Hillcrest Golf Course Site

Evaluation of Existing Conditions

Prepared for
Ramsey-Washington Metro Watershed District

February 2020

4300 MarketPointe Drive, Suite 200
Minneapolis, MN 55435
952.832.2600
www.barr.com

Hillcrest Golf Course Site

Evaluation of Existing Conditions

February 2020

Contents

List of Tables

List of Figures

List of Appendices, Attachments, or Exhibits

Certifications

I hereby certify that this Report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota

February 5, 2020

Erin Anderson Wenz
PE #: 41255

Date

Abbreviations

HSG	Hydrologic Soil Group
LGU	Local Governmental Unit
MCBS	Minnesota County Biological Survey
MNDNR	Minnesota Department of Natural Resources
MPCA	Minnesota Pollution Control Agency
NPC	MNDNR Native Plant Community
NPDES	National Pollutant Discharge Elimination System
RWMWD	Ramsey Washington Metro Watershed District
SHP0	Minnesota State Historic Preservation Office
SSURGO	Soil Survey Geographic Database
SWPPP	Stormwater Pollution Prevention Plan
TEP	Technical Evaluation Panel
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WCA	Wetland Conservation Act

1 Introduction

The former Hillcrest Golf Course site (now owned by the Saint Paul Port Authority) is slated for redevelopment. Beginning late 2019 and extending through 2021, the City of Saint Paul's (City's) Department of Planning and Economic Development is leading a public planning process to guide the site's development.

According to the City's webpage for the Hillcrest Golf Course Master Plan…

> *The Hillcrest Master Plan will determine future land uses and a new street network for the 112-acre former golf course on Saint Paul's East Side. In July, the Saint Paul City Council approved bonds for the Saint Paul Port Authority to purchase the site.*
>
> *The Department of Planning and Economic Development (PED) will lead the master plan process, in collaboration with community members, consultants, and the Port Authority. Community engagement throughout the process will outline how to build opportunity and community wealth on the redeveloped Hillcrest site – bringing more housing, jobs and public amenities.*

Presently, industrial and single-family housing are the most likely ultimate land uses for the site. Other likely features include community gathering spaces, screening for nearby homeowners, trails and open space. Graphics and deliverables will be a big part of the planning process deliverable, as the City has found them to be highly useful in similar past projects. The study area is shown in Figure 1.

Team members inspect a pond that collects local drainage from the golf course site.

Team members walked the 112-acre golf course site on October 11 and October 14, 2019.

RWMWD will play an important role in supporting the start of the City's planning process, by identifying and describing the existing land, water and stormwater conditions throughout the study area. This report is a summary of those findings.

Figure 1

SITE OVERVIEW

Barr Footer: ArcGIS 10.7.1, 2020-01-08 10:45 File: I:\Client\Ramsey_Washington_Metro_WD\Work_Orders\2019_Feasibility_Studies\003_HillcrestGolfCourse\Maps\Reports\Existing Conditions_Dec2019\Figure 1 - Site Overview.mxd User: JRV

2 Characterization of existing stormwater flows

The Hillcrest Golf Course site (Hillcrest) drains in two directions: towards Beaver Lake and towards the Beltline Storm Sewer Interceptor. The goal of this task was to provide information and greater detail on where stormwater travels through and away from the site. Barr staff characterized existing stormwater flows, including drainage divides (higher resolution than originally delineated for the Port Authority's concept plan developed to inform their purchase of the site), inter-community flows and key pathways, and capacity constraints and locations with excess capacity. Barr leveraged previous RWMWD modeling efforts to evaluate the capacity of storm sewer infrastructure downstream of the site as well as surrounding municipal/county storm sewer systems within the Beltline and Beaver Lake major subwatersheds.

2.1 Hydrologic and Hydraulic Model Development

Barr leveraged existing models, reports, and as-built drawings to construct the hydrologic and hydraulic model for Hillcrest. RWMWD has developed XP-SWMM models covering a majority of the watershed district, including models for the Beaver Lake Subwatershed and Beltline tunnel system, which were used as a starting point for this effort. As part of the Port Authority's concept plan development, subwatersheds were delineated for Hillcrest by the Saint Paul Port Authority. Barr reviewed and refined these subwatershed delineations using topography, available utility data, and information collected during a site visit. Additionally, Barr digitized subwatershed divides to all low, disconnected storage areas throughout the golf course to ensure that detention storage from these areas could be accurately modeled. A total of 24 subwatersheds were delineated on the golf course. Existing subwatersheds from the RWMWD model were subdivided at the parcel boundary of the golf course so that flow leaving the site could be accurately quantified. Subwatershed divides are shown on Figure 2.

Utilizing the existing RWMWD XP-SWMM models, Barr created a model of Hillcrest using subwatersheds shown in Figure 2. Hydrologic parameters for these new and subwatershed divides (i.e., imperviousness, slope, watershed width, and Horton infiltration parameters) were calculated using best available land use and topographical datasets. Ramsey County imperviousness and LiDAR datasets were utilized to calculate the imperviousness and slope for each subwatershed. The imperviousness and slope for each subwatershed is listed in Table 2-1. The impervious percentage for the entire site under existing conditions (including open water surfaces) is 8.9%. Watershed width was calculated by dividing the total subwatershed area by the longest flow path of the subwatershed. Horton infiltration parameters were generated using the Soil Survey Geographic Database (SSURGO) hydrologic soil groups. The available soils data for the site is shown on Figure 3. Overall, the site has mostly Hydrologic Soil Group (HSG) type C soils (i.e., sandy clay loam). These soils have low infiltration rates, which could impact the use of infiltration versus filtration BMPs for meeting RWMWD's stormwater management requirements (see Section 6.1). Soil boring data included in the Port Authority's concept plan were reviewed and, in general, matched soil types as defined by SSURGO soil data.

In addition to hydrologic inputs, Barr incorporated hydraulic infrastructure into the model where information was available from as-built drawings or field survey. This infrastructure included pond and wetland outlets across the site, and receiving storm sewer along Larpenteur Avenue East and McKnight Road North. Modeled infrastructure is shown in Figure 4.

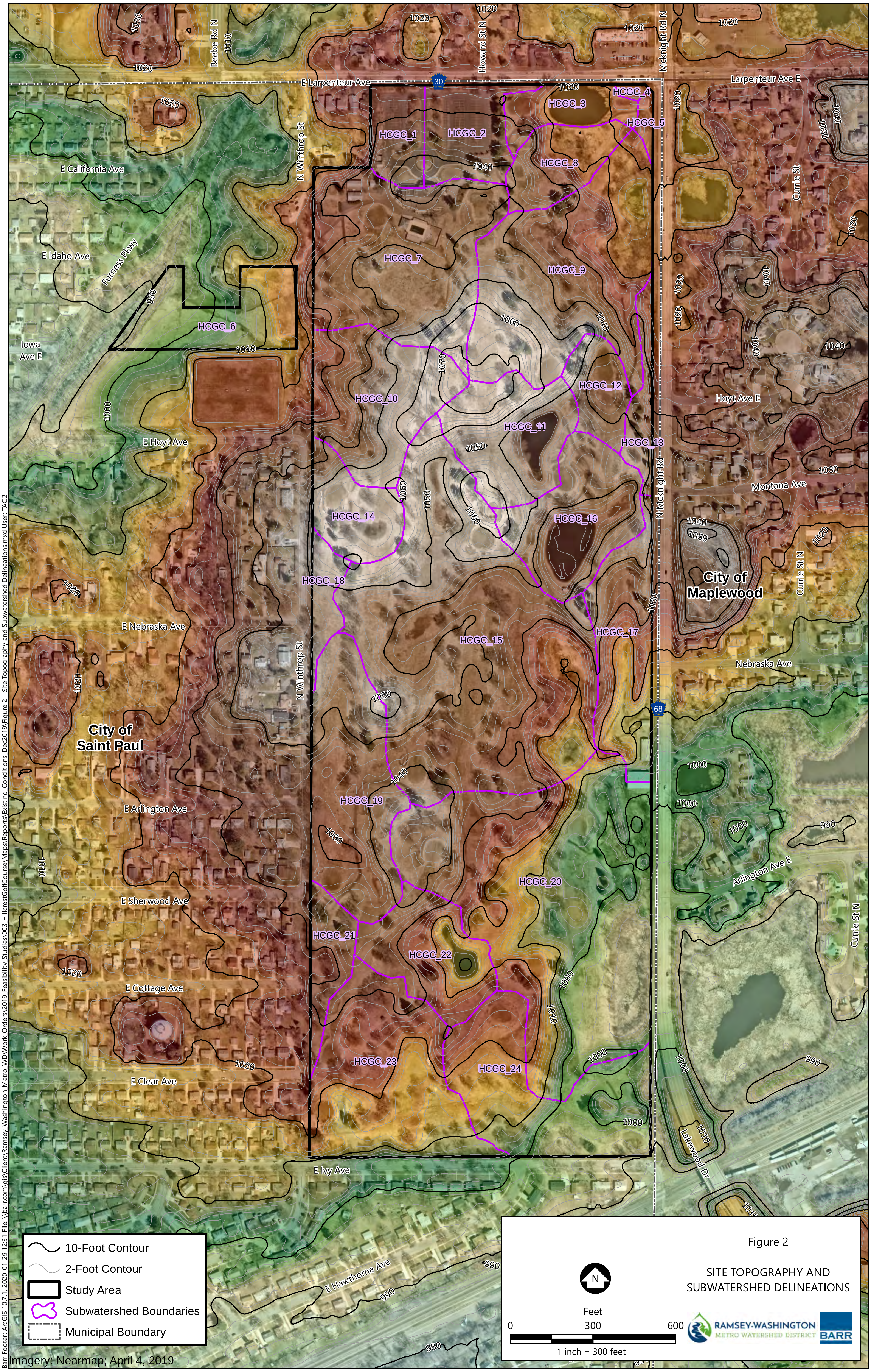


Figure 2

SITE TOPOGRAPHY AND SUBWATERSHED DELINEATIONS

Barr Footer: ArcGIS 10.7.1, 2020-01-29 12:31 File: \\barr.com\gis\Client\Ramsey_Washington_Metro_WD\Work_Orders\2019_Feasibility_Studies\003_HillcrestGolfCourse\Maps\Reports\Existing_Conditions_Dec2019\Figure 2 - Site Topography and Subwatershed Delineations.mxd User: TAO2

