Hollydale Residential Development

Environmental Assessment Worksheet

January 21, 2020

Responsible Governmental Unit (RGU)

City of Plymouth
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Plymouth, MN 55447
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Memo

To: Minnesota Environmental Quality Board
Environmental Review Distribution List

From: Shawn Drill, Senior Planner

Date: January 21, 2020

Subject: Hollydale Residential Development EAW

As the Responsible Governmental Unit (RGU), the City of Plymouth is issuing this Environmental Assessment Worksheet (EAW) for Hollydale Residential Development. The public comment period on this EAW begins when the public notice is published in the Minnesota Environmental Quality Board (EQB) Monitor on January 27, 2020. A public notice has been submitted for publication in the Sun Sailor newspaper. A public hearing will be held at the City of Plymouth Planning Commission meeting on February 19, 2020. Public comments on this EAW will be accepted by the City of Plymouth until 4:30 p.m. on February 26, 2020.

Environmental Assessment Worksheet (EAW)

Hollydale Residential Development

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Environmental Assessment Worksheet (EAW)

Hollydale Residential Development

This Environmental Assessment Worksheet (EAW) form and EAW Guidelines are available at the Environmental Quality Board's website at: http://www.eqb.state.mn.us/EnvRevGuidanceDocuments.htm. The EAW form provides information about a project that may have the potential for significant environmental effects. The EAW Guidelines provide additional detail and resources for completing the EAW form.

Cumulative potential effects can either be addressed under each applicable EAW Item, or can be addresses collectively under EAW Item 19.

Note to reviewers: Comments must be submitted to the RGU during the 30-day comment period following notice of the EAW in the *EQB Monitor*. Comments should address the accuracy and completeness of information, potential impacts that warrant further investigation and the need for an EIS.

1. Project Title: **Hollydale Residential Development**

2. Proposer:	Hollydale GC Development, Inc.	**RGU:**	City of Plymouth
Contact person:	Jake Walesch	Contact person:	Shawn Drill
Title:	Development Manager	Title:	Senior Planner
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4. Reason for EAW Preparation

Required:
- ☐ EIS Scoping
- ☑ Mandatory EAW

Discretionary:
- ☐ Citizen petition
- ☐ RGU discretion
- ☐ Proposer initiated

If EAW or EIS is mandatory give EQB rule category subpart number(s) and name(s):
Minnesota Rules Part 4410.4300, Subp. 19.D. (Residential Development)

5. Project Location

County: Hennepin County, Minnesota
City/Township: City of Plymouth
PLS Location (Section, Township, Range): South Half of Section 8, Township 118 North, Range 22 West
Watershed (81 major watershed scale): Mississippi River Metro (20)
GPS Coordinates: 45.040557, -93.492015
Tax Parcel Number(s): 08-118-22-31-0001, 08-118-22-34-0014, 08-118-22-44-0057, 08-118-22-43-0002, 08-118-22-34-0011, and 08-118-22-34-0007

At a minimum attach each of the following to the EAW:

- *County map showing the general location of the project;*
- *U.S. Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries (photocopy acceptable); and*
- *Site plans showing all significant project and natural features. Pre-construction site plan and post-construction site plan.*

6. Project Description

a. Provide the brief project summary to be published in the EQB Monitor, (approximately 50 words).

The Hollydale Residential Development would include up to 319 single-family lots. It is proposed on land that has been occupied by the Hollydale Golf Course since 1965. The project would include removal of existing structures, mass grading, installation of streets and municipal utilities, and dedication of roughly five acres of public park land.

b. Give a complete description of the proposed project and related new construction, including infrastructure needs. If the project is an expansion include a description of the existing facility. Emphasize: 1) construction, operation methods and features that will cause physical manipulation of the environment or will produce wastes, 2) modifications to existing equipment or industrial processes, 3) significant demolition, removal or remodeling of existing structures, and 4) timing and duration of construction activities.

The Hollydale Residential Development is located on roughly 158.58 acres of land in the northwest portion of the City of Plymouth, Hennepin County, Minnesota (**Figure 1**). The project area includes the existing 18-hole Hollydale Golf Course, driving range, clubhouse, storage and maintenance buildings, remote fairway restroom buildings, a farmstead with outbuildings, and a single-family home. Delineated wetlands cover roughly 30.98 acres, including a large cattail marsh and seven small wetlands/golf course ponds. The small triangular-shaped parcel (roughly 0.19 acres) within the project area that lies northwest of the Canadian Pacific railway would be transferred to an abutting land owner or to the city. The project area is located in the south half of Section 8, Township 118 North, Range 22 West (**Figure 2**). The project area is bordered on all sides by existing single-family and multi-family residential development. It is located east of Holly Lane, south of Schmidt Lake Road, west of Vicksburg Lane, and north of Old Rockford Road. The Canadian Pacific Railway (formerly known as Soo Line) cuts diagonally through the extreme northwest corner of the project area.

The project area has rolling topography with elevations that vary from a high point of 1,020 feet above mean sea level in the northeast part of the project area to a low point of 964 feet above mean sea level in the ditch within the wetland near the southeast corner of the project area. Roughly eight acres in the northeast portion of the project area drain north to Elm Creek, then to Rice Lake, and ultimately to the Mississippi River. The remainder of the project area drains south, through the large wetland (Wetland 6) in the southeast area, then to Plymouth Creek, Medicine Lake, Bassett Creek, and ultimately to the Mississippi River (**Figure 3**).

The Hollydale Residential Development (hereafter called “the project”) would consist of up to 319 single-family lots. Development would involve installation of municipal sewer, water, and streets,

mass grading, and construction of the stormwater management system. The project would convert roughly 122.91 acres of golf course, 1.3 acres of woodland, 1.01 acres of wetlands/ornamental golf course ponds, and 1.8 acres of impervious surface to streets, homes, lawns, landscaping, and stormwater features. The proposed site plan includes 319 single-family lots and is shown on **Figure 4**. An alternative site plan with 318 single-family lots is shown on **Figure 5**. Depending on the site plan implemented, the project may include roughly 40 acres of open space, consisting of common community spaces, wetlands, stormwater features, and park land. The future residential development would operate under one or more homeowners' associations. Open spaces may include tree buffers on the perimeter of the project area and natural overland drainage routes in community spaces behind residential lots. Homeowners' association amenities may include a clubhouse, pool, open space, and playground equipment.

The project is expected to impact roughly 1.01 acres of wetlands/ornamental golf course ponds distributed among five basins. (Note that three of eight the basins within the project area would not be impacted.) Of the five basins that would be impacted, four basins are not regulated under the Wetland Conservation Act. The U.S. Army Corps of Engineers would review those four basins to determine if they fall under their jurisdiction. The remaining basin (Wetland 7) is regulated under the Wetland Conservation Act and is assumed to be regulated by the U.S. Army Corps of Engineers. Details are discussed under **Item 11.b.iv.a**. Natural wetland buffer strips would be provided to protect preserved wetlands.

The project area includes loam, clay loam, and organic soils, 56 feet of topographic elevation change, and gradual slopes. The project area would be mass graded to install utilities, streets, residential building pads, and stormwater features.

The project may include up to three different single-family, detached home product types with lots ranging from roughly 60 to 90 feet wide and from roughly 130 to 135 feet deep. Lots that are covered by an easement to protect trees may exceed 135 feet in depth. Public streets are expected to be 28 feet wide and located within 50-foot rights-of-way. Sidewalks would connect residential lots to neighborhood open spaces and the park land that would be dedicated in the northwest area of the project area. Sidewalks would be constructed along one side of all streets. Private trails may be planned for some areas within the development.

Development of the project area would require installation of public and private infrastructure, including streets, sidewalks, municipal water and sanitary sewer, stormwater systems, electrical lines, natural gas, and telephone lines. The development would be served by Plymouth Police and Fire, and by the Wayzata Independent School District.

It is anticipated that construction of the development may start in the summer of 2020 and be phased over three to five years, depending on market conditions. Construction is anticipated to be phased from south to north as municipal water and sewer is extended into the project area. The city would determine the point at which the internal street system would need to connect to Schmidt Lake Road (via existing Comstock Lane) located to the north, in order to provide a second means of access to the project area. The number of development phases would be determined by market demand and absorption. Infrastructure would be installed at the initiation of each construction phase. In most

cases, streets, water main, and sanitary sewer would only be installed to serve the upcoming phase of construction. It may be necessary to initiate stormwater system construction at the start of each construction phase to obtain borrow material, properly treat stormwater, and minimize potential effects of stormwater runoff.

c. Project magnitude:

Table 1. Project Magnitude

Characteristic	Number of Units
Total Project Acreage	158.58
Linear project length	N/A
Number and type of residential units proposed	Up to 319 (single-family detached)
Commercial building area proposed (square feet)	0
Industrial building area proposed (square feet)	0
Institutional building area proposed (square feet)	0
Other uses proposed – specify (acres)	N/A
Structure height	35 feet (maximum)

d. Explain the project purpose; if the project will be carried out by a governmental unit, explain the need for the project and identify its beneficiaries.

The owners of the golf course have decided to cease golf course operations and sell the golf course land. The project purpose is to respond to the demand for housing and increase the diversity of single-family homes in the City of Plymouth. The project would be carried out by a private entity.

e. Are future stages of this development including development on any other property planned or likely to happen? ☐ Yes ☑ No
If yes, briefly describe future stages, relationship to present project, timeline and plans for environmental review.

The project area is surrounded by existing residential development.

f. Is this project a subsequent stage of an earlier project? ☐ Yes ☑ No
If yes, briefly describe the past development, timeline and any past environmental review.

The project is not a subsequent stage of an earlier project.

7. Cover Types

Estimate the acreage of the site with each of the following cover types before and after development:

Table 2. Cover Types

Land Cover	Before (acres)[1]	After (acres)[2]
Golf course and lawn (turf and trees)	122.91	81.52
Wetlands and golf course ponds	30.98	29.97
Woodland	2.70	1.40
Impervious surface (buildings/pavement)	1.80	39.00
Grassland/meadow	0.19	0.19
Stormwater basins	0.00	6.50
Totals	158.58	158.58

[1] Existing impervious surface includes the clubhouse, parking, maintenance buildings, farmstead buildings, a single-family home, and trails.

[2] Before and after development wetland acreage reflects that Wetlands 5, 6, and 9 would not be filled. Some ornamental golf course ponds would be filled or relocated as stormwater basins. Mitigation/replacement of any filled wetland area would be provided from acceptable wetland banks as needed. Replacement may not be required for certain ornamental golf course ponds. See **Item 11** for details.

Existing cover types are shown on **Figure 6**. Delineated wetlands are shown on **Figure 7**.

8. Permits and Approvals Required

List all known local, state and federal permits, approvals, certifications and financial assistance for the project. Include modifications of any existing permits, governmental review of plans and all direct and indirect forms of public financial assistance including bond guarantees, Tax Increment Financing and infrastructure. All of these final decisions are prohibited until all appropriate environmental review has been completed. See Minnesota Rules, Chapter 4410.3100.

Table 3. Permits and Approvals Required

Unit of Government	Type of Application	Status
City of Plymouth	Environmental Assessment Worksheet (EAW)	Decision requested
City of Plymouth	Reguiding, Rezoning, and Preliminary Plat	To be applied for
City of Plymouth	Final Plat	To be applied for
City of Plymouth	Wetland Delineation and No-Loss Approval	Approved
City of Plymouth	Wetland Impact and Replacement Approval	To be applied for
City of Plymouth	Grading Permit	To be applied for
City of Plymouth	Demolition and Building Permits	To be applied for
City of Plymouth	Stormwater Management and Erosion Control Approval	To be applied for
City of Plymouth	Municipal Water Connection Permit	To be applied for
City of Plymouth	Sanitary Sewer Connection Permit	To be applied for

Table 3. Permits and Approvals Required

Unit of Government	Type of Application	Status
Bassett Creek Watershed Management Commission	Stormwater Management and Erosion Control Approval	To be applied for
Elm Creek Watershed Management Commission	Stormwater Management and Erosion Control Approval	To be applied for or deferred to Bassett Creek
Metropolitan Council Environmental Services	Sanitary Sewer Extension Permit	To be applied for
Minnesota Department of Health	Water Main Extension Approval	To be applied for
Minnesota Department of Natural Resources	Water Appropriation Permit	To be applied for if needed
Minnesota Department of Natural Resources	Public Waters Work Permit	To be applied for
Minnesota Pollution Control Agency	NPDES/SDS General Permit	To be applied for
Minnesota Pollution Control Agency	Sanitary Sewer Extension Approval	To be applied for if needed
Minnesota Pollution Control Agency	Section 401 Water Quality Certification or Waiver	To be applied for if needed
U.S. Army Corps of Engineers	Wetland Delineation Concurrence and Waters of the U.S. Approved Jurisdictional Determination	Submitted
U.S. Army Corps of Engineers	Section 404 Permit	To be applied for

Cumulative potential effects may be considered and addressed in response to individual EAW Item Nos. 9-18, or the RGU can address all cumulative potential effects in response to EAW Item No. 19. If addressing cumulative effect under individual items, make sure to include information requested in EAW Item No. 19

9. Land Use

a. Describe:

i. Existing land use of the site as well as areas adjacent to and near the site, including parks, trails, prime or unique farmlands.

Hollydale Golf Course has existed and operated within the project area since 1965. Prior to that, the property included a farmstead and had been in agricultural use since before the 1930s. The golf course, clubhouse, parking area, farmstead and single-family home cover roughly 127.6 acres. The balance of the project area includes wetlands that cover roughly 30.98 acres. Surrounding land use includes multi-family residential development to the north, and single-family residential development to the east, west, and south (**Figure 8**). Public parks within one mile of the project area include:

1. Schmidt Woodlands Park, 0.1 miles west;
2. Kimberly Lane Elementary School Park, 0.3 miles southwest;

3. Prairie Ponds Park, 0.3 miles north;
4. Woodland Trails Park, 0.4 miles northeast;
5. Plymouth Creek Elementary School Park, 0.5 miles southeast;
6. Shenandoah Park, 0.6 miles southeast;
7. Northwest Greenway, 0.7 miles northwest;
8. Elm Creek Playfields at Wayzata High School, 0.7 miles west;
9. Elm Creek Woods Park, 0.8 miles northwest;
10. Turtle Lake Park, 0.8 miles east;
11. Crooked Creek Park, 0.9 miles southwest; and
12. Fairway Greens Park, 0.9 miles northeast.

Farmland ratings for soils mapped in the project area are listed in **Table 4**. Of the 14 soil map units present in the project area, three are considered prime farmland, two are farmland of statewide importance, five are prime farmland if drained, and four are not prime farmland. Soils mapped as prime farmland cover roughly 25 percent of the project area.

ii. Plans. Describe planned land use as identified in comprehensive plan (if available) and any other applicable plan for land use, water, or resources management by a local, regional, state, or federal agency.

The majority of the project area is presently guided "P-I" for public, semi-public, and institutional land uses on the city's comprehensive plan. Three parcels totaling 1.66 acres within the project area are presently guided "LA-1" (living area 1) on the comprehensive plan. Under the development proposal, the P-I area would need to be reguided to LA-1. LA-1 is city's lowest density residential land use classification, and allows a density of two to three dwelling units per acre.

iii. Zoning, including special districts or overlays such as shoreland, floodplain, wild and scenic rivers, critical area, agricultural preserves, etc.

The majority of the project area is presently zoned "FRD" (future restricted development) on the city's zoning map. The purpose of the FRD zoning district is to provide a holding zone until a development occurs, at which time the city must rezone the affected property. Three parcels totaling 1.66 acres within the project area are presently zoned "RSF-1" (residential single family 1) on the zoning map. Under the development proposal, the project area would be rezoned to a planned unit development (PUD). A PUD is a customized zoning district.

The project area does not fall within or adjacent to a wild and scenic river, critical area, agricultural preserve, shoreland overlay district, or FEMA-mapped 100-year (1% annual chance) floodplain. The large wetland located in the southeast portion of the project area (Wetland 6) lies partially within the FEMA-mapped 500-year (0.2% annual chance) flood hazard area of Zone X (**Figure 9**). The 500-year flood zone corresponds roughly to the location of the 966-foot above mean sea level (AMSL) contour, and is contained entirely within Wetland 6. The project would not impact Wetland 6 or affect flood storage capacity. FEMA Panel Map No. 27053C0190F shows that the nearest 100-year floodplain is located on Plymouth Creek roughly 0.25 miles south of the project area and south of Old Rockford Road (**Figure 9**). The 100-year flood elevation at that location is roughly 965.8 feet

AMSL. The Bassett Creek Watershed Management Commission floodplain model also identifies one other area on the project site that extends beyond the limits of the FEMA flood plain and lies within the 100-year flood plain elevation.

b. Discuss the project's compatibility with nearby land uses, zoning, and plans listed in Item 9a above, concentrating on implications for environmental effects.

