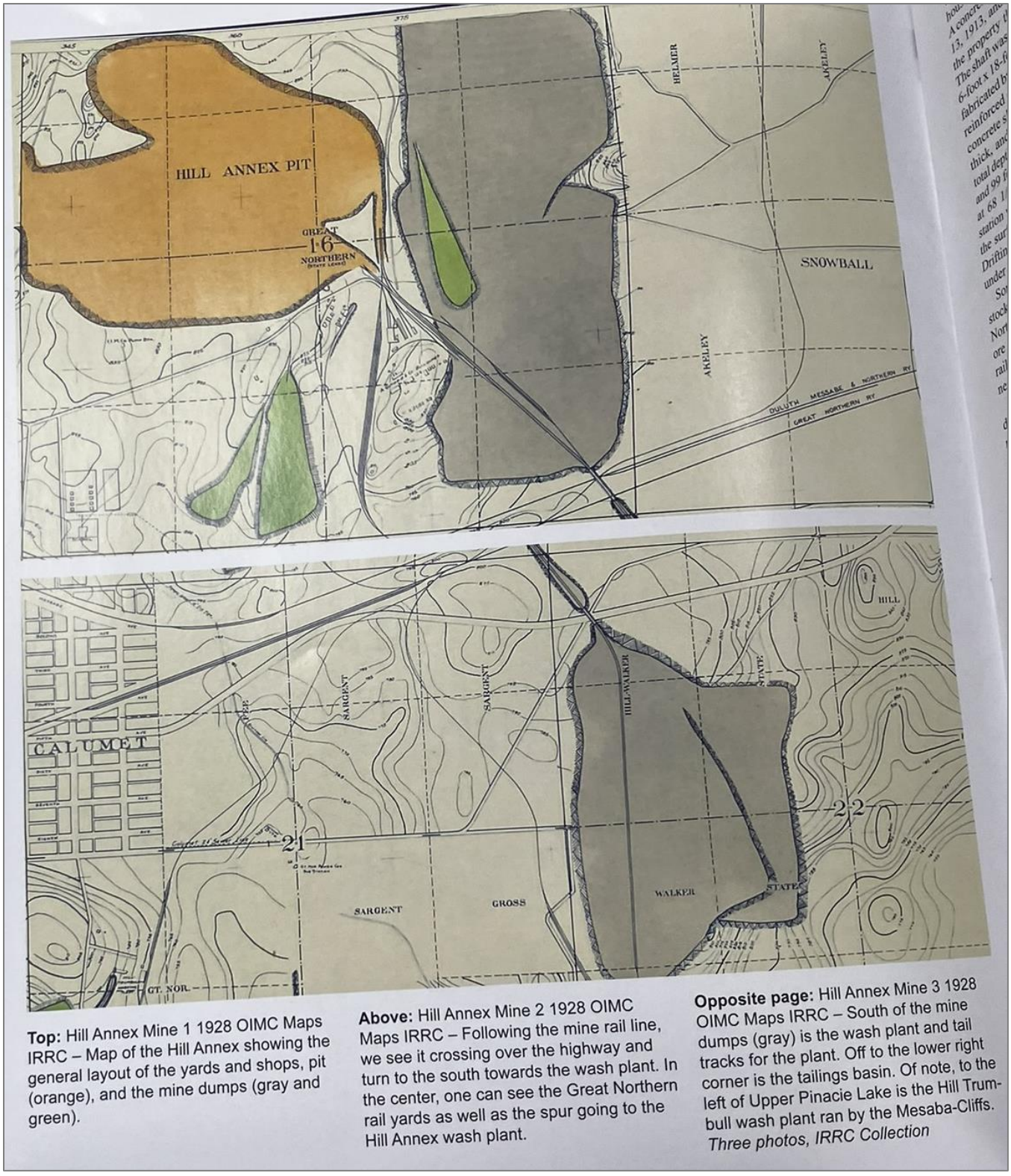
By 1921, an additional nine residences were built for the foreman, engineers, superintendents, and their families (Monroe 2019:14). A non-extant school building was built at the same time, located southeast of the Calumet Community Clubhouse and directly south of mine's residential subdivision. The school was built in three stages, with the first floor constructed around 1915, the second floor added in 1922; and the gymnasium and auditorium added some time before 1940 (Johnson 1974 March 24:17; Monroe 2020b:13). In 1925, part of the southern area of the mine, presumably this residential section, was transferred to the City of Calumet (Hill Annex Mine State Park N.D.).

Further additions were made to the complex of mine buildings, east of the open mine pit. In circa 1919, a wooden water tower was constructed near the Railroad Equipment Repair Shop. Previously two steel water tanks—a 15,000 gallon one for the boiler house and a 50,000 gallon to serve as a water reserve for the boiler and engine house, shops—were noted around this time (Monroe 2019:9). A 1921 map of the mine's stockpiles and crushing and screening plan location also includes two dozen nine-extant buildings southeast of the rail lines. Those buildings are not labeled and are not included in the next available map from 1928 (Hill Annex Mine 1921, Monroe 2019:10).

Construction of the mine's own Wash Plant, which used various washing processes to break down the ore and free silica waste in order to ready the iron for blast furnaces, began in 1920, and was completed in 1922. This plant was located 2.5 miles southeast of the open pit (and project site) at Pinacie Lake.[1] The Wash Plant's design was based on the Oliver Mining Company's Trout Lake Concentrator Plant, which was a gravity feed plant. The wash process started with crude ore dropped into one of two receiving bins, which was then run over a grizzly bar (a specialized screen) to remove pieces larger than seven inches. The material was then sent though a 20-foot-long conical screen with two-inch openings. The undersized material was then run through a log washer to separate the iron ore, which was then sent to the shipping bin. These tailings were further washed with a turbo washer, with the remaining ore-bearing material sent to shipping bins, and the tailings pumped to a large Tailing Basin east of the plant. The oversized material from the conical screen was then run over a conveyor belt to have the waste rock removed before that ore was sent to shipping bins. The waste rock was removed and dumped at the southeast side of the plant (Monroe 2019:14).

A (non-extant) Direct Ship Screening and Crushing Plant building was constructed on the eastern edge of the pit, north of the rail entrance to the pit, from 1922 to 1923, though its location is called out on the 1921 map (Monroe 2019:14; Hill Annex Mine 1921). This plant's exact process is unknown, but it is likely that the ore would go over a grizzly bar to remove pieces larger than seven inches, with the smaller pieces were crushed to a desired size (Monroe 2019:14). Trestles on each side of the plant would support the trains being pushed through during the crushing and screening process (Monroe 2019:15).

[1] Pinacie Lake was known by several names and is alternately referred to as Panacas Lake.



Top: Hill Annex Mine 1 1928 OIMC Maps IRRC – Map of the Hill Annex showing the general layout of the yards and shops, pit (orange), and the mine dumps (gray and green).

Above: Hill Annex Mine 2 1928 OIMC Maps IRRC – Following the mine rail line, we see it crossing over the highway and turn to the south towards the wash plant. In the center, one can see the Great Northern rail yards as well as the spur going to the Hill Annex wash plant.

Opposite page: Hill Annex Mine 3 1928 OIMC Maps IRRC – South of the mine dumps (gray) is the wash plant and tail tracks for the plant. Off to the lower right corner is the tailings basin. Of note, to the left of Upper Pinacie Lake is the Hill Trumbull wash plant ran by the Mesaba-Cliffs.
Three photos, IRRC Collection

Figure 5. 1928 Hill Annex Mine Map (Monroe 2019:10)

A 1928 Oliver Iron Mining Company map illustrates the basic layout of the mine at the time, which encompassed Sections 16 and 22. The open mine pit dominated at the center of Section 16. The residential area for the mine workers was located south of the open pit, with City of Calumet located to the southwest. The main rail yards and repair shops were situated southeast of the central, open pit. A rail line ran southeast to the wash plant located in Section 22. Mine dumps were present south and east of the open mine pit. A *Mining Congress Journal*, article from 1929 describes the mine's tailings basins: "The tailings basin is a tract of low swamp land, approximately 3,500 ft. long and 1,000 ft. wide, lying between the washing plant on the westside and Little Penacie [*sic*] Lake on the east side. This area is not a naturally inclosed [*sic*] basin therefore it has been necessary to cast a dike along the north, east, south and part of the west sides in order to prevent the tailings from flowing into the lake" (Bolthouse 1929:756).

After nearly 15 years of operation and significant changes to the physical landscape—such as the development of the open-pit mine, ore-washing facilities, 20 miles of rail lines, a complex of buildings to power the operation, and a residential area for its growing workforce—the mine was on the brink of even greater transformations to come.

Interstate Iron Company 1930-1950

In 1930, at the start of the Great Depression, Guthrie Company's contract was terminated, and the Interstate Iron Company, which held the sub-lease since 1917, became directly involved with the mine operation. Interstate immediately started electrifying the entire length of track, which formerly used steam-powered locomotives. Hill Annex Mine was the first all-electric mine in Northern Minnesota (Hill Annex Mine State Park N.D.).

Interstate built several new buildings around 1930, located on the eastern side of the open mine pit within the existing complex of buildings. These included including a new office (Mine Managers Building), Warehouse (Laboratory) and maintenance building. The former mine office was remodeled into the Calumet Community Clubhouse, and six additional employee houses were constructed in the residential subdivision. IRRRB documentation notes that a 120 foot and 78 foot steel and brick machine shop was constructed at this time, which contained a "carpenter shop, a railroad repair shop, a blacksmith shop, storage rooms, a lunch room and a locker room" (Hill Annex Mine State Park N.D.). The physical description of this building matches the extant Railroad Equipment Repair Shop, though several other sources indicate that building was constructed circa 1919, not 1930.

The demand for steel dipped during the Depression, and in 1932, no ore was shipped—the first time since 1915. But the slowdown was short-lived and further (unspecified) modifications and expansions at Hill Annex Mine were completed in 1936, just in time for increased demand from World War II. In 1939, a third washing plant was completed at Pinacie Lake (IRRRB 1986:9).

A map from 1939 labels the building in the main mining complex, just east of the open pit (Figure X). The Water Tank (Wooden Water Tank), Office (Mine Manager's Office) and Garage (Laboratory) and Shops (Railroad Repair Shop) are in their present locations. Additionally, the map shows a Shaft directly northwest of the Garage (Laboratory) and a small Yard Office building is located to its northeast. Directly

southeast of the Garage (Laboratory) are buildings labeled “Lab” and “Dry.” East, across the rail tracks, is a Car Shop. The Sub Station is labeled and is the Crushing Plant (Direct Ship Screening and Crushing Plant).

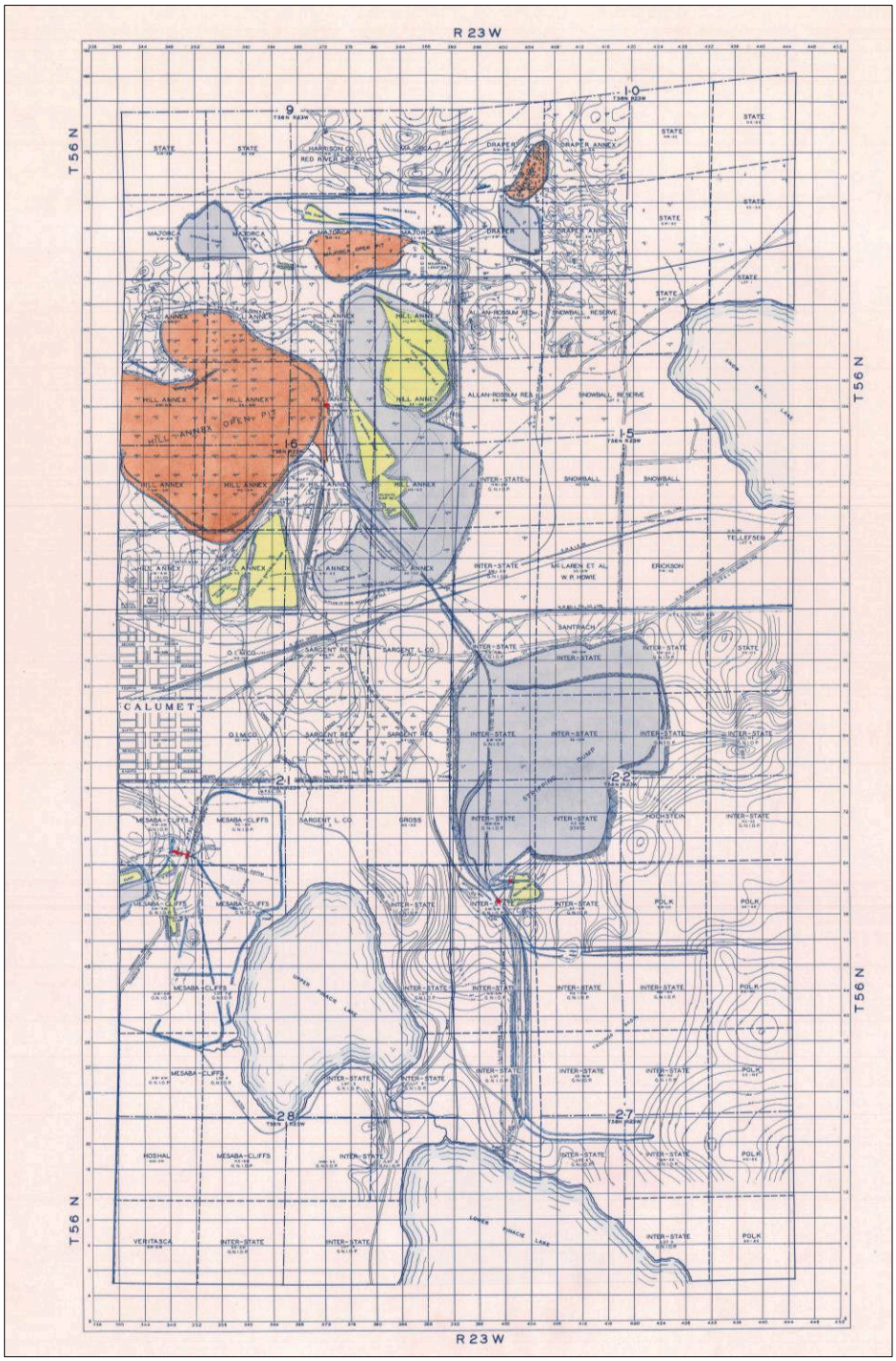


Figure 6. Map from 1939 (GNIOP 1939)

The mine's largest shipment of 3,646,000 tons of ore occurred in 1941 as part of World War II efforts (IRRRB 1986:9). Demand for iron ore swelled during World War II, not just at Hill Annex Mine, but across the region and country. Steel was essential to the manufacture of planes, warships, and tanks. By 1944, however, demand-fueled digging resulted in pits that were deeper and steeper than rail cars could efficiently manage (IRRRB 1986:9). In 1944, a conveyor and truck hauler system was incorporated into the mine's electric rail system (IRRRB 1986:9). The conveyor belt was constructed at the northeast edge of the open pit. An aerial photograph from 1947 shows the conveyor belt (University of Minnesota 1947). By 1950, the mine had shifted primarily to trucks, with rail no longer central to production (IRRRB 1986:9). Today, the southern end of the conveyor belt is submerged beneath water.

By 1950, Interstate Iron Company had made significant strides in adapting the Hill Annex Mine to meet the demands of a rapidly changing industry. Despite setbacks during the Great Depression, the company's innovations, including electrifying the rail system and expanding infrastructure, ensured that the mine remained operational and competitive. The strategic expansions and technological advancements implemented during this period laid the groundwork for the mine's continued success in the post-war years. However, as the supply of higher-grade ore diminished, the mine faced new challenges that would lead to further transformations in the years to come, signaling the end of one era and the beginning of another in the mine's history.

Jones & Laughlin: 1950-1979

1950 marked the conclusion of Willaim Robinson's original 50-year lease on Hill Annex Mine's land and with it, Interstate Iron Company's sublease. The State of Minnesota negotiated a new 25-year lease directly with the Jones and Laughlin Steel Corporation (J&L). Seemingly undeterred by the depletion of most of the mine's high-grade ores, J&L installed concentrating equipment that could produce shipping ore from the lower grade iron formation that remained. Over the next 29 years, J&L constructed several new plants that used advanced technology on the property.

To start, the old Wash Plant (1920-1922) at Pinacie Lake, southeast of the open pit and outside the current project boundaries, was modified in 1950. Two of three sections were removed for the construction of a double heavy media separation unit (IRRRB 1986:9). However, this operation was short lived, and in 1953, J&L constructed a new Heavy Media Plant (1953) and Prep Section (1953) in the main section of the mine, immediately east of the open mining pit and Conveyer Belt (Monroe 2020a:15; SHPO and Andersen 1985). The old plant was at the end of its useful life, and further, this new plant's location eliminated the need to haul material 2.5 miles by rail to the Pinacie Lake area (IRRRB 1986:9).

Despite the new Heavy Media Plant's construction, concentrate production continued to decline, and new methods and equipment were required once more to keep the mine competitive (IRRRB 1986). At this time, the old wash plants and electric railway were dismantled, marking the end of an era for Hill Annex Mine (Monroe 2021:10).

A 1986 flow chart illustrates the process of the Heavy Media Plant (1953) at Hill Annex Mine, including primary screening and the prep section (washing plant). In 1957, J&L constructed a large, round

Hydrolator Tank to the immediate east of the Heavy Media Plant, though no details apart from construction date was available in the NRHP nomination, which erroneously labeled the tank as a tailings basin (SHPO and Anderson 1985:7; 8.3).

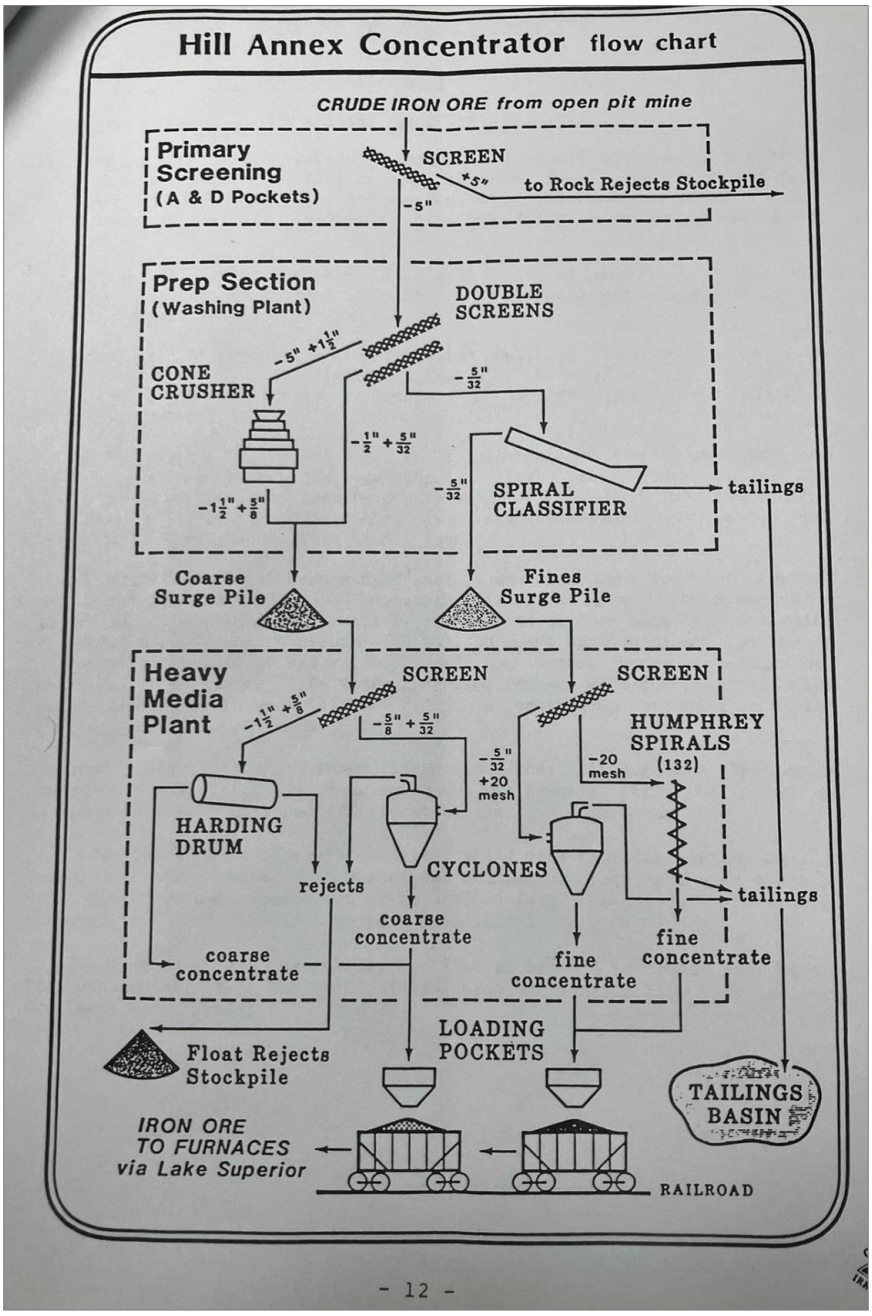


Figure 7. Flow Chart (IRRRB 1986:12)

Also in 1957, Jones & Laughlin (J&L) constructed a Tailings Reclamation Plant south of the former 1920-1922 Wash Plant. This state-of-the-art facility employed an innovative method to reprocess the old tailings that had been accumulating since mining operations began in 1913 (Monroe 2020a:14). Tailings, the byproduct left over from the washing process of direct ship ores, were once considered waste from higher-grade ore production. However, advancements in technology made it possible to reclaim and reprocess these materials (Monroe 2020a:14).

Hill Annex Mine's Tailings Reclamation Plant stood apart from others in the Mesabi Range, which typically used methods such as spiral sections, cyclones, or combinations of these techniques. It was the first on the Iron Range to implement the froth flotation process, utilizing a dredge barge—an innovation that was later adopted by other mines (The Duluth News Tribune, August 11, 1957:34). The operation garnered significant attention, being featured in a multi-page spread in *Mining World* magazine in 1958 (Monroe 2020a:16-21). The flow chart in Figure 8 illustrates the complex process (Monroe 2020a:16-21). This plant remained in operation until 1963 (Monroe 2020a:14).

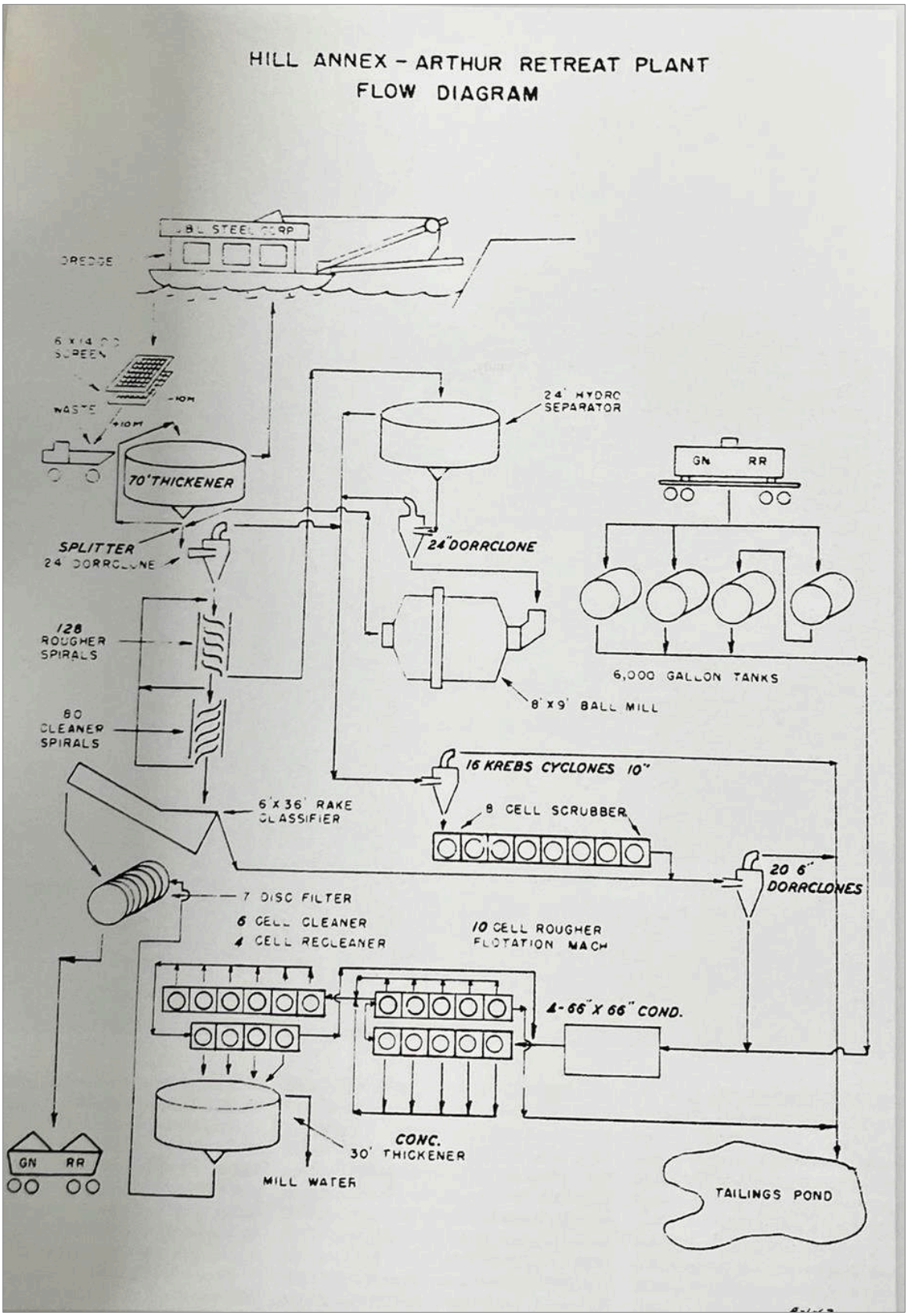


Figure 8. Official Tailings Reclamation Plant Flow Chart (Monroe 2020a:13)

In contrast to the construction of new plants, demolition was also taking place during this period. The residential subdivision, established on the site in the 1910s and 1920s, was completely demolished between 1958 and 1966 to accommodate the southward expansion of the open pit. Other buildings in the original mine building complex were also razed at this time (Monroe 2019:14).

The final plant at Hill Annex Mine, the Cretaceous Plant, was constructed from 1960 to 1961, and the last shop, the Truck Repair Shop, was completed the same year. The Cretaceous Plant operated from 1961 until 1968, with brief periods of activity in 1971, 1975, and finally in 1979 (Monroe 2020b:12). As its name suggests, the plant was designed to process Cretaceous Ore, which had been stockpiled in dumps during earlier clearing efforts (IRRRB 1986:17). Initially considered a waste product, Cretaceous Ore accumulated on site until technological advancements allowed it to be concentrated into shippable ore. The Cretaceous Plant was the last operational facility at Hill Annex Mine before its closure in 1979 and was demolished in the early 1980s (Missabe Railroad Historical Convention 2018).

By the time Annex Hill Mine ceased production in 1979, a total of 63,862,773 tons of iron ore had been produced and shipped from the mine, resulting in over $27 million in royalties paid to the State of Minnesota School Trust Fund (Hill Annex Mine State Park N.D.). Despite its closure, the mine left behind substantial ore reserves, and the possibility of future mining remained a potential consideration if technological advancements allowed for its return.

The period from 1950 to 1979 marked a significant chapter in Hill Annex Mine's history, as J&L took over operations and introduced innovative processes to address the depletion of high-grade ore. The construction of new plants, such as the Heavy Media Plant and the Tailings Reclamation Plant, demonstrated J&L's commitment to adapting to new technological advancements. Meanwhile, the demolition of older buildings and residential areas reflected the mine's ongoing expansion and transformation. The final years of operation saw the construction of the Cretaceous Plant, which continued to process previously discarded ore, marking the last phase of production at Hill Annex Mine. When the mine closed in 1979, it had produced over 63 million tons of iron ore and contributed significantly to the State of Minnesota's School Trust Fund. Despite its closure, the mine left behind substantial ore reserves, and the possibility of future mining remained a potential consideration if technological advancements allowed for its return.

Iron Range Resources and Rehabilitation Board (IRRRB): 1979-1988

In 1979, the Hill Annex Mine was turned over to the State of Minnesota for $1, to be operated as a tourist attraction by the Mineland Reclamation Division of the Iron Range Resources and Rehabilitation Board (IRRRB 1986) (News Tribune & Herald 1987 March 29:94). The Hill Annex Mine was recognized early on as the state's only intact natural ore facility; more than 400 natural ore mines were once in operation over the state's three iron ranges (SHPO and Anderson 1985). It illustrated a wide range of mining techniques, equipment, and technologies, and was left relatively intact at its closure. It was to be used as an interpretive site for the important Mesabi Iron Range mining history.

The IRRRB operated the site for 10 years. Mining history tours of the open mine pit were offered by trolly, and geology tours and fossil hunts were regularly offered, as well (News Tribune & Herald 1987 March 29:94). The mine's former Calumet Community Clubhouse (circa 1915) housed a mining museum, and the basement bowling alley was converted to a climate-controlled pine tree nursery (News Tribune & Herald 1987 March 29:94).