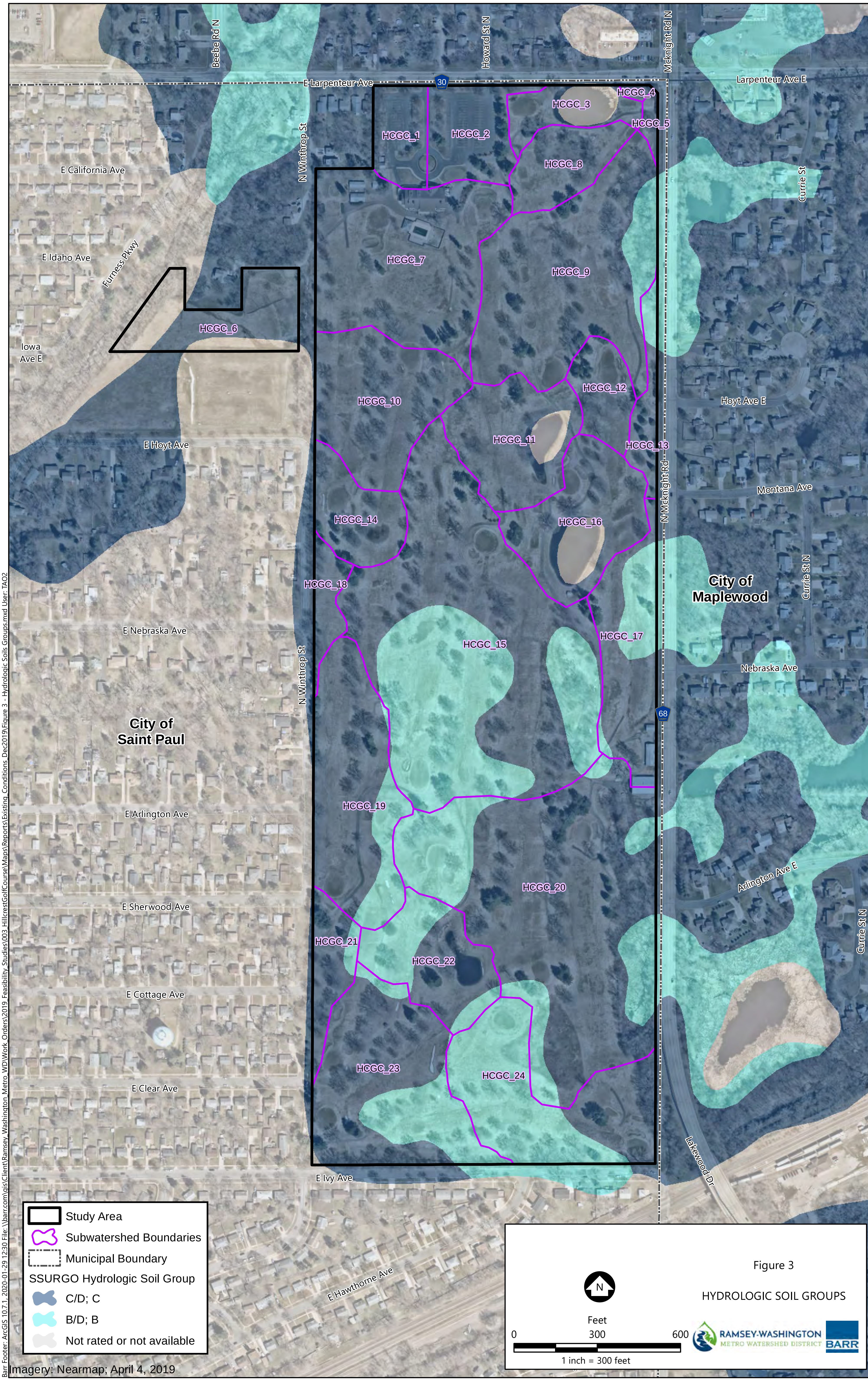


Figure 3

HYDROLOGIC SOIL GROUPS

Barr Footer: ArcGIS 10.7.1, 2020-01-29 12:30 File: \\barr.com\gis\Client\Ramsey_Washington Metro WD\Work_Orders\2019 Feasibility Studies\003 Hillcrest Golf Course\Maps\Reports\Existing_Conditions_Dec2019\Figure 3 - Hydrologic Soils Groups.mxd User: TAO2

Table 2-1 Hydrologic parameters

Subwatershed Name	Subwatershed Area (acres)	Watershed Width (ft)	Slope (%)	Existing Conditions Total Impervious Area (acres)	Existing Conditions % Impervious
HCGC_1	1.60	174.6	4.69	0.72	45%
HCGC_10	5.03	383.8	9.75	0.01	0%
HCGC_11	3.99	366.2	9.81	0.42	11%
HCGC_12	1.60	223.8	7.75	0.00	0%
HCGC_13	1.11	404.9	7.28	0.23	21%
HCGC_14	2.24	188.5	4.35	0.00	0%
HCGC_15	18.29	544.2	6.72	0.10	1%
HCGC_16	4.35	298.0	6.99	0.84	19%
HCGC_17	3.94	257.3	7.57	0.62	16%
HCGC_18	0.96	279.0	3.65	0.00	0%
HCGC_19	6.10	719.0	5.06	0.00	0%
HCGC_2	2.49	176.6	4.11	1.17	47%
HCGC_20	16.57	657.4	7.31	2.07	13%
HCGC_21	1.54	407.3	5.13	0.00	0%
HCGC_22	3.50	311.2	7.69	0.44	13%
HCGC_23	7.28	382.4	4.77	0.00	0%
HCGC_24	6.17	393.4	5.01	0.06	1%
HCGC_3	1.63	166.6	4.33	0.69	42%
HCGC_4	0.12	86.8	3.01	0.06	49%
HCGC_5	0.26	153.9	0.82	0.03	11%
HCGC_6	3.23	218.8	7.57	0.07	2%
HCGC_7	8.48	343.2	5.69	1.06	13%
HCGC_8	2.12	231.5	6.04	0.40	19%
HCGC_9	9.35	476.8	7.26	0.99	11%
Total	111.98	330.2[1]	6.58[2]	9.98	9%

[1] Average
[2] Weighted average

2.2 Hydrologic and Hydraulic Model Results

2.2.1 Existing Conditions

Utilizing the Hillcrest Golf Couse XP-SWMM model (Section 2.1), peak flow rates were calculated for each discharge point from the Hillcrest Golf Course. Peak flow rates from each discharge point for the 2-year, 10-year, and 100-year 24-hour Atlas 14 storm events are shown in Table 2-2. Under existing conditions, there is more runoff volume going to Beaver Lake than there is going to the Beltline. There is one subwatershed that does not contribute runoff (i.e., landlocked pond) from the site for all of the modeled events (HCGC_3). One additional subwatershed is landlocked for the 2-year and 10-year events, but does discharge offsite during the 100-year event (HCGC_19).

Table 2-2 Existing Conditions Results

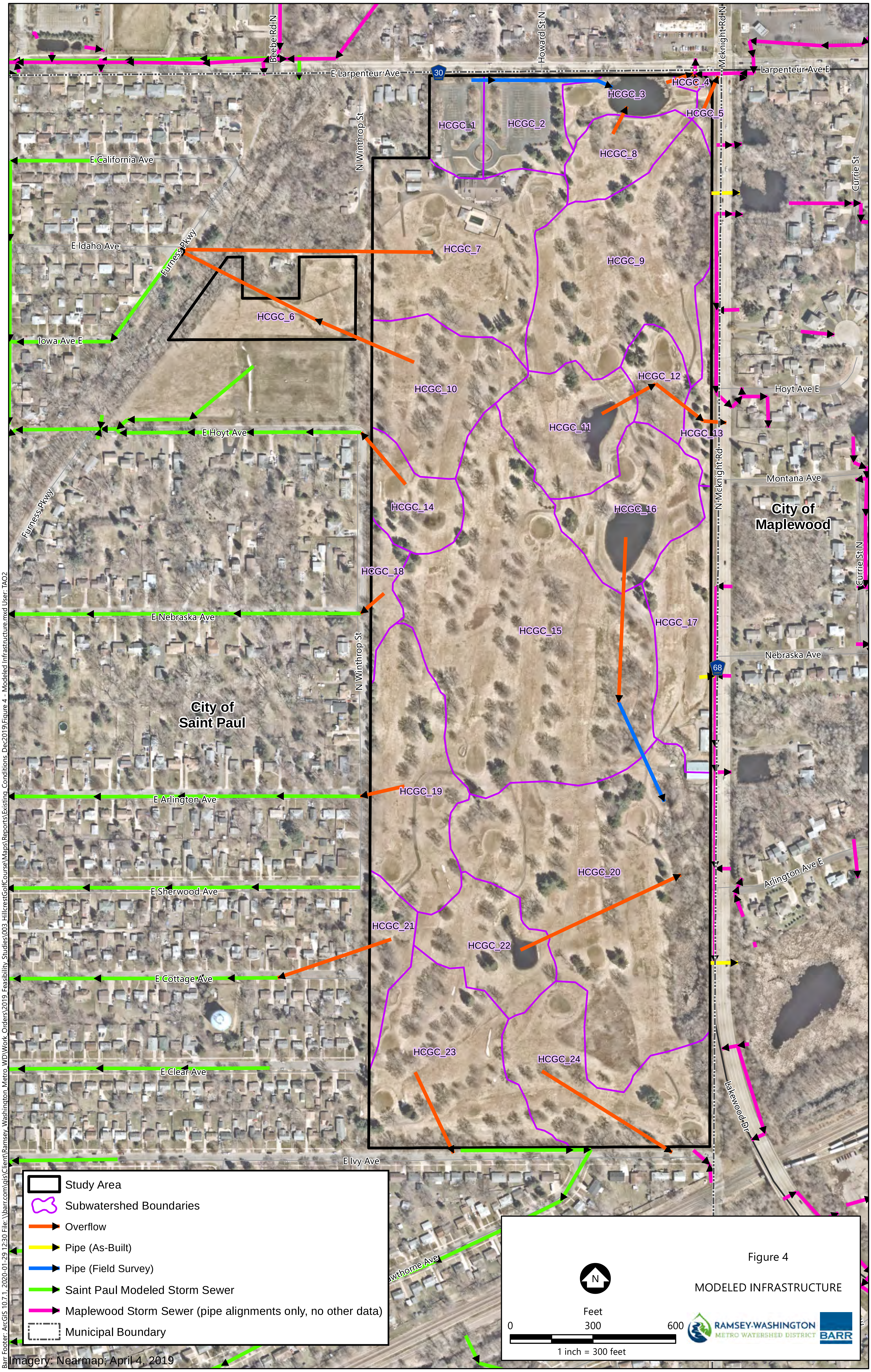
Discharge Point	Major Subwatershed	Existing Conditions Atlas 14 2-year, 24-hour Peak Flow Rate (cfs)	Existing Conditions Atlas 14 10-year, 24-hour Peak Flow Rate (cfs)	Existing Conditions Atlas 14 100-year, 24-hour Peak Flow Rate (cfs)	Existing Conditions 5.9-inch, 24-hour Peak Flow Rate (cfs)
HCGC_13	Beaver	5.1	7.6	13.5	10.8
HCGC_14	Beltline	8.5	13.6	25.3	19.9
HCGC_17	Beaver	1.6	7.2	16.9	10.7
HCGC_18	Beltline	3.3	5.3	10.4	8.0
HCGC_19	Beltline	--[1]	--[1]	7.8	2.1
HCGC_20	Beaver	40.7	54.9	71.5	64.9
HCGC_21	Beltline	5.0	7.9	14.3	11.3
HCGC_23	Beltline	21.0	38.5	75.2	58.3
HCGC_24	Beaver	18.3	33.9	65.8	51.1
HCGC_3	Beaver	--[1]	--[1]	--[1]	--[1]
HCGC_4	Beaver	0.6	0.8	1.5	1.2
HCGC_6	Beltline	7.1	41.2	92.0	71.1
HCGC_7	Beltline	27.6	46.5	89.1	64.7
HCGC_9	Beaver	13.9	17.4	29.5	19.0
Total[2]		130.3	248.1	469.5	376.4
Total to Beltline[2]		62.0	144.5	298.4	232.0
Total to Beaver Lake[2]		68.3	105.4	171.1	144.5

[1]Discharge points does not contribute runoff offsite. These subwatersheds are landlocked and all runoff generated is stored and infiltrated onsite.

[2]The total peak discharge is the maximum flow rate for the sum of all discharge point hydrographs, not the sum of each peak flow rate for each discharge point. This value is shown as it is more reflective of the timing of runoff hydrographs and the peak flow rate.

2.2.2 Downstream Capacity

Barr reviewed RWMWD's Atlas 14 precipitation modeling of the 5th, 50th and 95th percentile rainfall events to evaluate the downstream capacity of RWMWD and municipal infrastructure. RWMWD's best-available flood mapping (Appendix A) shows significant surface flooding and potential impacts to structures in the Beltline drainage area (within the City of Saint Paul), indicating there is limited capacity in this major drainage area to accept increased runoff volume and flow rates from future development within Hillcrest. Based on this review, Barr recommends that runoff rate and volume to the Beltline should not exceed existing conditions. To the extent practicable, runoff volume generated from future, developed conditions within Hillcrest should be directed to the Beaver Lake watershed. Review of existing inundation within the Beaver Lake watersheds shows few potentially flood-impacted structures, indicating that storm sewer infrastructure within the Beaver Lake major watershed (Cities of Saint Paul and Maplewood) has more available capacity than within the Beltline watershed.