The project would be compatible with the surrounding land uses, which include multi-family use as well as single-family use similar to the proposed project. As previously stated, the city's comprehensive plan presently guides the majority of the project area as P-I (public/semi-public/institutional). Under the development proposal, the P-I area would be reguided to LA-1, which allows a residential density of two to three units per acre. The proposed site plan showing 319 single-family lots would have a net density (excludes wetland acreage) of no greater than 2.5 dwelling units per acre.

The proposed project is not compatible with the current FRD zoning of the project area. It is anticipated that the project area would be rezoned to a PUD that allows single-family development. Land use incompatibility is not anticipated, and no land use mitigation measures are required by city ordinance for single-family developments. Nevertheless, the proposed development would incorporate mitigation measures to minimize visual and environmental effects as discussed in the following sections of this EAW.

c. Identify measures incorporated into the proposed project to mitigate any potential incompatibility as discussed in Item 9b above.

Under the proposed development, the project area would be rezoned to PUD. The net density allowed under LA-1 guiding is two to three dwelling units per acre. As shown on the proposed site plan (**Figure 4**), the project would have a residential density of 2.5 dwelling units per acre or less, which would be consistent with LA-1 guiding and compatible with adjoining land uses.

10. Geology, Soils and Topography / Land Forms

a. Geology - Describe the geology underlying the project area and identify and map any susceptible geologic features such as sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst conditions. Discuss any limitations of these features for the project and any effects the project could have on these features. Identify any project designs or mitigation measures to address effects to geologic features.

The Geologic Atlas of Hennepin County, Minnesota (Minnesota Geological Survey 1989) for the project area indicates that surficial sediments overlying bedrock consist primarily of loamy till, with small areas of lacustrine clay and silt. Surface sediments on most of the area are underlain by St. Peter Sandstone bedrock. Jordan Sandstone bedrock underlies a small area in the northwest part of the project area. The Geologic Atlas indicates the depth to bedrock in the project area varies from roughly 200 to 250 feet. Depth to bedrock indicated in logs of nearby domestic water wells varies from 189 to 268 feet (**Table 6**).

Neither the Geologic Atlas nor the Soil Survey of Hennepin County identify sinkholes or karst conditions in the project area. Minnesota Karst Lands Mapping and Sinkhole Mapping prepared by Professor Calvin Alexander and others (2006) show that the area may include "covered karst" or "mantled karst," which indicates areas underlain by carbonate bedrock, but covered by more than 100 feet of sediment. The 2018 Hennepin County Multi-Jurisdictional Hazard Mitigation Plan indicates that covered karst, which is underlain by carbonate bedrock, exists through the southeastern three-quarters of Hennepin County. However, the distribution of active karst is primarily limited to an area along the Mississippi River from the north portion of Minneapolis southerly to Fort Snelling. The thick surface sediments in the project area are expected to reduce the potential for subsurface erosion that leads to sinkholes and no mitigation measures are proposed.

Well records for 10 domestic water wells located within a quarter mile of the project area were obtained from the Minnesota Well Index. These wells are listed and discussed further under **Item 11.a.ii**. The ten well records include one of the five wells known to exist within the project area. The other four wells within the project area are not registered. The 10 wells were drilled to depths ranging from 171 to 319 feet and had static water levels ranging from 80 to 119 feet below the surface. Six of the 10 wells encountered bedrock. The only known nearby sources of contamination identified in these well logs were septic drain fields.

b. Soils and topography - Describe the soils on the site, giving NRCS (SCS) classifications and descriptions, including limitations of soils. Describe topography, any special site conditions relating to erosion potential, soil stability or other soils limitations, such as steep slopes, highly permeable soils. Provide estimated volume and acreage of soil excavation and/or grading. Discuss impacts from project activities (distinguish between construction and operational activities) related to soils and topography. Identify measures during and after project construction to address soil limitations including stabilization, soil corrections or other measures. Erosion/sedimentation control related to stormwater runoff should be addressed in response to Item 11.b.ii.

The Web Soil Survey indicates the project area includes 14 soil mapping units that range from loam and clay loam to muck (**Table 4 and Figure 10**). These soil units range from somewhat limited to very limited (muck) for dwelling units and local streets due to factors such as depth to saturation, shrink-swell potential, ponding, subsidence, and organic matter. Limitations due to depth to saturation are often associated with wetlands, which are addressed under **Items 11.a.i and 11.b.iv**.

Soils in the project area are generally considered moderately susceptible to sheet and rill erosion by water, as indicated by slopes and K factors that range between 0.24 and 0.43. This range is similar to K factors of other development areas in western Hennepin County and is considered acceptable. K factors were originally developed to estimate soil loss from agricultural lands. In this case, the K factors provide an indication of the potential for soil erosion during the construction process while soils are exposed. Sheet erosion is removal of exposed surface soil in thin layers by rain and overland flow. Rill erosion is removal of exposed surface soil by surface flow through small channels that are less than 0.5 inches wide.

Table 4. Soil Classifications

Symbol	Soil Name	% of Area	% Hydric	Hydric Category	Farmland Category
L50A	Muskego and Houghton soils	24.13	100	Hydric	Not prime farmland
L44A	Nessel loam, 1-3% slopes	14.22	10	Predominantly non-hydric	Prime farmland
L22C2	Lester loam, 6-10% slopes, moderately eroded	13.77	2	Predominantly non-hydric	Farmland of statewide importance
L37B	Angus loam, 2-6% slopes	10.61	5	Predominantly non-hydric	Prime farmland
L22D2	Lester loam, 10-16% slopes, moderately eroded	9.54	0	Non-hydric	Not prime farmland
L36A	Hamel, overwash-Hamel complex, 0-3% slopes	7.15	45	Partially hydric	Prime farmland if drained
L49A	Klossner soils	6.71	100	Hydric	Not prime farmland
L23A	Cordova loam, 0-2% slopes	5.92	95	Predominantly hydric	Prime farmland if drained
L14A	Houghton muck	3.73	100	Hydric	Farmland of statewide importance
L9A	Minnetonka silty clay loam	2.42	100	Hydric	Prime farmland if drained
L45A	Dundas-Cordova complex	1.36	30	Predominantly non-hydric	Prime farmland if drained
L40B	Angus-Kilkenny complex	0.44	5	Predominantly non-hydric	Prime farmland
L24A	Glencoe clay loam	0.22	100	Hydric	Prime farmland if drained
L22F	Lester loam, morainic, 25-35% slopes	0.02	5	Predominantly non-hydric	Not prime farmland

Grading related to construction of the project would affect roughly 127.02 acres and would involve movement of roughly 300,000 cubic yards of soil to construct streets, residential development areas, and stormwater features. Grading operations would avoid disturbance to Wetlands 5, 6, and 9, which cover roughly 29.97 acres. Grading operations would also avoid disturbance to 1.4 acres of woodland located in the south portion of the project area, and to 0.19 acres of grassland located in the northwest portion of the project area (**Figures 6 and 7**).

The project area has rolling topography with elevations that range from 1,020 feet above mean sea level (AMSL) at the highest point in the northeast area, to 964 feet AMSL at the lowest point at a ditch in the southeast area. The soil survey shows that roughly 10 percent of the project area has slopes with a gradient over 10 percent (**Table 4 and Figure 10**). Review of two-foot contour mapping indicates the project area has roughly seven acres of slopes with a gradient ranging between 12 and 22 percent (**Figure 7**). The project area does not include any bluffs.

Water draining from the site would flow through stormwater basins and wetlands to reduce peak flows and improve water quality. The wetlands would connect to the municipal stormwater system to convey treated runoff to watercourses and water bodies. Roughly eight acres in the northeast portion of the project area drain north to Elm Creek, then to Rice Lake, and ultimately to the Mississippi River. The remainder of the project area drains south, through the large wetland (Wetland 6) in the southeast area, then to Plymouth Creek, Medicine Lake, Bassett Creek, and ultimately to the Mississippi River (**Figure 3**). Stormwater runoff from the project would be retained in stormwater basins to improve water quality and manage runoff rates before flowing through existing wetlands and exiting the site.

Development of the project area would disturb more than one acre of land. As a result, an application for coverage under the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) General Construction Permit, as administered by the Minnesota Pollution Control Agency (MPCA), is required prior to initiation of earthwork. In compliance with the General NPDES Permit for construction activities, the project proposer and construction contractor would need to implement Best Management Practices (BMPs) to reduce erosion and sedimentation and stabilize exposed soils after construction. Erosion and sedimentation control BMPs related to stormwater runoff are discussed in greater detail under **Item 11.b.ii**.

NOTE: For silica sand projects, the EAW must include a hydrogeologic investigation assessing the potential groundwater and surface water effects and geologic conditions that could create an increased risk of potentially significant effects on groundwater and surface water. Descriptions of water resources and potential effects from the project in EAW Item 11 must be consistent with the geology, soils *and topography/land forms and potential effects described in EAW Item 10.*

11. Water Resources

a. Describe surface water and groundwater features on or near the site in a.i. and a.ii. below.

i. Surface water - lakes, streams, wetlands, intermittent channels, and county/judicial ditches. Include any special designations such as public waters, trout stream/lake, wildlife lakes, migratory waterfowl feeding/resting lake, and outstanding resource value water. Include water quality impairments or special designations listed on the current MPCA 303d Impaired Waters List that are within one mile of the project. Include DNR Public Waters Inventory number(s), if any.

The project area includes eight delineated wetlands and a network of sub-surface drain tile lines and culverts (**Figure 7**). In addition, Wetland 6 includes open ditches that are confined within it. Wetland 6 is the largest wetland in the project area. The project area does not include any Department of Natural Resources (DNR) public waters, wetlands, or watercourses, lakes, or streams. There are no known trout streams/lakes, wildlife lakes, migratory waterfowl feeding/resting lakes, or outstanding resource value waters in or near the project area. Impaired waters listed by the MPCA and located within one mile of the project area include:

1. Plymouth Creek (a/k/a Unnamed Creek, 07010206-526), impaired for aquatic life and aquatic recreation, located roughly 0.4 miles south of the project area; and
2. Elm Creek (07010206-508), impaired for aquatic life and aquatic recreation, located roughly 0.5 miles northwest of the project area.

Kjolhaug Environmental Services delineated wetlands within the project area on August 14, 2019 (**Table 5 and Figure 7**). Several of the wetlands in the project area have been excavated and exist as ornamental golf course ponds. Wetlands 1, 2, 3, and 8 are incidental ornamental golf course ponds that are exempt from regulation under the Minnesota Wetland Conservation Act. The U.S. Army Corps of Engineers has not yet determined whether those ornamental golf course ponds are regulated under Section 404 of the Federal Clean Water Act. Wetlands on the site have been degraded by excavation, partial drainage, invasive species, and the golf course use.

Table 5. Wetlands and Water Resources

Map[1] ID	Acres On-site	Classification			Dominant Vegetation	Modifier
		Circ. 39	Cowardin	Eggers and Reed		
1	0.46	5	PUBGx	Shallow open water	Open water, narrow fringe of cattail, beggarticks, smartweed	Excavated, ornamental golf course pond
2	0.09	5	PUBGx	Shallow open water	Open water, narrow fringe of jewelweed, sandbar willow, red-osier dogwood	Excavated, ornamental golf course pond
3	0.07	5	PUBGx	Shallow open water	Open water, duckweed	Excavated, ornamental golf course pond
5	0.08	2	PEMBx	Wet meadow	Fowl bluegrass, Kentucky bluegrass	Excavated drainage area
6	29.67	2/3/6	PEMB/ PEMC/ PSS1Cd	Wet meadow/Shallow marsh/Shrub-carr	Cattail, reed canary grass, jewelweed, arrowleaf tearthumb, red-osier dogwood, black willow, nettle, sedges	Partially ditched/ drained
7	0.19	2/5	PEMB/ PUBGx	Wet meadow/Shallow open water	Open water with a narrow fringe of fowl bluegrass	Partially excavated
8	0.20	5	PUBGx	Shallow open water	Open water, duckweed	Excavated, ornamental golf course pond
9	0.22	5	PUBGx	Shallow open water	Open water with a narrow fringe of smartweed	Excavated, ornamental golf course pond
Total	30.98					

[1]Wetland 4 is not listed because it was found to be off-site, within the railroad right-of-way to the northwest.

A Wetland Delineation Report was submitted to the city and U.S. Army Corps of Engineers (USACE) on September 27, 2019. The delineation report identified eight wetlands that cover a total of 30.98 acres. A ninth wetland (Wetland 4) was found to be off-site and within the railroad right-of-way adjacent to the northwestern corner of the project area. Wetlands in the project area are described in **Table 5**. Six wetlands are shown on the National Wetlands Inventory map (**Figures 7 and 11**).

Appendix A includes excerpts from: 1) the Wetland Delineation Report; 2) a memo that determined some wetlands are incidental; and 3) responses from regulatory agencies to the project proposer. The city reviewed wetlands in the field with Kjolhaug representatives on October 11, 2019. Delineated wetland boundaries were approved by the city under the Minnesota Wetland Conservation Act (WCA) on November 6, 2019. Delineated wetlands still need to be approved by USACE under Section 404 of the Federal Clean Water Act (CWA). The project proposer has submitted a memo and historical review that determined that Wetlands 1, 2, 3, and 8 were incidentally created on dry land by excavation. This is discussed further under **Item 11.b.iv**.

ii. Groundwater – aquifers, springs, seeps. Include: 1) depth to groundwater; 2) if project is within a MDH wellhead protection area; 3) identification of any on-site and/or nearby wells, including unique numbers and well logs if available. If there are no wells known on site or nearby, explain the methodology used to determine this.

Depth to groundwater varies across the project area. Based on domestic water wells located near the project area, depth to static groundwater levels ranges from 80 to 135 feet (**Table 6 and Appendix B**). The Geologic Atlas of Hennepin County (University of Minnesota 1989, Plate 5 of 9) estimates the elevation of groundwater in the project area to be at or near 960 feet above mean sea level. Wetlands and golf course ponds on the site generally contain surface water, which is perched above confining soil layers such as clay loams.

Table 6. Registered Groundwater Wells located near the Project Area

Well No.	Surface Elevation (feet)	Depth (feet)	Cased Depth (feet)	Depth to		Location (Direction from Site)	Aquifer
				Static Water Level (feet)	Bedrock (feet)		
483951	--	290	261	135	--	On-site	--
425096	987	261	244	95	240	Northwest	St Peter
199186	976	319	259	90	250	Northwest	St. Peter-Jordan
181969	1,002	235	231	107	--	North	Quaternary buried
790092	1,000	175	154	119	--	Northeast	Quaternary buried
204209	1,015	171	--	116	--	Northeast	Quaternary buried
204210	1,020	296	285	117	268	Northeast	St. Peter-Jordan
204211	1,013	265	244	115	230	East	St. Peter
434314	989	215	189	90	189	South	St. Peter
204290	990	272	260	80	260	South	St. Peter
405052	1,007	179	174	91	--	Southwest	Quaternary buried

Professional geologists and engineers have reviewed the project and indicated that project construction and operation is not expected to affect the equilibrium of groundwater elevations below or around the site (**Appendix C**). Footings and basements of new homes would be above the water table and are not expected to affect underlying soil and groundwater conditions. Modern homes are typically constructed with drain tile systems that collect surface water that infiltrates into soils near basement walls. These tile systems are designed to convey collected water to ponds or storm sewer

systems, in accordance with engineering guidelines. With these considerations, the project would be designed to minimize impacts on surface water and groundwater, and also to minimize surface water and groundwater impacts on homes. Prior to final city approval, the development design would need to consider existing groundwater conditions and potential effects on local groundwater and surface water conditions. Additional information is provided in **Appendix C**.

Municipal water service for the project area is provided by the city. As listed in **Table 7**, the city operates 17 wells that draw the municipal water supply from the Prairie du Chien-Jordan aquifer and range in depth from 353 to 505 feet. The city's Wellhead Protection Plan, the Bassett Creek Watershed Management Commission 2015 Management Plan, and Minnesota Department of Health (MDH) Source Water Protection maps show a Wellhead Protection/Drinking Water Supply Management Area covering roughly the eastern half of the project area (**Figure 9**).