It was during this time that the NRHP nomination was completed. Photographic documentation of the mine site in 1980 was included in the 1985 document, which was listed in the NRHP in 1986.

Hill Annex Mine State Park: 1988-2024

The state park was legislatively authorized in 1988, becoming Hill Annex State Park, offering both mining history and paleontology (Wessel 2015 July 7:). Responsibility for the site was transferred to the MN DNR in 1991. The park was located in the main portion of the open pit mine in Section 16 only, and did not include the area in Section 22 where the Wash Plants and Tailings Basins were located.

The Historic Mine Tour offered visitors a chance to visit the working level of the open pit by bus and included stops at overlooks and machine sites. The Fossil Hunting Tours allowed visitors to hunt for fossils to take home on the Cretaceous Ore Pile at the mine (MN DNR 2010).

In the 2000s and 2010s, the geological offerings of the park gained in popularity, and Minnesota's first dinosaur fossil, a claw, was discovered there in 2015 (Arndt 2015).

Hill Annex Mine State Park was abolished as a state park by the Minnesota State Legislature in 2024 (MN DNR 2025).

3.1.2 NRHP District: Hill Annex Mine Historic District

The Hill Annex Mine Historic District (IC-GRN-00002) was listed in the NRHP in 1986, with state-level significance in the area of Industry for "its high production and effective representation of the early mine but also in its clear depiction of the evolving nature of mining inherent on the Mesabi Range" (SHPO and Anderson 1985). The period of significance is 1912-1957, which spans the start of the mine operations in 1912 though the construction of the Heavy Media Plant's Hydrolator Tank in 1957. This nomination was complete before modern criteria were established (SHPO and Anderson 1985).

There are seven contributing buildings, four contributing structures, and one non-contributing building located in the District. One contributing building, the Frame Truck Repair Shop (circa 1919), is non-extant. The six extant contributing buildings include the Calumet Community Club (circa 1915), Railroad Equipment Repair Shop (circa 1919), Mine Managers Office (circa 1930), Laboratory (circa 1930), Quonset Repair Shop (circa 1950), and Heavy Media Plant (1953). The four extant contributing structures include the Wooden Water Tower (circa 1919), Hydrolator Tank (referred to as a Tailings Basin) (1957), Conveyor Belt (1944), and Prep Section (1953). The non-contributing building is the Truck Repair Shop (1961).

Calumet Community Club (circa 1915)

The oldest extant structure on site, Calumet Community Club, was constructed circa 1915 as the Hill Annex Mine's first office building.[2] It has subsequently served as a community club, chemical lab, and museum. The building originally contained three offices and a commissary on the first floor; the second floor had three bedrooms and a full bathroom (Hunner 1917). Office staff were housed in the living quarters on the second floor (Hunner 1917).



Figure 9. Calumet Community Clubhouse (circa 1915), Facing Northwest

When a new mine office (Mine Managers Office**)** was constructed to the northeast in the active mining complex around 1930, this building was converted to the Calumet Community Club. As a community club, it was opened for use by the greater community as an activity center (SHPO and Anderson 1985; Hill Annex Mine State Park N.D.). After its conversion, the Calumet Community Club included sleeping accommodations for single miners, a reading room, and a dining hall for special occasions (Hill Annex Mine State Park N.D.). It is likely that the single-story western wing was constructed at this time, as the earliest aerial photograph available from 1940 shows it was present (Monroe 2020b:13). A basement bowling alley was installed at some point during its use as a community center.

[2] It's not clear if it was the lease holder, the Arthur Iron Mining Company, or the operator, Guthrie and Company, who constructed this building.

After the mine closed in 1979, the building became the museum and interpretive center headquarters for the IRRRB-run site. Museum exhibitions were installed on the first and second floor of the main building, and the basement's bowling alley was converted to a specialized, climate-controlled growth chamber for tree seedlings (IRRRB 1986:2). Exhibitions included mining artifacts, period rooms, and state-of-the-art laser disk equipment that was used to share a collection of historic photographs with visitors. The building remained a museum and interpretive center headquarters when the Hill Annex Mine State Park opened in 1988 and remained through its closure in 2024.

Railroad Equipment Repair Shop (Circa 1919)

The Railroad Equipment Repair Shop was constructed circa 1919, though it appears that construction started as early as 1915. An *Iron Trade Review* article from 1915 describes the early mining complex buildings, including what is likely the Railroad Equipment Repair Shop: "The principal structure is a blacksmith shop, machine shop, and carpenter shop under one roof, 200 feet long and 51 feet wide. The smith shop is equipped with a circular crane and will be provided with four forges, a steam hammer, punches, shears, etc. The machine shop will be provided with the customary tool equipment. Adjacent to this building, a 40 x 80 foot warehouse and a boiler and engine house have been erected. The buildings are fireproof throughout with steel frames and brick walls" (Estep 1915:75-76). It is not clear if the Arthur Iron Mining Company constructed the building, or if it was constructed by Guthrie and Company. Its footprint has remained largely unchanged since the first aerial photo taken in 1940 (Monroe 2020b:13). The two other buildings mentioned in the article, the brick warehouse and boiler and engine house, are no longer extant, demolished between 1958 and 1966, though two unidentified extant shop buildings are located to the Railroad Equipment Repair Shop's immediate east (Monroe 2020b:14-15).



Figure 10. Railroad Equipment Repair Shop, Facing Northeast

Wooden Water Tower (Circa 1919)

The Wooden Water Tower was constructed circa 1919 (SHPO and Anderson 1985). No further details were found about its initial construction, use, or maintenance, and there have been no major changes since construction. Historians at the Itasca County Historical Society noted it may be one of the last standing wooden water towers in Minnesota, but no corroborating evidence was located to substantiate the theory.

The construction of two steel water tanks—a 15,000-gallon one for the boiler house and a 50,000-gallon to serve as a water reserve for the boiler and engine house, and shops—was noted during the early development of the mine (Monroe 2019:9). Neither of those steel water tanks are extant.



Figure 11. Wooden Water Tower (Circa 1919), Facing West

Frame Truck Repair Shop (Circa 1919, non-extant)

According to the NRHP nomination, the Frame Truck Repair Shop was constructed circa 1919. This building is no longer extant, but it was likely located northwest of the Wooden Water Tower on a ridge in the open pit area of the mine. A 1980 photograph included in the NRHP nomination shows a structure in that area that is now submerged. It is unknown if the building was razed before the open pit filled with water between 1981 and 1991, or if it remains below the water surface (Nationwide Environmental Title Research, LLC [NETR] 1981, 1991).

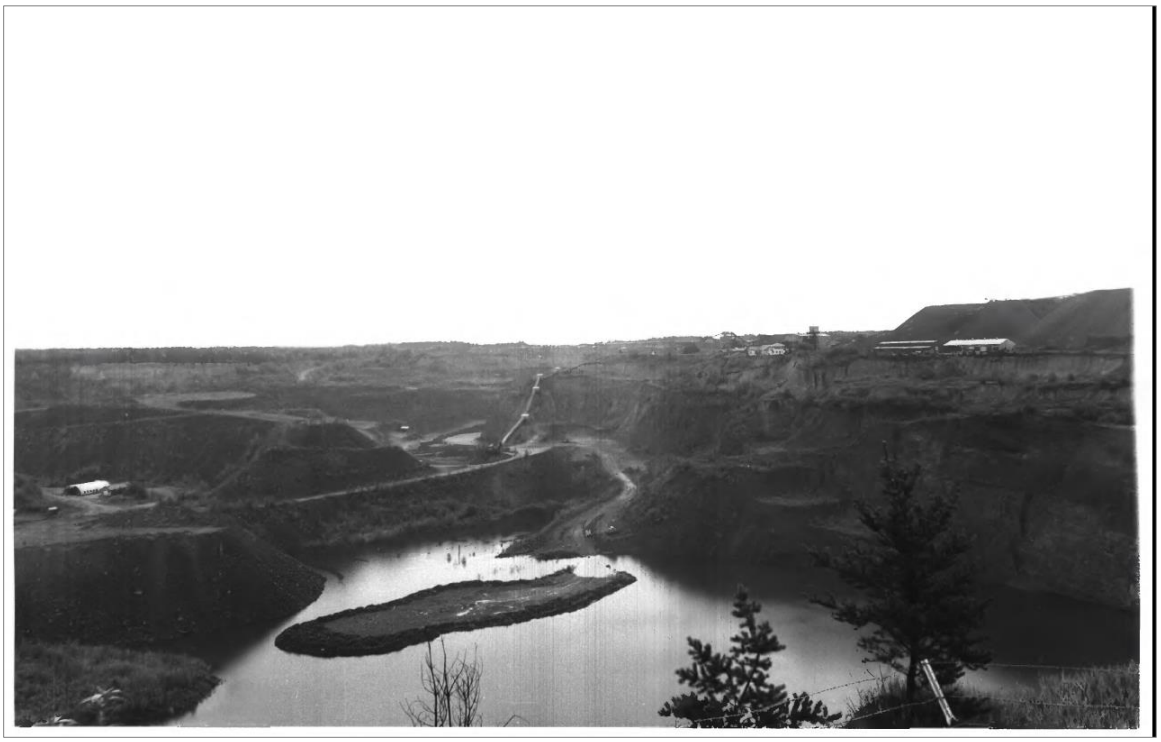


Figure 12. Presumed Frame Truck Repair Shop, second building from the left (non-extant) in 1980 (SHPO and Anderson 1985).

Mine Managers Office (Circa 1930)

The Mine Managers Office was constructed in circa 1930, after Interstate took over operation of the mine from Guthrie and Company. It was constructed at the eastern edge of the open mine pit, as part of a complex of mining buildings that included the warehouse (Laboratory) to the northeast and Wooden Water Tower to the southwest, near the non-extant dry house (changing room) and boiler and engine house. The Railroad Equipment Repair Shop is located to its southeast. Built as a two-story building, the single-story volume on the southeast elevation of the Mine Managers Office was likely constructed between 1935 and 1940, though the 1935 photo shows the northwest-facing façade on the opposite side, facing the open pit (ICHS photo 1935; Monroe 2020b:13). It has remained largely unchanged since 1940 (Monroe 2020b:13). By 1991, small, hipped-roof pay station (extant) was constructed to the northeast of the Mine Managers Office, presumably for park usage (NETR 1991).



Figure 13. Mine Managers Office (circa 1930) and Pay Station (Circa 1990), Facing Southwest.

Laboratory (Circa 1930)

The Laboratory was likely built as a warehouse circa 1930 by Interstate, though it appears to have had many names and functions since construction. The NRHP nomination refers to this building as a laboratory; educational materials produced by the IRRRB refer to it as a warehouse. It is currently known as the Mechanic Building, and signs affixed to the building indicate that it was the old boiler house and shaft in 1913, an ore processing lab in 1939, and an electric shop in 1969. Despite its many uses, the building's footprint has remained unchanged since 1940 (SHPO and Anderson 1985; IRRRB 1986; Monroe 2020b:13).

Laboratories were important to mining operations. In the early years, each mine would produce and label their own grades of iron ore. By the 1920s, however, ore furnaces operations demanded a uniform grade for firing. Mines used on-site laboratories to sample to ore and mix designated grades (Zellie 2005:2-22).



Figure 14. Laboratory (Circa 1930), Facing Northwest

Quonset Repair Shop (Circa 1950)

The Quonset Repair Shop is listed in the NRHP nomination with a circa 1930 construction date, though it is not included on the NRHP map. The building is not visible in aerial photography until 1966, when it appears next to the non-extant Frame Truck Repair Shop, located northwest in the open pit (Monroe 2020b:14). It appears to be in the same location in the 1980 NRHP photo, but it was moved to its present location south of the Railroad Equipment Repair Shop by 1981 (SHPO and Anderson 1985; NETR 1981).

Quonset huts were not produced in the U.S. until 1941, and not widely available until 1946 when surplus quantities from World War II were sold by the government (Lamm 1998). For that reason, it is likely that the Quonset Hut at Hill Annex Mine was acquired after 1946, not in circa 1930.



Figure 15. Quonset Hut, last building on the right, (Circa 1950), Facing Southeast. Other pictured structures and vehicles are not original to Hill Annex Mine.

Conveyor Belt (1944)

The Conveyor Belt was constructed by Interstate in 1944, after the open mine pit's sides became too steep for the electric rail cars to operate efficiently. The Conveyor Belt was constructed to efficiently move iron ore from the bottom of the pit to the surface for processing. A truck haulage system was concurrently developed and incorporated into mine operations (Hill Annex Mine State Park N.D.). The Conveyer Belt is visible in the 1947 aerial photograph, and it remained largely unchanged, however its southwest end became submerged in the open mine pit's water between 1991 and 2003 (University of Minnesota 1947; NETR 1991, 2003). Today, the Conveyor Belt's southwestern end remains submerged under water.



Figure 16. Conveyer Belt (1944), Facing Southwest

Heavy Media Plant (1953) and Hydrolator Tank, aka “Tailings Basin” (1957)

The Heavy Media Plant was constructed by J&L in 1953, replacing the older wash plants that were located offsite near Pinacie Lake to the southeast in Section 22. The heavy media process was able to produce shipping ores from lower grade iron formation. To separate the waste rock from valuable ore, the material was floated in a heavy gravity solution of powered ferrosilicon and water (Hill Annex Mine State Park N.D.). This plant is located at the open mine pit’s edge, where it could be more easily fed by the Conveyor Belt (1944), eliminating the need to transport the material great distances. The Heavy Media Plant remains largely unchanged since construction (Monroe 2020b:14; NETR 1981, 2021).

According to the NRHP nomination, the round, metal Hydrolator Tank, located immediately east of the Heavy Media Plant, was constructed in 1957. However, it is mistakenly referred to as the “tailings basin” in the NRHP nomination and associated photos, and it is not included on the NRHP nomination’s map (SHPO and Anderson 1985). The NRHP nomination located the tailings basin “to the east immediately adjacent to the heavy media plant,” which is why this structure is assumed to be the contributing structure. There is a tailings basin that was built as part of the non-extant Heavy Media Plant that was constructed in 1957 southeast of the main mine complex in Section 22 (SHPO and Anderson 1985:8.3).



Figure 17. Heavy Media Plant, left (1953) and Hydrolator Tank, right (1957), Facing Northwest

There was a tailings basin constructed as part of the Hill Annex Mine's (non-extant) Wash Plant (built 1920-1922) near Pinacie Lake, which is southeast of the main mine site in Section 22. Construction of the plant, which used various washing processes to break down the ore and free silica waste in order to ready the iron for blast furnaces, began in 1920 and was completed in 1922. Tailings were the waste product of the ore washing process, comprised of a sandy silica material. Prior to its construction, the mine's ore was sent to the Hawkins Wash Plant at O'Brien Lake. The Wash Plant operated from 1922 to 1950 (Monroe 2020a:12; 14).

A *Mining Congress Journal* article from 1929 describes the Hill Annex Mine's tailings basins: "The tailings basin is a tract of low swamp land, approximately 3,500 ft. long and 1,000 ft. wide, lying between the washing plant on the westside and Little Penacie [*sic*] Lake on the east side. This area is not a naturally inclosed [*sic*] basin therefore it has been necessary to cast a dike along the north, east, south and part of the west sides in order to prevent the tailings from flowing into the lake" (Bolthouse 1929:756).

In 1950, the Wash Plant was converted to the heavy media process. It was used for a few years more, from 1950-1953, until the new Heavy Media Plant (1953), located in the main mine complex, took over processing (SHPO and Anderson 1985).

Section 22's tailings basin would also later feed a 1957 Tailings Reclamation Plant that was constructed just south of the defunct 1920-1922 Wash Plant (Monroe 2020a:15). The 1957 plant used an innovative method that employed a dredge floating on the surface to froth the material in the tailings basin in order to concentrate the remaining iron through a specialized process. The Tailings Reclamation Plant operated from 1957 to 1963 (Monroe 2020a:15). After 1963, the tailings basin remained in place as a part of the landscape (NETR 2021).



Figure 18. Tailing Basin, shown at the right of the photo (1920-1922) in 1958 (Monroe 2020a:14)

Prep Section (1953)

The Prep Section, consisting of a trestle structure, was constructed by J&L at the eastern end of the pit in 1953. As the name suggests, it housed operations that prepared the ore for processing in the Heavy Media Plant. This included a double screening of the iron ore. The larger material was sent though a cone crusher and collected in a coarse surge pile. The smaller material was run through a spiral classifier and collected in a fine surge pile. These two surge piles were then processed further at the adjacent Heavy Media Plant. Tailings were collected in a tailings basin. The process is illustrated in a flow chart (Figure 7 above) (IRRRB 1986:12). There have been no changes since its construction (Monroe 2020b:14; NETR 1981, 2021).



Figure 19. Prep Section (1953), Facing West. Dump truck at right not original to Hill Annex Mine.

Truck Repair Shop (1961, non-contributing)

In 1961, the Truck Repair Shop was constructed by J&L at the Railroad Equipment Repair shop's southeast corner. After 1950, the mine's main transportation system switched from using electric rail to truck hauling to move the mined iron ore to processing and shipping locations. While there were other various repair shops on the mine site, this appears to be the first automobile-specific building constructed. There have been no changes to the shop's footprint since its construction (Monroe 2020b:14; NETR 1981, 2021).



Figure 20. Truck Repair Shop (1961), Facing East.

3.2 Architectural History Literature Review

3.2.1 Other Previously Inventoried Architectural History Properties

In addition to the NRHP District described in the previous sections, there are three previously inventoried, unrelated properties located at the north edge of the NRHP District boundary. They are not a part of the District despite proximity, and thus, are not part of this mitigation plan. These include the Majorca Mine Open Pit (IC-GRN-00010), the BN/BNSF Railroad Corridor to Barbara Mine (IC-GRN-00013), and the BN Railroad Spur to Barbara Mine (IC-GRW-00013).

In 2008, Majorca Mine Open Pit (IC-GRN-00010) was inventoried by 106 Group for the Itasca County Railroad Phase I Cultural Resources Survey. Majorca Mine Open Pit was determined not eligible for listing in the NRHP (Van Erem 2008a).

In 2008, BN/BNSF Railroad Corridor to Barbara Mine (IC-GRN-00013) was inventoried and determined not eligible for listing in the NRHP. Property records available through the Minnesota Statewide Historic Inventory Portal (MnSHIP) do not include details of the inventory but indicate that the BN/BNSF Railroad Corridor to Barbara Mine was determined not eligible in 2009 (SHPO 2025).

In 2008, BN Railroad Spur to Barbara Mine (IC-GRW-00013) was inventoried by 106 Group for the Itasca County Railroad Phase I Cultural Resources Survey. The BN Railroad Spur to Barbara Mine was determined not eligible for listing in the NRHP (Van Erem 2008b).

3.2.2 Above-Ground Objects and Structures Inventory

In addition to the 10 extant contributing buildings and structures and one non-contributing building, there are structures and equipment located onsite that are not noted in the NRHP form. In June 2024, SHPO visited the site and worked with MN DNR to identify extant equipment and objects associated with the site to prioritize for inclusion in the mitigation plan. Sixteen items were identified as part of the priority list ("A-List"). See Table 1 and Appendix C for more details.

Table 1. Above-Ground Objects and Structures in the Hill Annex Mine Historic District

Item	Location	Notes	Thumbnail[3]
Ore Storage Structure	Northeast of the Railroad Equipment Repair Shop	Open-air ore storage structure made of poured concrete; three rectangular sections and angled walls. Original to Hill Annex Mine. Constructed between 1959 and 1966.[4]	
Shovel Bucket (with historic designation plaque)	Calumet Community Club	Uncertain of bucket's contribution to site. Bucket modified when plaque was attached.	
Sign - "Office Shops Heavy Media Plant"	Second intersection after Calumet Community Club	Not named in the NRHP documentation as a contributing object but considered by the State of Minnesota to be part of historic district. Contributes to landscape.	
Colburn Machining Tool	Railroad Equipment Repair Shop	Original location in Railroad Equipment Repair Shop.	
Columbia Machine Tool	Railroad Equipment Repair Shop	Original location in Railroad Equipment Repair Shop.	

[3] Photos provided by MN DNR.
[4] NETR, Aerial Photos 1947, 1981; Great Northern Iron Ore Properties (GNIOP) Map, 1959; Monroe 2020b.

Item	Location	Notes	Thumbnail[3]
Horizontal Press	Railroad Equipment Repair Shop	Original location in Railroad Equipment Repair Shop.	
Machining Tool	Railroad Equipment Repair Shop	Original location in Railroad Equipment Repair Shop.	
Bandsaw	Railroad Equipment Repair Shop	Original location in Railroad Equipment Repair Shop.	
Lathe	Railroad Equipment Repair Shop	Original location in Railroad Equipment Repair Shop.	
Milling Table	Railroad Equipment Repair Shop	Original location in Railroad Equipment Repair Shop.	
Bit Sharpener	Railroad Equipment Repair Shop	Original location in Railroad Equipment Repair Shop.	

Item	Location	Notes	Thumbnail[3]
Press	Railroad Equipment Repair Shop	Original location in Railroad Equipment Repair Shop.	
Grinder	Railroad Equipment Repair Shop	Original location in Railroad Equipment Repair Shop.	
1931 Electric Loco	North end of train yard by Heavy Media Plant	Original to Hill Annex Mine.	
Ore Car 1	Heavy Media Plant	Original to Hill Annex Mine.	
Ore Car 2	Heavy Media Plant	Original to Hill Annex Mine.	
Ore Car 3	Heavy Media Plant	Original to Hill Annex Mine.	

3.3 Archaeological Literature Review and Assessment

In order to provide an overview of archaeological potential for the entire Project, the study area for the archaeological literature review and assessment includes all areas of proposed construction activities or other potential ground disturbing activities associated with construction (project area), identified in CRC's Project Description (Appendix B). Recommendations for archaeological resources (Section 4.2.3) are focused primarily on the NRHP District itself.

3.2.3 Methods

The archaeological investigation included a literature review and desktop assessment. The literature review included research at the SHPO and the Minnesota Office of the State Archaeologist (OSA), and a review of available documentary sources such as maps and aerial images of the project area with the objective of identifying where there are any known archaeological sites or records previously conducted surveys within the study area. The desktop assessment was based on the results of the literature review, and no site visit was conducted. The objective of the assessment was to gauge whether the study area, or portions of the study area, have the potential to contain intact archaeological resources that may be potentially eligible for listing in the NRHP. Areas generally assessed as having a greater probability to contain intact archaeological sites included undisturbed portions of the study area that are:

- located within 150 m (492 ft.) of an existing or former water source of 40 acres (16 ha) or greater in extent or within 150 m (492 ft.) of a former or existing perennial stream;
- located on topographically prominent landscape features;
- located within 100 m (328 ft.) of a previously reported site; or
- located within 100 m (328 ft.) of a former or existing historical structure or feature (such as a building foundation or cellar depression).

Areas assessed as having a relatively low potential for containing intact archaeological resources included inundated areas, former or existing wetland areas, poorly drained areas, areas with slope of 20 degrees or greater, and areas of extensive disturbance.

The results of this investigation aid in determining what, if any, additional cultural resources studies may need to be completed to comply with applicable laws. All work was conducted in accordance with the SHPO *Manual for Archaeological Projects in Minnesota* (SHPO 2005), *State Archaeologist's Manual for Archaeological Projects in Minnesota* (OSA 2011), and *The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation* [48 Federal Register 44716-44740] (National Park Service [NPS] 1983).

3.2.4 Results

3.2.4.1 Literature Review

Research indicates no previous archaeological surveys have been conducted within the study area. No archaeological sites have been recorded (field confirmed), and no sites have been reported (not field confirmed) within the study area used for the archaeology literature review.

3.2.4.2 Environmental History Overview

The nearest sources of naturally occurring perennial water include Upper and Lower Panaca Lakes, Snowball Lake, an unnamed creek, and the Swan River; these bodies of water are between 0 and 1,058 m (0 and 3,470 ft.) from the study area boundaries. Historic maps show no prominent topographical features (i.e., ridges, hills, river valleys), and while modern topographical maps do show variations in the landscape, these may be attributed to long-term mining operations within the study area.

Soils within the study area are predominantly wet clay (Slickens) soil, Udorthents with some slope (2 to 12 percent), and mine dumps (NRCS 2025). The remaining soil profiles are classified as mixed loams (silty and sandy loams) and muck; these soils make up less than 12% of the land composition (UC Davis 2025).

3.2.4.3 Historical Research

The earliest available map depicting the study area is a BLM GLO map from 1867 (BLM GLO 1867). This map shows portions of the study area intersecting swamps, overlapping portions of the northeast side of Lower Panaca Lake (then unlabeled), portions of the southwest side of Snowball Lake (then unlabeled) and an unlabeled creek on the far west end of the study area. No development or occupation of the land is shown. A 1916 plat map shows no demarcation of swamps in the APE but does show the perennial water sources (now labeled, except the creek) (Hixson 1916). This plat also shows four unnamed roads, the Duluth, Missabe & Northern Railway (DM&N) line, and the Great Northern Railroad line overlapping portions of the study area (Hixson 1916).

A rendering of the 1918 Hill Annex Mine boundaries, revised in 1955, shows that mining efforts were concentrated in the northern half of Section 16 and depicts one mine shaft near the center of Section 16 (Hill Annex Mine 1955). Based on the location, it is likely that this mine shaft is the same one that was excavated in 1913 during the ownership by the Arthur Iron Mining Company (Monroe 2019:11).

A Hill Annex Mine map from 1921, again specific to Section 16, shows the expansion of the mining pit edge to south by approximately 19 m (62 ft.) and west by several hundred meters, compared to previous maps (Hill Annex Mine 1921). This map also shows several buildings, ore dumps, roads, rail lines, and the 1913 mining shaft. Labeled buildings on this map include a screening and crushing plant, and there are 44 unlabeled structures along the southeast and south sides of the pit mine (Hill Annex Mine 1921). Only two roads are labeled (“Path to Calumet” and “Missabe Ave”), and none of the rail lines are labeled. The three ore dumps are labeled as “stockpiles” (two) and a “taconite stash pit” (one) (Hill Annex Mine 1921). A 1928 map from the Oliver Mining Company shows, in the far west end of the project area, two unlabeled mining access roads (OIM Company 1928). The unlabeled creek at the far west end of the study area is no longer shown (and does not reappear on future maps and aerial images).

The development shown on the 1921 map also includes a sewer line between 11 of the southernmost structures and Calumet (off map), indicating that these 11 structures are likely to have been, or been related to, the miners’ residences noted in the 1915 *Iron Trade Review* article (Estep 1915:76). This is further corroborated by a 1931 sewer and water line map, 1939 aerial image, and 1939 mining plat map,

which all show the residential section in detail (Inter State Iron Co. 1931; MN DNR 1939). The 1931 map shows the (now labeled) school, clubhouse (now Calumet Community Clubhouse), and 17 individual residences (each with a corresponding outbuilding within property lines), as well as several manholes, fire hydrants, water mains, sewer lines, and a septic tank to the south of the subdivision.

A 1939 aerial image and mining plat map (Figure 6) show a significant expansion of the mining pit, whose southernmost edge is now shown to abut the "Path to Calumet" (GNIOP 1939). The 1939 map shows thirteen labeled structures ("Crushing Plant", "Sub-Station", "Scale House", "Yard Office", "Dry", "Lab", "Garage", "Office", "Water Tank", "Car Shop", "Shops", "School", "Clubhouse"), as well as general locations for the town of Marble, the Hill Annex Mine residential section, and the expanded dump locations. Many of the buildings shown on the 1921 map are no longer depicted on the 1939 map, and appear to have been located in the footprints of expanded stripping dumps or the mine pit (GNIOP 1939).

The 1939 map also shows more of the study area, and includes portions of the study area near Upper and Lower Panaca lakes (here labeled "Pinacie" instead of Panaca). This extended map area shows additional mining operations structures in sections 22 and 27, labeled as the "Screening Plant", "Concentrator", and "Pump House", "Office", and "Dry" (GNIOP 1939). This map also shows the power and telephone lines (and pole locations), railway lines, two main roads ("Old County Road" and "U.S. Trunk Highway 169") and several smaller residential or township roads (GNIOP 1939). Lastly, this map shows the 1913 mine shaft (near the center of Section 16), and a second mine shaft north/northwest of the residential section.

Aerial imagery of the project area from 1940, specific to Section 16, shows portions of what are labeled the Lean Ore Dump, Ore Material Dump, Taconite Dump #2, the Mine Shops, the Direct ship ore GN (Great Northern) interchange yard, the stripping dump, the Lean concentration material dump, the Hill Annex location (which refers to the residential section buildings such as the residences, school, and clubhouse), the ISI rail line to wash plant, portions of the DM&N railway and Taconite Dump #2; as well as several unlabeled mining access roads (Monroe 2020). Unlabeled, but depicted, buildings appear to include the lab, dry, yard office, car shop, water tank, office, garage, crushing plant, and sub-station which were shown on the 1939 map. The shafts are indiscernible from the quality of the photo and the scale house does not appear to be present (Monroe 2020). This aerial also shows the pit edge as having been extended an additional 95 m (312 ft.) to 560 m (1,837 ft.) south (Monroe 2020).