Barr Footer: ArcGIS 10.7.1, 2020-01-29 12:30 File: \\barr.com\gis\Client\Ramsey Washington Metro WD\Work Orders\2019 Feasibility Studies\003_HillcrestGolfCourse\Maps\Reports\Existing_Conditions_Dec2019\Figure 4 - Modeled Infrastructure.mxd User: TAO2

3 Wetland and natural resources inventory

Barr identified wetland locations and classifications throughout the site (not performing delineations) including restoration (both wetland and upland) opportunities. In addition, this task includes evaluation of the current quality of landscape habitat and potential endangered species on the site and adjacent areas, including a description of pre-golf course conditions, leveraging historical photos.

3.1 Site History

Prior to European settlement, the site was historically oak openings and barrens with some areas of wet and mesic prairie communities. After European settlement, prior to the 1920s, the site was used for agricultural crops and grazing. An electric railroad line was constructed where Furness Parkway is currently located. The site was developed and used as a golf course from the 1920s until it was closed in 2017. The site has been vacant since 2017.

The site development applicant should request a database search of historic or archaeological records within the vicinity of the site from the Minnesota State Historic Preservation Office (SHPO) to identify the potential for any historic or archaeological concerns prior to site development.

3.2 Site Landscape Habitat

Topography on the site is rolling terrain ranging from approximately 992 feet to 1,070 feet above mean sea level (see Figure 2). The site' soils are of significant ecological value, since mass grading did not occur to establish the golf course, and native soil profiles are generally intact. Native oak trees greater than 18 inches in diameter present throughout the site are shown on Figure 5. A vast majority of the trees have been planted since the golf course was established. Given the disturbance from the golf course creation and its maintenance activities, native plant species are generally lacking on the site. The wetland areas are generally vegetated with a combination of native and non-native species. Wetlands are primarily located in low elevations along the eastern edge of the site as shown on Figure 6.

3.3 Wetland Descriptions

Wetland locations and general characteristics were documented during a site visit on October 14, 2019 for the purpose of evaluating current site features. The RWMWD Wetland Management Classification designations are shown on Figure 6 for wetlands that have been assessed during a previous district-wide assessment. RWMWD Wetland Management Rule E 3. (d) specifies requirements associated with each classification. The project proponent will be responsible for conducting wetland assessments for wetlands that were not previously assessed as referenced in RWMWD Rule E 3. (c). Wetland delineations were not conducted for this report. Wetland delineations and obtainment of wetland boundary and type approval will be the project proponent's responsibility prior to site design. Table 3-1 provides a preliminary summary of wetlands observed during the site review followed by general wetland descriptions.

Table 3-1 Preliminary Wetland Summary

Wetland ID	RWMWD Management Classification	Approximate Area (acres)	Circular 39 Wetland Type [1]	Cowardin Wetland Type [2]	Eggers & Reed Wetland Community Type [3]
Wetland A	Manage C	0.63	Type 5/3/2	PUBHx/EMC/B	shallow open water with shallow marsh and wet meadow fringe
Wetland B	Not Assessed	0.66	Type 3	PEMC	wet/sedge meadow
Wetland C	Manage B	0.89	Type 3	PEMC	shallow marsh
Wetland D	Manage C	0.54	Type 3	PEMC	shallow marsh
Wetland E	Manage C	0.75	Type 5	PUBHx	shallow open water
Wetland F	Not Assessed	1.20	Type 2	PEMB	sedge/wet meadow
Wetland G	Not Assessed	0.97	Type 2	PEMB	drainage channel with wet meadow fringe
Wetland H	Not Assessed	1.25	Type 1/3	PEMA/C	seasonally flooded basin and shallow marsh
Wetland I	Manage C	0.47	Type 2	PEMB	wet meadow
Wetland J (within project site)	Manage C	0.14	Type 3/6	PEMC/SSB	shallow marsh with shrub-carr fringe
Total Approximate Wetland Area within project site (acres)		**7.50**			
Wetland J (outside of project site)	Manage C	5.28	Type 3/6	PEMC/SSB	shallow marsh with shrub-carr fringe

[1]U.S. Fish and Wildlife Service. 1956. Wetlands of the United States Circular 39. U.S. Government Printing Office, Washington, D.C.

[2]Cowardin, L.M., V. Carter, F.C. Golet, and R.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service, FWS/OBS079/31.

[3]Eggers, S.D. and Reed, D.M. Version 3.2 July 2015. Wetland Plants and Plant Communities of Minnesota and Wisconsin. U.S. Army Corps of Engineers, Saint Paul District. Saint Paul, Minnesota.

- **Wetland A**
  Wetland A is designated by the RWMWD as a Manage C wetland, which requires a 12.5 foot minimum and 25 foot average buffer width. This wetland is currently utilized for stormwater management. However, based on historical USGS Topographic mapping and aerial imagery, a natural wetland was located in this area originally. In addition, the surface soils observed by Barr staff in this area appear to be hydric soils. Therefore, Wetland A is likely a jurisdictional wetland according to the Minnesota Wetland Conservation Act. The wetland is a Type 5/3/2 PUBHx/EMC/B shallow open water community with a shallow marsh and wet meadow fringe. Vegetation within the shallow open water community was not documented during the

October 14, 2019 site visit. A mixture of native and non-native vegetation was observed along the fringe of the wetland. Native vegetation includes swamp milkweed (*Asclepias incarnata*), jewelweed (*Impatiens capensis*), and sedges (*Carex spp*.). Non native vegetation includes narrowleaf cattail (*Typha angustifolia*) and silvergrass (*Miscanthus sp*.). Miscanthus is an invasive species which is tracked by the Ramsey County Cooperative Weed Management Area program. Project development planning should include efforts to control and prevent the spread of this species. A miscanthus fact sheet is provided in Appendix B. Other non-native species observed near this wetland include common mullein (*Verbascum thapsus*), burdock (*Arctium minus*), and thistle (*Cirsium sp*.).

- **Wetland B**
  Wetland B was not previously assessed in the RWMWD district-wide wetland assessments. Therefore, the project applicant will be responsible for completing a wetland assessment to determine the wetland management classification which will dictate the designated buffer requirements for this wetland. The wetland is a Type 3 PEMC wet/sedge meadow wetland. Vegetation observed during the October site visit includes jewelweed, swamp milkweed, sedges, narrowleaf cattail, and goldenrod (*Solidago spp*.). Wetlands A, B, and C may have historically been connected as one wetland. These wetlands are currently separated by paved trails. There may be a potential wetland restoration opportunity in this area.

- **Wetland C**
  Wetland C is designated by the RWMWD as a Manage B wetland, which requires a 25 foot minimum buffer and 50 foot average buffer width. This wetland is a Type 3 PEMC shallow marsh which was inundated with several inches of surface water during the October 14, 2019 site visit. Native aquatic vegetation observed in this wetland includes arrowhead (*Sagittaria sp*.) and duckweed (*Lemna minor*).

- **Wetland D**
  Wetland D is designated by the RWMWD as a Manage C wetland, which requires a 12.5 foot minimum and 25 foot average buffer width. This wetland is a Type 3 PEMC shallow marsh which was inundated with several inches of surface water during the October 14, 2019 site visit. Native vegetation observed in this wetland includes beggarticks (*Bidens sp*.), arrowhead, soft stem bulrush (*Schoenoplectus tabernaemontani),* and blue vervain (*Verbena hastata*).

- **Wetland E**
  Wetland E is designated by the RWMWD as a Manage C wetland, which requires a 12.5 foot minimum and 25 foot average buffer width. This wetland appears to have been excavated for a golf course pond feature, however a wetland is shown in this location in 1923 aerial imagery when the land was used for agricultural cultivation and grazing prior to golf course construction. The wetland is currently a Type 5 PUBHx shallow open water wetland inundated with several feet of surface water. Native vegetation observed in this wetland during the October 2019 site visit includes duckweed and soft stem bulrush. Common milkweed (*Asclepias syriacia*) was observed in the adjacent upland.

- **Wetland F**
  Wetland F was not previously assessed in the RWMWD district-wide wetland assessments. Therefore, the project applicant will be responsible for completing a wetland assessment to determine the wetland management classification which will dictate the designated buffer requirements for this wetland. This wetland is a Type 2 PEMB sedge/wet meadow. Native vegetation observed in this wetland includes river bulrush (*Bolboschoenus fluviatilis*), blue vervain, smartweed (*Persicaria sp.*), willow herb (*Epilobium sp.*), and jewelweed. A drainage swale to the east of this wetland was designated as Wetland F2 which includes some native sedges and smartweed.

- **Wetland G**
  Wetland G was not previously assessed in the RWMWD district-wide wetland assessments. Therefore, the project applicant will be responsible for completing a wetland assessment to determine the wetland management classification which will dictate the designated buffer requirements for this wetland. The southern end of Wetland F connects through a pipe to Wetland G. Wetland G is a drainage channel with a Type 2 PEMB wet meadow fringe. Channelized portions are located around golf course sand traps. Native vegetation within this wetland includes beggarticks and jewelweed.

- **Wetland H**
  Wetland H was not previously assessed in the RWMWD district-wide wetland assessments. Therefore, the project applicant will be responsible for completing a wetland assessment to determine the wetland management classification which will dictate the designated buffer requirements for this wetland. According to the City of Saint Paul, this wetland's 2012 delineation is no longer valid, though this wetland has a jurisdictional determination that is was a Water of the U.S. (though the definition of "Waters of the U.S." has been changing recently) and warrants review.

  Wetlands G and H have a channelized hydrologic connection. Wetland H is a Type 1/3 PEMA/C seasonally flooded basin/shallow marsh. The southern portion of Wetland H is dominated by non-native invasive purple loosestrife (*Lythrum salicaria*) with and bordered by a dense fringe of non-native invasive common buckthorn (*Rhamnus cathartica*). Project development planning should include efforts to control and prevent the spread of these two species.

- **Wetland I**
  Wetland I is designated by the RWMWD as a Manage C wetland, which requires a 12.5 foot minimum and 25 foot average buffer width. Wetland I is a Type 2 PEMB wet meadow with reed canary grass (*Phalaris arundinacea*), goldenrod, narrowleaf cattail, smartweed, with a dense fringe of miscanthus. As described above, miscanthus is tracked by the Ramsey County Cooperative Weed Management Area program and project development planning should include efforts to control and prevent the spread of this non-native invasive species.

- **Wetland J**

  Wetland J is designated by the RWMWD as a Manage C wetland, which requires a 12.5 foot minimum and 25 foot average buffer width. Wetland J is a Type 3/6 PEMC/SSB shallow marsh wetland with a shrub-carr fringe. The wetland is dominated with non-native narrowleaf cattail, and native species including lake sedge (*Carex lacustris*), willow herb, sensitive fern (*Onoclea sensibilis*), and bur-reed (*Sparganium sp.*).

3.4 Potential Special Concerns, Threatened, and Endangered Species

The Minnesota Department of Natural Resources (MNDNR) Natural Heritage Database was reviewed for potential threatened, endangered, or special concerns species in the vicinity of the site.

- **Blanding's turtle**

  The potential for the presence of the state threatened Blanding's turtle (*Emydoidea blandingii*) has been identified within the vicinity of the site. A Blanding's turtle fact sheet is provided in Appendix C with information on identification of this species. This fact sheet should be provided to contractors working on the site. If Blanding's turtles are encountered, they should be left undisturbed if possible; if they are in imminent danger, they should be moved by hand out of harm's way. If Blanding's turtles are encountered nesting on the site, the MNDNR Nongame Program staff for the Central Region should be contacted (https://www.dnr.state.mn.us/eco/nongame/central.html).