Available information indicates the project area includes five groundwater wells (**Figure 9**). These wells are used for golf course irrigation and domestic water supplies. Only one of these wells (number 483951) is known to be registered in the Minnesota County Well Index. This well is located in the west-central portion of the project area, near the clubhouse. The other on-site wells are located near the clubhouse and farmstead on the western side of the project area, and near the remote restrooms on the eastern side of the project area. Review of the Well Index identified 10 additional registered domestic groundwater wells located within 0.25 miles of the project area (**Table 6**). **Appendix B** includes a sketch showing the location of on-site wells and logs for wells listed in **Table 6**.

The Geologic Atlas of Hennepin County (University of Minnesota 1989, Plate 7 of 9) estimates that the susceptibility of groundwater contamination is low in the Prairie du Chien-Jordan aquifer below the project area. This indicates that groundwater takes a relatively long time to reach the aquifer. The travel time of groundwater to the aquifer was estimated by considering the distance and confining layers between the ground surface and the aquifer. The susceptibility of water-table contamination is higher in the southeast portion of the project area where Wetland 6 is located, and is low for the remainder of the project area. The water table below Wetland 6 is more susceptible to contamination because it is nearer to the surface in that location than it is in other locations of the project area. Project development would implement measures and management practices to protect the water table, including silt fences, buffers, sediment basins, stormwater basins, and site stabilization.

The project is not expected to cause groundwater impacts due to the depth of the aquifer beneath the project area and the mitigation measures to be implemented. To mitigate the potential for groundwater contamination, existing on-site wells would need to be sealed and abandoned in compliance with MDH regulations during the early part of the construction process. Well sealing must be conducted by an MDH-licensed well contractor. In addition, septic systems would be emptied and removed from the project area, contaminated soils would be isolated in an on-site soil management area or removed from the property, and stormwater basins would retain runoff from impervious surfaces before being discharged into wetlands.

b. Describe effects from project activities on water resources and measures to minimize or mitigate the effects in Item b.i. through Item b.iv. below.

i. Wastewater - For each of the following, describe the sources, quantities and composition of all sanitary, municipal/domestic and industrial wastewater produced or treated at the site.

1) If the wastewater discharge is to a publicly owned treatment facility, identify any pretreatment measures and the ability of the facility to handle the added water and waste loadings, including any effects on, or required expansion of, municipal wastewater infrastructure.

The project is expected to produce normal domestic wastewater that is typical of residential developments. The project would not include industrial wastewater production or on-site wastewater treatment.

Sanitary wastewater production for the project was estimated using methods described in the Sewer Availability Charge (SAC) Procedure Manual (Metropolitan Council 2019). Metropolitan Council has established 274 gallons per day (GPD) as the average daily wastewater production from a typical residential unit. Based on this residential equivalent, the project is expected to generate roughly 87,406 gallons of wastewater per day. The project is expected to connect to existing sanitary sewer lines located near the south boundary line of the project. A sanitary sewer extension permit would detail the predicted wastewater flow and would need to be reviewed by Metropolitan Council Environmental Services and MPCA.

Wastewater from the project would be routed through the city's sanitary sewer system and ultimately to the Metropolitan Wastewater Treatment Plant located on the Mississippi River near Pig's Eye Lake in St. Paul. With the capacity to treat 251 million gallons of wastewater per day, this is the largest wastewater treatment facility in Minnesota. The treatment plant is owned and operated by Metropolitan Council. The Council's 2040 Water Resources Policy Plan includes a specific plan to serve the region's projected growth through 2040 and a general plan to serve the region's growth far beyond 2040.

Both the city and the Metropolitan Council have planned for increased capacity to convey and treat sanitary wastewater. The project is not expected to require expansion of wastewater treatment infrastructure or raise wastewater treatment capacity concerns.

2) If the wastewater discharge is to a subsurface sewage treatment systems (SSTS), describe the system used, the design flow, and suitability of site conditions for such a system.

Wastewater would not be discharged to subsurface sewage treatment systems. Subsurface sewage treatment systems (septic systems) that presently exist within the project area would be emptied and removed in compliance with Minnesota Pollution Control Agency regulations.

3) If the wastewater discharge is to surface water, identify the wastewater treatment methods and identify discharge points and proposed effluent limitations to mitigate impacts. Discuss any effects to surface or groundwater from wastewater discharges.

Wastewater would be treated at the treatment plant and then discharged to the Mississippi River. The treatment plant is an advanced secondary wastewater treatment plant located on the east bank of the Mississippi River, roughly three miles south of downtown St. Paul. Treatment capability is maintained during times of flood by a levee and floodwall that protect the plant treatment area.

The plant uses an activated sludge process to remove phosphorus and ammonia nitrogen from wastewater prior to discharge to the Mississippi River. Sludge is processed by thickening, centrifugal dewatering, and fluid bed incineration with energy recovery (steam and electricity). These processing facilities were completed in 2004 as part of a major rehabilitation and upgrade program at the plant. At that time, six outdated multiple hearth incinerators were replaced with three fluid bed sludge incinerators, state-of-the-art air pollution control systems and an alkaline stabilization system that produces biosolids for agricultural utilization. Ash from incineration is disposed of in a landfill.

ii. *Stormwater - Describe the quantity and quality of stormwater runoff at the site prior to and post construction. Include the routes and receiving water bodies for runoff from the site (major downstream water bodies as well as the immediate receiving waters). Discuss any environmental effects from stormwater discharges. Describe stormwater pollution prevention plans including temporary and permanent runoff controls and potential BMP site locations to manage or treat stormwater runoff. Identify specific erosion control, sedimentation control or stabilization measures to address soil limitations during and after project construction.*

Pre-Construction Site Runoff

Surface runoff from the existing Hollydale Golf Course likely contains pesticides, fertilizers, and other nutrients. The majority of the existing runoff drains overland and through a system of sub-surface drain tiles and small culverts to the large wetland (Wetland 6) in the southeast area, then to Plymouth Creek, Medicine Lake, Bassett Creek, and ultimately to the Mississippi River. Roughly eight acres in the northeast portion of the project area drain north to Elm Creek, then to Rice Lake, and ultimately to the Mississippi River.

Post-Construction Site Runoff

Project development must comply with the regulations and requirements of the city and Bassett Creek Watershed Management Commission (Bassett Creek), and with the regulations and requirements of the Elm Creek Watershed Management Organization unless they defer permitting authority to Bassett Creek. Water quality treatment and rate control of stormwater runoff would need to be provided as part of the project. In addition, the required NPDES permit must be obtained. Proposed development construction (streets, homes, driveways) would increase the amount of impervious surface by roughly 37.2 acres to a total of roughly 39 acres. The increased impervious surface area is expected to generate additional runoff volume, rate and pollutants in the project area. The increase for each of these is expected to be mitigated through the creation of stormwater Best Management Practices (ponds, filtration basins, etc.) to ensure the discharge from the project area does not increase in rate and pollutant loading. The project would include roughly 6.5 acres of stormwater ponding and basins in compliance with city requirements (**Figures 4 and 5**).

The runoff volume would be reduced to the maximum extent practicable, given existing conditions and soils, which control the feasibility of infiltration. Overall, the project would be designed and constructed in compliance with city, Bassett Creek, and NPDES stormwater management requirements to control, mitigate and treat stormwater runoff. It is anticipated that stormwater rate and volume control compliance with city and Bassett Creek requirements would limit increases in runoff volume and associated pollutant transport.

Potential adverse effects of runoff volume and quality would be mitigated by construction of stormwater basins designed to reduce peak runoff rates and meet requirements of the city. Requirements of the city code and engineering guidelines would be used as design standards for the stormwater Best Management Practices incorporated in the project area. The city requires that stormwater ponds be designed to meet NURP (Nationwide Urban Runoff Program) standards and that grading and erosion control plans be consistent with the Minnesota Stormwater Manual authored by the MPCA. The city also requires grading and construction activities to comply with the MPCA's General NPDES Permit for Construction Activity.

Impervious surface runoff from storm events would be retained in roughly five stormwater ponds, filtration basins, and infiltration basins until discharged at or below existing peak runoff rates. Temporary sediment basins would be used during construction and would meet the requirements of the MPCA General Stormwater Permit for Construction Activity. In addition, green spaces would be used to the extent practicable to route runoff from impervious surfaces and provide treatment, helping to improve overall quality of the stormwater runoff.

The effectiveness of stormwater ponds designed to NURP criteria is discussed in Protecting Water Quality in Urban Areas: Best Management Practices for Dealing with Storm Water Runoff from Urban, Suburban and Developing Areas of Minnesota (MPCA 2000). The NURP research projects conducted by the U.S. Environmental Protection Agency concluded that 90 percent removal of total suspended solids appears to be an attainable goal, and that significant removal of other pollutants, such as phosphorus, was also predicted to be achievable. Actual removal would vary due to site-specific conditions. However, well-designed wet ponds and constructed wetland treatment systems are effective in removing sediment and associated pollutants, such as trace metals, nutrients, and hydrocarbons. Stormwater basins also remove or treat oxygen-demanding substances, bacteria, and dissolved nutrients.

The project would need to be designed to comply with the city's engineering guidelines, which require:

1. Surface water treatment, including NURP ponds, iron-enhanced sand filter/trench/bench, green roofs, porous pavements, or other approved Best Management Practices.
2. Ponds intended to provide water quality are designed to NURP standards.
3. Post-construction runoff rates and volumes that are equal to or less than existing conditions.
4. An average permanent pond pool depth of at least four feet with a maximum depth of 10 feet.
5. Basin side slopes no steeper than 3:1 above and below the normal water level.
6. A 10-foot wide bench with a maximum slope of 10:1 that extends into the pond from the normal water level.
7. Maximized distance between storm sewer outfalls and pond outlets.
8. Access easements to ponds for future maintenance.

The following mitigation measures are expected to minimize potential adverse effects of stormwater runoff of receiving water bodies:

1. Construction of on-site stormwater basins to meet city requirements and engineering guidelines;
2. Sediment basins and BMPs that comply with the General NPDES/SDS Permit for Construction Activities, as discussed below.

Stormwater and Erosion Control BMPs

Because project construction would involve disturbance of more than one acre of land, the project proposer would be required to apply for coverage under the National Pollutant Discharge Elimination System/State Disposal System (NPDES/SDS) General Permit to the MPCA prior to initiating construction. This permit process would require a Stormwater Pollution Prevention Plan detailing practices for erosion and sediment control. BMPs would be employed during construction to reduce erosion and sediment loading of stormwater runoff. Inspection of BMPs would be required weekly by the permitee after each rainfall exceeding one-half inch in 24 hours. The NPDES permit also requires perimeter sediment control maintenance and sediment removal. BMPs that would be implemented during construction include:

1. Construction of temporary sediment basins during construction and development of proposed stormwater basins for permanent use following construction.
2. Installation of silt fence and other perimeter erosion controls prior to initiation of earthwork and maintenance of these controls until viable turf or ground cover is established on exposed areas.
3. Periodic and required street sweeping/cleaning and installation of a rock construction entrance to reduce tracking of dirt onto public streets.
4. Stabilization of exposed soils within the time limits specified in the General NPDES permit.
5. Energy dissipation, such as riprap, installed at storm sewer outfalls.
6. Use of cover crops, seed mixes, sod, and landscaping to stabilize exposed surface soils after final grading.

Erosion control plans would be reviewed and must be approved by the city and Bassett Creek prior to project construction. Potential adverse effects from construction-related sediment and erosion on water quality would be minimized by implementation of the above BMPs during and after construction.

iii. Water Appropriation. Describe if the project proposes to appropriate surface or groundwater (including dewatering). Describe the source, quantity, duration, use and purpose of the water use and if a DNR water appropriation permit is required. Describe any well abandonment. If connecting to an existing municipal water supply, identify the wells to be used as a water source and any effects on, or required expansion of, municipal water infrastructure. Discuss environmental effects from water appropriation, including an assessment of the water resources available for appropriation. Identify any measures to avoid, minimize, or mitigate environmental effects from the water appropriation.

Surface/Groundwater Appropriations and Dewatering

Project construction may require dewatering to facilitate installation of sanitary sewer within wetlands. The project would not involve installation of new water wells. Project development would require a Minnesota DNR water appropriation permit if dewatering required for installation of utilities exceeds 10,000 gallons per day or one million gallons per year. If construction dewatering does not exceed 50 million gallons in total and a duration of one year from the start of pumping, the project proposer would be eligible for coverage under the amended Minnesota DNR General Permit 1997-0005 for temporary water appropriations. Although the extent and duration of construction dewatering that may be necessary is currently unknown, construction dewatering is expected to be temporary. Groundwater appropriated for construction dewatering would be discharged to temporary sediment basins and retained within the project area. It is not anticipated that construction dewatering would be extensive or continue long enough to affect nearby domestic water wells.

Well Abandonment

As indicated under **Item 11.a.ii**, available information indicates the project area includes five existing groundwater wells. As previously stated, to mitigate the potential for groundwater contamination, existing on-site wells would need to be sealed and abandoned in compliance with MDH regulations during the early part of the construction process. Well sealing must be conducted by an MDH-licensed well contractor.

Connection to a Public Water Supply

The project would be connected to the city's municipal water supply. As previously stated, the city draws its public water supply from the Prairie du Chien-Jordan aquifer. Minnesota DNR Water Use Data indicates that the city currently maintains 17 active municipal wells (**Table 7**). These wells are located in Sections 11, 13, 14, 27, and 28, and are all at least one mile from the project area. These existing wells have a combined permitted capacity to pump 69,700 million gallons of water per year. The city also has an underground public water supply reservoir at Schmidt Lake Road and Vicksburg Lane.

During 2013-2018, the city wells pumped a maximum of 4,060.4 million gallons per year. Based on past use and permitted capacity, the existing municipal wells have sufficient surplus capacity to serve the proposed project. Water mains would be extended from adjoining streets to serve the development area. Water flow, pressure, and storage would be adequate to serve the development area.

Table 7. City of Plymouth Municipal Water Appropriation Permits[1]

Permit No.	Well No.	Permitted Volume in MGY (Million Gallons Yearly)	Max Use 2013-2018 in MGY (Million Gallons Yearly)
1978-6376	432026	4100	168.9
1978-6376	481659	4100	221.7
1978-6376	655943	4100	369.1
1978-6376	705459	4100	393.4
1978-6376	204272	4100	82.4
1978-6376	439796	4100	269.6
1978-6376	759585	4100	416.7
1978-6376	432024	4100	245.1
1978-6376	204617	4100	0.0
1978-6376	508300	4100	236.6
1978-6376	462918	4100	242.3
1978-6376	204619	4100	242.4
1978-6376	204618	4100	234.3
1978-6376	112202	4100	4.4
1978-6376	449184	4100	378.9
1978-6376	184882	4100	322.9
1978-6376	778048	4100	231.7
Total		69,700	4,060.4[2]

[1]Source: Minnesota DNR – Minnesota Water Use Data, https://www.dnr.state.mn.us/waters/watermgmt_section/appropriations/wateruse/html

[2]Although 4,060.4 MGY is the total maximum use, all wells did not supply the maximum within the same year, so the highest total annual volume pumped from 2013-2018 was 3,198.8 MGY.

iv. Surface Waters

a) Wetlands. Describe any anticipated physical effects or alterations to wetland features such as draining, filling, permanent inundation, dredging and vegetative removal. Discuss direct and indirect environmental effects from physical modification of wetlands, including the anticipated effects that any proposed wetland alterations may have to the host watershed. Identify measures to avoid (e.g., available alternatives that were considered), minimize, or mitigate environmental effects to wetlands. Discuss whether any required compensatory wetland mitigation for unavoidable wetland impacts will occur in the same minor or major watershed, and identify those probable locations.

Wetlands in the project area are regulated by the city under the Minnesota Wetland Conservation Act (WCA) and USACE under Section 404 of the CWA. The project area does not include any DNR public waters or watercourses.

Wetland Buffers

City regulations require wetland applications and reviews consistent with the WCA. They also require wetland buffers to be established and maintained with native vegetation and drainage and utility easements. Buffer strips with slopes of 12 percent or more are required to conform to the

maximum buffer width for the respective wetland classification. Review of two-foot contour mapping does not show slopes of 12 percent or greater located within 100 feet of wetlands in the project area. Monumentation is required at least every 100 feet along buffer edges, and where lot lines cross buffer strips and where needed to indicate the contour of the buffer strip. Buffer monitoring reports are required annually during the first five years after initial buffer planting.