Aerial images from 1958 and mining plat map from 1959 show minimal changes to the 1940 aerial image (GNIOP 1959; Monroe 2020). The main changes within Section 16 shown on the 1958 aerial include the appearance of what is labeled the Heavy Media Plant, Tailings Thickener, Conveyor from the pit, load out pocket, Substation, coarse surge pile, "D" pocket, fines surge pile, two unlabeled outbuildings and the Prep section (Monroe 2020). There is a slight contrast between the labeling in the aerial images and that of the mining plat. In the plat map, the Heavy Media Plant and Tailings Thickener are marked as one structure and labeled "Concentrator"; the Prep section is labeled as the sub-station; the conveyor is drawn, but not labeled; and the surrounding dumps are not as specified, instead labeled as "Lean Ore Dump", "Stripping Dump", Rejects", or "Taconite Dump" (GNIOP 1959; Monroe 2020). These aerial images and

plat map show the expansion of the mining pit southward, toward the residential section, by an additional 100 m (328 ft.).

These aerial images and plat map show the southern portion of the project area, including the Heavy Media Tailings Basin, and what is labeled the "former" wash plant (demolished in 1958) and "former" wash plant tailings basin (south of the Heavy Media Tailings Basin). Again, there is a discrepancy between the aerial images and the mining plat map. The mining plat map still shows the office, dry, and pump house from the 1939 map, which the aerial does not label (and the quality of the image cannot confirm), as well as a "Concentrator" which is shown on the aerial but not labeled (GNIOP 1959; Monroe 2020). Lastly, the plat map simply calls the surrounding areas "tailings basin" and does not specify function or association with any specific building or operations. Several access roads and drainage dikes are shown around and within the Heavy Media Plant Tailings Basin (Monroe 2020). There are several mining service roads intersecting the project area in both sources, as well as lines for the DM&N and Great Northern railroads (Monroe 2020; GNIOP 1959). Neither of the previously depicted mining shafts (1913 and 1939) are shown in these documents, and it appears that the second shaft (first shown on the 1939 map) near the residential section would have been within the extended boundaries of the open pit.

An aerial image from 1966 depicting only the northern half of the study area (north of Hwy 169) and a 1968 mining plat map depicting the entire project area show some significant development within the project area. Most notably, the residential area is no longer shown, and the pit edge is shown to extend south, southeast, and east by another 105 m (344 ft.) to 254 m (833 ft.). The clubhouse and school are still shown, as well as the Substation, Heavy Media Plant and Thickener, water tower, office, lab, shops, 1913 mine shaft, prep section (now distinct from the substation), and the conveyor (Jones & Laughlin Steel Corporation 1968; Monroe 2020). There is also a building, not depicted on previous maps, labeled 'Cret Plant' (Cretaceous Plant) just north of the rail lines (Jones & Laughlin Steel Corporation 1968; Monroe 2020). Several dumps are shown along unlabeled access roads. No changes are shown to the Duluth Missabe or Great Northern Railroad lines, but the ISI rail line does not appear to be in use anymore, as the northern portion of rail is not shown, and the former track appears to be disturbed by mining activities (Monroe 2020). In the southern portion of the project area, the southern office, lab, and dike are still shown, as is the concentrator – but it has been relabeled "reclamation plant" (Jones & Laughlin Steel Corporation 1968). The pump house is not shown, and there are no changes to the mining roads in this area (Jones & Laughlin Steel Corporation 1968).

An aerial image from 1975 shows minimal changes to the northern half of the project area (north of Hwy 169) in the form of possible structures on the south side of the shops (Monroe 2020). An aerial from 1982 no longer shows the school building, which was one of the final remaining buildings from the previous residential section (the clubhouse is still shown) (Monroe 2020). No other resources were available depicting the entirety of the project area in 1975, so the buildings in Sections 22 and 27 cannot be confirmed. A 1981 aerial and the 1982 aerial also show the gradual overgrowth of the unused mining piles, as well as the overgrowth and remaining ponds from the tailings basins in the southern portion of the project area (Nationwide Environmental Title Research [NETR] 1981; Monroe 2020). The 1981 aerial also shows a maintained area near the clubhouse where the current park entry and pavilion are now, and

the office and lab within Section 27, however the reclamation plant is not shown. A 1991 aerial image shows the development of the pavilion buildings, but the Cretaceous Plant and southern office and lab are not shown (NETR 1991). A satellite image from 2024 shows timbering activities within the northern portion of the former tailings basin and the former track of the DM&N appears to be paved and labeled "Mesabi Trail" (a paved bike trail between Grand Rapids and Ely, MN) (Google 2024; Mesabi Trail 2025). No further residential or industrial development is shown within the project area.

3.2.4.4 Discussion of Archaeological Potential

3.2.4.4.1 Precontact Archaeological Resources

There are no previously identified archaeological sites within the project area. There are no naturally occurring topographically prominent landscape features within the project area. The project area overlaps or is within 150 m (492 ft.) of two contemporary perennial sources of water (Upper and Lower Panaca Lakes) and two historically mapped water sources, Snowball Lake and an unnamed creek. Therefore, is it likely that portions of the project area within 150 m (492 ft.) of all current and former perennial water sources have the potential to contain precontact archaeological resources. Changes in the local landscape, as a result of the mining, have affected these areas near historically mapped water sources. Although mining activities may not have involved excavation in these areas, dumping and piling of waste ore and tailings did occur. Therefore, if precontact archaeological resources do exist near water sources, they may be likely to be deeply buried in areas where mining dumping occurred, such as near Snowball Lake and the unnamed creek. There are no perennial sources of water within the historical Hill Annex Mine area (Section 16), and therefore there is a low potential for this area to contain precontact archaeological sites.

3.2.4.4.2 Post-Contact Archaeological Resources

Hill Annex Mine Historic District

Post-contact development within the project area is primarily associated with Hill Annex Mine and includes the construction, maintenance, and, in some cases, demolition, of the residential section (residences, school, and Calumet Community Clubhouse), mine shops (Railroad Equipment Repair Shop, Truck Repair Shop, Laboratory, Mine Managers Office, Quonset Repair Shop), mine structures (Conveyor Belt, Wooden Water Tower, Prep Section), processing plants (Wash Plant, Heavy Media Plant and Hydrolator Tank, Cret Plant, Reclamation Plant), mining dumps (Taconite Dump #1, Taconite Dump #2, stripping dumps, tailings basins, stock and tailings piles), roadways, rail lines, and utilities. This list includes both extant and non-extant structures. Several non-extant structures appear to have been demolished and subsequently buried under a mining dump. It is possible that remnants of these structures exist beneath the dump sites. Additionally, one contributing building, the Frame Truck Repair Shop (circa 1919), is no longer extant, but its location is currently submerged beneath the mine pit lake. It is unknown whether remnants of this structure still exist beneath the water. Additionally, the southwestern end of the Conveyor Belt is submerged beneath water.

Areas adjacent to some of the extant structures (such as the Section 16 Mine Managers Office, Laboratory, Calumet Community Clubhouse, repair shops and other buildings where people spent long periods working), all located within the NRHP-listed historic district, have increased potential for archaeological resources due to the higher likelihood of refuse deposits and privy deposits near these

buildings. Non-extant structures, such as the Wash Plant, Cret Plant, Section 27 office and lab, the reclamation plant, and the schoolhouse, also present potential for post-contact archaeological features in the form of foundations and building remnants, as well as refuse deposits and/or privy deposits. Potential archaeological resources related to both extant and non-extant structures, if present, could have the potential to yield important information regarding the evolving nature of extraction and processing methods, mining technology, the use and workflow of the mine, as well as residential use and habitation patterns, as the mine property changed over time. Therefore, such intact archaeological resources, if they exist, could contribute to the significance of the NRHP district under Criterion D.

The former miners' residences, now non-extant, were demolished to expand the pit mine. The land on which most of the residential section was located was excavated to expand the boundaries of the pit, and is currently submerged. Due to the deep excavation that was required to create and expand the mine pit, is it unlikely that there are intact archaeological resources associated with the residential section within the area now submerged under the mine pit lake. However, some of the land on which the residential section was built remains intact. Therefore, there may be potential in this area for building remnants, foundations, and archaeological deposits associated with miners' habitation to still be intact within the remaining landscape. The remaining portions of land on which the residential section was built has the potential to yield significant information related to the residents of one of Minnesota's earliest mines, including how they built, worked and lived within their community, as well as how that community evolved alongside the mining operations from a camp into a residential area and community. Therefore, such intact archaeological resources, if they exist, could contribute to the significance of the NRHP district under Criterion D.

Due to the increased potential for intact significant archaeological sites, some of which may contribute to the NRHP distinct, portions of the project area within 100 m (328 ft.) of the remaining landform of the residential section, the extant mine shops, the extant and non-extant processing plants, and the extant and non-extant mine structures are assessed as possessing moderate to high potential for intact significant post-contact archaeological resources.

Dump Sites

Post-contact development also included the use of several basins and dump sites around the project area. These appear to have been constructed by dumping waste soil and other material over the topsoil. It is unlikely that significant post-contact archaeological resources to exist in these areas, as the mining operations occurred in specific locations near and around, but not within, these dump sites. Additionally, the dump sites themselves have little information potential or potential significance beyond their presence within the landscape. Therefore, areas near dump sites and basins are assessed as possessing low potential to contain significant intact archaeological resources.

Rail Lines, Roadways, and Utilities

Post-contact development also included the construction and maintenance of infrastructural mining components such as the DM&N, Great Northern, and ISI railroads, mining access roads, portions of Hwy 169, and utility services. Due to the use of the ISI railroad and Duluth Missabe railroad lines within the

main mining complex (north of Hwy 169), there are likely to be intact archaeological resources related to the maintenance and use of these railroad lines (two now defunct) and utility routes (such as the telephone and power lines) within the project area. The railroad lines have been determined not to contribute to eligibility of the district, and utility lines are similarly unlikely to contribute. Furthermore, any potential archaeological resources related to utilities, roadways, and rail lines are likely to be the result of incidental discard during construction and use, rather than the concentrated and intact remains of prolonged habitation or other localized human activities which tend to result in archaeologically significant deposits. Therefore, areas along rail lines, roadways, and utility corridors are assessed as possessing low potential to contain significant intact archaeological resources.

4.0 RECOMMENDATIONS

4.1 Assessment of Effects

4.1.1 Assessing Effects on Historic Properties

The criteria that must be used to assess effects on historic properties that are listed in, or are eligible for listing in, the NRHP are set forth 36 CFR § 800.5(a)(1):

An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the NRHP. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative.

An adverse effect can occur if any aspect of a historic property's integrity is diminished. Examples of adverse effects are identified in 36 CFR § 800.5(a)(2) and include, but are not limited to:

- Physical destruction of or damage to all or part of the property;
- Alteration of a property that is not consistent with the Secretary of the Interior's (SOI's) Standards for the Treatment of Historic Properties (36 CFR § 68) and applicable guidelines;
- Removal of the property from its historic location;
- Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;
- Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features;
- Neglect of a property that causes its deterioration; and
- Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

It is important to note that just because an undertaking may have an effect on a historic property it does not necessarily constitute an adverse effect. For example, project elements may be visible from a historic property without the effect rising to the level of an adverse effect. In this example, factors to consider when assessing whether the visual effect is adverse would include proximity of project components to the historic property, the nature of the element being introduced to the setting, the significance of the views to and from the historic property, and the overall importance of integrity of setting to the historic property's ability to convey its significance and maintain its eligibility for the NRHP. Direct effects, however, are often more likely to result in an adverse effect due to the actual physical changes they often cause to a

historic property, although one notable exception is rehabilitation projects completed in accordance with the SOI's Standards for the Treatment of Historic Properties (36 CFR § 68).

4.1.2 NRHP District: Hill Annex Mine Historic District (IC-GRN-00002)

To aid in this assessment of effects study, field notes and digital photographs were taken on February 20, 2025. The purpose of fieldwork was to assess the physical and visual impacts on known historic properties. Additionally, the study examined concept drawings and project element descriptions of the proposed Project.

This analysis includes an examination of the following potential effects: physical, visual, noise, vibration, traffic. Potential effects were analyzed for the NRHP-listed District. Properties that are contributing to NRHP-listed District share the same significance and generally require the same integrity to convey that significance. Additionally, potential effects to all contributing properties will be universal. Therefore, the effects on historic properties within the District were assessed as a whole, rather than on individual properties within the District that are not also individually NRHP-listed or eligible (Advisory Council on Historic Preservation [ACHP] 2019).

4.1.2.1 Project Description

The Project proposes to return the Hill Annex Mine, in which the Hill Annex Mine Historic District (IC-GRN-00002) is located, to active use as a scram mine by the CRC. In order to produce feedstock from iron ore resources (i.e., legacy stockpiles and tailings basins) on site, the CRC plans to employ and combine the latest technology in mineral processing. Prior to stockpile mining, all buildings, including all of those located within the District's boundaries, and infrastructure will be razed, and debris will be removed from the site. This element of the Project is proposed in order to accommodate proposed mining infrastructure, which includes the construction of a new plant building, loadout facility, product stockpiles, conveyor lines, water pipelines, access roads and bridges within the current District boundary (Appendix A).

4.1.2.2 Assessment of Effects

The Hill Annex Mine Historic District (IC-GRN-00002) (District) is listed in the NRHP in the area of Industry, due to its representation of early, and evolving, mining on the Mesabi Range. The District is comprised of seven contributing buildings, four contributing structures, and one non-contributing building. One contributing building, the Frame Truck Repair Shop (circa 1919), is non-extant. The period of significance spans the start of the mine operations in 1912, though the construction of the Heavy Media Plant's Hydrolator Tank in 1957. See Section 3.1.2 above for more detailed information.

The entire property parcel of the Hill Annex Mine, including the entire District, is located within the proposed Project area. Completion of the Project includes demolition of all buildings and structures within the property parcel and the construction of a new plant building, loadout facility, product stockpiles, conveyor lines, water pipelines, access roads, and bridges (Appendix B). Due to construction requiring the removal of the buildings and structures within this historic District, the Project will have permanent, direct, physical effects. By removing all contributing resources within the District, the Project

will eliminate all of the District's integrity of location, setting, design, materials, workmanship, feeling, and association. Therefore, the Project will have an adverse effect on the District.

Due to the proposed demolition as a result of the Project, the Project will permanently affect the historic District's ability to convey its historic significance, and therefore, the Project will have an adverse effect on the historic district.



Figure 21. Calumet Community Club, Hill Annex Mine Historic District, facing west.



Figure 22. Mine Managers Office (left) and Pay station (right), Hill Annex Mine Historic District, facing southwest.



Figure 23. Heavy Media Plant (left, contributing) and ore storage structure (right, constructed after District period of significance), Hill Annex Mine Historic District, facing northeast.

4.1.3 Potential Effects to Potential Archaeological Resources

Because no archaeological survey has been completed within the Project area, it is unknown whether significant archaeological resources exist that could be affected by the Project; therefore, this assessment of effects can only be at a general level. Potentially significant archaeological resources, if they exist, may be adversely affected by ground-disturbing activities associated with the Project, including demolition of existing buildings and infrastructure, debris and vegetation removal, construction of new infrastructure, earth and stockpile movement, grading, excavation, and other ground disturbing activities. If significant archaeological resources are identified as a result of the additional investigations recommended below, then a more focused assessment of effects may be necessary.

4.2 Mitigation Strategy Recommendations

As part of their proposed approach for lease of the property from the MN DNR and MN IRRR, the CRC is planning for the demolition of all buildings and structures within the District for the construction of a scram mining operation that includes new buildings, product stockpiles, and other infrastructure (Appendix B). The District is listed in the NRHP, and initial findings indicate that this Project will have permanent, direct, adverse physical effects on the District, and therefore, requires mitigation.

The following mitigation strategy recommendations prioritize comprehensive documentation in an effort to mitigate these adverse effects and ensure the site's history is thoroughly recorded and available to the public in perpetuity. The recommendations themselves do not constitute mitigation.

4.2.1 NRHP District: Hill Annex Mine Historic District

The following sections define the mitigation strategies recommended for MN DNR and MN IRRR to make in order to resolve adverse effects of the undertaking on the District:

- Minnesota Historic Property Record (MHPR) package at Level I; and ONE of the following:
    - Video of site, 3-5 minutes, based on MHPR research and documentation
    - Digital mining history exhibit, based on MHPR research and documentation

4.2.1.1 Updated Minnesota Historic Property Record Package for the Minnesota State Historic Preservation Office (SHPO)

It is recommended that the MN DNR and MN IRRR prepare, or hire a qualified consultant to prepare, a Level I MHPR package for the District that will be demolished as part of the Project, per the requirements of the *Minnesota Historic Property Record Guidelines* (Updated 06/2009).

The Level I MHPR would document the Hill Annex Mine Historic District (IC-GRN-00002), and each of its associated properties:

- Calumet Community Club (circa 1915)
- Frame Truck Repair Shop (circa 1919, non-extant)
- Railroad Equipment Repair Shop (circa 1919)
- Mine Managers Office (circa 1930)
- Laboratory (circa 1930)
- Quonset Repair Shop (circa 1950)
- Heavy Media Plant (1953)
- Wooden Water Tower (circa 1919)
- Hydrolator Tank, aka Tailings Basin (1957)
- Conveyor Belt (1944)
- Prep Section (1953)

- Truck Repair Shop (1961, non-contributing)

The Level I MHPR package for the District would include the following:

- Cover Sheet
  - MHPR Background Data Form
- Narrative (Length limited only by subject and resources)
  - Property description
  - History of property
  - Bibliography
- Drawings
  - Photographic and/or photocopied reproduction of historic plans
  - Optional: Measured Drawings
- Photography
  - Medium or large format documentation photography (black & white). See *Minnesota Historic Property Record Guidelines* Appendix E for photography guidelines

4.2.1.2 Digital Documentation

In addition to the Level I MHPR, the development of digital documentation is recommended to resolve adverse effects of the Project to the District. This plan recommends two options for that digital documentation:

OPTION 1: Video Introduction to the History of the Hill Annex Mine Historic District

The recommended approach to the video introduction includes the following steps:

- MN DNR and MN IRRR could create and publish a video history of the Hill Annex Mine Historic District. The video history contents would be based upon the same information collected while writing and documenting the Level I MHRP described above.
- The goal of this video would be to spatially contextualize the buildings and structures on site before they are demolished and to briefly overview the history of the Hill Annex Mine site in a way that is engaging and is accessible to members of the general public who do not have a detailed knowledge of iron ore mining.
- The video could generate interest in the history of Iron Range mining but does not have to provide an in-depth facility overview. Those who are interested in a detailed overview of the history of the mine will be pointed towards the Level I MHPR described above. It is recommended that the video be between three (3) and five (5) minutes in length.
- MN DNR and MN IRRR could first develop a draft outline of the proposed video contents including an interpretive framework (themes, topics, goals, audiences); and narrative (film treatment); and provide the draft outline to SHPO to provide comments on the outline.

- MN DNR and MN IRRR could then consider and incorporate, as feasible, into the final outline for the video any comments and recommendations made by SHPO.
- MN DNR and MN IRRR could develop and share a first draft of the video (first draft text, script, or equivalent) and distribute the draft video to SHPO for review and comment. While drafting the video, MN DNR may opt to send content to SHPO s for partial review. This step could be optional.
- MN DNR and MN IRRR could consider and incorporate, as feasible, into the final video any comments and recommendations made by SHPO. MN DNR and MN IRRR would work with SHPO to address any significant concerns regarding the content of the draft deliverable.
- MN DNR and IRRR may offer a digital copy of the final video to local partners with whom they have been communicating about the project. Local partners could include, but would not limited to, the MNHS; Itasca County Historical Society; Hibbing Community College; Cities of Bovey, Calumet, Cohasset, Coleraine, Grand Rapids, Marble, Nashwauk, and Taconite; Greenway Township; Western Mesabi Mine Planning Board; Hull Rust Overlook; Red Head Mountain Bike Trails; Itasca County; Lake Superior Railroad Museum; the Minnesota Transportation Museum; the Minnesota Museum of Mining; Minnesota Discovery Center; and the North Central Minnesota Farm & Antique Association.
- The video could be made available to the public via a link on the MN DNR and MN IRRR website for an extended period of time, if not in perpetuity.

OPTION II: Digital Hill Annex Mine History Exhibit

The recommended approach to the digital history exhibit includes the following steps:

- MN DNR or MN IRRR could prepare a digital exhibit on the history of the Hill Annex Mine. This exhibit could include, but not be limited to, a narrative history with photographs, illustrations, drawings, maps, oral histories, etc.
- The goal of the exhibit would be to provide an engaging and comprehensive overview of the history of the Hill Annex Mine. The exhibit is intended to capture the history of the Hill Annex Mine facility, not the history of the entire Iron Range. The exhibit would be written in such a way that the content is generally understandable for members of the public who do not have a detailed knowledge of mining history and should be targeted for a 6th-8th grade reading level audience.
- The exhibit would be designed and laid out for use on an accessible website and as an accessible PDF.
- MN DNR and IRRR would distribute a copy of the draft outline to SHPO to ensure that the proposed content aligns with expectations and meets the intent of this stipulation.
- MN DNR and IRRR could then consider and incorporate, as feasible, into the final outline any comments and recommendations made by SHPO.
- The MN DNR and IRRR would then share the draft exhibit, in PDF format, to SHPO for review and comment. While drafting the exhibit, MN DNR and IRRR may opt to send content to SHPO for partial review. This step could be optional.

- MN DNR, MN IRRR, and SHPO would work collaboratively to address any significant concerns regarding the content and readability of the draft deliverable(s).
- MN DNR and IRRR may offer a digital copy of the final exhibit PDF to local partners with whom they have been communicating about the project. Local partners could include, but are not limited to the Itasca County Historical Society; MNHS; Hibbing Community College; Cities of Bovey, Calumet, Cohasset, Coleraine, Grand Rapids, Marble, Nashwauk, and Taconite; Greenway Township; Western Mesabi Mine Planning Board; Hull Rust Overlook; Red Head Mountain Bike Trails; Itasca County; Lake Superior Railroad Museum; the Minnesota Transportation Museum; the Minnesota Museum of Mining; Minnesota Discovery Center; and the North Central Minnesota Farm & Antique Association.
- The digital exhibit could be made available to the public via a link on the MN DNR and IRRR websites for an extended period of time, if not in perpetuity, and via the pdf, which would be disseminated in perpetuity, upon request.

4.2.2 Above-Ground Objects and Structures

The following sections define the mitigation strategies recommended for MN DNR and MN IRRR to make in order to preserve historical resources that are not explicitly included in the Hill Annex Mine Historic District form.

4.2.2.1 Rehoming of the Inventory of Onsite Mining Equipment and Hill Annex Mine State Park Museum Artifacts

MN DNR has already created an inventory of machinery and equipment remaining onsite at Hill Annex Mine. See Appendix C for the lists of items. These items are categorized in two ways:

- Items under historic designation (items directly related to Hill Annex Mine, also known as the A-List)
- Items not under historic designation (mining history items brought to site after the mine's closure, also known as the B-List).

MN DNR, in cooperation with MN IRRR, is actively strategizing how and where to rehome the machinery and equipment from both the A- and B-lists at no cost to local governments or qualifying non-profit organizations who have an interest and ability to preserve the pieces and their contribution to Iron Range mining history.

Details regarding the ongoing efforts:

- Priority has been given to organizations that will preserve and display the items for public benefit or repurpose as public art. Organizations are required to submit a note of intertest to MN DNR for desired items.
- When the time comes to rehome the A-List items, MN DNR will seek approval from SHPO for their rehoming recommendations (See Table 1 and Appendix C for the lists of items).
- Organizations that wish to take custody of an item must meet MN Department of Administration eligibility criteria. Local governments including counties, cities, and townships, public libraries,

public school districts and state universities are all eligible. Museums and other non-profit organizations must complete a federal surplus eligibility form and be approved before receiving public assets.

- Organizations who receive these items will assume full ownership. MN DNR will not assist with the cost to remove selected items from the site, or future costs related to their ownership.
- MN DNR, with SHPO's approval, has already been active in rehoming the B-List items and artifacts, displays, and art from the Hill Annex Mine State Park Museum. MN DNR has organized a small working group, comprised of MN DNR staff and external stakeholders, who will review notes of interest from organizations wishing to take custody of any of the items. They are also charged with resolving conflicts should more than one interested organization submit a note of interest.
- As of April 2025, MN DNR has conducted outreach to the following: MN IRRR; Itasca County Historical Society; MNHS; Hibbing Community College; Cities of Bovey, Calumet, Cohasset, Coleraine, Grand Rapids, Marble, Nashwauk, and Taconite; Greenway Township; Western Mesabi Mine Planning Board; Hull Rust Overlook; Red Head Mountain Bike Trails; Itasca County; Lake Superior Railroad Museum; the Minnesota Transportation Museum; the Minnesota Museum of Mining; Minnesota Discovery Center; and the North Central Minnesota Farm & Antique Association.

In addition, it is recommended that all A-list items must be appropriately rehomed and/or safely stored before construction begins at the site. Once the current full, good faith effort has been made to appropriately rehome B-list machinery and equipment, the MN DNR may elect to offer remaining B-list items for public auction or scrap.

4.2.3 Archaeology

These recommendations have been prepared for those areas within the boundaries of the NRHP district only.

Due to the potential for intact post-contact archaeological resources that may be eligible for listing in the NRHP, it is recommended that prior to Project implementation, the following steps be undertaken within areas of moderate to high archaeological potential within District boundaries (Appendix A).

- To efficiently facilitate and guide implementation of archaeological work, an archaeological research design should be prepared. The research design would outline research questions, expected significant resource types, regulatory requirements, archaeological methods for Phase I identification survey and Phase II evaluation, guidance for identifying potentially significant archaeological resources during Phase I identification survey, and specific criteria for evaluating the significance of archaeological resources during Phase II evaluation, including both individually and as potential contributors to the NRHP district. The research design would consider strategies for conducting the Phase I and Phase II field surveys concurrently. The research design would also include targeted research to identify whether potentially significant archaeological resources are likely to be submerged, whether they are likely to retain

archaeological integrity, whether such resources would be adversely affected by the Project, and whether underwater survey is warranted in order to identify, characterize, and/or mitigate submerged resources.

- In order to identify potentially significant archaeological resources, a Phase I archaeological survey should be conducted for moderate to high potential areas within the NRHP district where Project ground disturbance is proposed.
- If potentially significant archaeological site(s) are identified, a Phase II evaluation of these site(s) should be completed. Guided by the research design, this evaluation would consider the significance of the site(s) and their eligibility for listing in the NRHP, individually or as contributors to the NRHP district.
- Conducting the Phase I and Phase II field surveys concurrently could streamline the identification and evaluation process. Coordination with OSA, SHPO, and other relevant agencies should be conducted to determine a path that is acceptable to these agencies to conduct concurrent surveys, and what archaeological license(s) would be appropriate. The research design would be used to support this agency coordination and the license applications.
- If, as a result of Phase II evaluation, significant sites are identified, then:
    - It should first be considered whether adverse effects to these sites as a result of the Project can be avoided.
    - If avoidance is not possible, then consultation regarding appropriate mitigation of adverse effects should be undertaken among DNR, IRRR, SHPO, and/or IRRR as appropriate.
    - To support this consultation, a mitigation package should be prepared, which would include details about the significant resource(s) and their recommended eligibility, specific discussions of Project impacts, including maps and graphics, and proposed resource-specific mitigation recommendations.

There remain areas of moderate to high potential for archaeological resources, both pre- and post-contact, outside of the NRHP district and within the greater project area boundaries (Appendix A). If any Project ground-disturbing activities are proposed which overlap with these areas, in order to comply with State laws governing archaeological resources such as the Field Archaeology Act, similar archaeological investigations as recommended above for the District may be necessary for other portions of the Project on non-federal public land.

For areas that are assessed as having low potential for intact archaeological resources (Appendix A), no additional archaeological work is recommended in these areas for this Project as currently planned.