- **Rusty patched bumble bee**

  The U.S. Fish and Wildlife Service (USFWS) has listed the rusty-patched bumble bee (*Bombus affinis*) as a federally endangered species under the Endangered Species Act. This species has been identified as having the potential to be present within the vicinity of the site. Rusty-patched bumble bees pollinate native plants such as lupines, asters, bee balm, and native prairie plants, and spring ephemerals. Native plant species such as these are encouraged to be included in a project plan. A fact sheet is proved in Appendix D with information on identification of this species. The fact sheet should be provided to contractors working on the site. If the rusty-patched bumble bee is identified within the site, the USFWS (MidwestNews@fws.gov) and MNDNR Nongame Program staff for the Central Region should be contacted (https://www.dnr.state.mn.us/eco/nongame/central.html).

- **Clinton's bulrush**

  Clinton's bulrush (*Trichophorum clintonii*) is a state threatened vascular plant species which has been documented within the vicinity of the site within small mesic prairie remnant communities.

- **Yellow pimpernel**

  Yellow pimpernel (*Taenidia integerrima*) is a state special concerns vascular plant species, which has been documented in the vicinity of the site in sandy oak woods on rolling hills.

- **Cowbane**
  Cowbane (*Oxypolis rigidior*) is a vascular plant species on the state watchlist for potential protection has been documented within wet and mesic prairie communities in the vicinity of the site.

None of these species have been documented within the site and none were observed during a site review in October 14, 2019. Further evaluation and review should be conducted by the project applicant to determine whether any of these species are present on this site prior to site development. If present, planning efforts will require protection measures for these species. Development of this site could also be an opportunity for restoration efforts that could provide crucial habitat for these species.

3.5 Native Plant and Rare Natural Communities

In addition to the protected species listed above, there are several native plant and rare natural communities within the vicinity of the Hillcrest site which include:

The Minnesota County Biological Survey (MCBS) identifies Jim's Prairie, located approximately ½ mile to the east of the Hillcrest site as a Southern Wet Prairie (WPs54b) site of outstanding biodiversity significance, which is a MNDNR Native Plant Community (NPC) that has a state ranking of S2, meaning imperiled. Jim's Prairie is also identified in the Central Region Regionally Ecological Significant Areas with an outstanding ecological score.

In addition, the Hazel Park Prairie located less than ½ mile to the southwest of the Hillcrest site is listed by the MCBS as a site with high biodiversity significance, with MNDNR NPCs including Southern Mesic Prairie (Ups23a), with a state ranking of S2-imperiled and a Northern Wet Meadow/Carr system (WMn82). The Hazel Park Prairie is also identified in the Central Region Regionally Ecological Significant Areas with a high ecological score along with Beaver Lake located less than ½ mile to the south of the Hillcrest site.

3.6 Restoration and Preservation Opportunities

3.6.1 Restoration and Preservation within the Hillcrest Site

The historical wetland extent was similar to present wetlands on the Hillcrest site. Therefore, there doesn't appear to be a significantly large opportunity for potential wetland restoration on the site. Though there are potential mesic or wet prairie restoration opportunities on the site.

Areas with oak stands in the upland hillslopes are generally located near wetland areas with potential wet mesic prairie restoration opportunities.

Restoration activities should be coordinated with control of non-native invasive species on the site.

3.6.2 Habitat Connections and Neighborhood Development

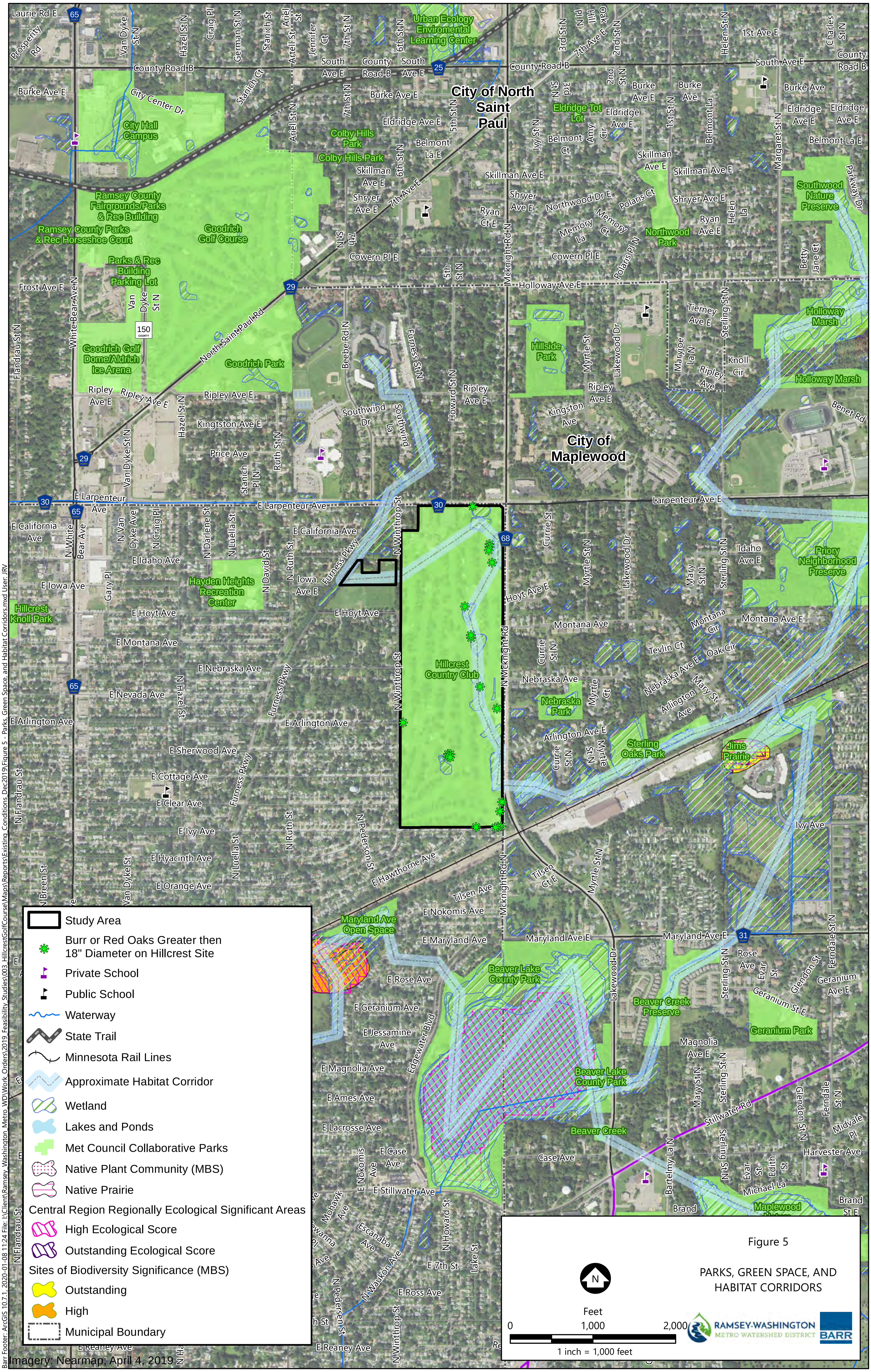
Restoration efforts within the Hillcrest site may provide a crucial habitat connection between valuable natural resources in the vicinity of this site.

Connections between these natural resources have been severed from surrounding development resulting in isolated remnant natural communities. Careful planning at the Hillcrest site could provide an opportunity to restore these connections and provide natural resource habitat and native plant communities for protection of threatened, endangered, and special concern plant and animal species.

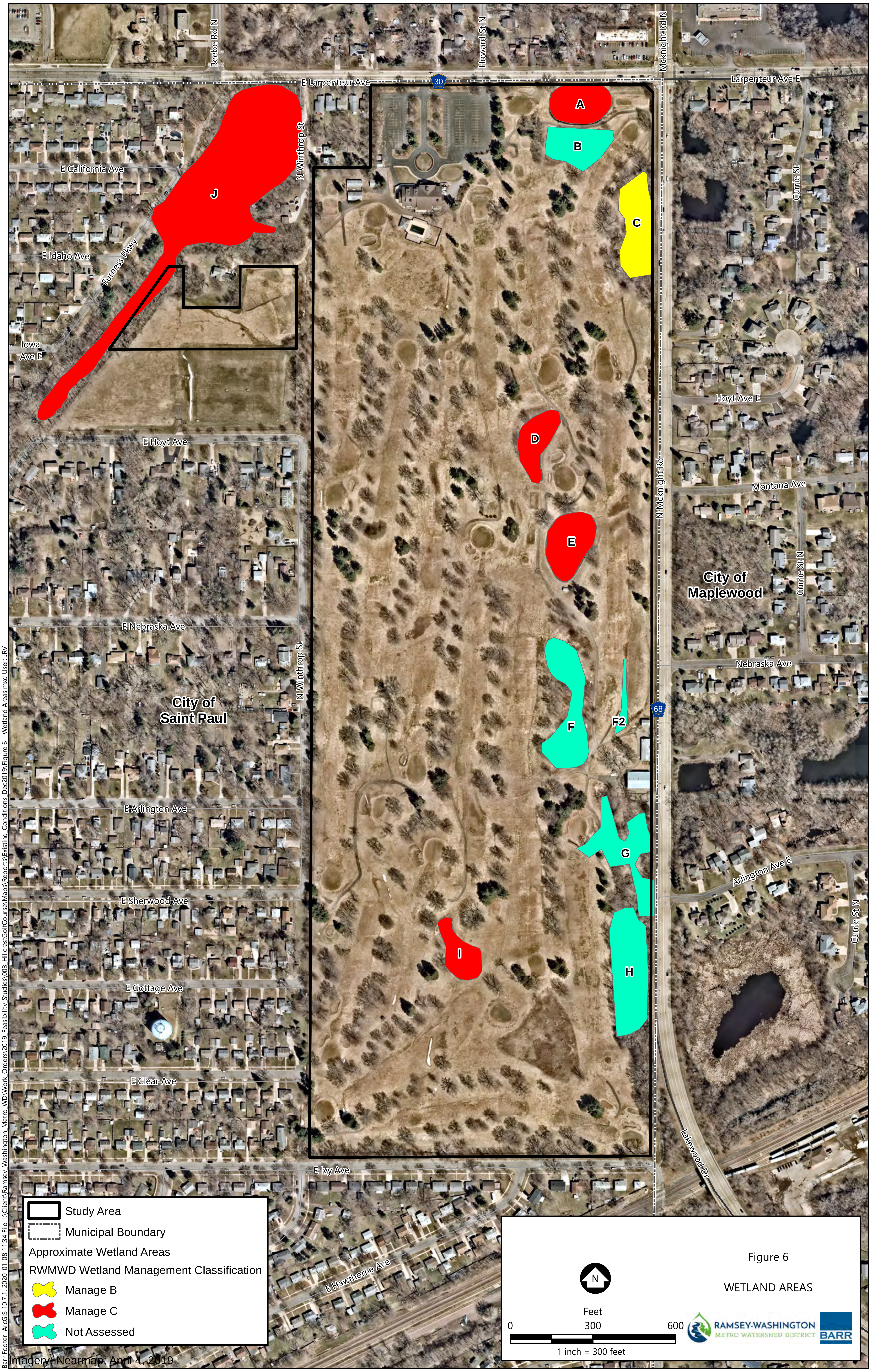
Project plans should include a concept plan to provide habitat connections to natural areas in the vicinity. A natural habitat corridor is present on the west portion of the site along **Furness Parkway** which is connected through wetlands and stream channels to the north of the site. A natural habitat corridor is also present from the southeastern portion of the Hillcrest site through several wetland complexes along the northern edge of the railroad tracks in the City of Maplewood's **Nebraska Park**, and **Sterling Oaks Park** to the **Priory Neighborhood Preserve**. North of the Priory is **Hill Murray school** with wetland complexes on the west side and **Holloway Marsh** to the north, which is a designated Ramsey County Open Space. North of Hollaway Marsh is **Southwood Nature Preserve**, a City of North Saint Paul preserve, which has active ongoing volunteer efforts for restoration. South of the railroad tracks is the City of Maplewood's **Jim's Prairie** with a wetland complex to the south connecting to City of Maplewood's **Beaver Creek Preserve Park** adjacent to **Beaver Lake Ramsey County Park** and City of Saint Paul's **Maryland Avenue Open Space Preserve Park**. Planning could coordinate restoration opportunities with park and green space connections and habitat corridors. An outline of this partially connected habitat corridor is shown on Figure 5.