Potential wetland classifications and corresponding wetland buffer widths are listed in **Table 8**. Five of the eight wetlands in the project area have wetland classifications shown on the city's wetland map (**Table 9**).

Table 8. City of Plymouth Wetland Buffer Strip and Setback Requirements

Parameter	**Management Classification and Required Width (ft.)**			
City Classification (MnRAM Equivalent)	**Exceptional (Preserve)**	**High (Manage 1)**	**Medium (Manage 2)**	**Low (Manage 3)**
Minimum Wetland Buffer Width	67	34	24	20
Maximum Wetland Buffer Width	100	60	50	50
Average Wetland Buffer Width	75	50	30	30
Structure Setback from Buffer	15	15	15	15
Average Buffer Plus Setback	90	65	45	45

Table 9. Estimated Classifications of Existing Wetlands

Wetland[1] ID	**On City's Wetland Map**	**City Classification**	**Anticipated Classification (to be based on MnRAM)**
1	Yes	Medium	Medium
2	No	None	Medium or Low
3	Yes	Medium	Medium
5	No	None	Medium or Low
6	Yes	High	High
7	No	None	Medium or Low
8	Yes	Medium	Medium
9	Yes	Medium	Medium

[1]Wetland 4 is not listed because it was found to be off-site, within the railroad right-of-way to the northwest.

Final wetland classifications would be based on MnRAM (Minnesota Routine Assessment Methodology for Evaluating Wetland Functions) analyses that would be completed for wetlands in the project area. Most wetlands in the project area would likely be classified as medium or low because they are either excavated or support invasive species (**Tables 5 and 9**).

Table 10. Anticipated Wetland and Golf Course Pond Impacts

Wetland[1] ID	Size (acres)	Regulated by City Under WCA	Anticipated Impacts (acres)[2]		
			Regulated by City	Not Regulated by City	Total
1	0.46	No	0.00	0.46	0.46
2	0.09	No	0.00	0.09	0.09
3	0.07	No	0.00	0.07	0.07
5	0.08	Yes	0.00	0.00	0.00
6	29.67	Yes	0.00	0.00	0.00
7	0.19	Yes	0.19	0.00	0.19
8	0.20	No	0.00	0.20	0.20
9	0.22	Yes	0.00	0.00	0.00
Total	30.98		0.19	0.82	1.01

[1]Wetland 4 is not listed because it was found to be off-site, within the railroad right-of-way to the northwest.

[2]The USACE has not yet determined whether they would regulate the ornamental golf course ponds. Depending on their determination, impacts regulated by the USACE may be up to 1.01 acres.

Four of the wetlands do not require replacement under the WCA and may not be regulated by the CWA. The project proposer submitted a memo and historical review suggesting that Wetlands 1, 2, 3 and 8 are ornamental golf course ponds that were incidentally created on dry land by excavation. The city approved this wetland No-Loss determination on December 13, 2019 (**Appendix A**). USACE was reviewing information on these wetlands at the time this EAW was distributed. The No-Loss determination means that these ornamental golf course ponds are outside the jurisdiction of the WCA. If found to be incidentally created on dry land for the purpose of providing ornamental golf course ponds, these wetlands would also be outside the regulatory jurisdiction of the CWA, and regulated wetland impacts would be reduced to 0.19 acres. **Appendix A** includes an excerpt from the wetland memo and the city's Notice of Decision approving the incidental determination for Wetlands 1, 2, 3 and 8.

To determine that ornamental golf course ponds are not regulated as wetland, historic aerial photographs from 1937 to 1971 were reviewed to interpret conditions before, during, and after golf course construction (**Table 11**). Wetland signatures were not observed at locations of Wetlands 1, 2, 3, or 8 on aerial imagery prior to construction of the golf course. Therefore, it appears that these wetlands were excavated on dry land for the purpose of creating ornamental golf course ponds. The WCA does not regulate impacts to incidental wetlands, which are defined as wetlands that the landowner can demonstrate, to the satisfaction of the local government unit, were created in non-wetland. Similarly, the definition of waters of the United States under the CWA (33 CFR Part 328.3, November 13, 1986) generally does not include "small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons."

Table 11. Wetland Conditions Observed on Historic Aerial Photographs

Year	Condition Observed
1937	Farmstead present in west portion, entire project area appears farmed or grazed except for the large Wetland 6. No wetlands appear to be present at the location of Wetland 1, 2, 3, or 8.
1945	Similar to 1937. No wetlands appear to be present at the location of Wetland 1, 2, 3, or 8.
1956	Entire project area drained and farmed except for Wetland 6 and area in vicinity of Wetland 7. No wetlands appear to be present at the location of Wetland 1, 2, 3, or 8.
1960	Entire project area drained and farmed except for Wetland 6 and area in vicinity of Wetland 7. No wetlands appear to be present at the location of Wetland 1, 2, 3, or 8.
1962	Wetlands appear to have re-formed in the ditched northwestern and central parts of the project area. No wetlands appear to be present at the location of Wetland 1, 2, 3, or 8.
1967	Golf course present. Ornamental golf course ponds have been excavated at the locations of Wetland 8 and 9.
1971	Similar to 1967.

The project must demonstrate compliance with the WCA and CWA sequencing process by evaluating design alternatives that avoid and minimize effects on wetlands. The project is expected to avoid impacts to Wetlands 5, 6, and 9, which account for 97 percent of the wetland acreage in the project area. If federally regulated wetland impacts exceed one-half acre, the project proposer would need to evaluate alternative site locations and obtain Section 401 Water Quality Certification or waiver from the MPCA to help ensure compliance with state water quality standards. The project avoids and minimizes impacts on wetlands and water resources to the extent practicable by:

1. Designing the overall project layout around existing wetlands and waters to the extent practicable, avoiding roughly 29.97 acres of wetlands;
2. Treating stormwater from impervious surfaces to remove sediment and nutrients prior to discharge to wetlands;
3. Implementing sedimentation and water quality protection BMPs to reduce and eliminate secondary wetland impacts over time; and
4. Creating and preserving buffers around preserved wetlands, identifying wetland buffers with permanent monumentation, and seeding disturbed buffers with appropriate native vegetation.

The project proposer would be required to implement BMPs or other management practices that help reduce and eliminate wetland impacts over time. As required under Part 9.17 of the MPCA's General Stormwater Permit for Construction Activity, the project proposer would maintain either a 50-foot wide natural buffer or a double row of silt fence down-gradient from construction and adjacent to surface waters and wetlands. The project proposer and construction contractors would need to choose appropriate stormwater practices for site conditions and incorporate the practices according to permit guidelines. Stormwater treatment basins would be designed to treat runoff from impervious surfaces and help maintain the hydrology of preserved wetlands either through discharge of treated surface runoff or infiltration.

After wetland impacts are avoided and minimized to the extent practicable, unavoidable wetland impacts regulated under the WCA or CWA would need to be offset by compensatory mitigation. It is anticipated that the WCA would require wetland replacement at a ratio of 2:1 and that the Army Corps of Engineers would require 1:1 to 2:1 compensatory mitigation within the same Bank Service Area as the wetland impacts. The project proposer would be required to provide wetland replacement through the purchase of approved wetland credits from appropriate wetland banks, or by constructing replacement wetland area on-site. The purchase of wetland credits has generally been preferred by regulatory agencies in recent years. The credits purchased for compensatory mitigation would depend upon credit balances available for sale when wetland impacts are proposed.

b) *Other Surface Waters. Describe any anticipated physical effects or alterations to surface water features (lakes, streams, ponds, intermittent channels, county/judicial ditches) such as draining, filling, permanent inundation, dredging, diking, stream diversion, impoundment, aquatic plant removal and riparian alteration. Discuss direct and indirect environmental effects from physical modification of water features. Identify measures to avoid, minimize, or mitigate environmental effects to surface water features, including in-water Best Management Practices that are proposed to avoid or minimize turbidity/sedimentation while physically altering the water features. Discuss how the project will change the number or type of watercraft on any water body, including current and projected watercraft usage.*

The project is not expected to affect (drain, fill, permanently inundate, dredge, dike, divert, or result in removal of aquatic plants) other surface water features such as lakes, streams, ponds, intermittent channels, or county/judicial ditches. Some surface water maps, especially older ones, show a ditched channel draining through the golf course and into Wetland 6 located in the southeast portion of the project area. However, that channel was placed in a sub-surface pipe when the golf course was constructed in 1965. Since that time, all surface water ditches on the site have been contained within Wetland 6.

12. Contamination / Hazardous Materials / Wastes

a. *Pre-project site conditions - Describe existing contamination or potential environmental hazards on or in close proximity to the project site such as soil or ground water contamination, abandoned dumps, closed landfills, existing or abandoned storage tanks, and hazardous liquid or gas pipelines. Discuss any potential environmental effects from pre-project site conditions that would be caused or exacerbated by project construction and operation. Identify measures to avoid, minimize or mitigate adverse effects from existing contamination or potential environmental hazards. Include development of a Contingency Plan or Response Action Plan.*

Investigations have evaluated the potential for environmental contamination that may have resulted from past use of the site as a golf course. Environmental sampling detected various chemicals in the soils, but only mercury and diesel range organics were detected at levels that would require cleanup. These chemicals were detected only in surface soils. The investigations did not detect contamination in soils more than 6 inches deep or in groundwater.

Soils contaminated with mercury would need to be isolated and managed in an on-site soil management area or transported off-site and disposed of in compliance with a response action plan approved by the Minnesota Pollution Control Agency (MPCA). Similarly, soils affected by

petroleum products would be excavated and disposed of off-site or managed on-site in accordance with an MPCA-approved response action plan.

Phase I Environmental Site Assessment

The project area has been used as a golf course since 1965 and was used as cropland at least as far back as 1937. Braun Intertec completed a Phase I Environmental Site Assessment (Phase 1 ESA) of the Hollydale Golf Course in June 2019. The Phase I ESA identified the following:

1. Two 300-gallon above-ground fuel storage tanks used for diesel and gasoline. No obvious indications of spills or leaks from the tanks were observed. Soils beneath the tanks appeared bare and somewhat discolored with no vegetation.
2. Storage of hazardous substances and petroleum products for equipment and golf course maintenance. The products appeared to be appropriately stored with no indication of leaks or spills.
3. Two above-ground propane tanks, which were not considered a potential source of contamination.
4. No indication of underground storage tanks located in the project area.
5. Two remote restrooms, each with their own septic system.
6. Past use of mercury-containing fungicide on golf greens, as discussed under Soils Investigation below.

A regulatory database report included in the Phase I ESA identified two spills associated with the history of the project area:

1. A fire that occurred in a storage shed on June 22, 1995 was recorded as a "spill" in databases held by the Minnesota Pollution Control Agency, Minnesota Department of Agriculture, and Minnesota State Patrol. The city's Fire Inspector reviewed the project area and found that the fire did not result in a release of hazardous substances or petroleum products.
2. Thirty gallons of non-PCB mineral oil spilled from an electrical transformer near the clubhouse on May 12, 1999. The Phase I assessment indicated that spill response actions were completed and the spill was assigned a closed status.

The Phase I ESA identified the following recognized environmental conditions. These conditions were evaluated further under the Phase II Environmental Site Assessment:

1. Petroleum products stored in above-ground storage tanks with no secondary containment. This condition suggested the potential for petroleum releases from the tanks.
2. Use of the site for storage, mixing, and application of agricultural chemicals. This condition suggested the potential for agricultural chemical releases to the soil and groundwater.
3. Use of mercury-based fungicide at the site. Repeated historical application of the fungicide suggested the potential for accumulation of mercury in the soils.

Phase II Environmental Site Assessment

Braun Intertec completed a Phase II Environmental Site Assessment (Phase II ESA) of the Hollydale Golf Course in November 2019 to investigate the recognized environmental conditions listed above. The Phase II ESA summarized results of soil and groundwater sampling in the project area during May to October of 2019 (**Appendix D**).

Golf course management practices have involved storage, mixing, and application of agricultural chemicals, including mercury-based fungicide. Repeated historical application of the fungicide results in an accumulation of mercury in the soils over time.

Soil samples were collected from the golf course, the wash area, and from beneath the above-ground storage tanks. Greens, fringes of greens, and tee boxes were sampled within the golf course. Soil samples were analyzed for total mercury, heavy metals, volatile organic compounds, polycyclic aromatic hydrocarbons, pesticides and diesel range organics. Results of soil analysis were compared to safety and risk-based contaminant concentrations set by the Minnesota Pollution Control Agency.

Eight heavy metals were detected in analyzed soil samples, but only mercury was detected at levels considered unsafe for people. Mercury and arsenic were the only heavy metals detected at levels considered to have potential for groundwater contamination. However, neither mercury nor arsenic were detected in the groundwater samples collected at the site. This indicates these metals are not leaching to the groundwater. Arsenic concentrations in soils were within the range considered safe for people. Arsenic was not detected in groundwater.

Samples taken in the top six inches of golf green soils indicated total mercury concentrations ranged from 0.28 milligrams per kilogram (mg/kg) to 77.2 mg/kg. Most surface soil samples from golf greens exceeded the 0.5 mg/kg mercury concentration considered safe for people and the 3.3 mg/kg level considered to have potential for groundwater contamination. However, soil samples from depths below 6 inches had low levels of heavy metal concentrations (considered safe for people), and heavy metals were not detected in groundwater samples. The analysis indicated that mercury concentrations that need to be addressed are limited to the top six inches of soils within golf greens.

The mercury in shallow soils on the golf greens likely resulted from use of fungicides to control snow mold. Contaminated soil would need to be isolated and managed on-site in a soil management area or transported off-site and disposed. Management of affected soils would be completed in compliance with an MPCA-approved response action plan that would be prepared in support of the proposed development. Contaminated soil would be managed in compliance with regulations to help protect human health, safety, and the environment.

Pesticides and volatile organic compound concentrations in soils were within the ranges considered safe for people. Volatile organic compounds were not detected in soil samples from depths of 2.0 to 2.5 feet below the surface.

Five surface samples were analyzed for diesel range organics. Diesel range organics were not detected in two samples and detected at safe levels in two other samples. One sample from directly below an above-ground storage tank had diesel range organics at a level above the regulatory cleanup threshold. Samples from deeper soils had lower diesel range organic concentrations that fell below the regulatory cleanup threshold. Concentrations of diesel range organics in surface soils likely resulted from small surface spills accumulating over time. Petroleum-impacted soils would be excavated during an early phase of the development process and disposed of off-site or managed on-site in accordance with an MPCA-approved response action plan. Petroleum products were not detected in groundwater.

Polycyclic aromatic hydrocarbons were detected in three of the five soil samples analyzed. The concentrations were within levels considered safe for people and below levels requiring cleanup.

Temporary monitoring wells were installed in two of the soil borings to evaluate groundwater conditions in the vicinity of the above-ground fuel storage tanks and maintenance areas. Volatile organic compounds, polycyclic aromatic hydrocarbons, and diesel range organics were not detected in groundwater samples. Dissolved barium was the only heavy metal detected in groundwater, and occurred at concentrations considered safe for people. Soil and groundwater sampling and analysis results are included in **Appendix D**.

Contaminated surface soils were limited to golf greens and an area beneath an above-ground storage tank. These soils would need to be managed consistent with an MPCA-approved response action plan to address concentrations of mercury and diesel range organics. Deeper soils and groundwater do not require cleanup.

What's in My Neighborhood?

Review of MPCA and Minnesota Department of Agriculture (MDA) "What's in My Neighborhood?" interactive websites identified a very small quantity hazardous waste generator site at the Hollydale Golf Course. Within a one-quarter mile radius of the project area, the MPCA and MDA websites identified nine sites with MPCA construction stormwater permits, one MPCA hazardous waste site, and one MDA small spill (**Table 12**).