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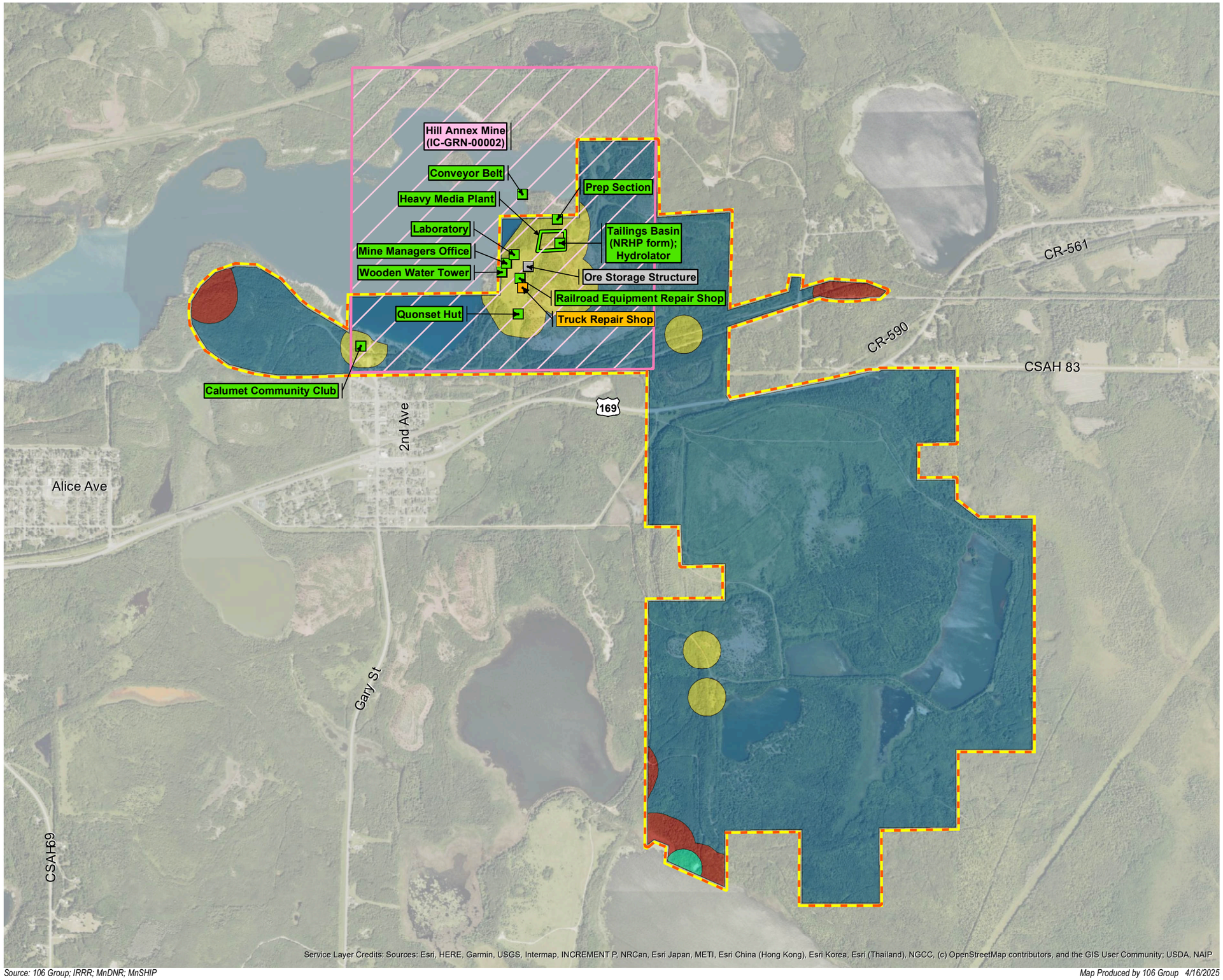
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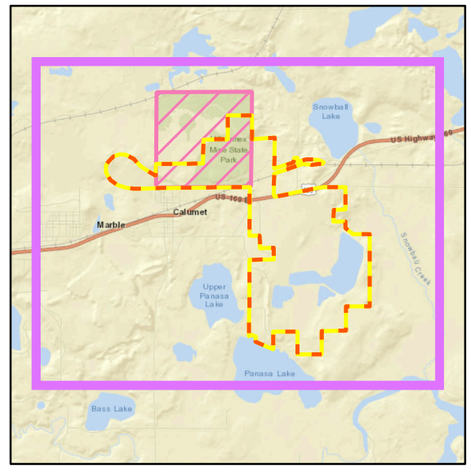
APPENDIX A: HILL ANNEX MINE HISTORIC DISTRICT AND SITES OF ARCHAEOLOGICAL POTENTIAL

Hill Annex Mine Project Mitigation Plan

Calumet, Itasca County, Minnesota



- Project Location
- NRHP Historic District
- Moderate to High Potential for Precontact Archaeological Resources
- Moderate to High Potential for Post-contact Archaeological Resources
- Moderate to High Potential for Both Precontact and Post-contact Archaeological Resources
- Low Potential for Archaeological Resources
- Contributing
- Non-contributing
- Not Included in the NRHP District



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Hill Annex Mine Historic District and Areas of Archaeological Potential

Appendix A: Map 1

Source: 106 Group; IRRR; MnDNR; MnSHIP

Map Produced by 106 Group 4/16/2025



Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community; USDA, NAIP

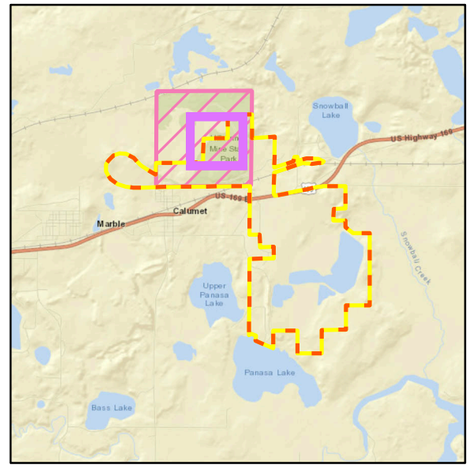
Source: 106 Group; IRRR; MnDNR; MnSHIP

Map Produced by 106 Group 4/16/2025

Hill Annex Mine Project Mitigation Plan

Calumet, Itasca County, Minnesota

- Project Location
- NRHP-Listed Historic District
- Moderate to High Potential for Precontact Archaeological Resources
- Moderate to High Potential for Post-contact Archaeological Resources
- Moderate to High Potential for Both Precontact and Post-contact Archaeological Resources
- Low Potential for Archaeological Resources
- Contributing
- Non-contributing
- Not Included in the NRHP District



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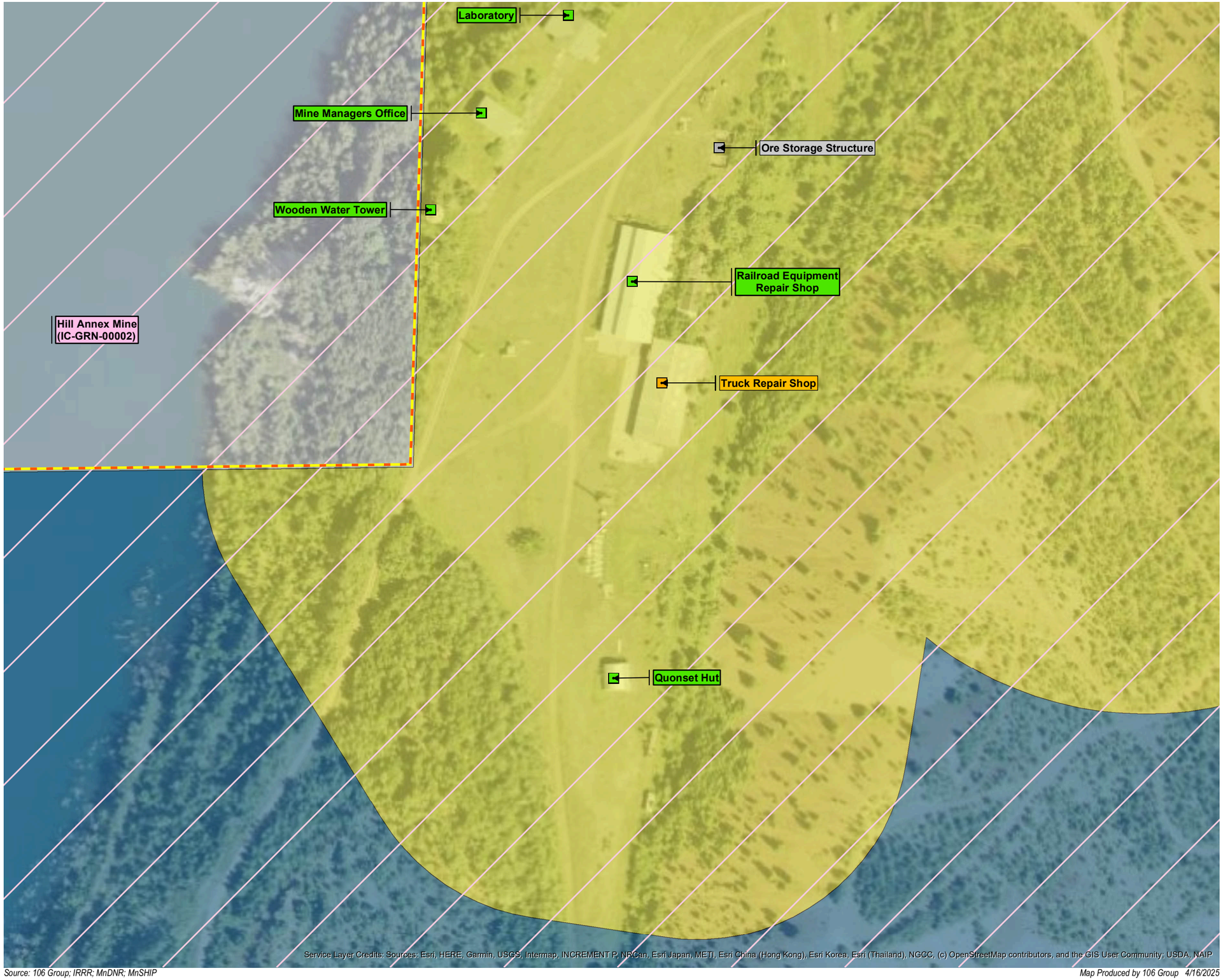
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Hill Annex Mine Historic District and Areas of Archaeological Potential

Appendix A: Map 2



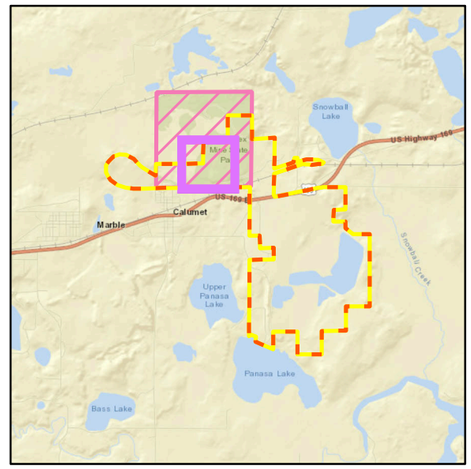
Source: 106 Group; IRRR; MnDNR; MnSHIP

Map Produced by 106 Group 4/16/2025

Hill Annex Mine Project Mitigation Plan

Calumet, Itasca County, Minnesota

- Project Location
- NRHP-Listed Historic District
- Moderate to High Potential for Precontact Archaeological Resources
- Moderate to High Potential for Post-contact Archaeological Resources
- Moderate to High Potential for Both Precontact and Post-contact Archaeological Resources
- Low Potential for Archaeological Resources
- Contributing
- Non-contributing
- Not Included in the NRHP District



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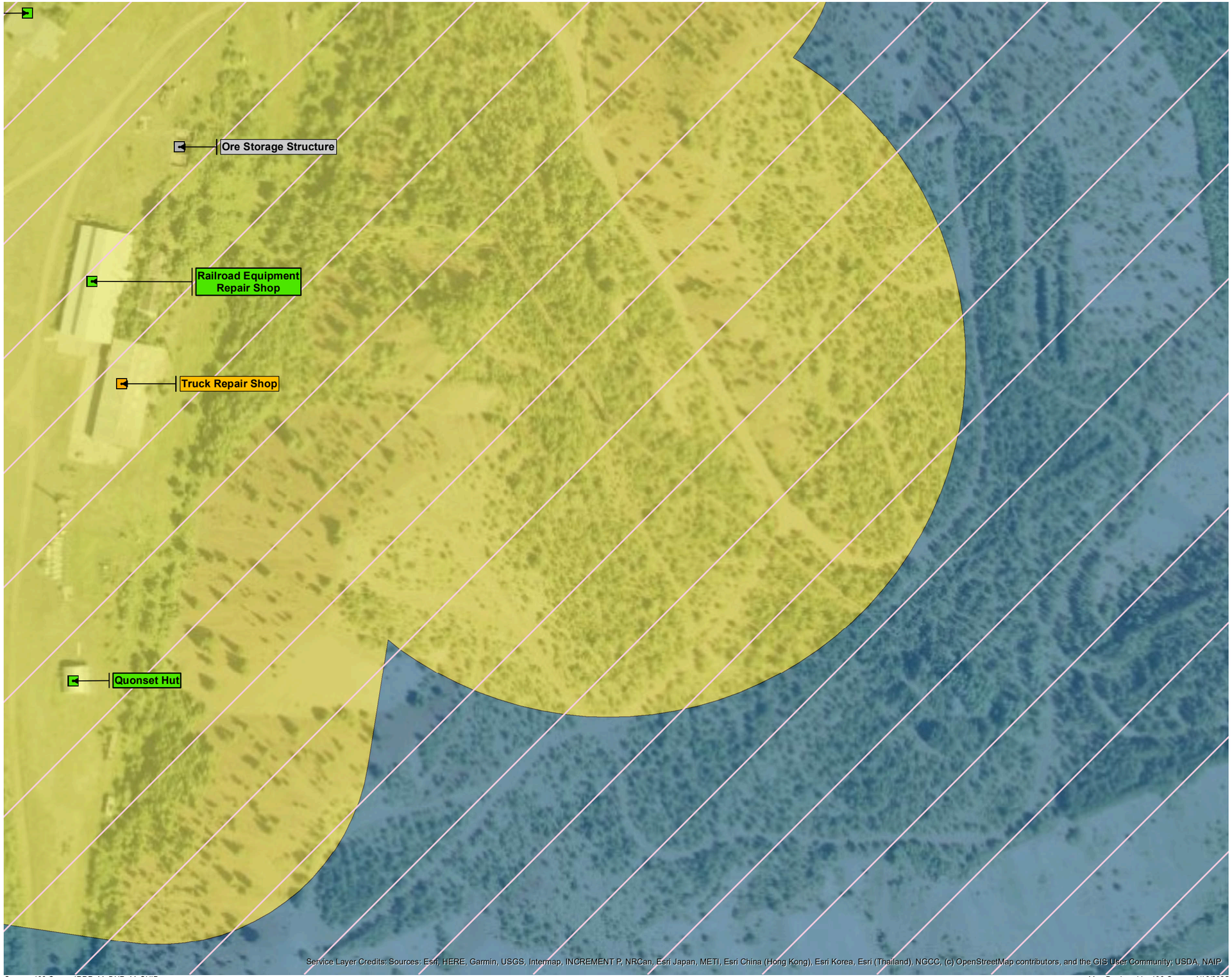
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Hill Annex Mine Historic District and Areas of Archaeological Potential

Appendix A: Map 3



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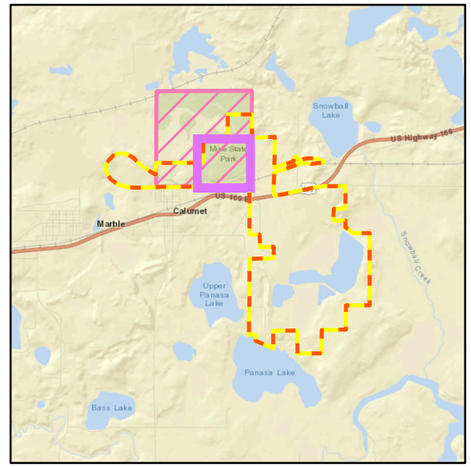
Source: 106 Group; IRRR; MnDNR; MnSHIP

Map Produced by 106 Group 4/16/2025

Hill Annex Mine Project Mitigation Plan

Calumet, Itasca County, Minnesota

- Project Location
- NRHP-Listed Historic District
- Moderate to High Potential for Precontact Archaeological Resources
- Moderate to High Potential for Post-contact Archaeological Resources
- Moderate to High Potential for Both Precontact and Post-contact Archaeological Resources
- Low Potential for Archaeological Resources
- Contributing
- Non-contributing
- Not Included in the NRHP District



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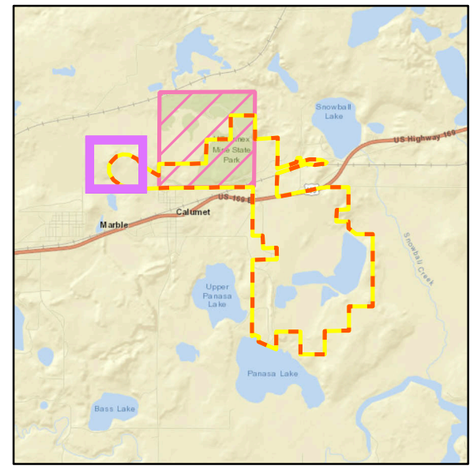
Hill Annex Mine Historic District and Areas of Archaeological Potential

Appendix A: Map 4

Hill Annex Mine Project
Mitigation Plan

Calumet, Itasca County, Minnesota

- Project Location
- NRHP-Listed Historic District
- Moderate to High Potential for Precontact Archaeological Resources
- Moderate to High Potential for Post-contact Archaeological Resources
- Moderate to High Potential for Both Precontact and Post-contact Archaeological Resources
- Low Potential for Archaeological Resources
- Contributing
- Non-contributing
- Not Included in the NRHP District



0 30 Meters

0 100 Feet

1:1,800

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Hill Annex Mine Historic District and Areas of Archaeological Potential

Appendix A: Map 5

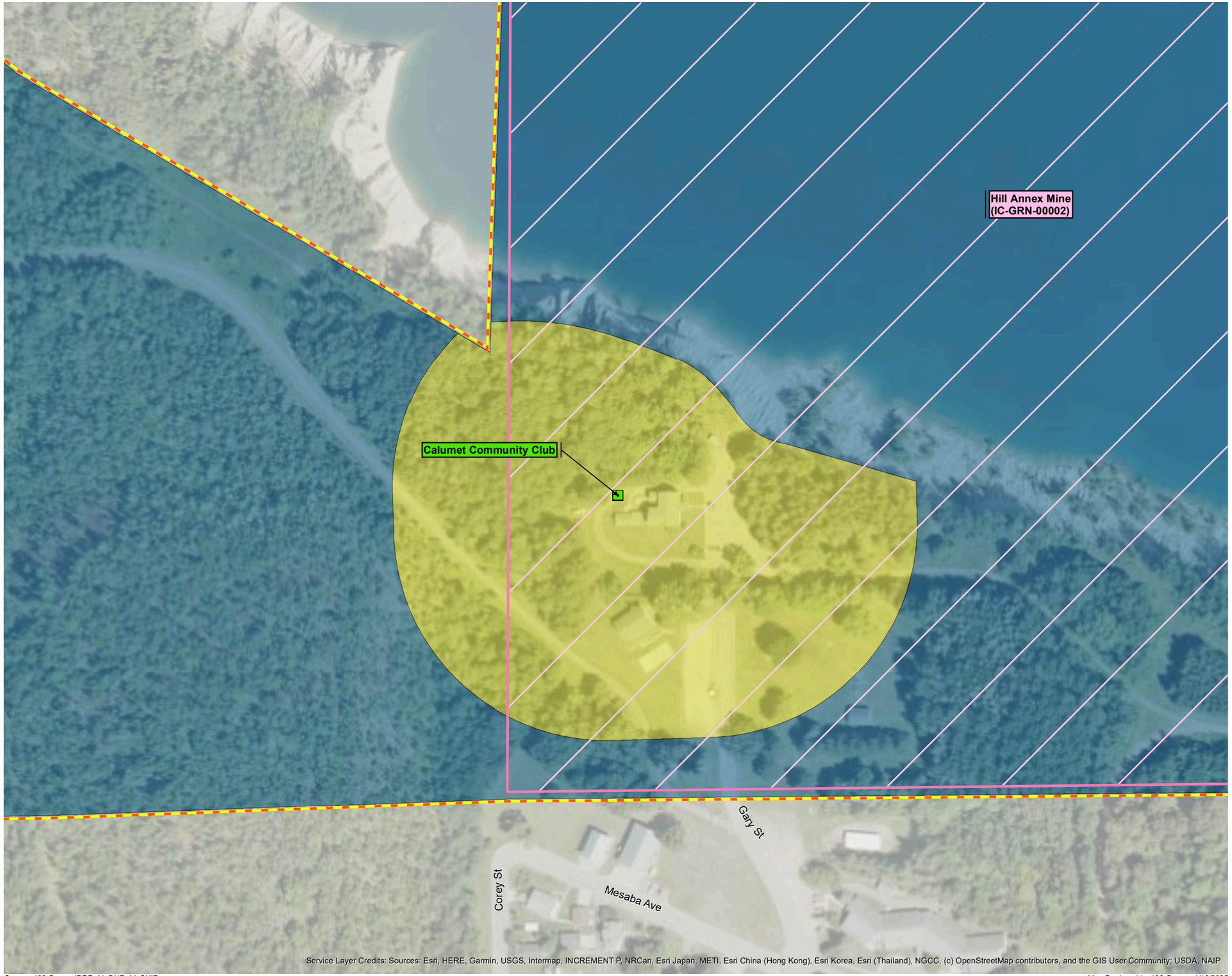
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Source: 106 Group; IRRR; MnDNR; MnSHIP

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Hill Annex Mine Project
Mitigation Plan

Calumet, Itasca County, Minnesota

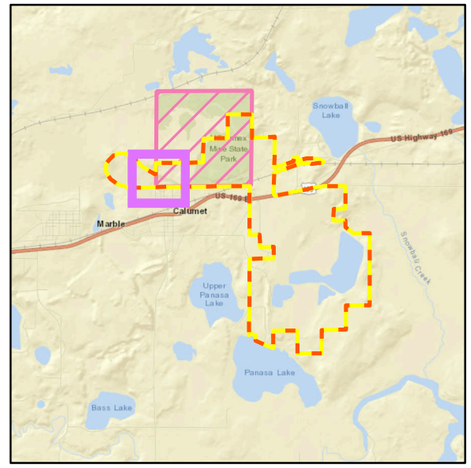


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Source: 106 Group; IRRR; MnDNR; MnSHIP

Map Produced by 106 Group 4/16/2025

- Project Location
- NRHP-Listed Historic District
- Moderate to High Potential for Precontact Archaeological Resources
- Moderate to High Potential for Post-contact Archaeological Resources
- Moderate to High Potential for Both Precontact and Post-contact Archaeological Resources
- Low Potential for Archaeological Resources
- Contributing
- Non-contributing
- Not Included in the NRHP District



0 30 Meters

0 100 Feet

1:1,800

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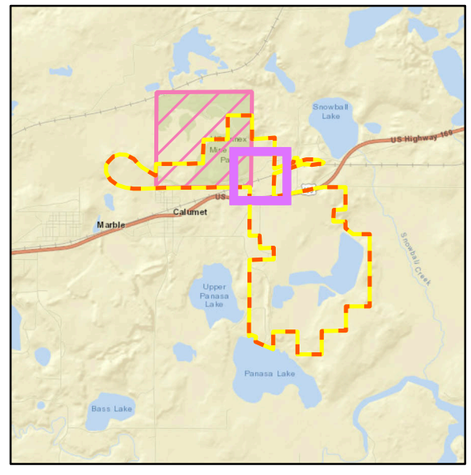
Hill Annex Mine Historic District and Areas of Archaeological Potential

Appendix A: Map 6

Hill Annex Mine Project
Mitigation Plan

Calumet, Itasca County, Minnesota

- Project Location
- NRHP-Listed Historic District
- Moderate to High Potential for Precontact Archaeological Resources
- Moderate to High Potential for Post-contact Archaeological Resources
- Moderate to High Potential for Both Precontact and Post-contact Archaeological Resources
- Low Potential for Archaeological Resources
- Contributing
- Non-contributing
- Not Included in the NRHP District



0 30 Meters

0 100 Feet

1:1,800

106GROUP

Hill Annex Mine Historic District and Areas of Archaeological Potential

Appendix A: Map 7

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NCGC, (c) OpenStreetMap contributors, and the GIS User Community; USDA, NAIP

Source: 106 Group; IRRR; MnDNR; MnSHIP

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Hill Annex Mine Project
Mitigation Plan

Calumet, Itasca County, Minnesota

Project Location

NRHP-Listed Historic District

Moderate to High Potential for Precontact Archaeological Resources

Moderate to High Potential for Post-contact Archaeological Resources

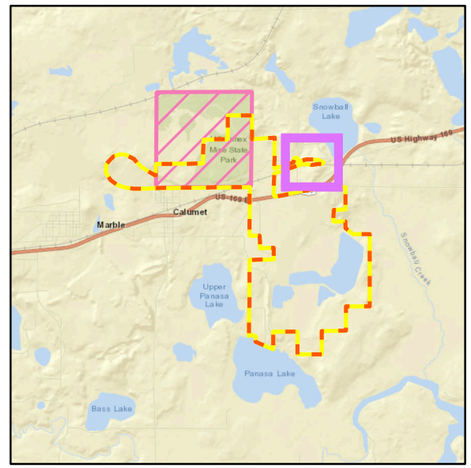
Moderate to High Potential for Both Precontact and Post-contact Archaeological Resources

Low Potential for Archaeological Resources

Contributing

Non-contributing

Not Included in the NRHP District



0 30 Meters

0 100 Feet

1:1,800

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Hill Annex Mine Historic District and Areas of Archaeological Potential

Appendix A: Map 8

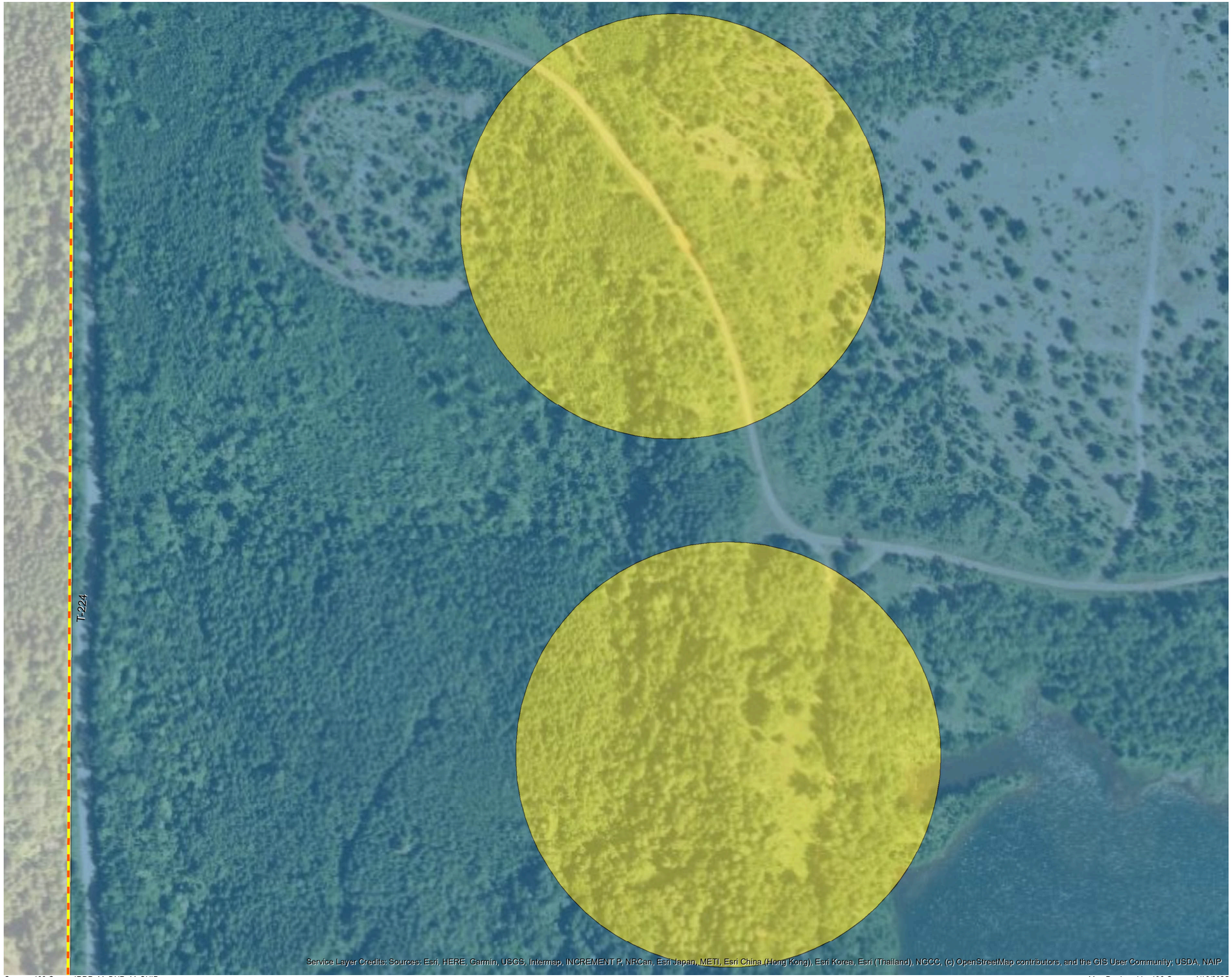
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Source: 106 Group; IRRR; MnDNR; MnSHIP