Site development plans could also provide an opportunity for community redevelopment, education, and involvement. Surrounding schools including Hayden Heights Elementary, Hazel Park Middle School, Nokomis Montessori, Cowern Elementary, Webster Elementary, Maplewood Middle School, Hill Murray, Mounds Park Academy, and other schools in the community could provide an opportunity for teachers and students of various ages to work together on environmental educational restoration opportunities. With the guidance of teachers, older youth can develop leadership skills while providing valuable environmental education to younger students. Collaboration between these educational facilities in the neighborhood, the City of North Saint Paul, the Maplewood Nature Center (located within one mile to the southeast of the Hillcrest site), the City of Maplewood Parks and Recreation Department, volunteer organizations, the Ramsey County Cooperative Weed Management Area program, and the RWMWD could result in projects that would provide significant benefits to the community and improve the natural environment.

Re-development of the Hillcrest site can be designed with a comprehensive approach that incorporates commercial development with restoration of the natural environment and community involvement. This site can be an opportunity to bring people together to create a cohesive, successful, and thriving development plan that benefits the local economy, community, and natural environment.



City of North Saint Paul
City of Maplewood
Hillcrest Country Club
Urban Ecology Enviromental Learning Center
City Hall Campus
Ramsey County Fairgrounds/Parks & Rec Building
Ramsey County Parks & Rec Horseshoe Court
Goodrich Golf Course
Parks & Rec Building Parking Lot
Goodrich Golf Dome/Aldrich Ice Arena
Goodrich Park
Colby Hills Park
Colby Hills Park
Eldridge Tot Lot
Southwood Nature Preserve
Northwood Park
Holloway Marsh
Holloway Marsh
Hillside Park
Priory Neighborhood Preserve
Hayden Heights Recreation Center
Hillcrest Knoll Park
Nebraska Park
Sterling Oaks Park
Jims Prairie
Maryland Ave Open Space
Beaver Lake County Park
Beaver Creek Preserve
Geranium Park
Beaver Lake County Park
Beaver Creek
Maplewood Nature
County Road B
Larpenteur Ave E
E Larpenteur Ave
Holloway Ave E
Maryland Ave E
N McKnight Rd
N Winthrop St
White Bear Ave N
Furness Pkwy
North Saint Paul Rd
Stillwater Rd
E Stillwater Ave
Study Area
Burr or Red Oaks Greater then 18" Diameter on Hillcrest Site
Private School
Public School
Waterway
State Trail
Minnesota Rail Lines
Approximate Habitat Corridor
Wetland
Lakes and Ponds
Met Council Collaborative Parks
Native Plant Community (MBS)
Native Prairie
Central Region Regionally Ecological Significant Areas
High Ecological Score
Outstanding Ecological Score
Sites of Biodiversity Significance (MBS)
Outstanding
High
Municipal Boundary
Figure 5
PARKS, GREEN SPACE, AND HABITAT CORRIDORS
N
Feet
0
1,000
2,000
1 inch = 1,000 feet
RAMSEY-WASHINGTON METRO WATERSHED DISTRICT
BARR
Imagery: Nearmap; April 4, 2019



Barr Footer: ArcGIS 10.7.1, 2020-01-08 11:34 File: I:\Client\Ramsey_Washington_Metro_WD\Work_Orders\2019 Feasibility Studies\003_HillcrestGolfCourse\Maps\Reports\Existing Conditions_Dec2019\Figure 6 - Wetland Areas.mxd User: JRV

4 Tree inventory

This task involved creating an inventory of significant tree stands throughout the site, as well as other native stands of plants. The site is not currently within a tree preservation overlay. This task did not include a full tree survey. As discussed above, few original native trees exist on site. A map of native oak trees greater than eighteen inches can be seen in Figure 5. A vast majority of trees on site have been planted since the golf course had been built.

5 Groundwater inventory

Publicly available information and previous studies were reviewed in context of groundwater levels and existing wells at the Hillcrest Site. Two open wells and one sealed well are known to exist on the Hillcrest Site. An irrigation well (MN UNIQUE number 603061) is located near the pond in the east central part of the site. This well is reported to be 486-feet deep and open to the Prairie du Chien and Jordan aquifers. Groundwater from this well was historically pumped into the pond and water from the pond was pumped for irrigation of the golf course. A well near the maintenance building was used for maintenance activities; no construction information is available for this well. A well located near the clubhouse (unique number 208231) was sealed in 1999. The Minnesota Department of Heath requires unused wells to be located and properly sealed.

The regional groundwater flow direction at the water table is primarily to the west (Kanivetsky and Cleland, 1992a; Barr, 2015). For deeper aquifers, groundwater flow is primarily from northeast to southwest (Kanivetsky and Cleland, 1992b). Groundwater levels were measured in April 2019 from borings and temporary wells conducted as part of a geotechnical and environmental investigation (Braun, 2019). The water levels observed, in addition to the local stratigraphy, were interpreted as potentially representing perched groundwater conditions (Braun, 2019). This is consistent with Barr (2015) which indicated that most of the ponds/wetlands at the site are likely perched. The depth to groundwater measured in temporary monitoring wells ranged from 4.5-feet below ground surface to 13.9-feet below ground surface (Braun, 2019). Depth to groundwater observed in borings at the site ranged from 4.5 feet to greater than 21 feet (Braun, 2019).

6 Relevant regulatory processes during redevelopment

For this task, Barr created a summary of relevant regulatory/permitting considerations that the City/Port Authority should expect in redeveloping this site.

6.1 RWMWD Permit Requirements

RWMWD seeks to protect the public health and welfare and the natural resources of the District by providing reasonable regulation of the District's lands and waters to reduce the severity and frequency of flooding and high water; preserve floodplain and wetland storage capacity; improve chemical, physical, and biological quality of surface water; reduce sedimentation; preserve waterbodies' hydraulic and navigational capacity; preserve natural wetland and shore land features; and minimize future public expenditures to avoid or correct these problems.

6.1.1 Rule C, Stormwater Management

Redevelopment of the former Hillcrest site must meet the requirements of Rule C, Stormwater Management, which supports several Board policies including, "…to protect and maintain downstream drainage systems to provide permanent and safe conveyance of stormwater. Reduce the frequency and/or duration of potential downstream flooding." To comply with Rule C a proposed redevelopment must demonstrate that runoff rates for the site shall not exceed existing runoff rates for the 2-year, 10-year, and 100-year critical storm events using Atlas 14 precipitation depths and MSE3 storm distributions. Runoff rates may be restricted to less than the existing rates when the capacity of downstream conveyance systems is limited.

Rule C also requires limiting of runoff volumes by utilizing site designs that limit impervious surfaces or incorporating volume control practices such as infiltration. Stormwater runoff must be retained onsite in the amount equivalent to 1.1-inches of runoff over the new and reconstructed impervious surfaces of the development. In some locations, there may be site constraints which limit the ability to infiltrate stormwater. If these site constraints exist at the Hillcrest site, then the District's alternative compliance sequencing must be followed which allows for enhanced filtration or filtration. If enhanced filtration (e.g., iron-enhanced sand) is used, then the required volume must be multiplied by 1.25. If filtration is used, then the required volume is multiplied by 1.82.

6.1.2 Rule D, Flood Control

Redevelopment of the former Hillcrest site must also meet requirements in Rule D, Flood Control, which supports several Board policies including to "Encourage water quantity controls to ensure no net increase in the impacts or potential for flood on or off the site and encourage, where practical, controls to address existing flooding problems." To comply with Rule D the proposed redevelopment must demonstrate that there would be no increase in the potential for flooding downstream of the redevelopment. The proposed design must also demonstrate that proposed structures meet minimum freeboard requirements for the 100-year event. Freeboard requirements vary depending on whether the building is new, existing, or an underground parking structure and type of stormwater management BMP (i.e., water body or underground). In general, for new habitable building adjacent to waterbodies with a piped outlet, the low floor must be a minimum of 2-feet above the 100-year water level.

RWMWD does not regulate freeboard for public roadways. Freeboard for proposed roadways within the redevelopment site would be regulated by the roadway authority. In this case, the City of St Paul.

6.1.3 Rule E, Wetland Management

The City of St Paul is the local governmental unit (LGU) that administers the Wetland Conservation Act (WCA). However, the proposed redevelopment would need to meet the wetland buffer requirements of RWMWD's Rule E, Wetland Management. RWMWD Rule E governs impacts to wetlands and wetland buffers. This rule applies whether or not the District is the Wetland Conservation Act local government unit in the municipality where the wetland is located. As described in Section 3 of this report, the project proponent will be responsible for completing wetland assessments for wetlands that were not previously assessed.

6.1.4 Rule F, Erosion and Sediment Control

The proposed redevelopment must also meet the requirements in Rule F Erosion and Sediment Control. The project must implement erosion and sediment controls to limit the export of sediment off site, which impacts surface water quality.

6.2 City of Saint Paul Permit Requirements

The City of Saint Paul stormwater management rules state that the proposed design must have a discharge to the city storm sewer of less than 1.64 cfs per acre for the 5.9 inch, 24-hour 100-year storm. There is not a volume retention requirement in the stormwater management rules, but rate control features for meeting the 1.64 cfs per acre requirement will provide some volume retention.

Filling, excavating, and draining wetlands are regulated by the Minnesota Wetland Conservation Act, which is locally administered by the City of Saint Paul. As described in Section 3 of this report, the project proponent will be responsible for conducting wetland delineations and submitting a Joint Application Form for Activities Affecting Water Resources in Minnesota (Joint Application Form) to request applicable wetland approvals from the City of Saint Paul for a proposed site development project.

6.3 State Permit Requirements

As described in Section 6.2 of this report, the WCA is a state regulation, which is locally administered by the City of Saint Paul. There are no MNDNR Public Waters on the Hillcrest Site, therefore the project proponent will not need a MDNR Public Waters Permit for work on the site. However, a MNDNR staff person is a member on the Technical Evaluation Panel (TEP) for wetland reviews and the MNDNR ecologist may be consulted for potential impacts to state protected species or rare natural communities. If applicable, the Minnesota Pollution Control Agency (MPCA) under Section 401 of the Clean Water Act certifies that discharges of dredged or fill material authorized by a federal permit or license complies with state water quality standards.

The MPCA regulates the National Pollutant Discharge Elimination System (NPDES) stormwater permitting program. An NPDES permit is required for construction projects that disturb more than 1 acre of soil. An NPDES permit may be required depending on the area of disturbance. The MPCA will also require a stormwater pollution prevention plan (SWPPP).

6.4 Federal Permit Requirements

The United States Army Corps of Engineers (USACE) regulates the placement of dredge or fill materials into wetlands that are located adjacent to or are hydrologically connected to interstate or navigable waters under the authority of Section 404 of the Clean Water Act. If the USACE has jurisdiction over any portion of a project, they may also review impacts to wetlands under the authority of the National Environmental Policy Act. The project proponent will be responsible for submitting a wetland delineation report and submitting a Joint Application Form requesting wetland delineation concurrence, jurisdictional determinations, and any other applicable wetland documents to the USACE. The USACE will consult with the USFWS to identify potential impacts to federally protected species.

Prior to submitting a Joint Application, the project proponent is strongly encouraged to seek input from the RWMWD, the USACE Project Manager, and City of Saint Paul wetland regulatory staff to identify regulatory issues and required application materials for the proposed project.

7 Suggested sizing of on-site stormwater treatment facilities

This task involves generating recommendations related to the preliminary sizing of on-site stormwater treatment facilities. Future land use concepts are not expected until May 2020, so preliminary analysis of future conditions utilized the Saint Paul Port Authority's concept plan developed to inform their purchase of the site (concept plan) as a starting point. This task does not include any conceptual design. Using the permitting requirements outlined in Section 6, Barr determined preliminary sizing stormwater management features and rate control requirements for the redeveloped Hillcrest site.