Table 12. What's in My Neighborhood? --MPCA and MDA Sites near Project Area

Agency	Site ID	Type	Name	Direction from Project
MPCA	229182	Hazardous Waste, Very small quantity generator	Hollydale Golf Course	Clubhouse location
MPCA	231547	Construction Stormwater	Timbers Edge	0.1 miles W
MPCA	136281	Hazardous Waste	House Demolition	0.25 miles NW
MPCA	8372	Construction Stormwater	Nanterre	0.20 miles E
MPCA	57843	Construction Stormwater	Seven Greens Addition	0.25 miles E
MPCA	151110	Construction Stormwater	Vicksburg Lane Reconstruction	0.20 miles E
MPCA	149367	Construction Stormwater	Vicksburg Ridge	0.25 miles E

Agency	Site ID	Type	Name	Direction from Project
MPCA	100952	Construction Stormwater	Plymouth Covenant Church	0.20 miles E
MPCA	140604	Construction Stormwater	Plymouth Covenant Church	0.20 miles E
MDA	181101000275	Small Spills & Investigations	Adams Pest Control	0.20 miles E
MPCA	6136	Construction Stormwater	Conor Meadows 2nd Addition	0.15 miles SE
MPCA	220662	Construction Stormwater	Creekside Woods	0.20 miles SE

Sites listed as construction stormwater permits relate to recent construction projects approved in the vicinity of the proposed project. Hazardous wastes generated at the golf course would be addressed in connection with demolition, as discussed under **Item 12.d**. The other listed hazardous waste site and the small spill site are listed as inactive or closed. Available information suggests these sites have been properly investigated and managed. As a result, they are not expected to affect the project area.

b. *Project related generation/storage of solid wastes - Describe solid wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from solid waste handling, storage and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of solid waste including source reduction and recycling.*

Project construction would require demolition of existing structures, including those on the golf course and the farmstead located along Holly Lane, as well as remote golf course restrooms. Prior to demolition, a survey would be completed to identify potentially hazardous materials and those materials would be managed appropriately as described in **Item 12.d**. Structures would be demolished after hazardous materials are removed or managed appropriately. To the extent feasible, demolition is expected to segregate recyclable materials such as concrete, blacktop and metals. Materials that are not recycled would be managed by the demolition contractor and disposed of at one of several MPCA-permitted demolition landfill facilities in the greater metropolitan area.

Construction of new residential neighborhoods is expected to generate waste, including scraps of wood and other construction materials. On-site construction debris would likely be stored in roll-off dumpsters that would be hauled to an MPCA-permitted solid waste disposal facility. Some construction waste may be recycled by contractors as feasible. The construction process may also generate small quantities of hazardous wastes (e.g., oils, greases, solvents) as a result of routine use and maintenance of construction equipment. Contractors would be responsible for disposing of such wastes in accordance with state requirements as further discussed in **Item 12.d**. It is anticipated that grading for streets and residential lots would balance the cut and fill quantities of soils, avoiding the need to dispose of excess earthen material.

After construction, residents of the area would generate mixed municipal solid waste. Most solid waste is expected to include organics, paper, other waste, and plastic (**Table 13**). Municipal solid

waste generated by the project would be managed through a routine, scheduled disposal plan using garbage (solid waste) haulers licensed by the city. The licensed haulers would truck solid waste to approved nearby disposal facilities such as the Rolling Hills Landfill in Buffalo, the Elk River Landfill, or the Elk River Energy Recovery Station. The Elk River Energy Recovery Station converts mixed municipal solid waste into energy as refuse-derived fuel. Using waste to generate electricity provides an efficient disposal method for garbage and prevents garbage from going to landfills.

Table 13. Estimated Solid Waste Composition

Waste Type	Estimated %
Organic	31.0
Paper	24.5
Other	18.3
Plastic	17.9
Hazardous	0.4
Metal	4.5
Glass	2.2
Electronics	1.2
Total	100.0

Source: 2013 Statewide Waste Characterization (Burns & McDonnell for MPCA 2013).

The city has a curbside recycling program for paper, plastic, glass, and metal, and promotes recycling programs so that recyclables can be removed from the waste stream instead of being disposed of at sanitary landfills. Toward that goal, the city contracts with Republic Services to provide every-other-week curbside recycling service to single-family through eight-plex residences. Participation in the recycling program by future residents of the project area is expected to help mitigate the amount of solid waste to be generated by the development and going to landfills.

Neither the construction process nor the proposed residential development is expected to generate substantial solid or hazardous wastes, solid animal manure, sludge, or ash. Construction contractors would be required to dispose of wastes generated during construction using approved methods and facilities. It is anticipated that contractors would minimize and mitigate adverse effects from solid waste generation and storage by recycling construction waste to the degree practicable. Brush and tree waste generated by construction would likely be chipped or otherwise recycled rather than burned.

c. *Project related use/storage of hazardous materials - Describe chemicals/hazardous materials used/stored during construction and/or operation of the project including method of storage. Indicate the number, location and size of any above- or below-ground tanks to store petroleum or other materials. Discuss potential environmental effects from accidental spill or release of hazardous materials. Identify measures to avoid, minimize or mitigate adverse effects from the use/storage of chemicals/hazardous materials including source reduction and recycling. Include development of a spill prevention plan.*

Development of the project area is not expected to generate or require storage of substantial amounts of hazardous wastes or materials. Project construction may include some temporary storage of

potentially hazardous substances, such as diesel fuel for construction vehicles. Temporary storage of such hazardous materials would need to be secured by contractors. Future residential development is expected to result in the storage or generation of small amounts of typical household cleaners, paints, lubricants, and small engine fuels over time. Petroleum storage tanks and commercial petroleum-based businesses are not proposed in the project area.

d. Project related generation/storage of hazardous wastes - Describe hazardous wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from hazardous waste handling, storage, and disposal. Identify measures to avoid, minimize or mitigate adverse effects from the generation/storage of hazardous waste including source reduction and recycling.

The project area includes the golf clubhouse, storage and maintenance buildings, and a farmstead with a single-family home. Asbestos-containing materials, lead-based paint, or other hazardous building materials could be present in existing structures because most or all buildings were constructed prior to 1973. The golf course owner indicated the barn is over 100 years old and the maintenance building was constructed in the mid-1990s. Other existing structures were generally constructed in the 1960s and 1970s with subsequent remodels and additions. Prior to demolition, hazardous materials, including pesticides and petroleum products, should be identified and properly removed or managed.

During demolition, contractors may find other materials containing hazardous materials, such as mercury-containing light fixtures or chlorofluorocarbon-containing equipment. The existing clubhouse and farmstead were constructed prior to 1978, the year lead-based paints were banned.

Contractors must comply with established BMPs during demolition and construction, including BMPs for the handling of chemical and hazardous materials. Hazardous waste would be hauled to the appropriate Hennepin County disposal site.

Homeowners would be responsible for management and disposal of hazardous wastes after development. Homeowners would be able to dispose of household hazardous waste at appropriate Hennepin County recycling facilities.

13. Fish, Wildlife, Plant Communities and Sensitive Ecological Resources (Rare Features)

a. Describe fish and wildlife resources as well as habitats and vegetation on or in near the site.

Fish and wildlife resources on and near the project area are related to the composition, quality, size, and connectivity of plant communities such as manicured turf, woodlands, and wetlands. Vegetation cover type mapping in the project area was based on aerial photography, the wetland delineation, and field reviews (**Figures 6 and 7**). The project area consists of golf course turf and trees (78%), wetlands and ponds (20%), and building sites (2%). Habitats in the project area are used by a variety of wildlife species common in east-central Minnesota, including species adapted to mowed turf, suburban tree cover, emergent wetlands, and open water. Such species include white-tailed deer, songbirds, waterfowl, small mammals, and amphibians.

The project area falls in the Eastern Broadleaf Forest Province of the Minnesota DNR Ecological Classification System and the Big Woods Level IV Ecoregion of the U.S. Environmental Protection Agency. This region generally consists of rolling plains covered primarily by row crops with some lakes, pastures, and suburban development. Prior to modern settlement, much of this ecoregion was covered by extensive hardwood forest.

Much of the project area has limited wildlife habitat value because it is occupied by golf course and building sites. The Hollydale Golf Course consists mostly of manicured turf dominated by species like Kentucky bluegrass and bentgrass. The golf course also includes a variety of planted and naturally occurring deciduous and coniferous trees. Deciduous trees include aspen, green ash, oak, silver maple, boxelder, and willow. Common buckthorn (a non-native, invasive species) is predominant in the understory of wooded areas on the golf course. Conifers include mostly white spruce with some red pine. Trees on the golf course range from roughly 4 to 30 inches in diameter. A tree inventory would be conducted as part of any future preliminary plat application.

Wetlands in the project area consist primarily of open water, duckweed, and cattail, with areas or fringes of green ash, willows, reed canary grass, jewelweed, beggarticks, smartweed, red-osier dogwood, tearthumb, nettle, sedges, and fowl bluegrass (**Table 5**). Small areas of unmowed grassland are dominated by smooth brome, Kentucky bluegrass, and Canada goldenrod, with scattered small red cedar trees and prickly ash shrubs.

*b. Describe rare features such as state-listed (endangered, threatened or special concern) species, native plant communities, Minnesota County Biological Survey Sites of Biodiversity Significance, and other sensitive ecological resources on or within close proximity to the site. Provide the license agreement number (**LA-890**) and/or correspondence number (**ERDB 2019____**) from which the data were obtained and attach the Natural Heritage letter from the DNR. Indicate if any additional habitat or species survey work has been conducted within the site and describe the results.*

State

A Natural Heritage Inventory System data request was submitted to the Minnesota DNR to assess whether known locations of rare plant or animal species or other significant natural features are known to occur within a roughly one-mile radius of the project area. Kjolhaug Environmental Services also queried a licensed copy of the Natural Heritage database to assess rare species and natural features pending a response from the Minnesota DNR.

The only occurrences of rare species or features identified within a one-mile radius of the project area were two natural communities, a mesic Maple-Basswood Forest and a mesic Red Oak-Sugar Maple-Basswood Forest. Both communities are separated from the project by at least a quarter mile and neither community is expected to be adversely affected by the proposed project.

Federal

Online information on rare species information maintained by the U.S. Fish and Wildlife Service was also reviewed for the project area. The Wildlife Service listed the northern long-eared bat (*Myotis septentrionalis*) as federally threatened on May 4, 2015. On February 2, 2017, they listed

the rusty patched bumble bee (*Bombus affinis*) as federally endangered. The project is not expected to affect federally threatened or endangered species for reasons explained below.

The northern long-eared bat hibernates in caves during winter and establishes maternity roosting colonies under the loose bark of trees during the summer. The project area does not contain caves and includes limited tree cover. As of April 1, 2019, Minnesota DNR data showed no documented maternity roost trees or hibernacula entrances of the northern long-eared bat in or near the project area (http://files.dnr.state.mn.us/eco/ereview/minnesota_nleb_township_list_and_map.pdf).

Review of the Wildlife Service Rusty Patched Bumble Bee Map indicates the project area falls within a high potential zone (https://www.fws.gov/midwest/Endangered/insects/rpbb/rpbbmap.html). This means that the rusty patched bumble bee is likely to be present where suitable habitat exists.

Most habitats suitable for rusty patched bumble bees in the Upper Midwest have been converted, fragmented, or degraded by agriculture or other land uses. Prior to this degradation, rusty patched bumble bees occupied grasslands and tallgrass prairies. 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).

The Wildlife Service Endangered Species Guidance for rusty patched bumble bees indicates the species requires access to a diverse array of plant species that collectively provide pollen and nectar throughout the species' long active season, from April through September. Site reviews conducted during field investigations and an interview with the golf course owner indicated that native prairie plantings with diverse native wildflowers have not been preserved or established in the project area. However, the project may require consultation with the Wildlife Service under Section 7 of the Endangered Species Act if it requires a federal permit, such as a Section 404 permit from the Army Corps of Engineers.

Review of the Wildlife Service Information for Planning and Consultation website (https://ecos.fws.gov/ipac/) with a polygon encompassing the project area identified the northern long-eared bat and rusty patched bumble bee as threatened or endangered that may potentially be affected by activities within the project area. The website also noted that there are no critical habitats at this location.

c. *Discuss how the identified fish, wildlife, plant communities, rare features and ecosystems may be affected by the project. Include a discussion on introduction and spread of invasive species from the project construction and operation. Separately discuss effects to known threatened and endangered species.*

Residential development is expected to convert roughly 122.91 acres of golf course, 1.3 acres of woodland, 1.01 acres of wetlands and ornamental golf course ponds, and 1.8 acres of impervious surface to streets, homes, lawns, landscaping, and stormwater features. The existing 1.8 acres of impervious surface would increase by about 37.2 acres. The project is expected to avoid and preserve about 0.19 acre of grassland, 1.4 acres of woodland, and 29.97 acres of wetland.

This habitat conversion is expected to affect the number and type of wildlife species in the area, but changes in wildlife abundance are not expected to be regionally significant. The golf course includes extensive areas of manicured turf with limited wildlife habitat value. Wildlife species that depend on a manicured turf with patches of woodland and wetland could be displaced during project construction. Species adapted to suburban habitats are expected to be affected primarily by short-term construction impacts. Non-migratory species with small home ranges such as small mammals may experience more adverse effects during project construction.

Development of the project area is not expected to have substantial effects on rare species and sensitive natural communities. The two natural communities identified by the Natural Heritage database search are located off-site and would not be physically affected by the proposed project.

The project is not likely to adversely affect the northern long-eared bat or substantially affect its habitat because there are no known maternity roosts or hibernacula of this species in or near the project area. The woodlands in the project area are not known or likely to support maternity roost colonies for these bats. The project includes measures to minimize any potential effects on the northern long-eared bat and its habitat. The project would preserve roughly 29.97 acres of wetland and 1.4 acres of woodland.

The project area is not known to contain highly suitable habitat for the rusty patched bumble bee, and the proposer has agreed to seek advanced informal consultation with the Wildlife Service to confirm that the project is not likely to adversely affect this bee or its habitat. If suitable habitat is found in the project area, the project proposer would work with the Wildlife Service to offset habitat impacts with native prairie plantings to be established in common areas of the project that would be managed by the homeowners' associations.

Although project construction is expected to slightly increase the potential for the spread of invasive and weedy species, much of the project area has been previously disturbed by golf course construction. BMPs may include the cleaning of construction equipment before transport, which may reduce the potential spread of invasive species.

d. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to fish, wildlife, plant communities, and sensitive ecological resources.

Measures to minimize and mitigate adverse effects on wildlife include: 1) preservation of, and buffer establishment on, roughly 29.97 acres of wetland; 2) preservation of roughly 1.4 acres of woodland; 3) creation of roughly 6.5 acres of stormwater basins; and 4) providing natural vegetation in parts of the common spaces and drainage corridors that would be created behind residential lots.

14. Historic Properties

Describe any historic structures, archeological sites, and/or traditional cultural properties on or in close proximity to the site. Include: 1) historic designations, 2) known artifact areas, and 3) architectural features. Attach letter received from the State Historic Preservation Office (SHPO). Discuss any anticipated effects to historic properties during project construction and operation. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to historic properties.

Nienow Cultural Consultants completed an Archaeological Literature Review Phase Ia Letter Report for the project area in September 2019. The review found there are no archaeological sites within the project area. Nienow did not recommend that any additional archaeological surveys be completed for the project. This recommendation was based on project area geography, known archaeological sites, research previously completed within two miles, and clear evidence of project area disturbance-based on-site history and aerial photography.

The literature review identified five previously inventoried archaeological sites located within two miles of the project area (**Table 14**). Results showed no archaeological sites within one mile of the project area. Aerial photographs show large-scale alterations/disturbances to the landscape, which would have significantly impacted any archaeological material that may have been present.

Turn of century topographic maps indicate the property was likely in agricultural production by 1902. The property has been in either agricultural or golf course use for more than one hundred years. The golf course owner indicated the farmstead is over 100 years old and the golf course maintenance building was constructed in the mid-1990s. Other existing structures were generally constructed in the 1960s and 1970s with subsequent remodels and additions.

In September 2019, the Phase Ia Archaeological Letter Report was submitted to the Minnesota State Historic Preservation Office (SHPO) with a Request for Project Review and photographs of the farmstead. The SHPO responded in October 2019 and concluded that there are no properties listed in the National and State Registers of Historic Places and no known or suspected archaeological properties in the area that would be affected by this project. Based on the response from SHPO, no further archaeological or historic architectural review is considered necessary for this project because the project is not expected to affect known or suspected cultural resources. The response from SHPO, the Archaeological Phase 1a Letter Report, and the Request for SHPO Project Review is included in **Appendix E**.