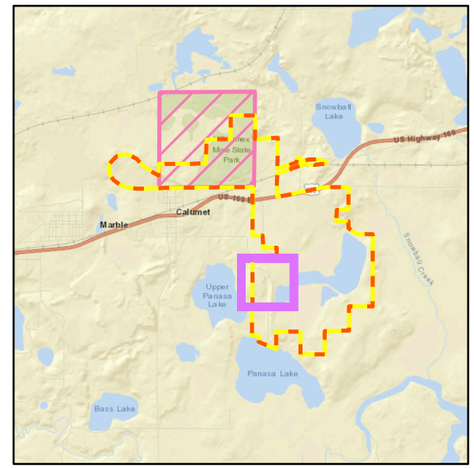
Map Produced by 106 Group 4/16/2025

Hill Annex Mine Project
Mitigation Plan

Calumet, Itasca County, Minnesota



- Project Location
- NRHP-Listed Historic District
- Moderate to High Potential for Precontact Archaeological Resources
- Moderate to High Potential for Post-contact Archaeological Resources
- Moderate to High Potential for Both Precontact and Post-contact Archaeological Resources
- Low Potential for Archaeological Resources
- Contributing
- Non-contributing
- Not Included in the NRHP District



0 30 Meters

0 100 Feet

1:1,800

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Hill Annex Mine Historic District and Areas of Archaeological Potential

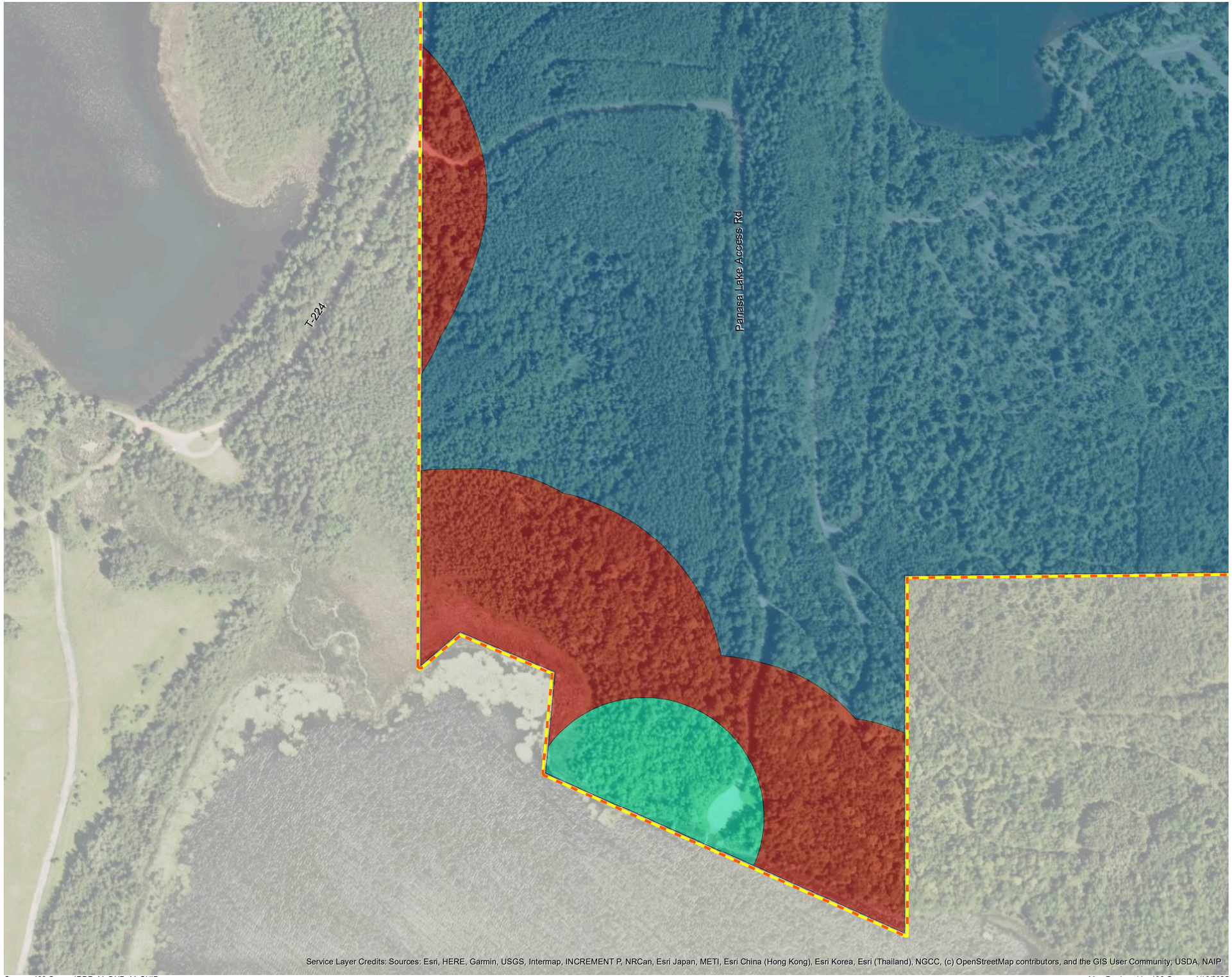
Appendix A: Map 9

Source: 106 Group; IRRR; MnDNR; MnSHIP

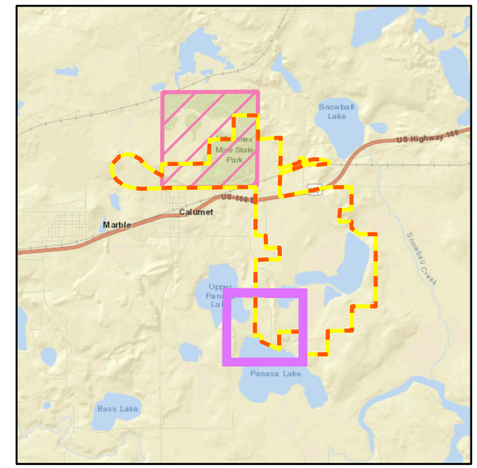
Map Produced by 106 Group 4/16/2025

Hill Annex Mine Project
Mitigation Plan

Calumet, Itasca County, Minnesota



- Project Location
- NRHP-Listed Historic District
- Moderate to High Potential for Precontact Archaeological Resources
- Moderate to High Potential for Post-contact Archaeological Resources
- Moderate to High Potential for Both Precontact and Post-contact Archaeological Resources
- Low Potential for Archaeological Resources
- Contributing
- Non-contributing
- Not Included in the NRHP District



0 60 Meters

0 160 Feet

1:3,200

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Hill Annex Mine Historic District and Areas of Archaeological Potential

Appendix A: Map 10

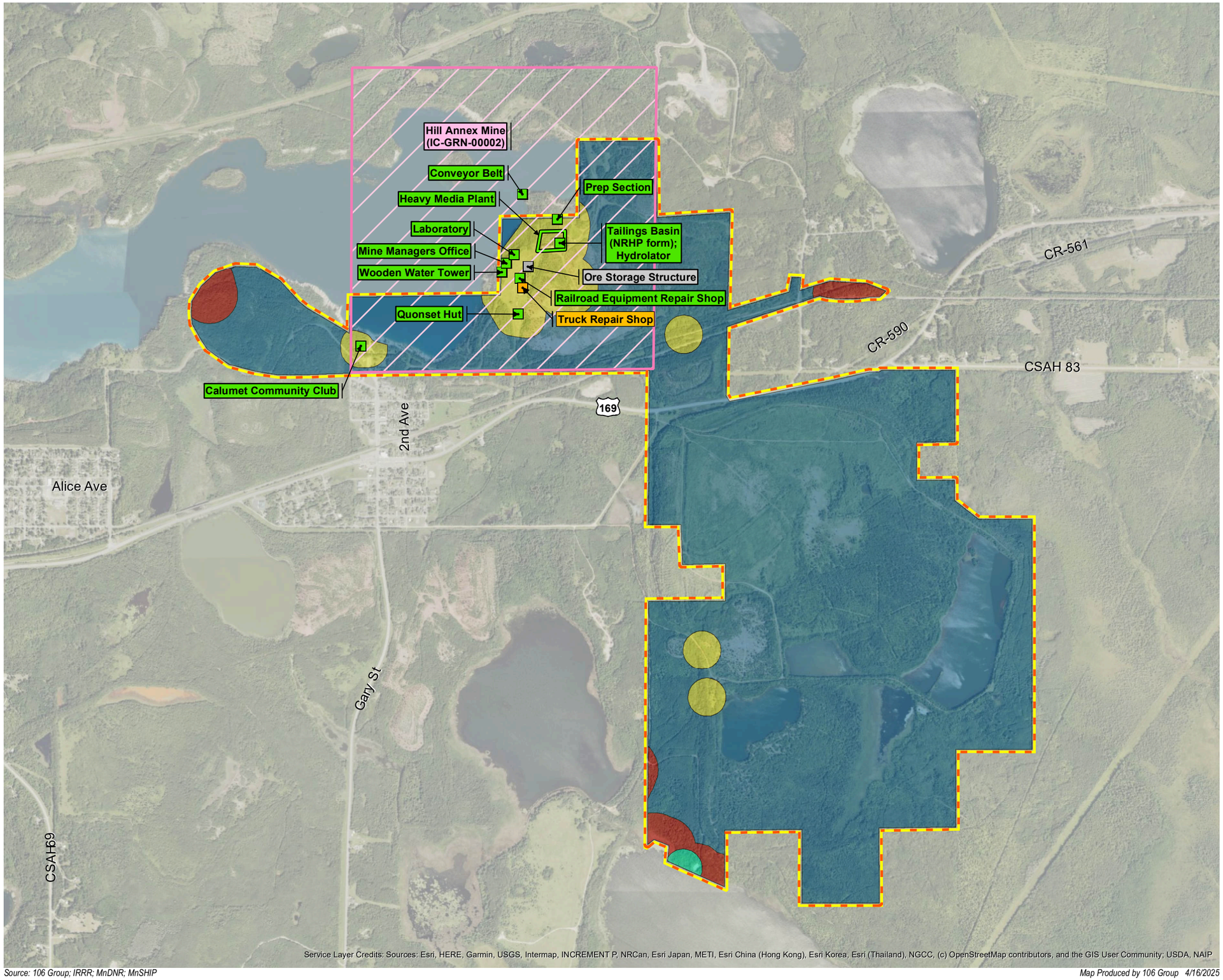
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Source: 106 Group; IRRR; MnDNR; MnSHIP

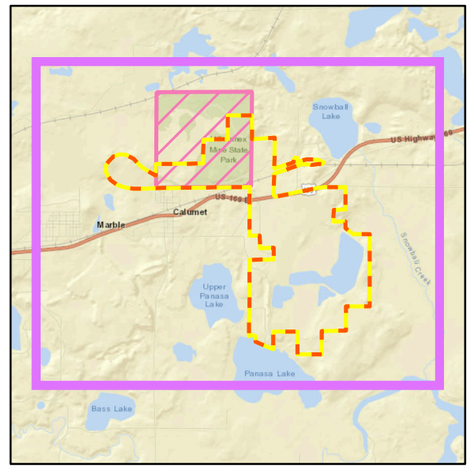
Map Produced by 106 Group 4/16/2025

Hill Annex Mine Project Mitigation Plan

Calumet, Itasca County, Minnesota



- Project Location
- NRHP Historic District
- Moderate to High Potential for Precontact Archaeological Resources
- Moderate to High Potential for Post-contact Archaeological Resources
- Moderate to High Potential for Both Precontact and Post-contact Archaeological Resources
- Low Potential for Archaeological Resources
- Contributing
- Non-contributing
- Not Included in the NRHP District



0 400 Meters

0 970 Feet

1:20,000

106GROUP

Hill Annex Mine Historic District and Areas of Archaeological Potential

Appendix A: Map 1

Source: 106 Group; IRRR; MnDNR; MnSHIP

Map Produced by 106 Group 4/16/2025

APPENDIX B: CALUMET RECLAMATION COMPANY PROJECT DESCRIPTION: HILL ANNEX SCRAM MINE

PROJECT DESCRIPTION
HILL ANNEX SCRAM MINE PROJECT

CALUMET, MINNESOTA

PREPARED FOR:

CALUMET RECLAMATION COMPANY

3401 15TH AVE. E., UNIT #1

HIBBING, MN 55746

PREPARED BY:

NORTHEAST TECHNICAL SERVICES, INC.

526 CHESTNUT STREET

VIRGINIA, MINNESOTA 55792

218.741.4290

NTS PROJECT# 22292

REVISION 2 – September 2024

Revision 1 – July 2023
Original May 2023

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1.0 Executive Summary

The following provides a comprehensive overview of a proposed project by Calumet Reclamation Company (CRC) for the extraction of legacy stockpiles and tailings from the Hill Annex Mine, which is situated near Calumet in Itasca County, Minnesota. The project aims to employ modern mineral processing technology to mine iron ore resources, including legacy stockpiles and tailings basins on the Iron Range in Minnesota, which will subsequently be processed to concentrate hematite, iron hydroxides, and magnetite to a grade of > 50% iron. The resulting processed material, or pre-concentrate, will serve as feed in pelletizing plants and will be utilized in domestic steel production.

CRC plans to utilize Heavy Media Separation (HMS) and Humphrey Spiral processes, historically employed at the Hill Annex Mine for iron recovery from 1913 to 1979. In modern processes, the coarse material excavated from the Hill Annex Mine stockpiles and tailings basins will be processed with HMS (also known as dense medium separation (DMS)). The undersized stockpile material will be directed to the second primary process in CRC's flowsheet, the Humphrey Spirals (spirals). The legacy tailings basins will also undergo processing and concentration using only spirals.

The rejects from both processes will be dewatered to reduce the moisture content to <10% and disposed of in one of two Waste Management Areas (WMAs), as detailed in Section 4.7. This material will be compacted at the WMAs and have the consistency of a moist, coarse gravel mixture. Upon completion, the final product will be transported via rail from a new load-out facility on the Itasca County Regional Rail Authority line.

Water consumption for processing is anticipated to be over eight months, totaling. The detailed water balance can be found in Section 4.1. Calumet Reclamation Company has applied for two State of Minnesota Water Appropriation Permits, one aimed at dewatering Hill Annex Tailings Basin #3 and the other to commence dewatering the Hill Annex Mine Pit.

2.0 Introduction

2.1 Purpose

This Project Description aims to provide comprehensive details about CRC's Proposed Project, enabling a thorough evaluation of the environmental approvals and permits required for the project. The feedstock for the processing plants will be collected from legacy stockpiles and tailings basins at the Hill Annex State Park site at Calumet. The Hill Annex Mine was originally developed from to mine the Biwabik Iron Formation (BIF) "natural ore" (hematite and iron hydroxide) deposits. The CRC Project will produce a single product enriched in iron content that can be used as feedstock for steel production. The product will be shipped by rail to a pig iron producer outside Minnesota as feedstock. Commencement of production will begin after obtaining the required permits and completing construction. Delays in issuing the permits will push out the start of the Project.

2.2 Site Location

CRC's Proposed Project is located near Calumet, Itasca County, as shown in Figure 1. The Hill Annex Mine lies within Township 56, Range 23, Section 16. The Hill Annex tailings basin lies southeast in Township 56, Range 23, Sections 15, 16, 22, 23, 26 & 27. The layout of the Project is presented in Figure 2. The plant's location, product stockpile, loadout facility, and waste management areas are shown, with colored lines indicating the conveyors that link the process activities and the water pipeline depicted in blue (See Figures 3A and 3B). Besides the new access road from Snowball Road, a road next to the rail line will be required for maintenance. Many of the existing roads can be used.

2.2.1 Elevation

Past mining operations have altered the entire surface area at the project site. An historical open pit iron ore mine (Hill Annex Mine) and its associated mining infrastructure (e.g., heavy media processing plant, workshops, rolling stock, a variety of stockpiles, abandoned mining equipment, tailings basins, etc.) surround and are located on the site, as shown in Figure 4. The elevation of the Proposed Project Ranges from 1316.9 feet to 1603.2 feet. The overflow elevation of the Hill Annex Pit is 1368 feet.

2.2.2 Geology

The Mesabi Iron Range was formed by the chemical precipitation of iron oxides in an ancient basin (the Animikie Ocean). Sediment input into the basin was supplied by chemical and mechanical weathering of rocks in the surrounding hinterland, such as the Giants Range Batholith and the Canadian Shield volcanic rocks.

Current theory holds that the primary source of iron was related to volcanism and mantle superplume activity, with lesser contributions from surface weathering. Precipitation of iron silicates and iron oxides in distinct layers is still contentious but involved a complex interplay of water chemistry, tidal influences, and biogenic agents (cyanobacteria). Fossilized stromatolites that are associated with the BIF help to support this concept.

Bedrock in the project area consists of (the Precambrian) Biwabik Iron Formation (BIF) and (the Cretaceous) Coleraine Formation. The BIF consists of Taconite and "natural" banded iron formation and comprises four distinct layers: The Upper Slaty is on top, followed by the Upper Cherty, Lower Slaty, and Lower Cherty. "Natural" ore deposits result from the oxidation of the iron formation along and adjacent to faults. The underlying rocks beneath the Iron formation are quartzite and greenstone. As Sloan described, The Coleraine Formation "...comprises iron-ore conglomerate, shale, and sandstone that form a thin irregular mantle over an uneven surface on the underlying Precambrian bedrock." Pockets of bluish-green shale occur in the upper part of the Coleraine Formation observed near the Hill Annex mine (1964). The depth to bedrock ranges from 71 to 151 feet below the land surface (1,236 feet to 1,354 feet above MSL).

The Calumet fault is a primary structural scissors fault zone in this area. The iron formation exposed beneath the glacial till to the west of this fault zone is predominantly hematite, whereas the iron formation to the east features predominantly magnetite.

Virginia Slate overlies the exposed iron formation's southern boundary. This formation was deposited in a slightly shallower sea environment and is younger than the BIF. Virginia Slate is considered void of economically mineable iron mineralization.

Years ago, during the much later Cretaceous period, an inland sea formed again. Some of the iron formation was eroded and deposited on top of the north boundary area of the Virginia Formation. This formed a fossil-rich "pebble" hematite ore layer varying from 5 to 25 feet thick. Most of this soft and unconsolidated formation was eroded by a succession of glacial periods within the past 500,000 years. However, the Cretaceous iron formation survived in bedrock valleys and fault zones.

Glacial deposits in the area include mixed deposits consisting predominantly of till, described by Jennings, C.E., and Reynolds, W.K. (2005) as "unsorted yellow-brown to gray clay to loam—textured sediment with incorporated pebbles, cobbles, and boulders juxtaposed chaotically with a variety of other glacial and ice-proximal units." Much of the overburden can be traced back to the advances of the Wadena and Rainy Lake Lobes.

2.2.3 Historic and Cultural Considerations

The Hill Annex Mine operated from 1913 to 1979, producing 63,682,773 long tons of predominantly hematite heavy media and direct shipping concentrates. Part of this total also included a contribution from Cretaceous Ore. The Hill Annex mine operated both a heavy media and cretaceous concentrate plant.

CRC is working closely with the State Historic Preservation Office to ensure the project adequately addresses historical and cultural requirements.

2.3 Stockpiles

The State of Minnesota owns all iron-bearing stockpiles and tailings within Section 16. The State of Minnesota owns most iron-bearing materials in the Hill Annex tailings basin. The minority interest is owned by Glacier Park Iron Ore Properties (GPIOP). There are approximately 62.6 million long tons of tailings basin and stockpile material available in these sections, and they are under a mineral lease from the State of Minnesota to CRC, as shown in Figures 2A and 2B. CRC is in contact with GPIOP to arrange stockpile/tailings mineral leases. CRC intends to eventually mine all 62.6 long tons as feedstock for its plant.

The iron-bearing stockpiles planned to be mined as a part of CRC's Proposed Project are segregated by type and grade. One kind of stockpile contains taconite. Magnetic taconite mineralization was not treated at the Hill Annex plant, which consists of drilled and blasted material hauled to stockpile sites.

Another category of stockpile is comprised of heavy media rejects. There are two large, heavy media reject piles in the permit area. These stockpiles contain roughly 4-inch (minus) lower-grade materials (25% Fe) that were separated in the Hill Annex Heavy Media Plant. Another stockpile category contains Lean Ore hematite (35% Fe), which was not of sufficient grade at the time of mining to be processed in the heavy media plant. These are coarse materials similar in size to currently deposited taconite stockpiles. There are also lean ore Cretaceous stockpiles that were not sufficient grade at the time of mining to be processed in the Cretaceous plant. Lastly, the site features heavy media and Cretaceous ore materials that were stockpiled for future processing plant feed but left in place due to the sudden closure of the mine and plant in 1979.

An Minnesota Department of Natural Resources (MDNR), Division of Lands and Minerals publication (MDNR, 2001) provided descriptions of similar stockpiles located near the Iron Range cities of Virginia and Calumet, which can be used to generally describe the geology of the area and the stockpiles situated in the Proposed Project area, as provided below.

2.3.1 Cretaceous Ore

The semi-lithified conglomerate was deposited during the Cretaceous period and contains sub-angular to rounded hematite cobbles and sands within an iron-rich, glauconitic, carbonate matrix. Glauconite has the chemical formula. Cretaceous ore and lean ore stockpiles have moderately poor sorting and range in grain size from clay to three-foot-diameter boulders. The boulders are highly cemented blocks of smaller rock particles.

2.3.2 Natural Ore Mixed-Sized Rock

This includes soft iron ore that has been altered and re-mineralized along faults and fractures. This material was originally taconite, which was then oxidized to create trough, fissure, or flat-lying natural iron ore bodies. The mineralogy consists mainly of hematite, goethite, and limonite, with minor amounts of magnetite and manganese oxides. Textures range from compact to rubble or friable. Bedding and other primary features are often evident. Within a stockpile, this material is unsorted. Rock sizes range from clay to +6-foot diameter boulders, with an estimated average rock size being 3/8 of an inch to five inches. The amount of clay in natural ore piles is difficult to quantify; however, the clay seems to be a natural cement stabilizing the stockpile. Natural ore rocks often contain fractures or are partially parallel to bedding planes. Taconite boulders are frequently observed along the slopes of natural ore stockpiles and may have been placed there for slope stability and erosion control.

2.3.3 Natural Ore Coarse Tailings

These include a by-product of the natural iron ore mining processes. These by-products contain mostly siliceous rock with some hematite banding. The stockpiles are moderately well sorted, ranging from 3/8” to four inches in diameter, and have an angular particle shape. The material was washed in the plant processing of coarse tailings; therefore, there is little to no silt within the pile.

2.3.4 Taconite Rock Boulders

This includes magnetic and some non-magnetic iron-bearing boulders, characterized by alternating bands of iron oxides (magnetite and/or hematite) with bands of silicates and carbonates. Bedding and other primary structures are evident. Most taconite stockpiles consist of boulder-sized rock ranging from two feet to +9 feet in diameter, with an estimated average of three feet. The boulders tend to have a blocky shape.

2.3.5 Taconite Mixed-Size Rock

Magnetic and non-magnetic iron ore, some of which may have been processed. The rock characterization is described in Taconite Rock Boulders above. This stockpile type category is difficult to discern from "Natural ore-mixed sized rock" in the field and may contain other material within the stockpiles. This classification is based on company records about individual stockpiles. These stockpiles are poorly sorted, with rock sizes from 2mm to +6 feet. Taconite boulders frequently occur along the slopes and edges of these piles.

2.4 Tailings Basins

The tailings basins are the legacy remnants of the fines rejected from the Hill Annex processing/beneficiating plants. These materials were too fine for product shipping or rejected by the Humphrey spirals in the previous Heavy Media plant. The fines were pumped into large, relatively shallow basins enclosed by a succession of perimeter dikes.

2.5 Surface Water

As shown in Figure 7, the Proposed Project site is in Itasca County, Minnesota, within the Swan River Watershed of the Upper Mississippi River Watershed.

The legacy stockpiles, infrastructure, roads, and rail lines have altered the original landscape, causing water drainage to occur in three main directions, as determined from the elevation map of the area, as shown in Figure 8. The proposed plant will be located on high terrain near the former Hill Annex Heavy Media plant, and surface water runoff will travel south and east. The area south of the plant location slopes towards Highway 169, directing surface water flow west, paralleling Highway 169 towards Calumet for a few hundred yards before it passes under the rail line and the highway via culverts. It then flows to Upper and Lower Panaca Lakes and then the Swan River.

The area west of the plant location slopes towards the Hill Annex Pit, where stormwater drainage currently contributes to the rising water level in the pit. This pit does not yet have a natural outflow. Most of the proposed activities will have surface water runoff directed toward the west into the mine pit. Surface water runoff patterns from the stockpiles and open land in the area are variable due to the ground surface being altered by historic mining operations. The estimated direction of natural

stormwater flow is presented in Figure 8.

The legacy Hill Annex Fine Tailings Basins #1, 2, and 3 are located in the Southeast portion of the project site, as shown in Figure 2B. The tailings basin materials will be screened and concentrated in screening plants and spirals and transported north to the plant building by a proposed pipeline across Highway 169. The tailings basins are enclosed by perimeter dikes that will be maintained until closure. At closure, a clear water holding pond will be constructed inside the reclaimed tailings area, and an outer perimeter dike will be breached for natural water flow to the southeast into the Snowball Creek drainage system and onward to the Swan River. This will eliminate the need for the State to maintain another dam.

2.6 Hydrogeologic Setting

Calumet Reclamation Company has applied for two State of Minnesota Water Appropriation Permits, one to dewater Hill Annex Tailings Basin #3 (Figure 3B, MNPARS Reference Number 2024-1689) and one to begin dewatering the Hill Annex Mine Pit (Figure 3A, MPARS Reference Number 2024-1905).

2.6.1 Hill Annex Pit Dewatering

Besides the surface water runoff into the Hill Annex Mine Pit, groundwater also contributes to the rising water level at a rate of about 6 feet per year. The purpose of dewatering is to expose iron units for mining in the pit. This dewatering will eventually expose State-owned iron-bearing stockpiles at the north end of the pit, which will eventually provide future reserves for CRC's processing plant.

This dewatering will also reduce the potential for pit over-topping, thus reducing water damage to Calumet's homes and businesses. The Hill Annex Pit water level is the lowest water body in the vicinity, and both local surface water and groundwater inflow will eventually fill up the pit. Due to the lack of a natural outflow, there is a possibility that this mine pit could overflow. Topographical maps show that if the Hill Annex Mine Pit were to overflow, it could occur between the cities of Marble and Calumet, potentially flooding Highway 169 and flowing into Mud Lake. The activities proposed by CRC will mitigate this risk by installing a large pump in the pit for dewatering. The expected pumping rate will) and will follow a flow path under Hwy 169 into Upper and Lower Panaca Lakes and then into the Swan River.

The MDNR Lands and Minerals Division actively monitors the Hill Annex Mine Pit and surrounding groundwater levels to determine the rate of pit water level increase and groundwater flow through the subsurface materials; thus, the MDNR is assessing the need for an engineered outlet structure to prevent future flooding and other impacts. According to an MDNR website article, the Hill Annex Pit was previously dewatered by pumping under the direction of the MDNR Parks Division from 1988 to 2008. In September 2022, the DNR conducted a survey of the Hill Annex Pit to gather volume data. According to the MDNR website:

"As of August 26, 2024, the Hill Annex water level is approximately 1,331 feet, 37 feet below the natural

overflow elevation. There are three natural outflow locations at elevation 1,368 feet along the pit rim. The pit water level has risen approximately 80 feet since pumping ceased in 2008. The rate of water level rise from 2009 through 2014 was approximately 7 feet per year. However, this rate has declined to approximately 5 feet per year from 2014 to present." [2024]

Furthermore, the website states, *"If the Hill* Annex *water level continues to rise at a rate similar to those in recent years, water may begin to naturally overflow by 2028-2031"* [2024].

According to the website, this data from the 2022 survey and additional studies will help in future modeling, outlet route decisions, and impact assessments from rising water levels. Potential work includes analyzing pit wall stability, wetland delineations, and groundwater modeling. According to the article, the DNR will begin predesign, design, and engineering efforts after collecting the necessary data. The proposed dewatering efforts by the CRC could significantly decrease the resources expended by the State in addressing this water issue.

2.6.2 Hill Annex Fine Tailings Basin #3 Dewatering

To relieve pressure on the dikes and access old tailings containing iron, the Calumet Reclamation Company has applied for a Water Appropriation Permit from the State of Minnesota to drain the Hill Annex Tailings Basin #3 (MPARS Reference Number 2024-1689). The south and eastern perimeter dike has not been maintained since the mine closure in 1979. CRC has been in discussions with MDNR Dam Safety, regarding the siphon and dikes. Dam Safety concurred that lowering the phreatic water level in the Hill Annex Tailings Basin # 3, would likely relieve pressure on the dikes. The planned siphon will accomplish this with no excavation work needed on the dikes. Additionally, dewatering is necessary to extract iron units from this tailings basin. A siphon will be used for the dewatering process, similar to the previous one that the MNDNR had designed and briefly operated in the early 2000s. The water will flow from the siphon east to Snowball Creek.

3.0 Project Description

The two primary beneficiation methods in CRC's proposed project are Humphrey Spiral Banks (spirals) and Dense Media Separation (DMS).