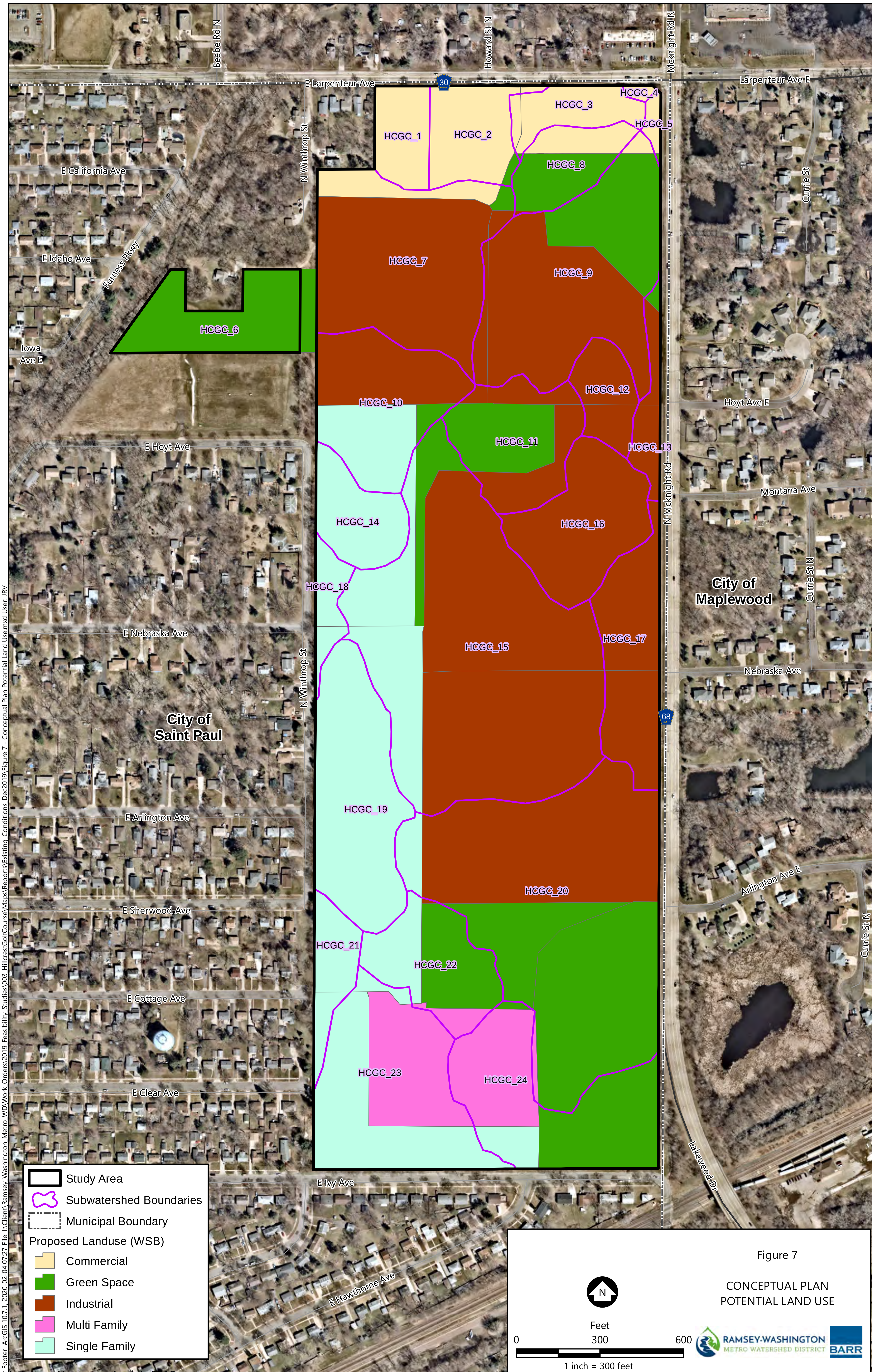
7.1 Preliminary Analysis of Future Conditions

To understand the impacts of developing the Hillcrest site, Barr calculated the increase in impervious coverage associated with the proposed land use categories from the concept plan. These updated land use categories were assigned in the concept plan across the entire site. The polygons representing each land use category developed from the concept plan are shown in Figure 7. The concept plan land use categories are very preliminary estimates of the future Hillcrest site conditions. Additionally, these land use categories do not account for preservation of existing features such as wetlands.

Land use polygons were intersected with the existing subwatershed divides, and the imperviousness was recalculated for each subwatershed based on land use assumptions shown in Table 7-1. Future conditions impervious area calculated for each subwatershed within the Hillcrest study area are summarized in Table 7-2. Using the preliminary land use categories established in the concept plan and impervious area assumptions shown in Table 7-1, future development could result in a total impervious area of 64.4 acres, which is an increase of 54.4 acres from existing conditions.

Table 7-1 Percent impervious assumptions for land use classifications

Land Use Classification	Impervious (%)
Commercial	85
Green Space	15
Industrial	72
Multi-Family Residential	40
Single-Family Residential	65



Barr Footer: ArcGIS 10.7.1, 2020-02-04 07:27 File: I:\Client\Ramsey_Washington_Metro_WD\Work_Orders\2019_Feasibility_Studies\003_HillcrestGolfCourse\Maps\Reports\Existing_Conditions_Dec2019\Figure 7 - Conceptual Plan Potential Land Use.mxd User: JRV

Table 7-2 Preliminary analysis of future conditions: impervious area

Subwatershed Name	Subwatershed Area (acres)	Future Conditions Total Impervious Area (acres)	Future Conditions % Imperviousness
HCGC_1	1.60	1.36	85%
HCGC_10	5.03	3.35	67%
HCGC_11	3.99	1.73	43%
HCGC_12	1.60	1.15	72%
HCGC_13	1.11	0.75	68%
HCGC_14	2.24	1.46	65%
HCGC_15	18.29	12.35	68%
HCGC_16	4.35	3.14	72%
HCGC_17	3.94	2.84	72%
HCGC_18	0.96	0.62	65%
HCGC_19	6.10	3.97	65%
HCGC_2	2.49	2.06	83%
HCGC_20	16.57	7.19	43%
HCGC_21	1.54	1.00	65%
HCGC_22	3.50	1.23	35%
HCGC_23	7.28	3.98	55%
HCGC_24	6.17	1.87	30%
HCGC_3	1.63	1.39	85%
HCGC_4	0.12	0.10	84%
HCGC_5	0.26	0.21	82%
HCGC_6	3.23	0.48	15%
HCGC_7	8.48	6.16	73%
HCGC_8	2.12	0.87	41%
HCGC_9	9.35	5.09	54%
Total	111.98	64.36	57%

[1]Watershed slope was assumed to be 2.5%. Based on the Port Authority's concept plan, the entire Hillcrest site will be regraded and developed, and the existing golf course slopes would no longer be applicable.

[2]The impervious area for future conditions modeling was calculated using the assumed land use percent imperviousness from Table 7-1, and the intersection of future conditions land use polygons in Figure 7 with the existing conditions subwatershed divides.

7.2 Analysis of volume control requirements

Table 7-3 shows the required infiltration / abstraction volumes based on the preliminary analysis of future conditions (Section 7.1). As outlined in Section 6, stormwater runoff must be retained onsite in the amount equivalent to 1.1-inches of runoff over the new and reconstructed impervious surfaces of the development. If site conditions do not permit stormwater runoff retention through infiltration, the District's alternative compliance sequencing must be followed which allows for enhanced filtration or filtration. Filtration through non-enhanced media (i.e., sand) requires that the 1.1-inch retention volume be multiplied by a factor of 1.82 (i.e., 2-inches). For filtration through enhanced media (i.e., iron-enhanced sand) requires that the 1.1-inch retention volume shall be multiplied by a factor of 1.25 (i.e., 1.375-inches).

Table 7-3 Volume Abstraction Permit Requirements

Permit Requirement	Total Future New/Redeveloped Impervious Area (acres)	Required Abstraction Volume (ft^3)		
		Infiltration (1.1 inches/acre)	Filtration[1]: enhanced media (1.375 inches/acre)	Filtration[1]: non-enhanced media (2.002 inches/acre)
Volume Abstraction	64.4	257,004	322,344	466,092

[1]RWMWD requires that infiltration practices must be used to meet the necessary abstraction volumes unless it is shown that site constraints limit the potential for infiltration.

7.3 Analysis of rate control requirements

As outlined in Section 6, RWMWD Rule C rate control requirements stipulate that proposed redevelopment must demonstrate that runoff rates for the site shall not exceed existing runoff rates for the 2-year, 10-year, and 100-year critical storm events using Atlas 14 precipitation depths and MSE3 storm distributions. Additionally, runoff rates may be restricted to less than the existing rates when the capacity of downstream conveyance systems is limited. Based on Rule C requirements, minimum rate control requirements for the Beaver Lake and Beltline major watersheds for the 2-year, 10-year, and 100-year Atlas 14 events (50th percentile) are summarized in Table 7-4.

Table 7-4 RWMWD Atlas 14 Rate Control Requirements

Discharge Summary	RWMWD Rate Control Requirements[2]		
	Atlas 14 2-year, 24-hour Maximum Allowable Discharge Rate (cfs)	*Atlas 14 10-year, 24-hour Maximum Allowable Discharge Rate (cfs)*	*Atlas 14 100-year, 24-hour Maximum Allowable Discharge Rate (cfs)*
Total to Beltline (Saint Paul)[1]	62.0	144.5	298.4
Total to Beaver Lake (Maplewood)[1]	68.3	105.4	171.1
Total[1]	130.3	248.1	469.5

[1]The total peak discharge is the maximum flow rate for the sum of all discharge point hydrographs, not the sum of each peak flow rate for each discharge point. This value is shown as it is more reflective of the timing of runoff hydrographs and the peak flow rate.

[2]Runoff rates may be restricted to less than the existing rates when the capacity of downstream conveyance systems is limited.

In addition to RWMWD Atlas 14 rate control requirements, development within the Hillcrest golf course study area must also meet Saint Paul rate control requirements. As outlined in Section 6.2, the Saint Paul stormwater rule stipulates that any proposed design must have a discharge to the city storm sewer of less than 1.64 cfs per acre for the 5.9 inch, 24-hour 100-year storm. Runoff results for the 5.9 inch, 24-hour 100-year storm are compared to Saint Paul rate control requirements in Table 7-5. Development within the Hillcrest study area (i.e., increased impervious area) will likely result in an increase in runoff rates from existing conditions.

Table 7-5 Saint Paul Rate Control Permit Requirements

Discharge Summary	Existing Conditions Runoff for 5.9-inch 24-hour Storm (cfs)	Required Saint Paul Rate Control (cfs): 1.64 cfs/acre for 5.9-inch 24-hour Storm
Total to Beltline (Saint Paul)[1]	232.0	57.2
Total to Beaver Lake (Maplewood)[1]	144.5	126.4
Total[1]	376.4	183.6

[1]The total peak discharge is the maximum flow rate for the sum of all discharge point hydrographs, not the sum of each peak flow rate for each discharge point. This value is shown as it is more reflective of the timing of runoff hydrographs and the peak flow rate.

7.4 Suggested sizing and placement of stormwater treatment facilities

The sizing of individual stormwater management features beyond the rate and volume control requirements specified in Section 6 will be completed once land use and site layout has been finalized for Hillcrest. The assumptions made in Section 7.1 reflect the concept plan outlined in the Saint Paul Port Authority's planning document, but may significantly change as the design phase of the project is underway. Stormwater treatment facilities will be necessary components of the site design. To meet the abstraction volume and rate control requirements outlined in Sections 7.2 and 7.3, significant land area may need to be dedicated to several stormwater treatment facilities including surficial and underground infiltration, filtration, and detention features.