Table 14. Previously Inventoried Archaeological Sites Within Two Miles of Project

Site No.; Name	Distance from Site	Type of Site	Artifacts	Landform	Reference
21HE0248; Vicksburg Lane I&II	2.25 Miles NE	Pre-Contact	Lithic Scatter Debitage	Wetland/Forest Now a Park	Christina Harrison HE-94-18 (Report)
21HE0253; Wayzata School	1 Mile NW	Pre-Contact	2 Secondary Chert Flakes	Upland Terrace west of Elm Creek	Christina Harrison HE-94-26 (Report)
21HE0258; Ostrum Terrace	2.5 Miles N	Pre-Contact	1 Chert Decortication Flake	Ridgeline west of Elm Creek	Christina Harrison HE-95-15 (Report)
21HE0259; Oetjen Peninsula	1.75 Miles N	Pre-Contact	1 Flake-Basal Segment Decortication Flake	Terrace west of Elm Creek	Christina Harrison HE-95-15 (Report)
21HE0261; CSAH 61	1.75 Miles SE	Pre-Contact	1 Corner Notched Point	Terrace east of Plymouth Creek	Scott Anfinson MCH-84-01

15. Visual

Describe any scenic views or vistas on or near the project site. Describe any project related visual effects such as vapor plumes or glare from intense lights. Discuss the potential visual effects from the project. Identify any measures to avoid, minimize, or mitigate visual effects.

There are no scenic views or vistas located on or adjacent to the project area, and substantial effects on visual resources are not anticipated in conjunction with project development. Although the golf course is visible from higher elevations around the project area, the abundance of trees and other vegetation throughout the project area generally obscures long views and open landscapes.

The project may affect some views from nearby homes, but it is expected to result in routine effects on visual resources. The project proposer has included design elements in the project to minimize visual effects on nearby homeowners. Open space buffers would help visually separate proposed residential lots from adjoining residential developments. The project design includes interior open spaces that would increase visual variety and help segment the development into small neighborhoods. Homes constructed in the project area would need to meet building height and setback requirements. As a result, the proposed development is expected to have visual continuity with surrounding residential land uses. Landscape plantings are expected to soften visual transitions and help mitigate effects on views from nearby residential areas and roadways. The project would not include industries that would emit vapor plumes.

The project would not involve installation of intense light that would cause glare. The project area is located in Lighting Zone 1 (LZ1), as are all of the abutting residential properties. Any lighting associated with single-family development would need to meet the requirements specified in Section 21105.06, Subd. 7 (c). These include compliance with pre-curfew light trespass limitations, restriction of motion activated lighting beyond a lot line, and criteria for recreation-associated lighting (i.e., sport courts, hockey rinks, or similar features).

16. Air

a. *Stationary source emissions. Describe the type, sources, quantities and compositions of any emissions from stationary sources such as boilers or exhaust stacks. Include any hazardous air pollutants, criteria pollutants, and any greenhouse gases. Discuss effects to air quality including any sensitive receptors, human health or applicable regulatory criteria. Include a discussion of any methods used assess the project's effect on air quality and the results of that assessment. Identify pollution control equipment and other measures that will be taken to avoid, minimize, or mitigate adverse effects from stationary source emissions.*

The project does not include heavy industrial facilities or stationary source air emissions. New residences are expected to have heating and cooling systems connected to natural gas and electricity, most or all of which would be direct or indirect sources of stationary source emissions. Emissions from heating and cooling units are expected to be similar to those of other residential buildings in the surrounding area.

b. Vehicle emissions. Describe the effect of the project's traffic generation on air emissions. Discuss the project's vehicle-related emissions effect on air quality. Identify measures (e.g. traffic operational improvements, diesel idling minimization plan) that will be taken to minimize or mitigate vehicle-related emissions.

The project would generate traffic, which would result in a relatively small corresponding increase in carbon monoxide, carbon dioxide, and other vehicle-related air emissions. Project development is expected to have a negligible effect on air quality. The project does not include air quality monitoring, modeling, or measures to mitigate effects on air quality.

c. Dust and odors - Describe sources, characteristics, duration, quantities, and intensity of dust and odors generated during project construction and operation. (Fugitive dust may be discussed under item 16a). Discuss the effect of dust and odors in the vicinity of the project including nearby sensitive receptors and quality of life. Identify measures that will be taken to minimize or mitigate the effects of dust and odors.

The project is not expected to generate dust or odors at levels considered unusual for suburban development construction practices. Dust and odors produced during project construction are expected to be consistent with applicable regulations of the city and MPCA. Dust, odors, and noise levels are expected to be slightly higher during project construction than during project operations.

The construction process is expected to generate some fugitive dust, but dust generation is expected to be typical of residential developments of this type and limited to dry time periods during site grading. Airborne dust will be reduced by spraying water if needed. Dust receptors near the project area include residential areas located in all directions. Odors routinely generated during construction would be typical of those associated with construction activity, such as exhaust from diesel- and gasoline-powered construction equipment.

Consideration would be given to suppression of airborne dust by application of water if fugitive dust generation during grading exceeds levels typically expected during normal construction practices.

17. Noise

Describe sources, characteristics, duration, quantities, and intensity of noise generated during project construction and operation. Discuss the effect of noise in the vicinity of the project including 1) existing noise levels/sources in the area, 2) nearby sensitive receptors, 3) conformance to state noise standards, and 4) quality of life. Identify measures that will be taken to minimize or mitigate the effects of noise.

Existing ambient noise within the project area comes from the following sources:

- Canadian Pacific Railway – averages 20 to 24 trains per 24-hour period and operates 24 hours per day (cuts diagonally through the extreme northwest corner of the project area);
- Wayzata High School football stadium/athletic facilities – seasonal during home games and school-sanctioned events (located roughly 0.75 miles to the west);
- Providence Academy football stadium/athletic facilities – seasonal during home games and school-sanctioned events (located roughly 0.65 miles to the east);

- Plymouth Gun Club – trap and skeet shooting certain weekday evenings and Saturdays (located roughly 0.34 miles to the north); and
- Incidental road noise emanating from Schmidt Lake Road – primarily from engines and rolling tires (located roughly 500 feet to the north).

It is anticipated that local noise levels would temporarily increase during project construction, but noise levels are expected to be at or near existing levels after construction is complete. Noise levels on and adjacent to the project area could vary considerably during construction, depending on the amount of construction that occurs simultaneously, the time of operation, and the distance between construction equipment and receptors.

Noise receptors near the project area include residential areas located in all directions. Residences near the project area would experience elevated noise levels at various times during construction compared to existing noise levels. Grading and excavation would require heavy equipment, such as scrapers, bulldozers, and other excavating equipment. Contractors would be required to minimize noise impacts by maintaining equipment properly, including the use of mufflers and other noise controls as specified by manufacturers.

Pursuant to city engineering guidelines, noise generated from grading and development construction operations (e.g., installation of public streets and utilities) is limited to between 7 AM and dusk on weekdays, and between 8 AM and 6 PM on Saturdays. No such work is allowed on Sundays or Holidays.

Pursuant to city ordinance, noise generated from residential building construction is limited to between 7 AM and 10 PM on weekdays, and between 8 AM and 9 PM on weekends and holidays.

18. Transportation

a. Describe traffic-related aspects of project construction and operation. Include: 1) existing and proposed additional parking spaces, 2) estimated total average daily traffic generated, 3) estimated maximum peak hour traffic generated and time of occurrence, 4) indicate source of trip generation rates used in the estimates, and 5) availability of transit and/or other alternative transportation modes.

SRF Consulting completed a traffic study to estimate the number of trips that would be generated by the Hollydale Residential Development, and to evaluate the potential need for transportation or roadway improvements. The complete traffic study is included in **Appendix F**.

Existing and Proposed Parking Spaces

Hollydale Golf Course is presently served by roughly 123 parking spaces. The project would replace the golf course with up to 319 single-family homes, each of which would include its own garage and driveway to accommodate parking for the residents. City ordinance requires a minimum of two on-site parking spaces per dwelling unit for single-family homes. Additionally, roughly five acres of land in the northwest portion of the site would be dedicated for public park purposes. It is anticipated that future development of the public park would include 7 to 10 parking spaces.

Estimated Traffic Generation

Trip generation was estimated using the methodology outlined in the *Institute of Transportation Engineers (ITE) Trip Generation Manual, Tenth Edition (2017)*. The project is expected to generate roughly 236 AM peak hour trips, 270 school departure peak hour trips, 316 PM peak hour trips, and 3,011 average daily trips (**Table 15**).

Table 15. Project Trip Generation Estimates

Land Use	AM Peak Hour Trips			School Departure Peak Hour Trips			PM Peak Hour Trips			Average Daily Trips*
	In	Out	Total	In	Out	Total	In	Out	Total	
319 Single-Family Dwelling Units	59	177	236	170	100	270	199	117	316	3,011

***** *Note: A round trip equals two trips*.

Based on the traffic volumes collected, the AM peak traffic hour occurs between 7:15 and 8:15 AM, the school departure peak traffic hour occurs between 2:45 and 3:45 PM, and the PM peak traffic hour occurs between 5:00 and 6:00 PM.

To understand the change in trip generation for the site as compared to the golf course use, the existing golf course trip generation information from both the peak summer and September periods were used. The net new trips are expected to range from 180 to 224 in the AM peak hour, from 206 to 236 in the school departure peak hour, and from 224 to 297 in the PM peak hour. The net new average daily trips for the site are expected to range from 2,461 to 2,711, depending on the time of the year. This information is based on historical "rounds played" data provided by the golf course, as well as by observed data collected as part of the traffic study.

Availability of Transit and Alternative Transportation

To serve residents and businesses in the community, the city operates Plymouth Metrolink, which presently includes 13 bus routes and four park-and-ride lots. The city also operates Plymouth Dial-A-Ride bus service. Another transit option includes Transit Link, which is available to the general public and intended to serve areas where regular transit route service is not available.

Transit service is presently available southwest of the project area, via bus route 776 (express service to downtown Minneapolis) which includes a bus stop at Old Rockford Road and Peony Lane. This route operates during the AM and PM peak travel periods. Existing sidewalks/trails in the area provide pedestrian access to the bus stop, and the project would extend the existing sidewalk/trail system along Holly Lane to provide a pedestrian connection between Old Rockford Road and Schmidt Lake Road. Additionally, a sidewalk would be installed along one side of all new streets within the project.

b. Discuss the effect on traffic congestion on affected roads and describe any traffic improvements necessary. The analysis must discuss the project's impact on the regional transportation system. If the peak hour traffic generated exceeds 250 vehicles or the total daily trips exceeds 2,500, a traffic impact study must be prepared as part of the EAW. Use the format and procedures described in the Minnesota Department of Transportation's Access Management Manual, Chapter 5 (available at: http://www.dot.state.mn.us/accessmanagement/resources.html) or a similar local guidance.

The traffic study concluded that the project would have minimal effects on the local and regional transportation system. No mitigation to either traffic controls or roadway geometry is warranted to accommodate the project. However, from a safety and sight distance perspective, the traffic study recommends modification of the Schmidt Lake Road/Comstock Lane intersection to a three-quarter access that prohibits northbound left turns.

c. Identify measures that will be taken to minimize or mitigate project related transportation effects.

Regardless of the project, the city has budgeted for improvements to the Schmidt Lake Road/Peony Lane intersection in 2020 to help address traffic delays and improve safety in the area. The following changes could improve operations:

- Construction of a right-turn lane from southbound Peony Lane into the main parking lot at Wayzata High School.
- Removal of the crosswalk on the north side of the Peony Lane/51st Avenue intersection.
- Removal of the northbound inside through-lane on Peony Lane starting south of the railroad bridge.

Although the traffic study concluded that no mitigation is necessary to accommodate the project from a capacity perspective, it offered the following recommendations to address and improve safety:

- Given the current and future traffic volumes along Schmidt Lake Road, converting that roadway from a four-lane undivided roadway to a three-lane roadway (i.e., a two-lane roadway with a shared center two-way left-turn lane) would help to reduce travel speeds on Schmidt Lake Road and improve sightlines at some intersections.
- Converting the Schmidt Lake Road/Comstock Lane intersection to a three-quarter access that prohibits northbound left turns would alleviate a sight-distance issue. This configuration would also allow the potential for an enhanced pedestrian crossing of Schmidt Lake Road, helping to further reduce travel speeds on Schmidt Lake Road.

19. Cumulative Potential Effects

Preparers can leave this item blank if cumulative potential effects are addressed under the applicable EAW Items.

a. Describe the geographic scales and timeframes of the project related environmental effects that could combine with other environmental effects resulting in cumulative potential effects.

The project covers 158.58 acres and would include up to 319 single-family residential lots with homes that are expected to be constructed over the next three to five years. Seven other developments located within one mile of the project merit review (**Table 16**). These include six residential developments and one retail center. All are located within Plymouth. Some of these projects would be under construction at the same time as the proposed project, and the operational timing of all of these projects could overlap. Consequently, these projects could potentially interact to result in cumulative effects.

Table 16. Current Developments within one mile of the Project Area

Name	Description	Status	Distance from Project
Timbers Edge Residential	40 single-family lots on 17.6 acres	Under construction	0.1 miles W
Vicksburg Square Retail Center	10,870 sq. ft. retail building, multiple tenants on one acre	Approved	0.9 miles SE
The Woods at Taylor Creek Residential	24 single-family lots on 17.3 acres	Approved	0.6 miles NE
Plymouth Reserve Residential	13 single-family lots on 5 acres	Under construction	0.5 miles NE
Creekside Woods Residential	11 single-family lots on 5.9 acres	Under construction	0.15 miles SW
Aspen Hollow 3rd Addition Residential	25 single-family lots on 12.4 acres (final phase of a subdivision with 138 lots)	Under construction	0.5 miles N
Beacon Ridge Residential	37 single-family lots on 15 acres	Under construction	0.34 miles N

b. Describe any reasonably foreseeable future projects (for which a basis of expectation has been laid) that may interact with environmental effects of the proposed project within the geographic scales and timeframes identified above.

Reasonably foreseeable future projects are discussed under **Item 19a** above. Neither the city nor the project proposer is aware of other projects proposed in the geographic vicinity of the proposed project in the foreseeable future.

c. Discuss the nature of the cumulative potential effects and summarize any other available information relevant to determining whether there is potential for significant environmental effects due to these cumulative effects.

Reasonably foreseeable future projects may combine with the project to result in cumulative effects on municipal infrastructure and natural resources. The potential for cumulative effects varies with the type of resource affected and the geographic area of impact. The geographic separation between projects serves to reduce the potential for cumulative effects. The seven developments listed above are located an average of 0.44 miles from the project area.

Potential cumulative effects on public infrastructure relate to municipal water supply systems, sanitary sewer conveyance and treatment systems, stormwater management systems, and traffic and transportation systems. The city has planned for continued growth and expanded infrastructure system capacity to address these effects and serve anticipated future projects. Consequently, cumulative effects on public infrastructure are not expected to be significant.

Potential cumulative effects of anticipated future projects on natural resources depend largely on the type, density, and location of future developments. The city is nearing full development and as a result, this project is not expected to combine with future projects to result in cumulative effects on natural resources. Although cumulative effects of suburban development on natural resources can include loss and fragmentation of wildlife habitat, most natural wildlife habitats in the project vicinity have been impacted by previous development.

Surface water runoff from the project area would ultimately discharge to the Mississippi River. The highly-regulated nature of stormwater runoff and implementation of BMPs to control erosion and sedimentation is expected to minimize cumulative effects of post-development runoff on downstream waters. The policies and regulations of the city and other government agencies provide an impetus for mitigation measures discussed in this EAW. These mitigation measures would help to ensure the minimization of cumulative effects on the environment and the capacity of municipal services.

20. Other Potential Environmental Effects

If the project may cause any additional environmental effects not addressed by items 1 to 19, describe the effects here, discuss the how the environment will be affected, and identify measures that will be taken to minimize and mitigate these effects.

No other additional environmental effects are anticipated as a result of development of the project area. Potential environmental effects have been addressed in **Items 1** through **19**.

RGU CERTIFICATION.

(The Environmental Quality Board will only accept SIGNED Environmental Assessment Worksheets for public notice in the EQB Monitor.)