3.1 Spiral Processing

The iron will be processed and concentrated using spirals. As the water and ore mixture travels down the spiral, minerals are separated based on size, shape, and specific gravity. Lighter particles move outward and upward into the fast-moving part of the stream, while the heavier iron-bearing minerals move to the inner, slow-moving portion. They are then drawn off through concentrate, middling, or tailings outlets.

3.2 Dense Media Separation

CRC plans to use dense media separation (DMS), also known as heavy media separation (HMS), in its proposed process. DMS is a well-established technology that has shown continuous improvement over the years. It was developed in the United States around 70 years ago. It was widely used in hematite mines in Minnesota and globally until it was replaced by the magnetic taconite process, which primarily recovers magnetite instead of non-magnetic hematite. In a paper titled "Dense Media Separation – a Valuable Process for Preconcentration," Lundt and Grewal, senior process engineers, explain, "Dense media separation (DMS) is one of several preconcentration methods used for early waste rejection from run-of-mine ores at relatively coarse particle sizes before additional milling and beneficiation." They also state that "ore preconcentration provides opportunities to lower operating costs and capital costs by reducing the size of the downstream beneficiation process. Preconcentration can also assist in producing a more consistent feed grade to the downstream milling circuit, which could improve the overall recovery of the process. Other benefits include reduced consumption of water and chemicals" (2017).

The separator module uses a dense media vortex to exploit gravitational and centrifugal forces. In CRC's DMS plant, ferrosilicon is used, which contains only iron and silicon. The material is fed from a hopper into the ferrosilicon vortex, with the tangential inlet causing the media to spiral along the cylinder wall. By adjusting pressure and density, the cut point for separation is determined. At the bottom of the vortex, a floats tube acts as an outlet for the lighter material. The pressure difference allows the lighter material to move down the internal surface of the media to the core, where it is eventually drawn out. The centrifugal forces created by the vortex transport the material heavier than the cut point away from the center axis and upwards, where they are collected.

3.3 Site Preparation

Prior to stockpile mining, historical buildings and infrastructure will be razed and debris removed from the site. This is necessary to accommodate proposed mining infrastructure. CRC is working closely with MDNR and the State Historical Preservation Office (SHPO) to ensure that site preparations encompass historical considerations.

3.4 Processing

The iron-bearing minerals found in the legacy stockpiles and tailings basins will be processed and used as raw material to produce pig iron. The processing of pig iron will take place outside of the state. CRC will employ two processes similar to those used at Hill Annex Mine during its active years: density media separation (DMS) and Humphrey spirals (spirals). Technological advancements have been made to both processes since the closure of the Hill Annex Mine, allowing CRC to recover additional iron units from the legacy stockpiles and tailings basins.

3.4.1 Stockpile Processing: Overview

The iron-bearing resources at the former Hill Annex Mine consist of several stockpiles created at different times with various ore types and rock sizes, as discussed in Section 2.3. Oversize stockpile material (+1/4") will be crushed to -1/4" + 20 mesh (M) and processed in the DMS processing plant. Undersized material, both from within the stockpiles and resulting from crushing, in the size range -20 M + 200 M, will be concentrated using spirals in the processing plant.

After the initial mine life of approximately 6.5 years, this site will be cleared of usable stockpiles, and new targets will be identified, sampled, and tested to continue the mining operations. Permit amendments for additional stockpile areas may be applied for in the future.

3.4.1.1 Stockpile Considerations

The stockpiles identified in the initial mine plan are presented in Figure 2A. They will be augmented with the 0.667 million long tons (MT) of Cretaceous Ore with an average iron content of 40% adjacent to the primary feed stockpiles. The size range of the Cretaceous Ore is 12 inches down to fines. It originated as pit rejects with the historical objective of separate treatment in the former Hill Annex Cretaceous Processing Plant. This gives a total of about 26.4 Mt of feedstock to the plant for a mine life of 6.5 years. The equipment will be energized by the nearby electrical power line crossing the south side of the former State Park.

The most significant volume and tonnage of the stockpiles to be included in the Permit to Mine, called Heavy Media Rejects #2, are lower iron-bearing reject materials from the original heavy media plant and, thus, have been stripped of some iron. It contains 15 Mt of material consisting of approximately 25% iron. The iron remaining in the stockpile consists of unliberated iron minerals still attached to larger iron silicate particles. It also contains some untreated ore bypassed due to inefficiencies in the original heavy media iron separation process. The stockpile also contains iron-bearing fines that were too small to be treated.

3.4.1.2 Stockpile Feed

A wheeled loader will feed material into a grizzly screen to remove unwanted items like tree stumps. The smaller material will then go to a separate screen to remove anything smaller than 1/4 inch. The larger material from the first screen will go to a cone crusher. This system will continuously reduce the size of all material to 1/4 inch or less. The sized material will be conveyed to a surge pile at the Plant Building and then fed into the plant via a conveyor belt, as shown in Figure 3A. Additionally, a jaw crusher will be strategically located to service two or more Hill Annex stockpiles, as some stockpiles will require a jaw crusher as the first processing step due to oversized material. This oversized material will be mined when needed to maintain uniform grade output. The unpredictability of the feed material will require close monitoring to respond quickly to grade variability, which can be managed by blending more than one source of iron-bearing material into the plant feed. Several other stockpiles near the

crusher locations, as shown in Figure 2, will be utilized as needed. As the face of the stockpile recedes, the crusher, screen, and feed bin ("crusher spread") will move forward to keep the tramming distance of the loader as short as practical, reducing fugitive dust generation and fuel consumption. The conveyor to the surge pile will be extended by adding another conveyor section. The jaw crusher will remain close to the receding face of the stockpiles it serves, while the crusher stockpile will move with the crusher spread to stay close to the operating loader by extending the conveyors running from the jaw crusher to the crusher stockpile.

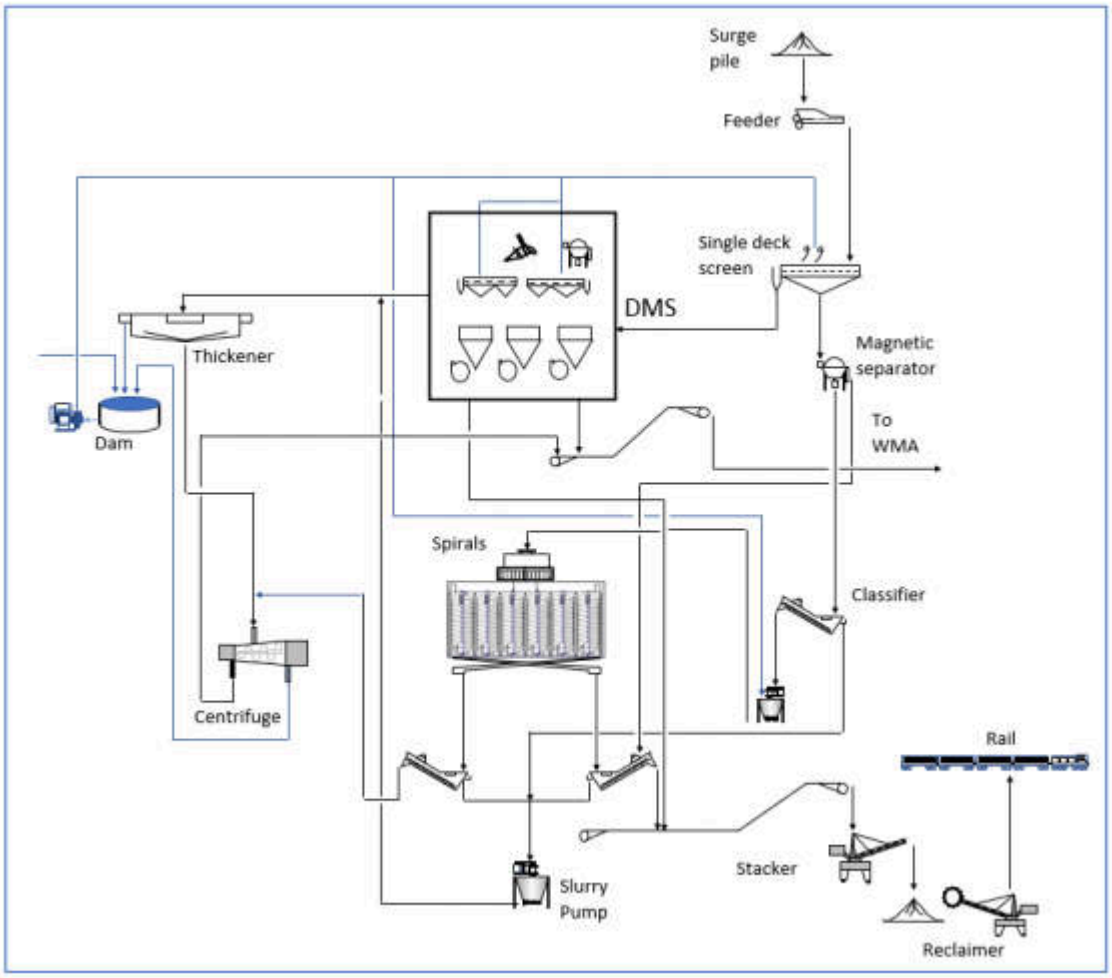
A stacker conveyor will create a conical stockpile of crushed products near an automatic loader from the high-priority stockpile. When there is a need to increase the lower grade from the main stockpile, the loader can load the required amount of higher-grade feed from the crushed stockpile into the rail crusher spread. This will allow the low-grade source to be temporarily suspended to access the better material around it for blending. The loader also has enough capacity to serve the jaw crusher. When full, the surge pile at the plant will allow the loader to move to one of the other stockpiles and feed the jaw crusher until the loader is required to return to its main function at the main stockpile. This will be a dry operation, but the material in the stockpile is moist. This will reduce the dust created by loading and limit the creation of dust particles due to the crushing of only oversized material. Water sprays will mitigate the amount of fugitive dust at the crusher. The crushed material will be transported with a belt conveyor to the surge stockpile. A State-certified belt scale will be installed on this conveyor to weigh the material mined from the stockpile for internal feed control and royalty payments. Samples taken on this conveyor will be tested for moisture content to determine the dry weight of the material, as required for royalty determination. Water sprays at the crusher will moisten the ore to suppress dust at the transfer points and discharge onto the surge pile.

The surge pile will be situated on the overburden stripping stockpile pile east of the plant, as depicted in Figure 3A. It will receive material from the crusher spread through a conveyor. The surge pile will be conical, with a diameter of 150 feet and a height of 60 feet. It will be positioned over a steel frame tunnel equipped with an emergency escape exit and a feeder in the tunnel roof to regulate the material flow onto a conveyor leading into the plant. The surge pile will be outfitted with a belt scale and automatic sampler for plant audit purposes. The operator will control the feed rate. With enough capacity to supply the plant for 8 hours during crusher maintenance and shift changes, it will have a working capacity of 4,000 tons per day and a total capacity of 12,000 long tons.

An authorized contractor will conduct the operations at the crusher site using their existing equipment. The contractor will perform in-house maintenance under their own permits, except emissions (fugitive emissions, etc.), which will be included as part of CRC's responsibility as per regulatory requirements.

3.4.1.3 Dense Media Separation

The materials from the surge pile will be conveyed and discharged onto a single-deck screen for wet screening to separate them into two size fractions. Please refer to the DMS Plant Process Flow Diagram below. The separation point of the screen is 20 M (850 microns), and the oversize will go to the DMS



DMS Plan Process Flow Diagram

process, while the undersize will undergo further processing (see below), be deslimed, and then sent to the spirals in the Plant Building.

The first step in the DMS process involves a mixing box, where the material is mixed with a circulating ferrosilicon water medium at a relative specific gravity between 3.0 and 3.2. The products are then directed to a cluster of dense medium cyclones, a key component in the process. These cyclones efficiently separate the low-density rejects from the high-density product. After separation, the product and reject streams are rinsed with water to remove and recover the ferrosilicon from the ore particles for reuse. The highly magnetic nature of ferrosilicon enables its recovery with stainless steel magnetic separators. The rinse water is then pumped to a magnetic separator to recover the highly magnetic ferrosilicon, which is reintroduced into the circuit. The rejects are transported to the North WMA by conveyor and spread out with a bulldozer as needed. The concentrate product is then conveyed to the

product bed, where a stacker shapes the product into a rectangular elongated Product Stockpile.

The undersized material from the wet screen will be directed to a low-intensity magnetic separator to recover magnetite. This magnetic separation step targets magnetite grains that are too small for the spirals to capture. The recovered magnetite will go to the product classifier. The non-magnetic material from the magnetic separator will then go to a classifier to remove slimes that could affect the spirals' performance. The slimes will be sent to the thickener and North WMA, while the sandy, oversized material will continue on to the spirals.

3.4.1.4 Stockpile Spiral Separation

The stockpile spiral plant processes material smaller than 1mm (18 mesh) down to 45 microns (325 mesh). The spirals produce a heavy product, which will proceed to a classifier to dewater before being combined with the DMS product and the magnetic product and conveyed to the product stacker. The material smaller than 45 microns (rejects) is removed, dewatered, and disposed of with the spiral rejects as a discard containing around 10% moisture. The rejects will be combined with the rejects from the DMS before being sent to the North WMA. The water run-off from the rejects and most of the process water is recovered and returned to the process for reuse.

3.4.1.5 Stockpile Product

The concentrate product will contain over 50% iron and range in size from 1/4 inch to 45 microns (325 M). It will be stockpiled using a stacker that runs the length of the Product Bed on a set of rails, similar to rail tracks. The stockpile dimensions will be high. A bucket wheel reclaimer will load the iron concentrate product at a rate of 4,000 tons per hour (tph) to the load-out facility. Two trains with 110 cars each are expected to be loaded every 24 hours. The iron concentrate will undergo further processing at a pig iron production plant (which is not part of this Proposed Project) to enhance the recovery of the iron and convert it into a direct feed for the domestic foundry and steel markets. The iron concentrate loaded onto the rail cars consists of products from both stockpiles and tailings basins. Therefore, production must commence concurrently at both the stockpiles and the tailings basin to ensure a consistent mix of iron concentrate. This will contribute to the desired product mix and facilitate efficient rail transport.

3.4.2 Tailings Basin Processing: Overview

When the Hill Annex Mine was operating, the rejected materials were directed to the tailings basins. Figure 3B shows a map of the tailings basins leased by CRC from the State of Minnesota. These basins are located to the south of Hwy. 169 and will necessitate the construction of a pipeline crossing from the south to the north, where the rail loadout will be located. The long-distance transportation of fine material will be achieved using pipelines, limited to the tailings contained within the diked perimeter of the tailings basins. As the tailings basins are excavated, screened, and pumped over the highway to the plant, space will be made available for future plant reject deposition. No new tailings basins will be

needed, and the existing dikes are sufficient to contain the reduced amount of fine materials remaining inside the dikes after reclamation. The proposed project intends to recover iron units from rejects in three tailings basins: Hill Annex Fine Tailings Basin #1 (12.8 Mt), Hill Annex Fine Tailings Basin #2 (0.8 Mt), and Hill Annex Fine Tailings Basin #3 (22.3 Mt). As shown in Figure 3Bb, the Tailings Basin Spiral Plant will be located in the Plant Building on an elevated area between Tailings Basin #2 and #3, allowing WMA to expand as Hill Annex Basin #2 material is excavated over time.

The initial tailings basin spiral plant will be installed at Hill Annex Fine Tailings Basin #2 to process the leftover fine materials after the dike collapsed decades ago. This location is visible in the southeastern part of Basin #3 in Figure 2B. Approximately 0.807 MT fines remain in Basin #2, and they are expected to last for about three months of production. This will free up a significant Waste Management Area (WMA) area. Additionally, this site will provide extra space for rejects from the spiral plant when it is moved to Basin #3. Basin #3 is projected to have a production life of about 7½ years before Hill Annex Basin #1 becomes operational. Basin #1 is expected to be operational for 3 years. The plant will operate 24 hours a day, seven days a week, for eight months a year (during spring, summer, and fall) but will cease operations during the cold winter months.

The tailings basins are currently overgrown with vegetation, which must be cleared just before mining operations are underway. The brush and trees will be removed as mining progresses, and a grizzly screen will be installed to prevent oversized and foreign materials from entering the processing plant.

3.4.2.1 Tailings Basin Considerations

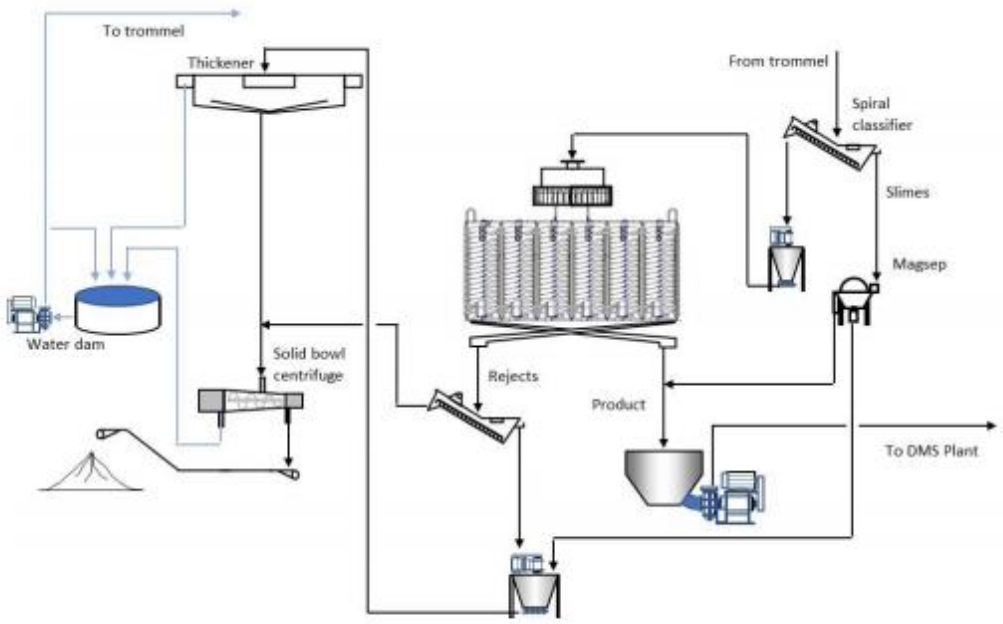
In the tailings basins, the coarse and heavy sand and ore particles settle near the discharge points, while the lighter slimes and water are transported down the gentle natural slopes towards the furthest, most downdip point. Over time, water accumulated against the dikes and, with it, the colloidal slimes. Accordingly, there is thus a gradual decrease in the granularity and iron content from the discharge point to the water's edge. The water accumulated against the southeastern dike, leaving the northern part of the basin exposed for reclaiming drier tailings.

Processing the tailings requires the separation of the iron-bearing particles from the waste particles. However, the available iron recovery processes limit what is economically feasible. As one moves from the iron-rich discharge point towards the low-grade slimes at the furthest from the original discharge, a point is reached where the iron content does not support the economic extraction of the iron units, and mining will cease at this location. This leaves part of the tailings basin in its present, undisturbed condition and can be used as a reference area, as per Rule 6130.3600 Vegetation Requirements, Subp. 4. The newly mined area can also be used as a containment area for water run-off while the other tailings are mined. As a result, there is no need to create another containment area for the tailings basins during operation.

3.4.2.2 Tailings Basin Feed

Tailings basin processing is initiated when tracked excavators stockpile tailings to be fed into the spiral

plant later by wheeled loaders. The tailings will be fed into a grizzly to remove the large foreign objects (i.e., tree stumps). The undersize will fall into a bin, and the bin feeder employs a short conveyor equipped with a State-certified belt scale for plant metrics and royalty payments. The conveyor feeds the trommel screen, a rotating screen with a 1mm (18 M) aperture screen. Water introduced from the process water dam is fed to the trommel, where the fines are washed through the rotating screen into a tank fitted with a pump. The oversized material passes through the trommel, is rejected at the end, and placed on a short reject conveyor as waste. The waste is predominantly organic matter left over from clearing and logging the surface of the tailings basins. As shown below in the Tailings Basin Feed Flow Diagram, a pump feeds the trommel undersize slurry to the spiral plant.



Spiral Plant Process Flow Diagram

This modular and transportable arrangement moves forward as the working face advances. The water pumped to the trommel from the process water dam can be used to suppress dust if required.

3.4.2.3 Tailings Basin Spiral Plant

Plant feed will be brought in by pumping undersize from the trommel screen at the working face of the tailings basin to the Tailings Basin Spiral Plant, as shown by the brown line in Figure 3B. A return water line from the spiral plant to the trommel screen supplies water for transportation and dust suppression at the loader.

The slurry received at the spiral plant will be deslimed using a spiral classifier. The slimes will be sent to a low-intensity magnetic separator to remove and recover all the magnetite. The nonmagnetic slimes will then be delivered to the rejects product pump box and then to the thickener with the excess water from the spiral rejects. The deslimed fines (spiral feed) are fed into a distributor, which feeds the spirals.

The spirals separate the feed into heavy iron-bearing particles and lighter rejects.

As the face moves towards the east, the water supply line and slurry pipeline will follow the trommel until Basin #2 is fully depleted of all tailings and can be turned into a WMA for all spiral plant rejects. The loader and trommel will then be moved down into Hill Annex Fine Tailings Basin #3, and the abovementioned process will continue. Finally, the process can be continued in Hill Annex Fine Tailings Basin #1.

3.4.2.4 Tailings Basin Product

The heavy iron-bearing products are collected in the product pump box and pumped about one mile to a centrifuge at the DMS plant. The slurry is dewatered and sent to the product stockpile. The water recovered from the product is returned to the process water dam at the spiral plant. Thus, the double green line and any shortage are made up by keeping the level in the process water dam constant.

The rejects of the spirals are dewatered in a classifier and sent to the centrifuge. The thickened underflow from the thickener is combined with the rejects from the spiral and introduced into the centrifuge. The dewatered reject solids at about 10% moisture are conveyed to the WMA east of the Hill Annex Basin #2, where there is enough room to stockpile the estimated 400,000 tons of rejects. As tailings continue to be mined from Hill Annex Basin #2, space will be available for the estimated rejects from said basin and from mining tailings from Hill Annex Basin #1.

4.0 Related Regulatory Considerations and Approvals

4.1 Water

The process will not directly discharge water. Water will leave the plant only as moisture in the product and the rejects. Make-up water from the Hill Annex Pit will be used in the CRC plants through water appropriations. The maximum rate of water use for the process is minute (gpm) for eight months (244 days) per year, totaling. The ore feed rate into the plant is 1,000 tons per hour (tph) at 5% moisture, resulting in 52.6 tons per hour (tph) or 236 gpm of water going into the process per hour. The calculation is based on the dry mass of the ore. CRC's flowsheet states 1000 tons of dry material into the plant at 5% moisture, which means 1000 tons are 95% of the total mass entering the plant.

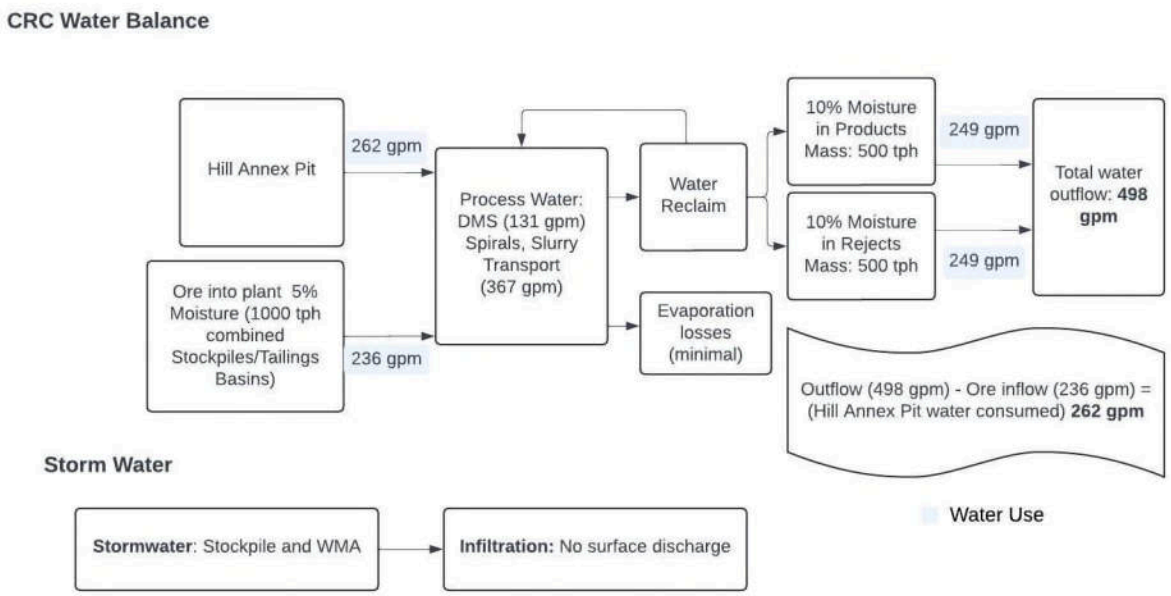
(Eq. 1) (1000 tons/0.95) = 1052.6 tons (1052.6-1000)/1052.6 = 4.99% = 5.0%) = 52.6 tph

The conversion to gallons per minute was calculated using the equation:

(Eq. 2) (52.6 tons/hour) x (2240 lb/long ton) x (1 gallon/8.33 lb) x (1 hour/60 minutes) = 235.7 gpm = 236 gpm.

A similar calculation for water outflow for 500 tph products and 500 tph rejects at 10% moisture results in 55.6 tons per hour (tph) or 249 gpm. The make-up process water (water lost as moisture in product and rejects) will come from the Hill Annex Pit at a rate of 262 gpm.

A water balance is presented above. Note that this does not include water used for dust suppression on



roads and loading sites, as it is dependent on weather conditions. Water consumption is limited to the amount of moisture in the iron concentrate product and rejects, evaporation, and dust suppression.

4.2 Wetlands

A wetland delineation was completed for the Project Mine Area in June and July 2024. Figure 6A shows wetlands identified on the National Wetland Inventory (NWI) and Figure 6B shows the wetlands delineated at the site.

Several identified wetlands likely to have been created by previous industrial activities in the area and may be considered incidental. Appropriate incidental and jurisdictional determinations will be requested from agencies regulating the Wetland Conservation Act (WCA) and Section 404 of the Clean Water Act (CWA). No new wetlands or tailings basins will be created.

4.3 Stormwater

The stormwater runoff is directed from the feed area toward one of two containment areas. The first area is a ditch created when the stockpile was built on top of the legacy stripping stockpile. The contour of the ditch is shown in orange as seen in Figure 3A. The orange line is the 1,470-foot topographic line, and it acts as a natural infiltration bed and does not build up with water, as is evident from the absence of any wetland features. It is more than 20 feet deep in some places. The catchment area is small, thus

precluding the possibility of an overflow into surface water channels. Some fill will be needed in the ditch near the crusher site for the loader to operate safely when working in that area. The second containment area is discussed under South WMA Section 4.7.2.

4.3.1 Tailings Basins

The containment areas for Hill Annex Fine Tailings Basins #1, #2, and #3 have been adequate for stormwater management for many years in their present state and will be maintained by CRC to sustain function until closure.

4.4 Air and Dust

The rail crusher spread and conveyor are movable and extendable. They will be relocated to limit the travel distance of the wheeled loader, reducing costs and fugitive dust from the loader. Moving the crusher spread along the indicated path will clear the stockpile, allowing the WMA to expand.

As a requirement of the MN Fugitive Dust Rule, CRC must take reasonable precautions to prevent the discharge of visible fugitive dust emissions beyond the property permit boundary from which the emissions originate. It is anticipated that fugitive dust generation during excavation and loading at the stockpiles will be minimal due to the natural moisture content of stockpile materials. Water will be employed for dust suppression at the crusher spread. CRC will provide contracted crushing operations with the required water to suppress dust during loading and crushing. The crushed material will be moistened with water sprays to reduce dust during the transfer from the crusher to the conveyor and onto the surge pile. Additional transfer points shall occur indoors to further minimize fugitive dust emissions.

Fugitive dust from traffic on unpaved roads will be controlled to the extent possible by utilizing water trucks. Traffic on paved and public roads will be minimized as much as possible to prevent fugitive emissions and vehicle track-out.

CRC will identify all the potential sources of fugitive emissions, including those from scram mining operations, conveyor belt transfer points, processing, load-out facility dust sources, etc. In addition, CRC will identify all mobile equipment and vehicle types, along with the road types (e.g., paved, gravel, etc.) on which they will be working/traveling to estimate fugitive dust emissions. This information will be available to prepare a Fugitive Emission Control Plan detailing Best Management Practices (BMPs) for controlling fugitive dust.

Air emissions associated with CRC's Project will likely include particulate matter (PM) in the form of PM10 and PM2.5. Potential to Emit (PTE) calculations will be completed to determine the type of air permit required. Fugitive emissions will likely need to be included in the PTE calculations for the CRC Proposed Project because it is adjacent to a taconite processing facility. A major stationary source is a source that has the potential to emit 100 tons per year or more of any air pollutant.