8 References

Barr Engineering. 2015. Groundwater/Surface Water Interaction Study. Prepared for Ramsey-Washington Metro Watershed District. September, 2015.

Braun Intertec Corporation (Braun), 2019. Preliminary Phase II Environmental Site Assessment Report. Former Hillcrest Golf Course, Saint Paul, Minnesota. Prepared for Saint Paul Port Authority. August 16, 2019.

Kanivetsky, R. and Cleland J.M. 1992b. Bedrock Hydrogeology, Plate 7 of Geologic Atlas of Ramsey County, Minnesota. Minnesota Geological Survey County Atlas C-7, scale 1:48,000.

Kanivetsky, R. and Cleland J.M. 1992a Surficial Hydrogeology, Plate 6 of Geologic Atlas of Ramsey County, Minnesota. Minnesota Geological Survey County Atlas C-7, scale 1:48,000.

Appendix A

RWMWD Flood Mapping

Structures Potentially Inundated During a:
- 100-Year Event (5% Confidence)
- 100-Year Event
- 100-Year Event (95% Confidence)

Modeled Inundation Extents Resulting from:
- 100-Year Event (5% Confidence)
- 100-Year Event
- 100-Year Event (95% Confidence)

- School
- Police
- Hospital
- Church
- Airport
- Grocery Store
- Government
- Fire Station
- College
- Storm Sewer Pipe
- Creeks
- Regional Park
- Hydrologic Boundary
- Major Subwatershed
- Subwatershed
- Subwatersheds to be hatched (No Info)

Surface Contours
- Index (10-Foot)
- Intermediate (2-Foot)

District Facilities
- CIP
- IDDE
- Project
- Trash Rack
- District Facility Area
- Outfall
- Pollution Control Device
- Other Stormwater Structure
- Stormsewer/Culvert
- Sediment/WQ Pond

350 0 350
Feet

Barr Footer: ArcGIS 10.7.1, 2019-08-29 12:27 File: I:\Client\Ramsey_Washington_Metro_WD\...

MAPLEWOOD
Atlas 14 Modeling Update
Ramsey Washington Metro
Watershed District

BARR
RAMSEY-WASHINGTON METRO WATERSHED DISTRICT

Structures Potentially Inundated During a:
- 100-Year Event (5% Confidence)
- 100-Year Event
- 100-Year Event (95% Confidence)

Modeled Inundation Extents Resulting from:
- 100-Year Event (5% Confidence)
- 100-Year Event
- 100-Year Event (95% Confidence)

- School
- Police
- Hospital
- Church
- Airport
- Grocery Store
- Government

- Fire Station
- College
- Storm Sewer Pipe
- Creeks
- Regional Park
- Hydrologic Boundary
- Major Subwatershed
- Subwatershed

- Subwatersheds to be hatched (No Info)

Surface Contours
- Index (10-Foot)
- Intermediate (2-Foot)

District Facilities
- CIP
- IDDE
- Project

- Trash Rack
- District Facility Area
- Outfall
- Pollution Control Device
- Other Stormwater Structure
- Stormsewer/Culvert
- Sediment/WQ Pond

N

350 0 350

Feet

SAINT PAUL
Atlas 14 Modeling Update
Ramsey Washington Metro
Watershed District

BARR

RAMSEY-WASHINGTON METRO WATERSHED DISTRICT

Appendix B

Miscanthus Fact Sheet

NOT-WANTED!

AMUR or CHINESE SILVER GRASS

Miscanthus species

EARLY DETECTION & CONTROL WILL PREVENT INFESTATIONS!

Late Summer

Early Fall

Amur or Chinese silver grass; ***Miscanthus sinensis, Miscanthus sacchariflorus*** (incorrectly referred to as pampas grass) is a perennial, ornamental grass, 3-10' tall. These plants grow in a thick monoculture, excluding and replacing other beneficial species as they expand.

Leaf Vein

Leaves are up to 1" wide x 40" long with a prominent white mid-vein. ***Miscanthus species*** begin to bloom in late July to early August in central Minnesota. **Flowers** start out thin and shimmery; then become silky and/or plume-like. Plumes may remain on plants into winter.

Over 50 varieties exist. These species are now spreading into road sides, shorelines, woodland borders, and open areas. ***M. sacchariflorus*** prefers to grow in wet places including in ditches, near stream, lake and wetland edges.

Avoid planting ***Miscanthus*** grasses. There are many showy, native grasses available for your landscape that provide food and cover for wildlife; including big bluestem, ***Andropogon gerardii***; Indian grass, ***Sorghastrum nutans;*** switch grass, ***Panicum virgatum;*** little bluestem, ***Schizachyrium scoparium;*** prairie dropseed***, Sporobolus heterolepis; or side-oats gramma, Bouteloua curtipendula.***

Ramsey Conservation District

For more information contact:
Carole Gernes, Coordinator
Ramsey County Cooperative Weed Management Area
carole.gernes@rwmwd.org
http://www.co.ramsey.mn.us/cd/cwma.htm

RAMSEY COUNTY Cooperative Weed Management Area RCCWMA

Appendix C

Blanding Turtle Fact Sheet

CAUTION

BLANDING'S TURTLES

MAY BE ENCOUNTERED
IN THIS AREA

The unique and rare Blanding's turtle has been found in this area. Blanding's turtles are state-listed as Threatened and are protected under Minnesota Statute 84.095, Protection of Threatened and Endangered Species. Please be careful of turtles on roads and in construction sites. For additional information on turtles, or to report a Blanding's turtle sighting, contact the DNR Nongame Specialist nearest you: Bemidji (218-308-2641); Grand Rapids (218-327-4518); New Ulm (507-359-6033); Rochester (507-206-2820); or St. Paul (651-259-5772).

DESCRIPTION: The Blanding's turtle is a medium to large turtle (5 to 10 inches) with a black or dark blue, dome-shaped shell with muted yellow spots and bars. The bottom of the shell is hinged across the front third, enabling the turtle to pull the front edge of the lower shell firmly against the top shell to provide additional protection when threatened. The head, legs, and tail are dark brown or blue-gray with small dots of light brown or yellow. A distinctive field mark is the bright yellow chin and neck.

BLANDING'S TURTLES DO NOT MAKE GOOD PETS
IT IS ILLEGAL TO KEEP THIS THREATENED SPECIES IN CAPTIVITY

Endangered, Threatened, and Special Concern Species of Minnesota

Blanding's Turtle

(*Emydoidea blandingii*)

Minnesota Status:	Threatened	State Rank[1]:	S2
Federal Status:	none	Global Rank[1]:	G4

HABITAT USE

Blanding's turtles need both wetland and upland habitats to complete their life cycle. The types of wetlands used include ponds, marshes, shrub swamps, bogs, and ditches and streams with slow-moving water. In Minnesota, Blanding's turtles are primarily marsh and pond inhabitants. Calm, shallow water bodies (Type 1-3 wetlands) with mud bottoms and abundant aquatic vegetation (e.g., cattails, water lilies) are preferred, and extensive marshes bordering rivers provide excellent habitat. Small temporary wetlands (those that dry up in the late summer or fall) are frequently used in spring and summer -- these fishless pools are amphibian and invertebrate breeding habitat, which provides an important food source for Blanding's turtles. Also, the warmer water of these shallower areas probably aids in the development of eggs within the female turtle. Nesting occurs in open (grassy or brushy) sandy uplands, often some distance from water bodies. Frequently, nesting occurs in traditional nesting grounds on undeveloped land. Blanding's turtles have also been known to nest successfully on residential property (especially in low density housing situations), and to utilize disturbed areas such as farm fields, gardens, under power lines, and road shoulders (especially of dirt roads). Although Blanding's turtles may travel through woodlots during their seasonal movements, shady areas (including forests and lawns with shade trees) are not used for nesting. Wetlands with deeper water are needed in times of drought, and during the winter. Blanding's turtles overwinter in the muddy bottoms of deeper marshes and ponds, or other water bodies where they are protected from freezing.

LIFE HISTORY

Individuals emerge from overwintering and begin basking in late March or early April on warm, sunny days. The increase in body temperature which occurs during basking is necessary for egg development within the female turtle. Nesting in Minnesota typically occurs during June, and females are most active in late afternoon and at dusk. Nesting can occur as much as a mile from wetlands. The nest is dug by the female in an open sandy area and 6-15 eggs are laid. The female turtle returns to the marsh within 24 hours of laying eggs. After a development period of approximately two months, hatchlings leave the nest from mid-August through early-October. Nesting females and hatchlings are often at risk of being killed while crossing roads between wetlands and nesting areas. In addition to movements associated with nesting, all ages and both sexes move between wetlands from April through November. These movements peak in June and July and again in September and October as turtles move to and from overwintering sites. In late autumn (typically November), Blanding′s turtles bury themselves in the substrate (the mud at the bottom) of deeper wetlands to overwinter.

IMPACTS / THREATS / CAUSES OF DECLINE

- loss of wetland habitat through drainage or flooding (converting wetlands into ponds or lakes)
- loss of upland habitat through development or conversion to agriculture
- human disturbance, including collection for the pet trade* and road kills during seasonal movements
- increase in predator populations (skunks, raccoons, etc.) which prey on nests and young

*It is illegal to possess this threatened species.

RECOMMENDATIONS FOR AVOIDING AND MINIMIZING IMPACTS

These recommendations apply to typical construction projects and general land use within Blanding's turtle habitat, and are provided to help local governments, developers, contractors, and homeowners minimize or avoid detrimental impacts to Blanding's turtle populations. **List 1** describes minimum measures which we recommend to prevent harm to Blanding's turtles during construction or other work within Blanding's turtle habitat. **List 2** contains recommendations which offer even greater protection for Blanding's turtles populations; this list should be used *in addition to the first list* in areas which are known to be of state-wide importance to Blanding's turtles (contact the DNR's Natural Heritage and Nongame Research Program if you wish to determine if your project or home is in one of these areas), or in any other area where greater protection for Blanding's turtles is desired.

List 1. Recommendations for all areas inhabited by Blanding's turtles.	**List 2. *Additional* recommendations for areas known to be of state-wide importance to Blanding's turtles.**
GENERAL	
A flyer with an illustration of a Blanding's turtle should be given to all contractors working in the area. Homeowners should also be informed of the presence of Blanding's turtles in the area.	Turtle crossing signs can be installed adjacent to road-crossing areas used by Blanding's turtles to increase public awareness and reduce road kills.
Turtles which are in imminent danger should be moved, by hand, out of harms way. Turtles which are not in imminent danger should be left undisturbed.	Workers in the area should be aware that Blanding's turtles nest in June, generally after 4pm, and should be advised to minimize disturbance if turtles are seen.
If a Blanding's turtle nests in your yard, do not disturb the nest.	If you would like to provide more protection for a Blanding's turtle nest on your property, see "Protecting Blanding's Turtle Nests" on page 3 of this fact sheet.
Silt fencing should be set up to keep turtles out of construction areas. It is <u>critical</u> that silt fencing be removed after the area has been revegetated.	Construction in potential nesting areas should be limited to the period between September 15 and June 1 (this is the time when activity of adults and hatchlings in upland areas is at a minimum).
WETLANDS	
Small, vegetated temporary wetlands (Types 2 & 3) should not be dredged, deepened, filled, or converted to storm water retention basins (these wetlands provide important habitat during spring and summer).	Shallow portions of wetlands should not be disturbed during prime basking time (mid morning to mid- afternoon in May and June). A wide buffer should be left along the shore to minimize human activity near wetlands (basking Blanding's turtles are more easily disturbed than other turtle species).
Wetlands should be protected from pollution; use of fertilizers and pesticides should be avoided, and run-off from lawns and streets should be controlled. Erosion should be prevented to keep sediment from reaching wetlands and lakes.	Wetlands should be protected from road, lawn, and other chemical run-off by a vegetated buffer strip at least 50' wide. This area should be left unmowed and in a natural condition.
ROADS	
Roads should be kept to minimum standards on widths and lanes (this reduces road kills by slowing traffic and reducing the distance turtles need to cross).	Tunnels should be considered in areas with concentrations of turtle crossings (more than 10 turtles per year per 100 meters of road), and in areas of lower density if the level of road use would make a safe crossing impossible for turtles. Contact your DNR Regional Nongame Specialist for further information on wildlife tunnels.
Roads should be ditched, not curbed or below grade. If curbs must be used, 4 inch high curbs at a 3:1 slope are preferred (Blanding's turtles have great difficulty climbing traditional curbs; curbs and below grade roads trap turtles on the road and can cause road kills).	Roads should be ditched, not curbed or below grade.