I hereby certify that:

- *The information contained in this document is accurate and complete to the best of my knowledge.*
- *The EAW describes the complete project; there are no other projects, stages or components other than those described in this document, which are related to the project as connected actions or phased actions, as defined at Minnesota Rules, parts 4410.0200, subparts 9c and 60, respectively.*
- *Copies of this EAW are being sent to the entire EQB distribution list.*

Signature Shawn B. Dille Date Jan. 21, 2020

Title Sr. Planner

Figures 1 – 11

Hollydale Residential Development EAW

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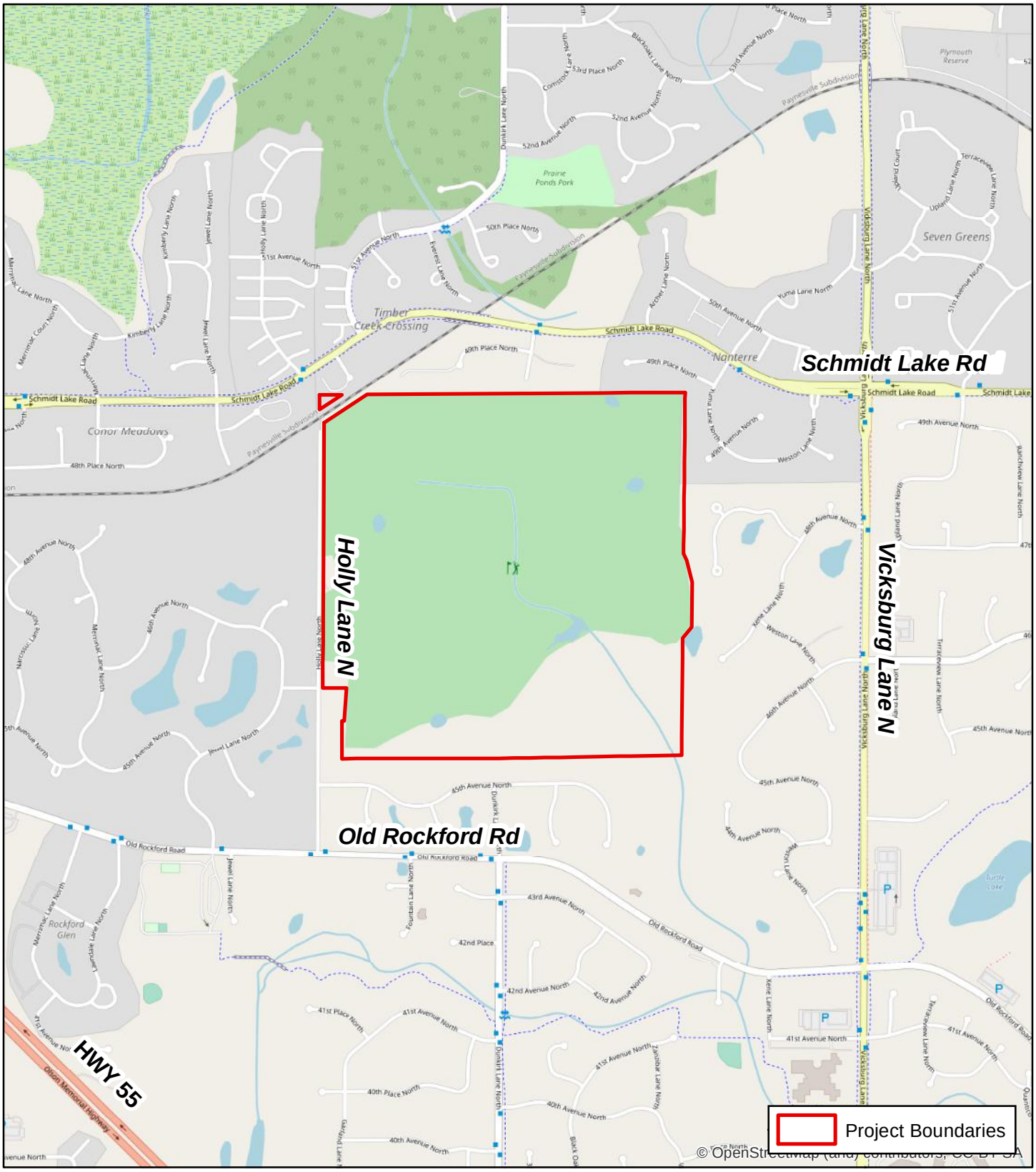

Figure 1 - Project Location

N

0 1,000 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: ESRI Streets Basemap

Hollydale Residential Development (KES 2019-146)
Plymouth, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Figure 2 - USGS Topography

N

0 750 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: Historical Information Gatherers

Hollydale Residential Development (KES 2019-146)
Plymouth, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

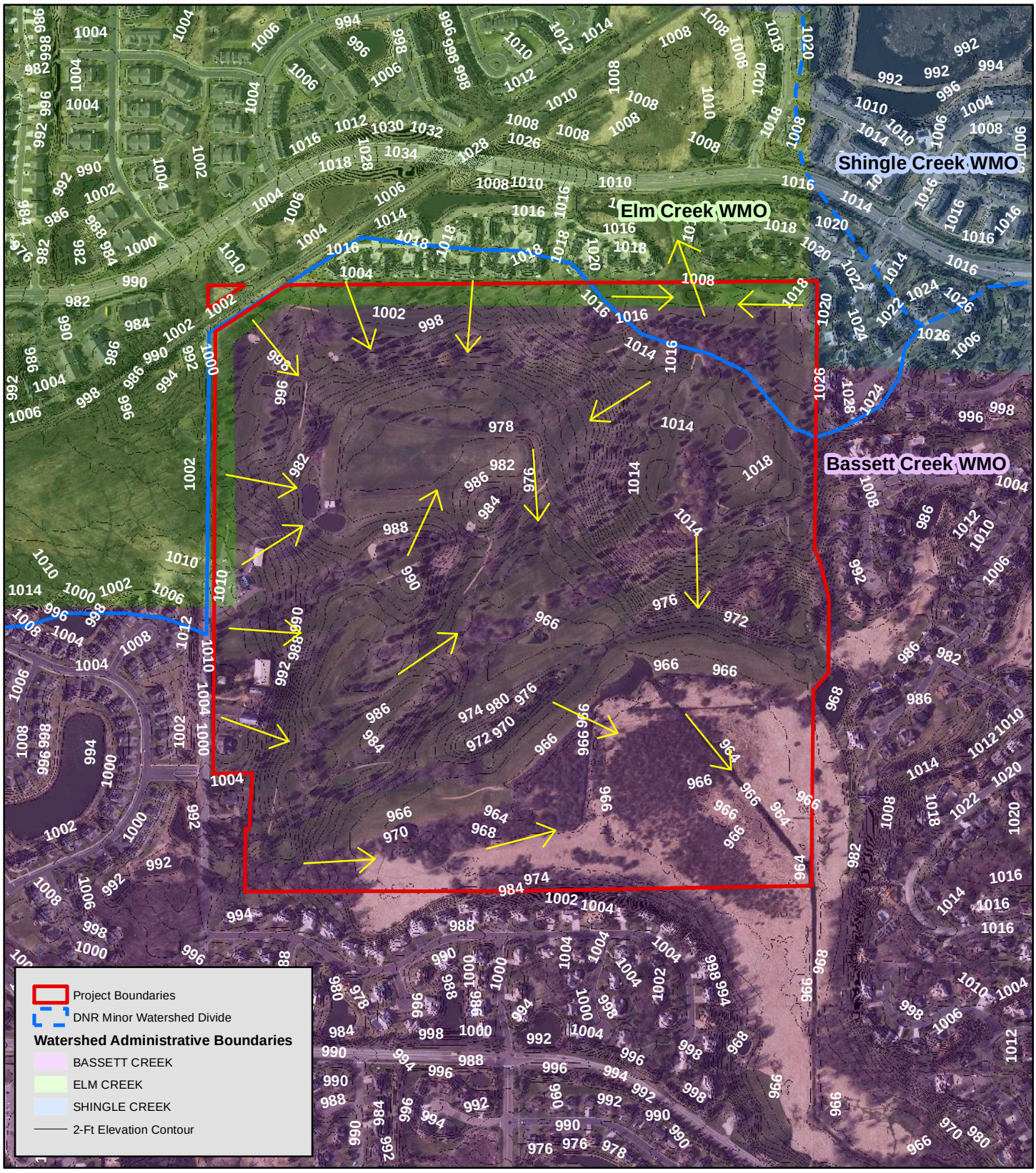

Figure 3 - Surface Water Drainage Divides

N

0 600 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, AE2S

Hollydale Residential Development (KES 2019-146)
Plymouth, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

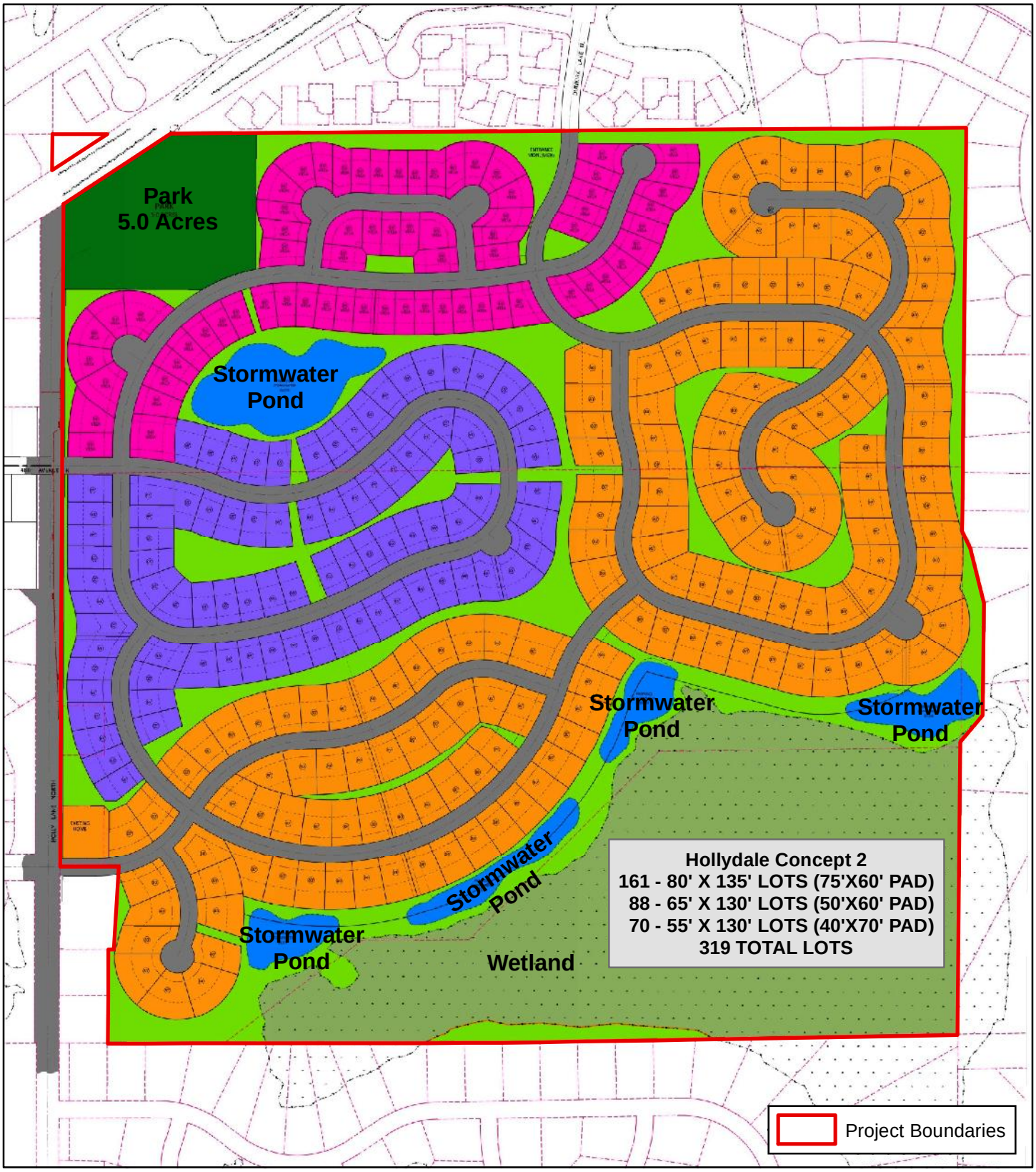

Figure 4 - Proposed Site Plan

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: Hollydale GC Development, Inc.

Hollydale Residential Development (KES 2019-146)
Plymouth, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

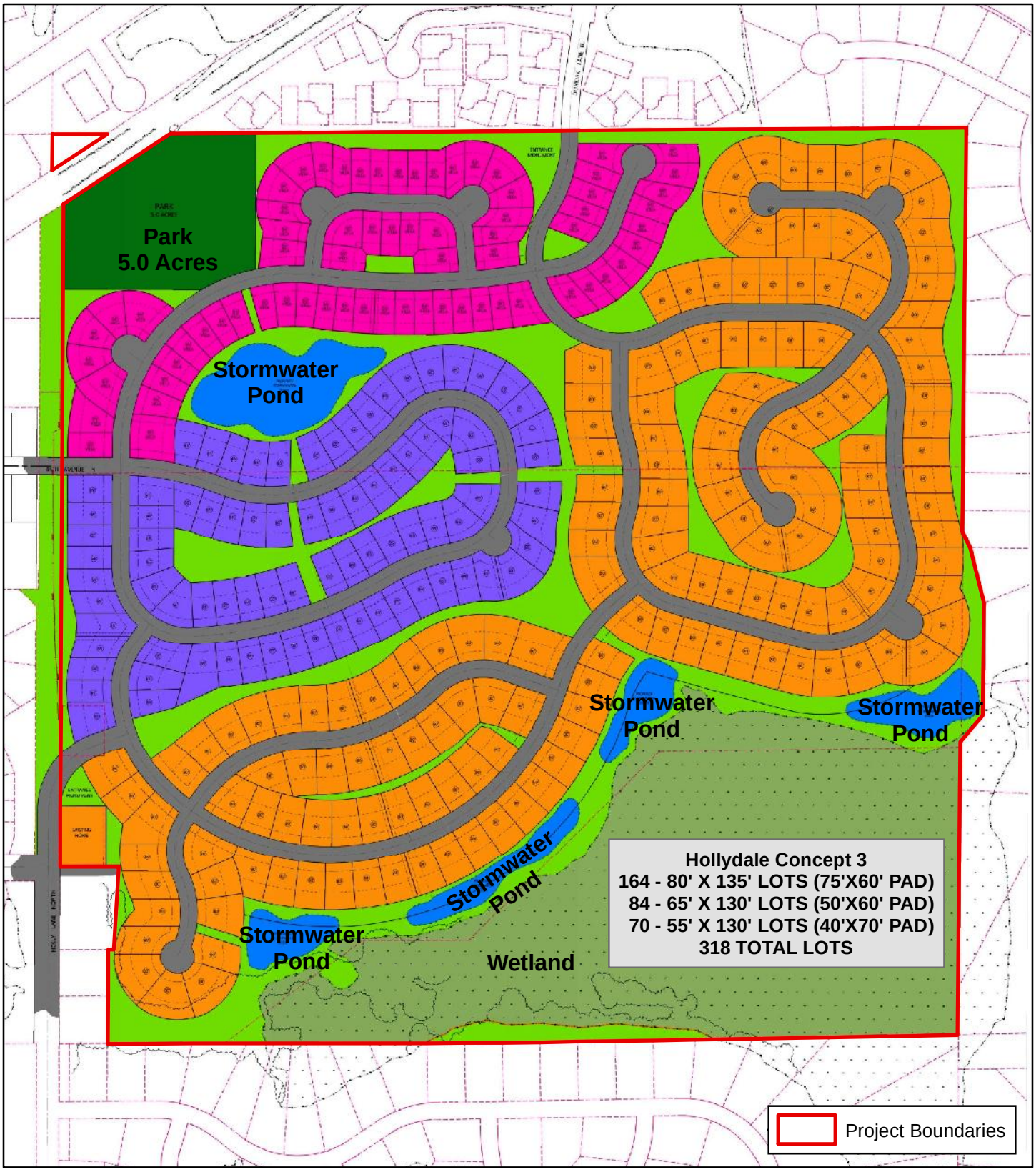

Figure 5 - Alternative Site Plan

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: Hollydale GC Development, Inc.