The following emission units will be considered in the PTE calculations: any crushers or screens near the stockpiles, additional in-plant crushers, screens, bucket elevators, conveyor belt transfer points, thermal dryers, product packaging stations, storage bins, enclosed storage areas, truck loading stations, truck unloading stations, railcar loading stations, railcar unloading stations, and mobile equipment.

4.5 Noise

The feed and crushing operations will occur 24 hours a day, seven days a week. Regarding the tailings basin operation, the closest residents are in Calumet, one mile from the proposed plant site. There is little risk of nuisance noise. As for the stockpile operations, the nearest residence is covered with trees and other vegetation, which will act as a sound dampener. The stockpile acts as a buffer for the community of Calumet and should not be affected by nuisance noise.

4.6 Additives

Additives planned for use in CRC's processes area discussed in Sections 4.6.1 and 4.6.2 below.

4.6.1 Chemical Additives

The only chemical agent (additive) used in the process is a flocculant, which helps settle the slimes in the thickeners. Flocculants are typically high-molecular-weight polymers that bind solid materials together to facilitate the coagulation of suspended material. They are extensively used on the Iron Range in thickeners and have been approved for similar projects. CRC plans to use HyperFloc 304, supplied by HyChem, for its thickeners.

4.6.2 Ferrosilicon

The DMS processing plant at CRC uses ferrosilicon in the density separation process. Ferrosilicon is a corrosion-resistant stainless-steel powder that is highly magnetic. During the plant's process, most of the ferrosilicon is recovered using magnetic separators and is then returned to the process for reuse. However, a small amount (will be lost in the rejects and transported to the WMA. Over time, the ferrosilicon will degrade into iron hydroxide and silica

4.7 Waste Management Areas (WMAs)

4.7.1 North WMA

Figure 3A shows the layout and direction of mining, which will create room for the WMA located on the same parcel (in Section 15) as the Cretaceous stockpile. Initial site preparations will level the surface of a legacy overburden stripping dump with a soft slope towards the containment area for stormwater drainage.

The waste from the DMS and spiral plants will be managed using best practices to benefit the State and its residents. The first waste management area (WMA) on the north side of Hwy 169 will be located on a parcel atop an existing overburden dump to the east of the DMS plant. This overburden dump also currently provides a base for a nearby 0.677 MT Cretaceous iron-bearing stockpile. This WMA is ideally located with a containment area downslope from the WMA and large enough to accommodate all the rejects from the DMS plant while processing the said Cretaceous stockpile. Once the Cretaceous stockpile is removed, the entire parcel will be available for stockpiling rejects from the DMS plant. The WMA will advance west, filling in and following the receding face of the reclaimed Rejects #2 Stockpile. The WMA will include any rejects from reclaiming the other stockpiles at the site. Rejects #2 Stockpile lies on top of a previously placed overburden stockpile, and the WMA will replace the Reject #2 ore on this overburden stockpile. The final size of the reject pile on the footprint of Rejects #2 Stockpile will be about 9 million tons, leaving behind a reduced height stockpile on a site cleared of legacy ore stockpiles. During construction of the WMA onto the footprint of Rejects #2 stockpile, the stormwater run-off will be directed towards the containment area that will consist of a dike parallel to and north of the new rail line running east-west, growing in length as the WMA expands. Stormwater will be contained north of this dike in a constructed area on the overburden stockpile. The porous overburden stockpile will allow stormwater to infiltrate. No new tailings basins will be constructed for the CRC plant. The deposited rejects will be compacted and contoured to promote future land use and direct surface water runoff toward the containment area. The surface areas of the rejects stockpile will be remediated per the Mineland Reclamation Rules and are the responsibility of CRC.

The rejected materials will be transported to the WMA using a conveyor. When leaving the DMS plant, rejects are expected to have a moisture content of approximately 10%, which is not likely to cause dust at transfer points or during discharge by the stacker. A dozer will be employed to shape the rejected materials into the desired contours to facilitate water run-off collection, and to prepare the slopes for remediation using erosion protection and natural vegetation.

Reclamation activities will adhere to the State of Minnesota requirements. All areas of ground disturbance, stockpiles, ponds, roads, etc., will undergo reclamation. A Reclamation Plan has not been prepared before the submission of the Scram PTM application. Upon obtaining the permit approval, financial assurance will be based on the Mine Plan and the Reclamation Plan.

4.7.2 South WMA

The rejects from the spiral plant south of Highway 169 will be moved to the WMA using a conveyor. This process will start at the high ground in the northeast corner of the overburden stockpile and progress south and west while maintaining the slope to direct stormwater towards the southeast containment area. The rejects will be spread out in a way that follows the remediation plan, using a dozer to create a contour. Flex Guard erosion protection will be used to establish vegetation. The existing dikes around Basins #1, #2, and #3 will be maintained. After processing all the tailings, the number of rejects within these basins' dikes will be reduced to about 16 million LTs, which is half the current amount.

A subsequent containment area in the Hill Annex Fine Tailings Basin complex (Hill Annex Fine Tailings Basin #3) has an existing pond within the existing perimeter dikes to be used for run-off and makeup water from the tailings basins to the north. The water contained in this pond will be removed before the commencement of mining tailings, as explained in Section 2.6.2, and will make room for the stormwater run-off that will contain some additional fine tailings from the operating site. Once the pond is dewatered, it is unnecessary to do it again since the volume of tailings in the basins will be reduced to half its original amount. The second containment area is a known infiltration site, and it can maintain that function in the future. The slopes of the WMA will be covered with Flex Guard erosion protection to minimize stormwater runoff. The WMA will expand southward from its original footprint, adding more conveyors as needed. Upon closure and agreement with the State, a clearwater pond will be created, and a breach of the perimeter dike will allow clean water to enter the Snowball Creek flowage and further into the Swan River to the south. This will help restore the flowage source back to pre-mining conditions. Also, the State will not have to maintain an unneeded dam in its inventory.

4.7.3 Leachable Materials

The stockpiled material at the proposed processing site consists of Superior-type Iron Formation, which is significantly different from Algoma-type Iron Formation. Superior-type Iron Formations are chemical precipitates, while Algoma-type Iron Formations are of volcanic origin and have a more complex syngenetic mode of origin, mineralogy, and subsequent evolution.

Superior-type Iron Formations are primarily a simple crystalline mixture of iron oxides, magnesium, manganese, aluminum, and calcium silicates and carbonates. In contrast to Algoma-type Iron Formation, Superior-type Iron Formations are epigenetic and relatively low in elements such as sulfur, arsenic, chlorine, cobalt, mercury, and non-ferrous base metals. Therefore, local hematitic ore stockpiles contain relatively low sulfur content, significantly reducing acid mine run-off.

The potential release of leachate from local stockpiles may depend on water characteristics such as pH, Eh, time duration of water contact, hydrology, and reduction (redox) potential of the source (feedstock) material. CRC has obtained recent information regarding the Hill Annex Stockpiles from the MDNR. This information is being compiled in a Waste Characterization Report to be filed separately from this Project Description. This subsequent report will help identify the potential sources for leachate constituents (Fe, Mg, Mn), sulfate, total dissolved solids, chlorine, and trace metals such as arsenic, mercury, selenium, and cobalt.

5.0 Conclusion

In conclusion, Calumet Reclamation Company's (CRC) proposed project for extracting and processing iron units from legacy stockpiles and tailings from the Hill Annex Mine represents a significant advancement in scram mining in northern Minnesota. By employing modern DMS and spiral processes, CRC aims to efficiently recover valuable iron ore resources, thereby contributing to the domestic steel production industry. The project’s comprehensive approach, including the dewatering initiatives,

ensures a minimal environmental footprint and synergic solutions benefitting both the public and private sectors.

Calumet Reclamation Company is committed to responsible resource management, including relatively low water and energy consumption. The successful implementation of this project will not only revitalize the Hill Annex Mine but also set a precedent for future reclamation and mineral processing endeavors regionally. With the necessary permits, CRC is poised to commence operations, bringing economic benefits to the region and reinforcing the importance of innovative processes in the mining sector.

6.0 References

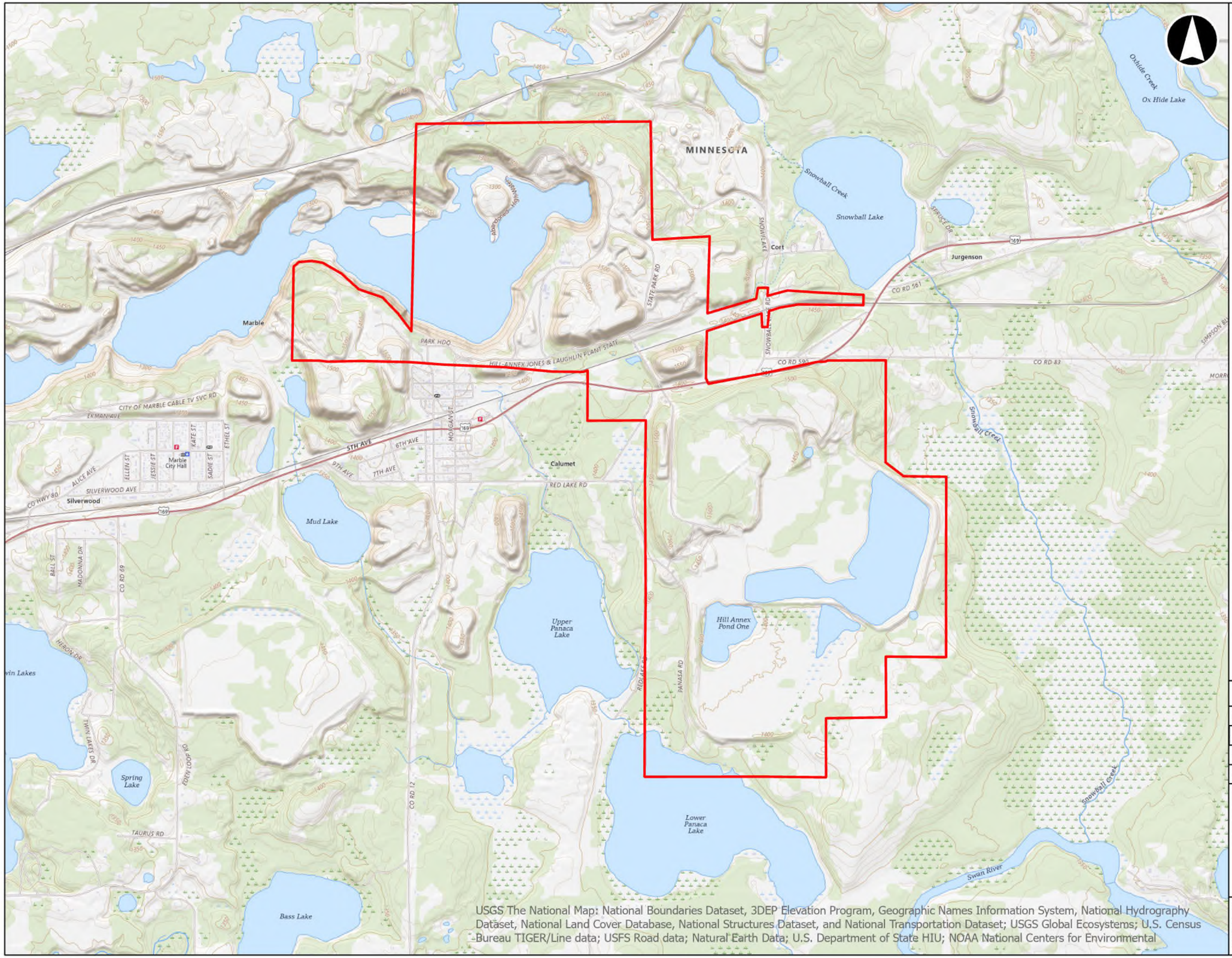
1. M. Lundt, I. Grewal. (2017). Dense media separation – a valuable process for preconcentration.

2. Sloan, R. E. (1964). The Cretaceous System in Minnesota. Minnesota Geological Survey Report of Investigations, 5, 9.

3. MDNR (2001). Stockpile Ownership, Composition, and Use for Two Study Areas Located Near Virginia and Calumet, Minnesota.

Figures

Figure 1: Site Vicinity Map
Figure 2: Site Detail Map
Figure 3A: Site Detail North of Hwy 169
Figure 3B: Site Detail South of Hwy 169
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Figure 5: Elevation Map
Figure 6A: NWI Map
Figure 6B: Wetland Delineation Map
Figure 7: Watershed Map
Figure 8: Surface Water Flow
Figure 9: Scranton Ownership / Lease



USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road data; Natural Earth Data; U.S. Department of State HIU; NOAA National Centers for Environmental

Calumet Reclamation Site Vicinity Map

Calumet Reclamation Company

Project Description

Itasca County

Figure 1

Map Center Coordinates *15T 480296 5240636*

Spatial Reference *NAD 1983 UTM Zone 15N*

Project Number *22292* | **Date Created** *9/18/2024*

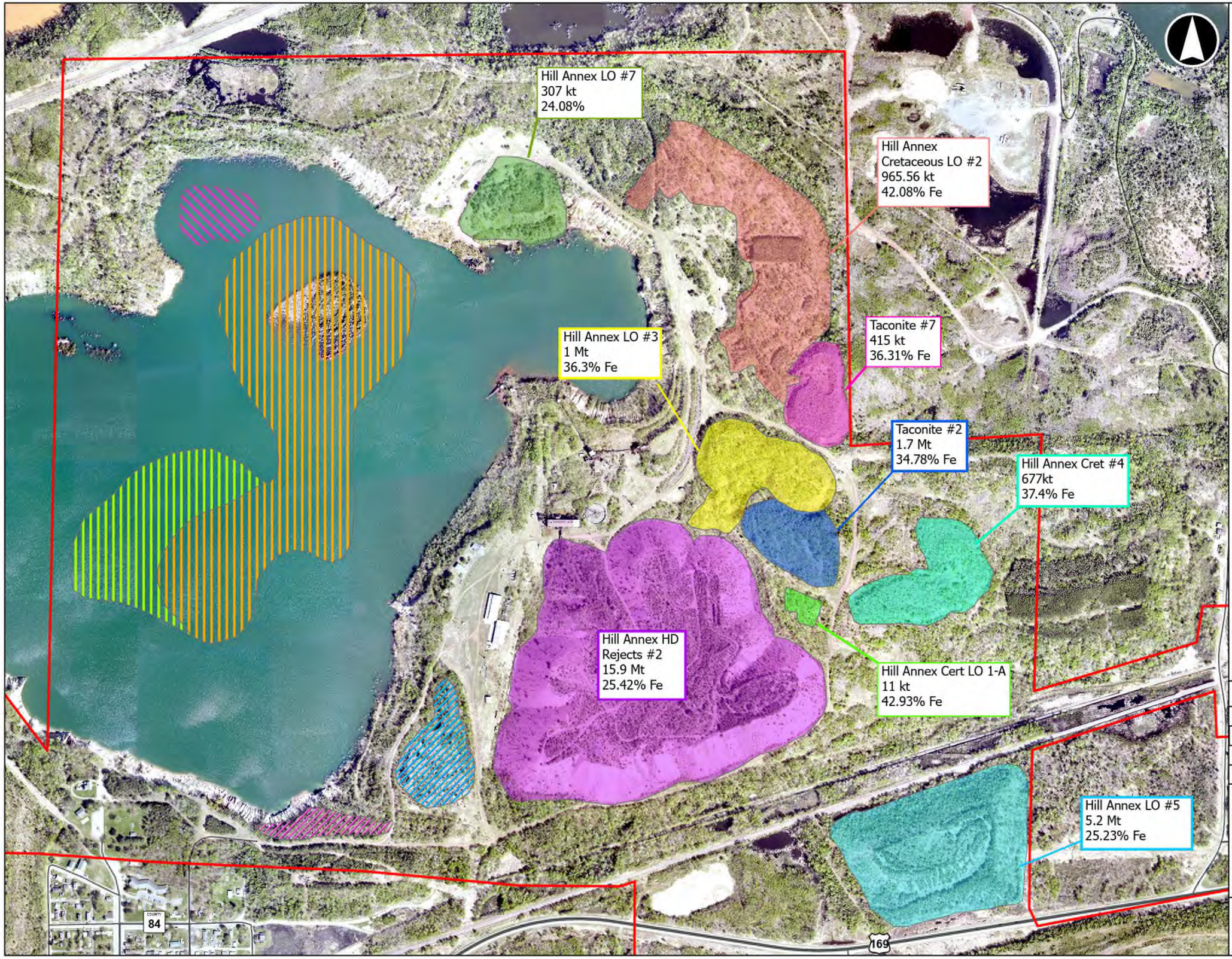
Author *K Berry, GIS Analyst/Project Manager, NTS*

Data Source

Disclaimer

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0 300 600 900 1200 Feet

Scale *1:7,200*

1 inch equals 600 feet

Legend

Permit to Mine Boundary

Roads

- Interstate; US Highway
- County Road
- Township/UT Road
- All Other Roads

Stockpile Name

- Hill Annex Cret LO 1
- Hill Annex Cret LO2
- Hill Annex HD Rejects 2
- Hill Annex LO 3
- Hill Annex LO 5
- Hill Annex LO 8
- Hill Annex Tac 1
- Hill Annex Tac 2
- Hill Annex Tac 4
- Hill Annex Tac 5
- Hill Annex Tac 7
- Hill Annex LO 7
- Hill Annex Cret LO 1-A
- Hill Annex Cretaceous 4

Calumet Reclamation Site Detail Map

Calumet Reclamation Company

Project Description

Itasca County

Figure 2A

Map Center Coordinates *15T 480064 5242177*

Spatial Reference *NAD 1983 UTM Zone 15N*

Project Number *22292* | **Date Created** *9/18/2024*

Author *K Berry, GIS Analyst/Project Manager, NTS*

Data Source

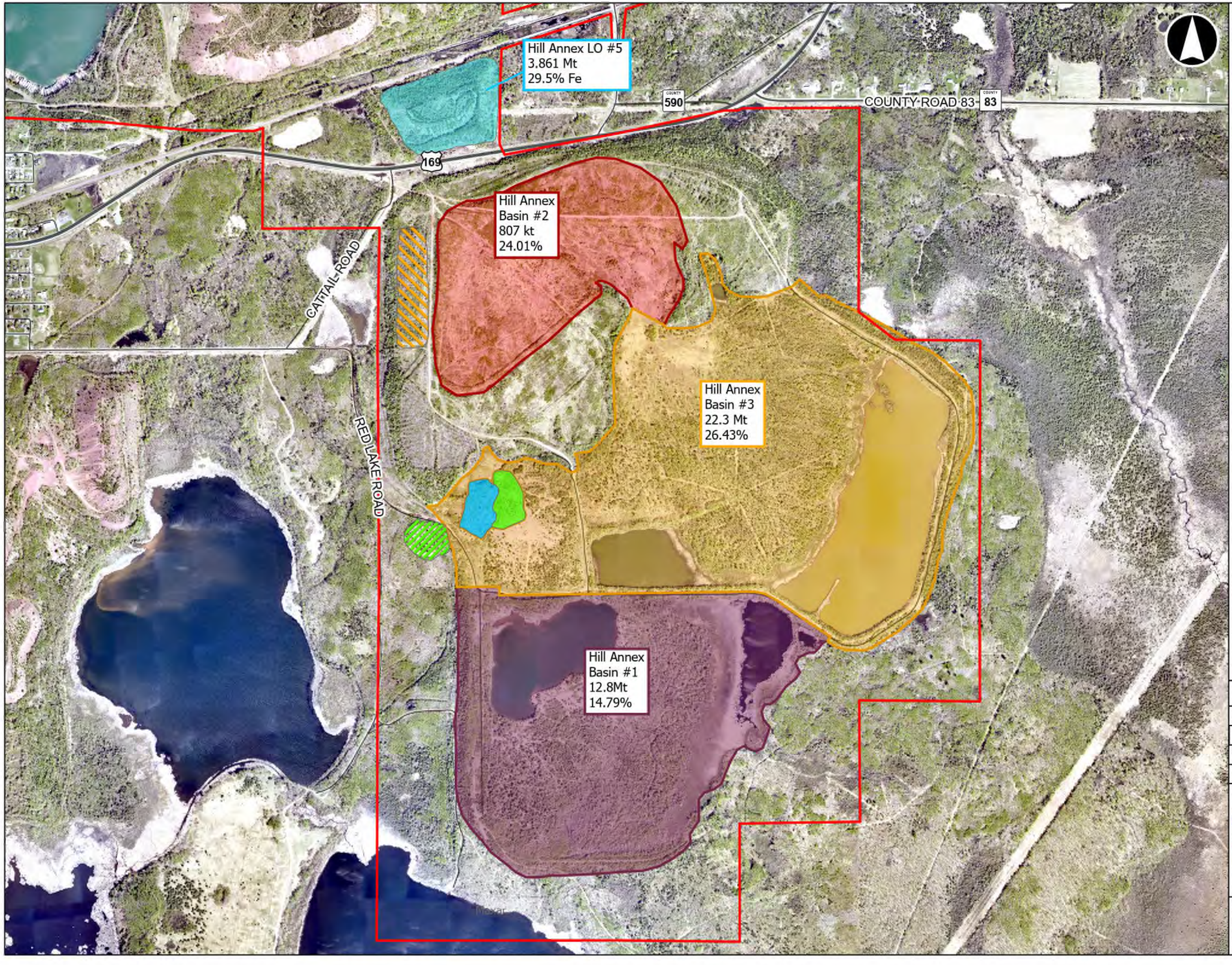
MN-DOT Route Centerlines - State of Minnesota GeoCommons - https://gisdata.mn.gov/dataset/trans-roads-centerlines

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0 500 1000 1500 2000 Feet

Scale *1:12,000*

1 inch equals 1,000 feet

Legend

Permit to Mine Boundary

Roads

- Interstate; US Highway
- County Road
- Township/UT Road
- All Other Roads

Stockpile Name

- Hill Annex HM Rejects 1
- Hill Annex Paint Rock 6
- Hill Annex Rock Rejects
- Hill Annex Tac 3

Tailings Basins Included in Lease

- Hill Annex Fine Tailings Basin 1
- Hill Annex Fine Tailings Basin 2
- Hill Annex Fine Tailings Basin 3

Calumet Reclamation Site Detail Map

Calumet Reclamation Company

Project Description

Itasca County

Figure 2B

Map Center Coordinates *15T 481289 5240186*

Spatial Reference *NAD 1983 UTM Zone 15N*

Project Number *22292* | **Date Created** *9/18/2024*

Author *K Berry, GIS Analyst/Project Manager, NTS*

Data Source

MN-DOT Route Centerlines - State of Minnesota GeoCommons - https://gisdata.mn.gov/dataset/trans-roads-centerlines

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Environmental Science & Engineering



0 300 600 900 1200 Feet

Scale *1:7,200*
1 inch equals 600 feet

Legend

- Culvert
- Water Discharge Point
- Water Intake Installation Point
- Surge Pile
- Access Road
- Feed Conveyor
- Infiltration Ditch
- Load Out
- Proposed PipeLine
- Proposed Rail Line
- Reject Conveyor
- Water Line
- Water Discharge Line
- Crusher Spread
- Crusher Stockpile
- Jaw Crusher
- Load Out Building
- Plant Building
- Proposed Road Bridge
- Product Stockpile
- Waste Managment Area
- Water Containment
- Parcels
- Permit to Mine Boundary

Stockpiles Included in Mine Plan

- Included in Mine Plan
- Included in State Lease

Calumet Reclamation Site Detail North of HW 169 Map

Calumet Reclamation Company
Project Description
Itasca County

Figure 3A

Map Center Coordinates *15T 480145 5242128*

Spatial Reference *NAD 1983 UTM Zone 15N*

Project Number *22292* | **Date Created** *9/18/2024*

Author *K Berry, GIS Analyst/Project Manager, NTS*

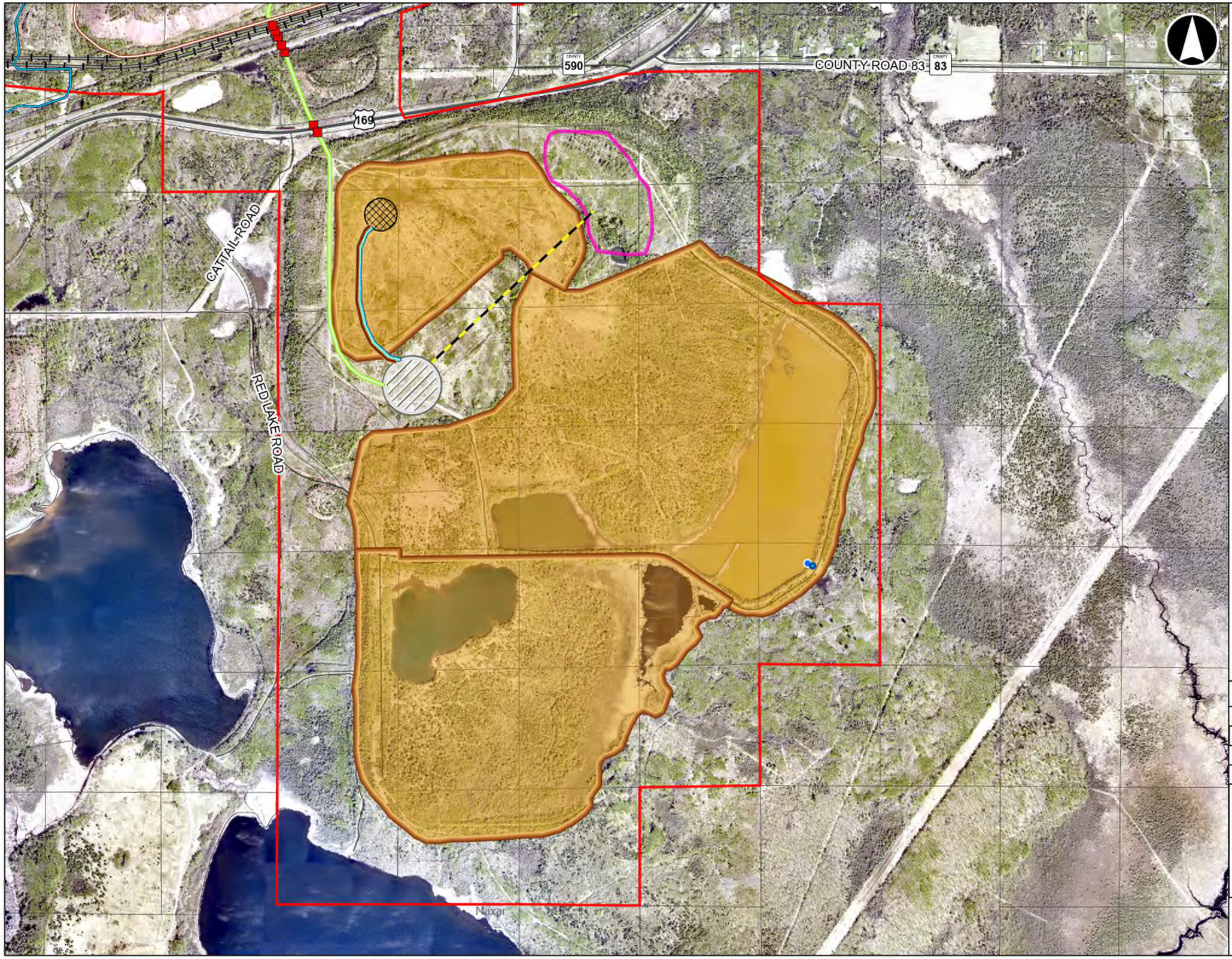
Data Source

MN-DOT Route Centerlines - State of Minnesota GeoCommons - https://gisdata.mn.gov/dataset/trans-roads-centerlines

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0 500 1000 1500 2000 Feet

Scale *1:12,000*
1 inch equals 1,000 feet

Legend

- Culvert
- Water Discharge Point
- Water Intake Installation Point
- Access Road
- Proposed PipeLine
- Proposed Rail Line
- Reject Conveyor
- Slurry Pipeline
- Water Line
- Water Discharge Line
- Plant Building
- Loader and Trommel
- Containment Area
- Waste Managment Area
- Parcels
- Permit to Mine Boundary

Calumet Reclamation site Detail South of HW 169 Map

Calumet Reclamation Company
Project Description
Itasca County

Figure 3B

Map Center Coordinates *15T 481625 5240063*

Spatial Reference *NAD 1983 UTM Zone 15N*

Project Number *22292* | **Date Created** *9/18/2024*

Author *K Berry, GIS Analyst/Project Manager, NTS*

Data Source

MN-DOT Route Centerlines - State of Minnesota GeoCommons - https://gisdata.mn.gov/dataset/trans-roads-centerlines

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0 125 250 375 500
Feet

Scale *1:3,000*
1 inch equals 250 feet

Legend

Permit to Mine Boundary

Calumet Reclamation Relic Mining Infrastructure Map

Calumet Reclamation Company
Project Description
Itasca County

Figure 4

Map Center Coordinates *15T 479954 5241962*

Spatial Reference *NAD 1983 UTM Zone 15N*

Project Number *22292* | **Date Created** *9/18/2024*

Author *K Berry, GIS Analyst/Project Manager, NTS*

Data Source

MN-DOT Route Centerlines - State of Minnesota GeoCommons - https://gisdata.mn.gov/dataset/trans-roads-centerlines