ROADS cont.	
Culverts between wetland areas, or between wetland areas and nesting areas, should be 36 inches or greater in diameter, and elliptical or flat-bottomed.	Road placement should avoid separating wetlands from adjacent upland nesting sites, or these roads should be fenced to prevent turtles from attempting to cross them (contact your DNR Nongame Specialist for details).
Wetland crossings should be bridged, or include raised roadways with culverts which are 36 in or greater in diameter and flat-bottomed or elliptical (raised roadways discourage turtles from leaving the wetland to bask on roads).	Road placement should avoid bisecting wetlands, or these roads should be fenced to prevent turtles from attempting to cross them (contact your DNR Nongame Specialist for details). This is especially important for roads with more than 2 lanes.
Culverts under roads crossing streams should be oversized (at least twice as wide as the normal width of open water) and flat-bottomed or elliptical.	Roads crossing streams should be bridged.
UTILITIES	
Utility access and maintenance roads should be kept to a minimum (this reduces road-kill potential).	
Because trenches can trap turtles, trenches should be checked for turtles prior to being backfilled and the sites should be returned to original grade.	
LANDSCAPING AND VEGETATION MANAGEMENT	
Terrain should be left with as much natural contour as possible.	As much natural landscape as possible should be preserved (installation of sod or wood chips, paving, and planting of trees within nesting habitat can make that habitat unusable to nesting Blanding's turtles).
Graded areas should be revegetated with native grasses and forbs (some non-natives form dense patches through which it is difficult for turtles to travel).	Open space should include some areas at higher elevations for nesting. These areas should be retained in native vegetation, and should be connected to wetlands by a wide corridor of native vegetation.
Vegetation management in infrequently mowed areas -- such as in ditches, along utility access roads, and under power lines -- should be done mechanically (chemicals should not be used). Work should occur fall through spring (after October 1st and before June 1st).	Ditches and utility access roads should not be mowed or managed through use of chemicals. If vegetation management is required, it should be done mechanically, as infrequently as possible, and fall through spring (mowing can kill turtles present during mowing, and makes it easier for predators to locate turtles crossing roads).

Protecting Blanding's Turtle Nests: Most predation on turtle nests occurs within 48 hours after the eggs are laid. After this time, the scent is gone from the nest and it is more difficult for predators to locate the nest. Nests more than a week old probably do not need additional protection, unless they are in a particularly vulnerable spot, such as a yard where pets may disturb the nest. Turtle nests can be protected from predators and other disturbance by covering them with a piece of wire fencing (such as chicken wire), secured to the ground with stakes or rocks. The piece of fencing should measure at least 2 ft. x 2 ft., and should be of medium sized mesh (openings should be about 2 in. x 2 in.). It is ***very important*** that the fencing be **removed before August 1st** so the young turtles can escape from the nest when they hatch!

REFERENCES

[1]Association for Biodiversity Information. "Heritage Status: Global, National, and Subnational Conservation Status Ranks." NatureServe. Version 1.3 (9 April 2001). http://www.natureserve.org/ranking.htm (15 April 2001).

Coffin, B., and L. Pfannmuller. 1988. Minnesota's Endangered Flora and Fauna. University of Minnesota Press, Minneapolis, 473 pp.

REFERENCES (cont.)

Moriarty, J. J., and M. Linck. 1994. Suggested guidelines for projects occurring in Blanding's turtle habitat. Unpublished report to the Minnesota DNR. 8 pp.

Oldfield, B., and J. J. Moriarty. 1994. Amphibians and Reptiles Native to Minnesota. University of Minnesota Press, Minneapolis, 237 pp.

Sajwaj, T. D., and J. W. Lang. 2000. Thermal ecology of Blanding′s turtle in central Minnesota. Chelonian Conservation and Biology 3(4):626-636.

Appendix D

Rusty-Patched Bumble Bee Fact Sheet

Endangered Species

Midwest Region

The Midwest Region includes Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio and Wisconsin. Find a location near you

Endangered Species Program

Conserving and restoring threatened and endangered species and their ecosystems

Great Lakes RESTORATION

Rusty patched bumble bee feeding on wild bergamot (*Monarda fistulosa*)
Photo Kim Mitchell; USFWS

Fact Sheet
Rusty Patched Bumble Bee (*Bombus affinis*)

PDF Version

The U.S. Fish and Wildlife Service listed the rusty patched bumble bee as endangered under the Endangered Species Act. Endangered species are animals and plants that are in danger of becoming extinct. Identifying, protecting and recovering endangered species is a primary objective of the U.S. Fish and Wildlife Service's endangered species program.

What is a rusty patched bumble bee?

Appearance:

Rusty patched bumble bees live in colonies that include a single queen and female workers. The colony produces males and new queens in late summer. Queens are the largest bees in the colony, and workers are the smallest. All rusty patched bumble bees have entirely black heads, but only workers and males have a rusty reddish patch centrally located on the back.

Illustrations of a rusty patched bumble bee queen (left), worker (center), and male (right). By Elaine Evans, The Xerces Society.

Habitat:

Rusty patched bumble bees once occupied grasslands and tallgrass prairies of the Upper Midwest and Northeast, but most grasslands and prairies have been lost, degraded, or fragmented by conversion to other uses. Bumble bees need areas that provide nectar and pollen from flowers, nesting sites (underground and abandoned rodent cavities or clumps of grasses), and overwintering sites for hibernating queens (undisturbed soil).

Reproduction:

Rusty patched bumble bee colonies have an annual cycle. In spring, solitary queens emerge and find nest sites, collect nectar and pollen from flowers and begin laying eggs, which are fertilized by sperm stored since mating the previous fall. Workers hatch from these first eggs and colonies grow as workers collect food, defend the colony, and care for young. Queens remain within the nests and continue laying eggs. In late summer, new queens and males also hatch from eggs. Males disperse to mate with new queens from other colonies. In fall, founding queens, workers and males die. Only new queens go into diapause (a form of hibernation) over winter - and the cycle begins again in spring.

Feeding Habits:

Why conserve

Bumble bees gather pollen and nectar from a variety of flowering plants. The rusty patched emerges early in spring and is one of the last species to go into hibernation. It needs a constant supply and diversity of flowers blooming throughout the colony's long life, April through September.

Range:

Historically, the rusty patched bumble bee was broadly distributed across the eastern United States and Upper Midwest, from Maine in the U.S. and southern Quebec and Ontario in Canada, south to the northeast corner of Georgia, reaching west to the eastern edges of North and South Dakota. Its range included 28 states, the District of Columbia and 2 provinces in Canada. Since 2000, this bumble bee has been reported from only 13 states and 1 Canadian province: Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Minnesota, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, Wisconsin – and Ontario, Canada.

rusty patched bumble bees?

As pollinators, rusty patched bumble bees contribute to our food security and the healthy functioning of our ecosystems. Bumble bees are keystone species in most ecosystems, necessary not only for native wildflower reproduction, but also for creating seeds and fruits that feed wildlife as diverse as songbirds and grizzly bears.

Bumble bees are among the most important pollinators of crops such as blueberries, cranberries, and clover and almost the only insect pollinators of tomatoes. Bumble bees are more effective pollinators than honey bees for some crops because of their ability to “buzz pollinate.” The economic value of pollination services provided by native insects (mostly bees) is estimated at $3 billion per year in the United States.

Why is the rusty patched bumble bee declining?

Habitat loss and degradation:

Most of prairies and grasslands of the Upper Midwest and Northeast have been converted to monoculture farms or developed areas, such as cities and roads. Grasslands that remain tend to be small and isolated.

Intensive farming:

Increases in farm size and technology advances improved the operating efficiency of farms but have led to practices that harm bumble bees, including increased use of pesticides, loss of crop diversity which results in flowering crops being available for only a short time, loss of hedgerows and the flowers that grew there, and loss of legume pastures.

Disease:

Pathogens and parasites may pose a threat to rusty patched bumble bees, although their prevalence and effects in North American bumble bees are not well understood.

Pesticides:

The rusty patched bumble bee may be vulnerable to pesticides used across its range. Pesticides are used widely on farms and in cities and have both lethal and sublethal toxic effects. Bumble bees can absorb toxins directly through their exoskeleton and through contaminated nectar and pollen. Rusty patched bumble bees nest in the ground and may be susceptible to pesticides that persist in agricultural soils, lawns and turf.

Global climate change:

Climate changes that may harm bumble bees include increased temperature and precipitation extremes, increased drought, early snow melt and late frost events. These changes may lead to more exposure to or susceptibility to disease, fewer flowering plants, fewer places for queens to hibernate and nest, less time for foraging due to high temperatures, and asynchronous flowering plant and bumble bee spring emergence.

What is being done to conserve rusty patched bumble bees?

U.S. Fish and Wildlife Service:

Several Service programs work to assess, protect, and restore pollinators and their habitats. Also, the Service works with partners to recover endangered and threatened pollinators and pollinator-dependent plants. Concern about pollinator declines prompted formation of the North American Pollinator Protection Campaign, a collaboration of people dedicated to pollinator conservation and education. The Service has a Memorandum of Understanding with the Pollinator Partnership to work together on those goals. The Service is a natural collaborator because our mission is to work with others to conserve, fish, wildlife, and plants and their habitats.

Other Efforts:

Trusts, conservancies, restoration groups and partnerships are supporting pollinator initiatives and incorporating native plants that support bees and other pollinators into their current activities. For example, the USDA Natural Resource Conservation Service is working with landowners in Michigan, Minnesota, Montana, North Dakota, South Dakota, and Wisconsin to make bee-friendly conservation improvements to their land. Improvements include the practices of planting cover crops, wildflowers, or native grasses and improved management on grazing lands.

Research:

Researchers are studying and monitoring the impacts of GMO crops and certain pesticides on pollinators. Efforts by citizen scientists and researchers to determine the status of declining bee species are underway throughout the U.S.

What can I do to help conserve the rusty patched bumble bee?

Garden:

Grow a garden or add a flowering tree or shrub to your yard. Even small areas or containers on patios can provide nectar and pollen for native bees.

Native plants:

Use native plants in your yard such as lupines, asters, bee balm, native prairie plants and spring ephemerals. Don't forget spring blooming shrubs like ninebark and pussy willow! Avoid invasive non-native plants and remove them if they invade your yard. For more information on attracting native pollinators, visit www.fws.gov/pollinators/pdfs/PollinatorBookletFinalrevWeb.pdf.

Natural landscapes:

Provide natural areas - many bumble bees build nests in undisturbed soil, abandoned rodent burrows or grass clumps. Keep some unmowed, brushy areas and tolerate bumble bee nests if you find them. Reduce tilling soil and mowing where bumble bees might nest. Support natural areas in your community,

Minimize:

Limit the use of pesticides and chemical fertilizer whenever possible or avoid them entirely. Pesticides cause lethal and sublethal effects to bees and other pollinators.

Rusty Patched Bumble Bee Home
Midwest Endangered Species

Last updated: August 14, 2018

USFWS Ecological Services Field Offices in the Upper Midwest
Illinois | Chicago | Indiana | Iowa | Michigan | Minnesota | Missouri | Ohio | Wisconsin

USFWS Midwest Region Sites
Home | Ecological Services | Endangered Species | Environmental Contaminants
Wind Energy | Ecological Services Field Offices

USFWS National Sites
Coastal Conservation | Endangered Species | Environmental Contaminants | Fisheries and Habitat Conservation