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0 750 1500 2250 3000 Feet

Scale *1:18,000*
1 inch equals 1,500 feet

Legend

- Permit to Mine Boundary

Roads

- Interstate; US Highway
- County Road
- Township/UT Road
- All Other Roads
- State/National Forest Road

Elevation in Feet

1603
1317

Elevation Contours

- 50 ft Contour
- 10 ft Contour

Calumet Reclamation Elevation Map

Calumet Reclamation Company
Project Description
Itasca County

Figure 5

Map Center Coordinates *15T 480509 5240751*

Spatial Reference *NAD 1983 UTM Zone 15N*

Project Number *22292* | **Date Created** *9/18/2024*

Author *K Berry, GIS Analyst/Project Manager, NTS*

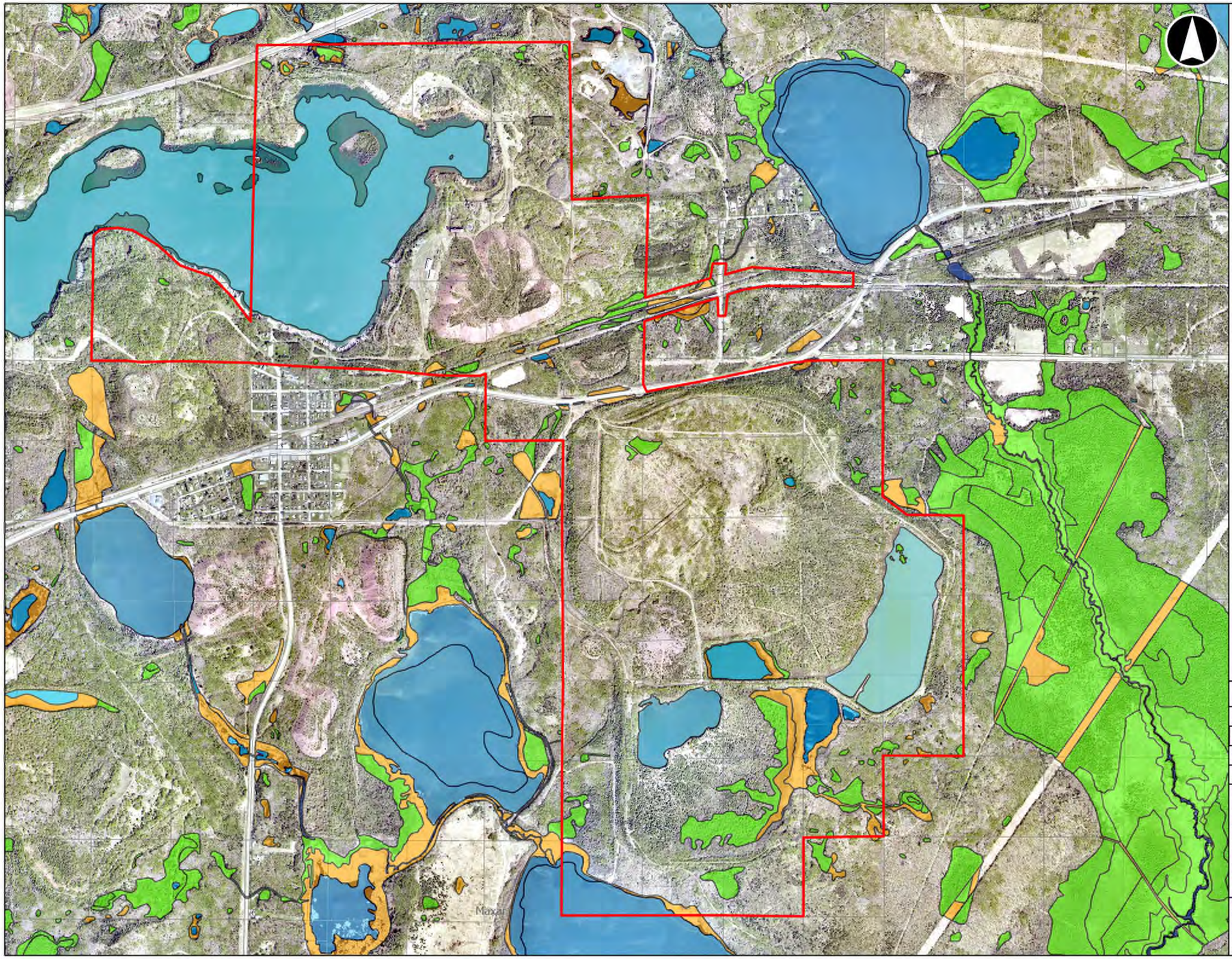
Data Source
MN-DOT Route Centerlines - State of Minnesota GeoCommons - https://gisdata.mn.gov/dataset/trans-roads-centerlines

MN Lidar DEM - USGS - Upper Mississippi River 3-B22 and 4-B22 - https://portal.opentopography.org/usgsDataset?dsid=MN_UpperMissRiver_4_B22 - https://portal.opentopography.org/usgsDataset?dsid=MN_UpperMissRiver_3_B22

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0 750 1500 2250 3000 Feet

Scale *1:18,000*
1 inch equals 1,500 feet

Legend

- Permit to Mine Boundary
- Parcels

NWI Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

Calumet Reclamation NWI Map

Calumet Reclamation Company
Project Description
Itasca County

Figure 6A

Map Center Coordinates *15T 480761 5240833*

Spatial Reference *NAD 1983 UTM Zone 15N*

Project Number *22292* | **Date Created** *9/18/2024*

Author *K Berry, GIS Analyst/Project Manager, NTS*

Data Source

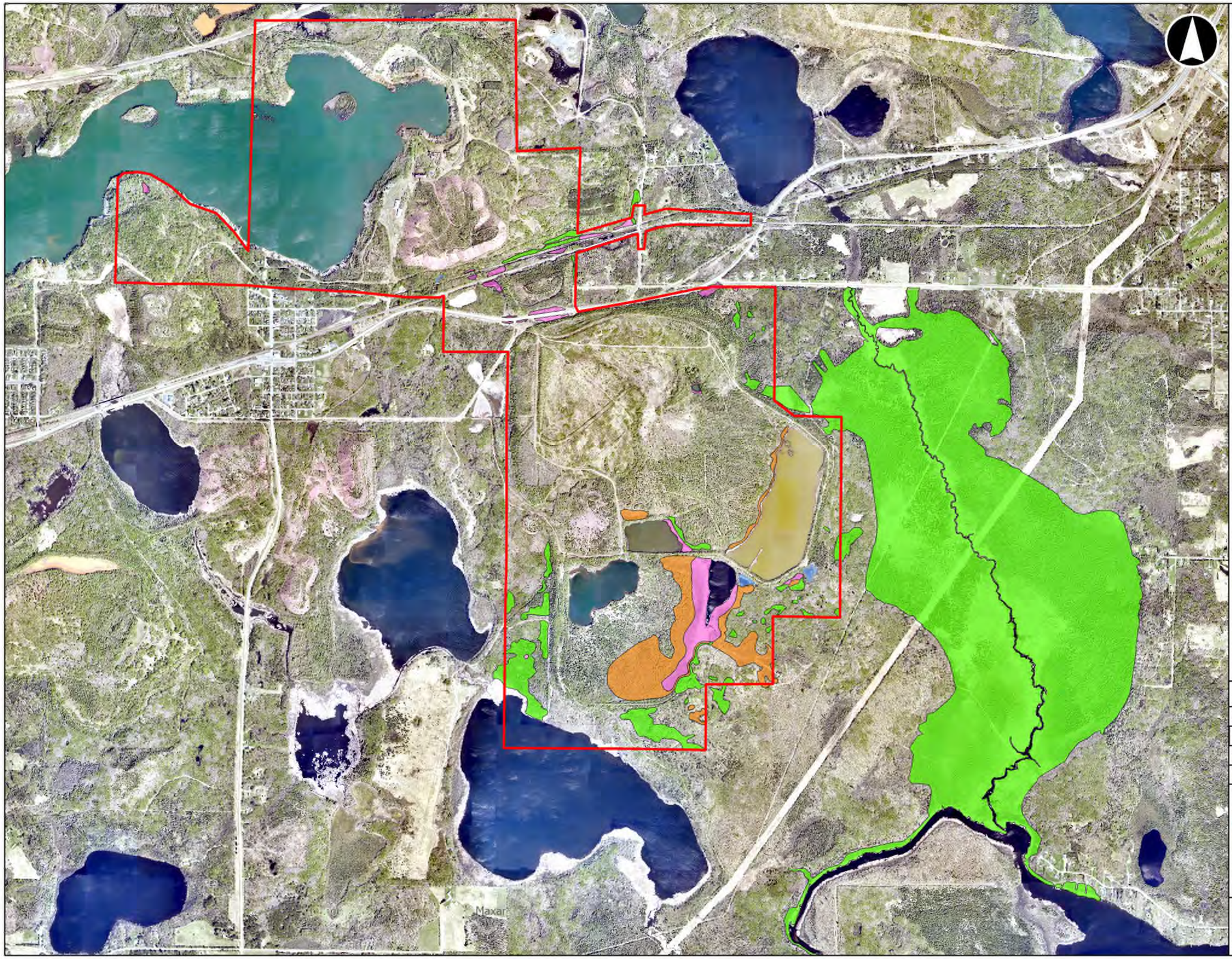
MN-DOT Route Centerlines - State of Minnesota GeoCommons - https://gisdata.mn.gov/dataset/trans-roads-centerlines

National Wetland Inventory for Minnesota - State of Minnesota GeoCommons - https://gisdata.mn.gov/dataset/water-nat-wetlands-inv-2009-2014

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0 900 1800 2700 3600
Feet

Scale *1:21,600*
1 inch equals 1,800 feet

Legend

- Permit to Mine Boundary

Wetland Type

- Open water
- Shallow marsh
- Shrub swamp
- Wooded swamp

Calumet Wetland Delineation Map

Calumet Reclamation Company
Project Description
Itasca County

Figure 6B

Map Center Coordinates *15T 481152 5240648*

Spatial Reference *NAD 1983 HARN Adj MN St Louis*

Project Number *22292* | **Date Created** *9/18/2024*

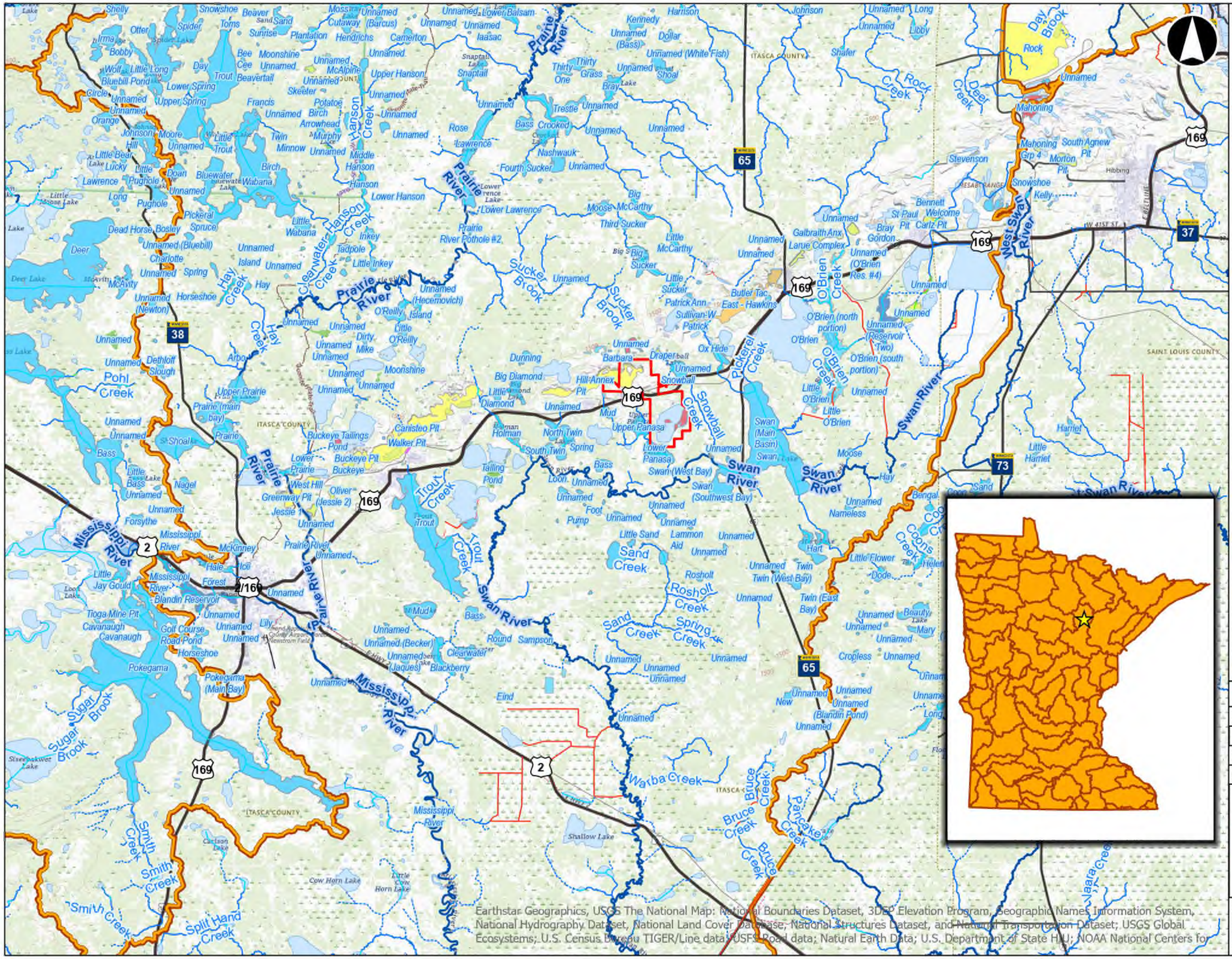
Author *K Berry, GIS Analyst/Project Manager, NTS*

Data Source

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0 7500 15000 22500 30000 Feet

Scale *1:180,000*
1 inch equals 15,000 feet

Legend

- Permit to Mine Boundary

Stream Type

- Stream (Perennial)
- Stream (Intermittent)
- Stream (Unknown)
- Ditch (Perennial)
- Ditch (Intermittent)
- Ditch (Unknown)
- Lake Connector
- Wetland Connector
- River Centerline
- River Connector
- Interpreted Arc Connector

Water Bodies Class

- Drained Wetland
- Intermittent Water
- Island or Land
- Lake or Pond
- Mine Pit Lake
- Mine Pit Lake (NF)
- Natural Ore Mine
- Reservoir
- Riverine island
- Riverine polygon
- Tac/Natural Ore Mine
- Tailings Pond
- Wetland
- DNR Watershed Level 8 All Catchments
- Project Location

Calumet Reclamation Watershed Map

Calumet Reclamation Company

Project Description
Itasca County

Figure 7

Map Center Coordinates *15T 478801 5236981*

Spatial Reference *NAD 1983 UTM Zone 15N*

Project Number *22292* | **Date Created** *9/18/2024*

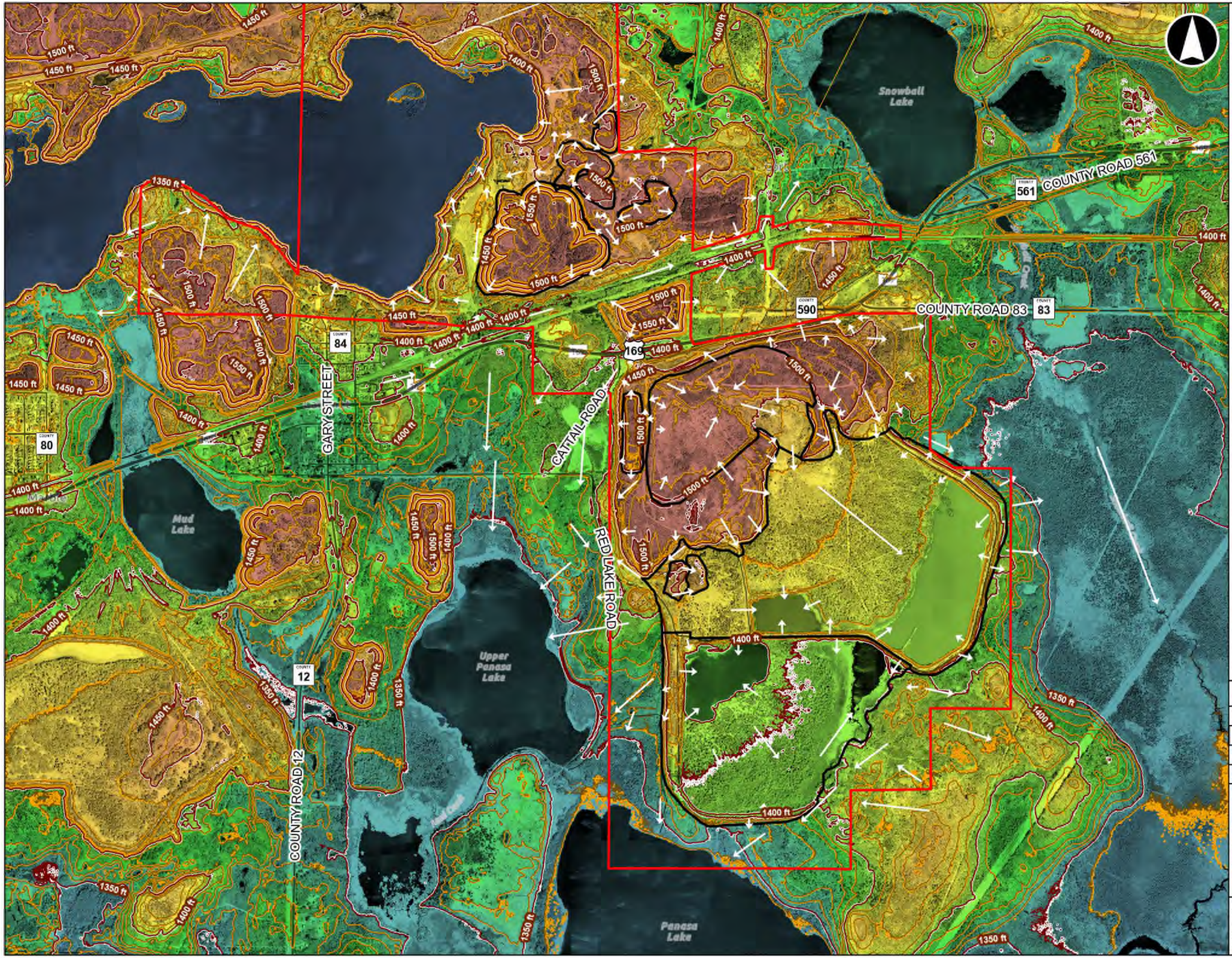
Author *K Berry, GIS Analyst/Project Manager, NTS*

Data Source

MN-DOT Route Centerlines - State of Minnesota GeoCommons - https://gisdata.mn.gov/dataset/trans-roads-centerlines

MN-DNR Hydrography Dataset- State of Minnesota GeoCommons - https://gisdata.mn.gov/dataset/water-dnr-hydrography

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0 750 1500 2250 3000 Feet

Scale *1:18,000*
1 inch equals 1,500 feet

Legend

- Permit to Mine Boundary
- Stockpiles and Tailings Basin in the Mine Plan
- Surface Water Flow
- 50 ft Contour
- 10 ft Contour

Elevation (ft)

1603.25
1316.9

Roads

- Interstate; US Highway
- County Road
- Township/UT Road
- All Other Roads
- State/National Forest Road

Calumet Reclamation Surface Water Flow

Calumet Reclamation Company
Project Description
Itasca County

Figure 8

Map Center Coordinates *15T 480523 5240597*

Spatial Reference *NAD 1983 UTM Zone 15N*

Project Number *22292* | **Date Created** *9/18/2024*

Author *K Berry, GIS Analyst, NTS*

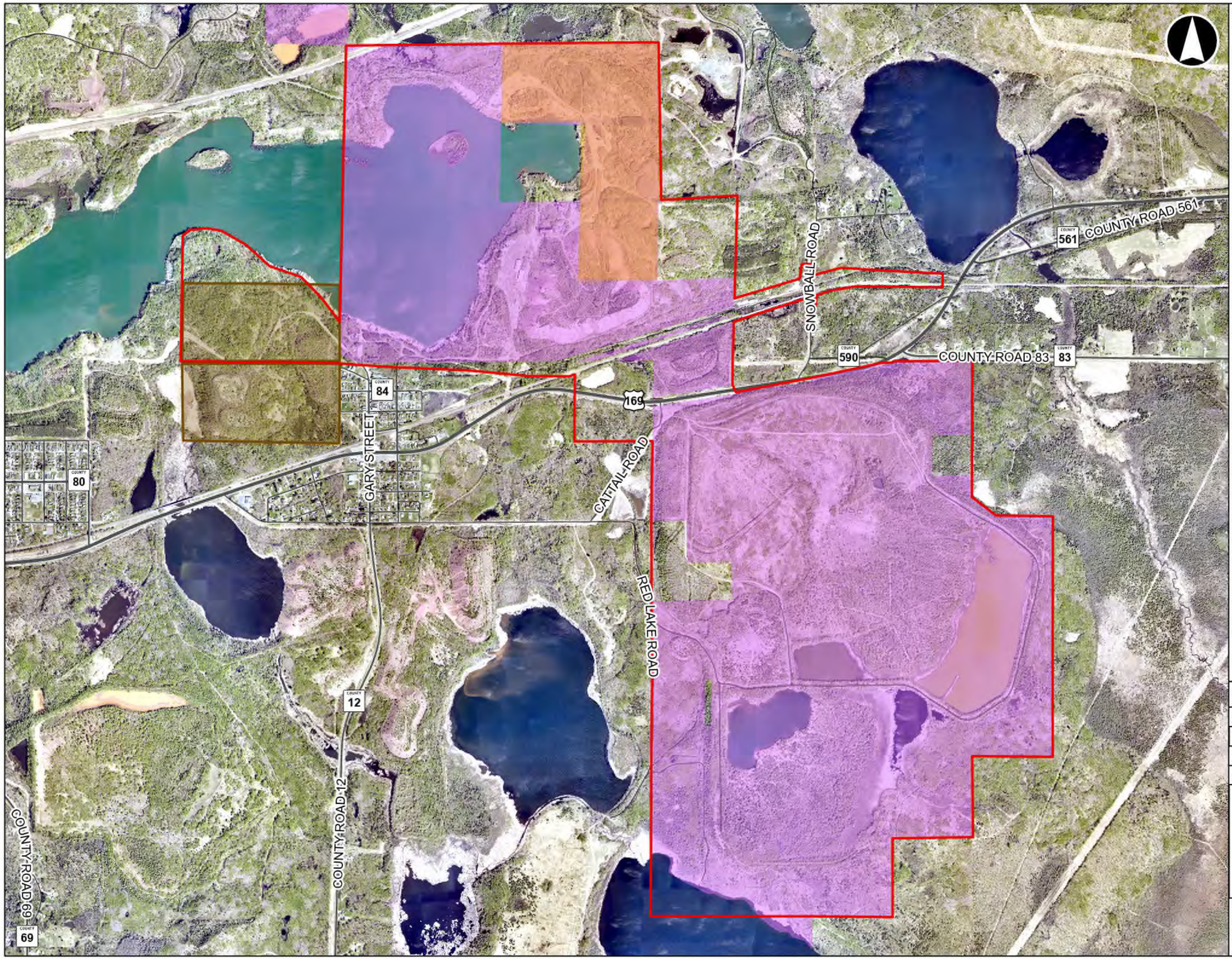
Data Source

MN-DOT Route Centerlines - State of Minnesota GeoCommons - https://gisdata.mn.gov/dataset/trans-roads-centerlines

2023 Aerial Imagery - Itasca County, MN (WMS) - https://www.stlouiscountymn.gov/departments-a-z/planning-development/enterprise-gis/web-services

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0 750 1500 2250 3000 Feet

Scale *1:18,000*
1 inch equals 1,500 feet

Legend

- Permit to Mine Boundary

Roads

- Interstate; US Highway
- County Road
- Township/UT Road
- All Other Roads
- State/National Forest Road
- Sampling RGGS materials ExhibitA
- MN Temp Use Permit 20240215
- State of MN Lease No. R-133

CRC Ownership Map

Calumet Reclamation Company
Project Description
Itasca County

Figure 9

Map Center Coordinates *15T 480312 5240834*

Spatial Reference *NAD 1983 UTM Zone 15N*

Project Number *22292* | **Date Created** *9/18/2024*

Author *K Berry, GIS Analyst/Project Manager, NTS*

Data Source

MN-DOT Route Centerlines - State of Minnesota GeoCommons - https://gisdata.mn.gov/dataset/trans-roads-centerlines

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APPENDIX C: HILL ANNEX MINE MACHINERY AND EQUIPMENT INVENTORY

Hill Annex Mine: machinery and equipment inventory

Items not under historic designation



(4) Drill Head & Chain. Not specific to site. Used as a display piece at the clubhouse.



(6) Rail car (caboose). Not original to site. Donated by Great Northern Railway between 1985-1992.



(7) Rail car. Not original to site. Donated by Great Northern Railway between 1985-1992.



(12) Pull-behind grader. Not original to site. Donated by township or county for park road maintenance.

Items currently under historic designation



(3) Shovel bucket with historic designation plaque. Uncertain of bucket's contribution to site. Bucket modified when plaque attached.



(5) Two-sided sign. Office Shops Heavy Media Plant.



(32) 1931 Electric locomotive. Original to mine.



(33) Ore car 1. Original to mine.



(34) Ore car 2. Original to mine.



(35) Ore car 3. Original to mine.



(9) Two utility boxes. Contribution to site uncertain.



(10) Blast shack on trailer. Contribution to site uncertain.



(11) Drill rig. Contribution to site uncertain.



(41) Black shack. Contribution to site uncertain.



(26) Screen. Original to mine.



(25) Large cog. ~48” diameter. Original to mine.



(13) Water truck. Contribution to site uncertain.



(36) Euclid Dump Truck. Original to mine.



(37) Marion shovel. Original to mine.



(38) P&H Shovel. Original to mine.



(39) Marion shovel 2. Original to mine.



(40) Steam Drill. Contribution Uncertain.



(42) Drill Rig. Uncertain of Contribution.



(43) Speeder Rail Car. Original to the mine.



(44) 6 Humphrey Spirals. Original to mine.



(24) Humphrey Spiral. Original to the mine.

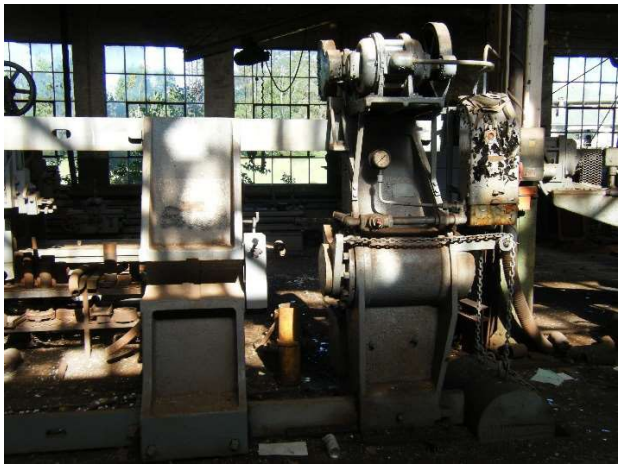
Train Shop Tools under historic designation

*Ideally, these items would be preserved as a collection in a mining or railroad themed setting.

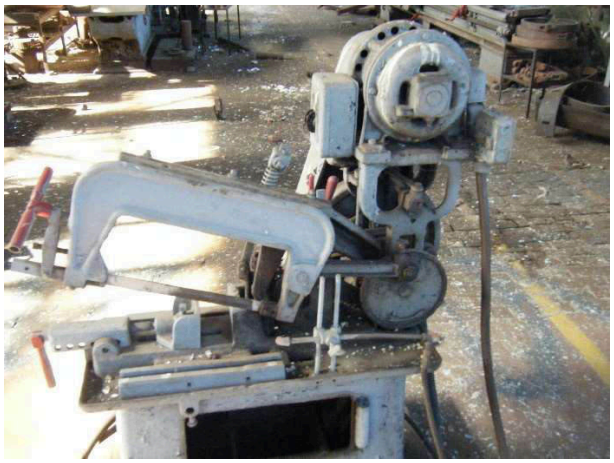
Colburn machining tool, Columbia machining tool, Horizontal press, Machining tool, Bandsaw, Lathe, Milling table, Bit sharpener, Hobart torpedo welder, press, grinder, welder

























APPENDIX D: PROJECT PERSONNEL

LIST OF PERSONNEL

Project Manager	Val Heider, M.A.
Archaeologists	Madeleine Bray, M.A., RPA Claire Nelson, M.A., RA
Historians	Emily Wallrath Schmidt, M.S. Lindsey Wallace, M.A.
Graphics and GIS	Josh Peterson, B.S.