Hollydale Residential Development (KES 2019-146)
Plymouth, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

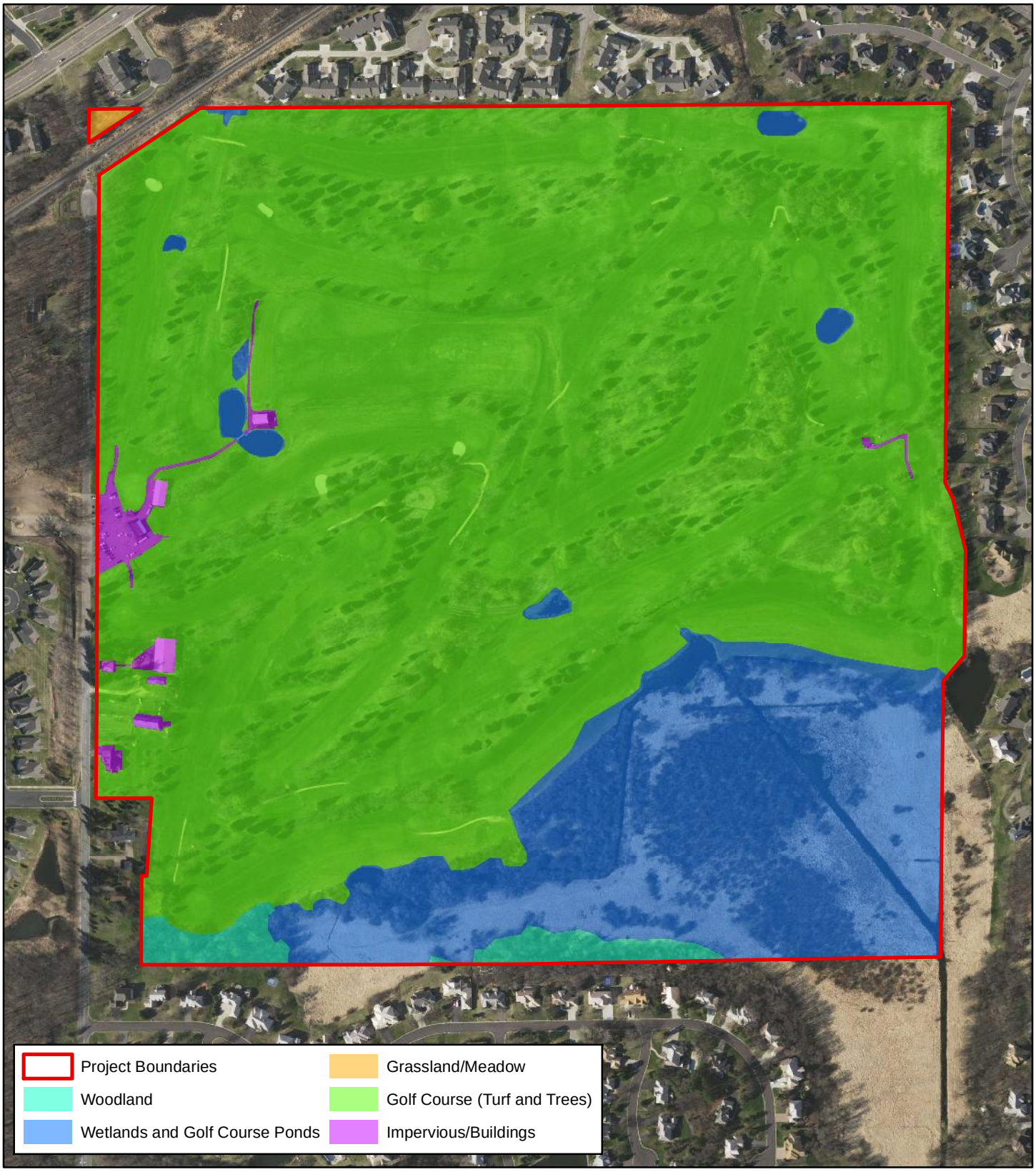

Figure 6 - Existing Cover Types

N

0 425 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, Kjolhaug Environmental Services

Hollydale Residential Development (KES 2019-146)
Plymouth, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

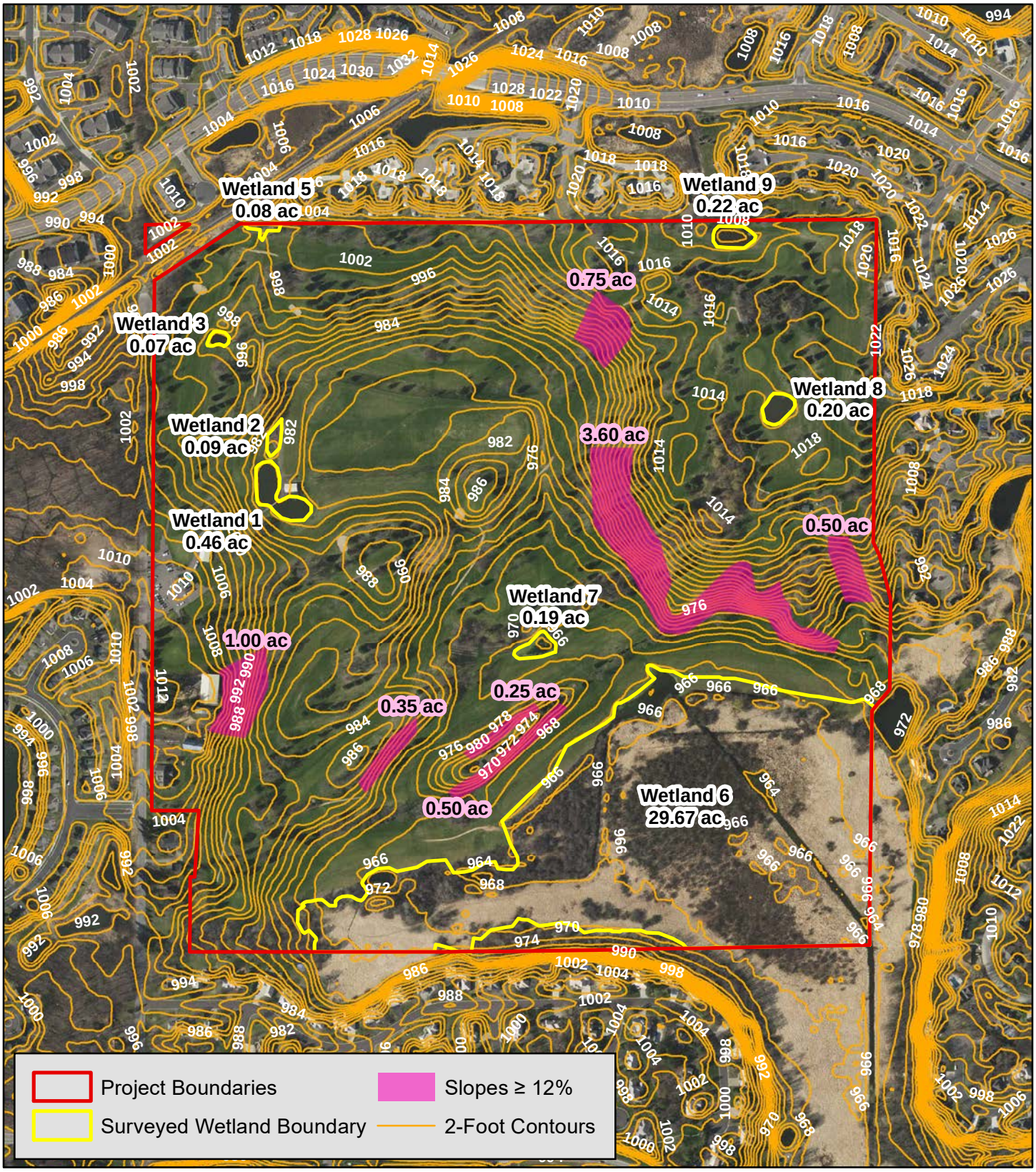

Figure 7 - Delineated Wetlands and Slopes ≥12%

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

Hollydale Residential Development (KES 2019-146)
Plymouth, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Figure 8 - Existing Land Use

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, Braun Intertec

Hollydale Residential Development (KES 2019-146)
Plymouth, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

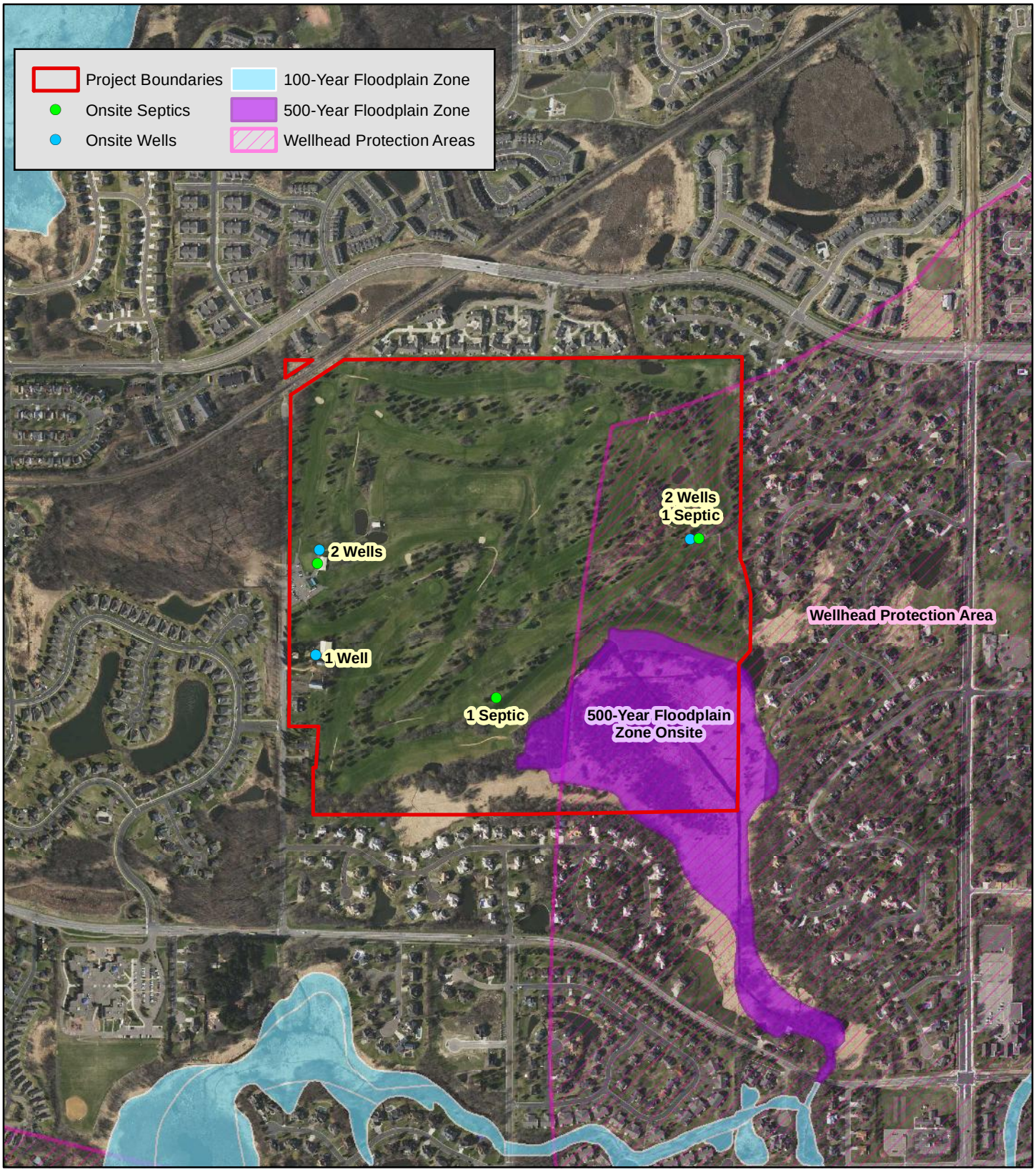

Figure 9 - Floodplains, Wells and Septic Systems

N

0 800 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

Hollydale Residential Development (KES 2019-146)
Plymouth, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

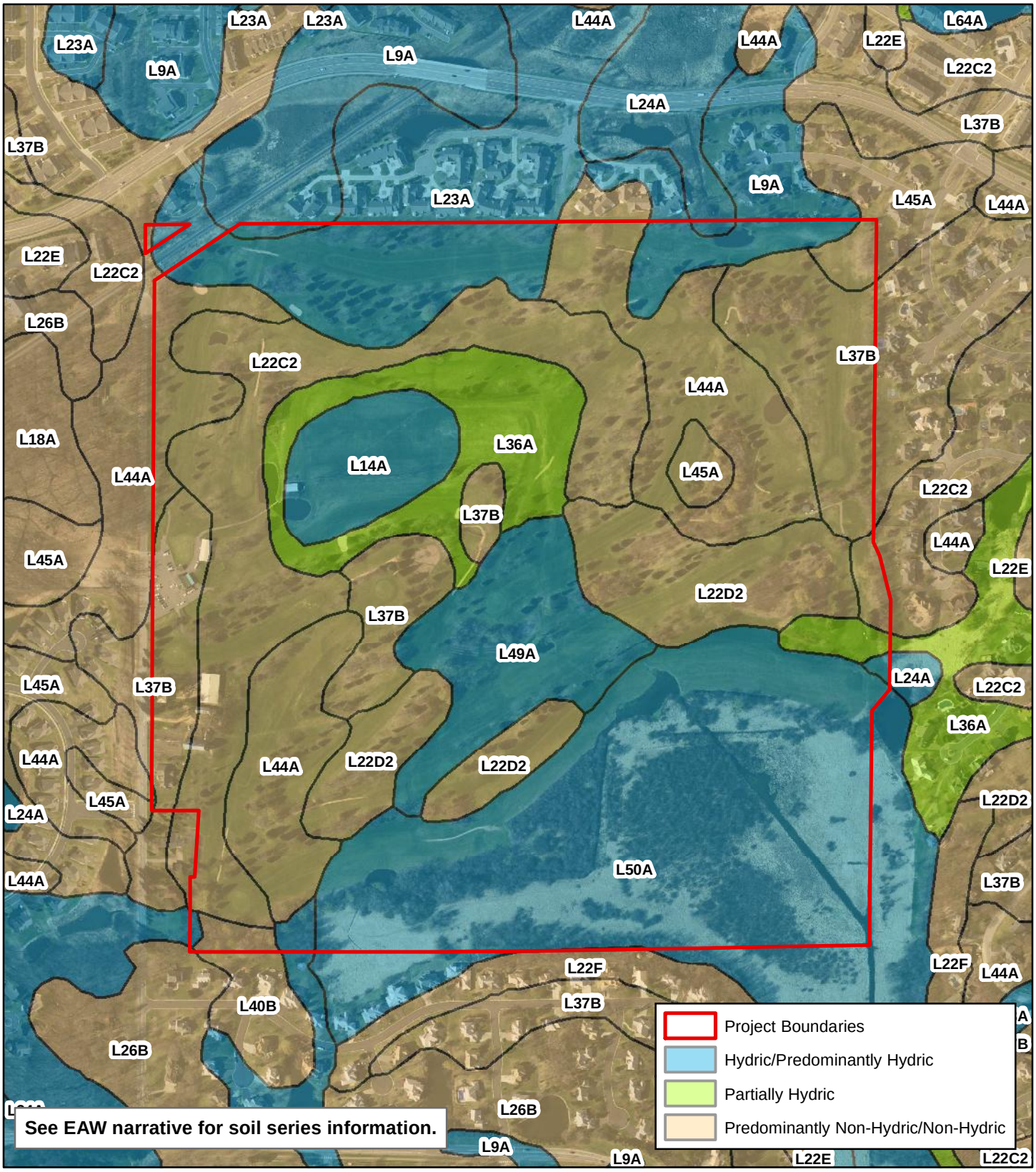

Figure 10 - Soil Types

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

Hollydale Residential Development (KES 2019-146)
Plymouth, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Figure 11 - National Wetlands Inventory

N

0 500 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

Hollydale Residential Development (KES 2019-146)
Plymouth, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

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Appendix A
Wetland Delineation Summary and Correspondence

Hollydale Residential Development EAW

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Hollydale Golf Course

Plymouth, Hennepin County, Minnesota

Wetland Delineation Report

Prepared for

Jake Walesch

by

Kjolhaug Environmental Services Company, Inc.
(KES Project No. 2019-113)

September 27, 2019

Hollydale Golf Course

Plymouth, Hennepin County, Minnesota

Wetland Delineation Report

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FIGURES

APPENDICES

Hollydale Golf Course

Plymouth, Hennepin County, Minnesota

Wetland Delineation Report

1. WETLAND DELINEATION SUMMARY

- The 156.7-acre Hollydale Golf Course was inspected on August 14, 2019 for the presence and extent of wetland.
- The National Wetlands Inventory (NWI) map showed six wetlands on the site.
- The soil survey showed Muskego and Houghton (Hydric), Hamel (Partially Hydric), Klossner (Hydric), Cordova (Predominantly Hydric), Houghton (Hydric), Minnetonka (Hydric) and Glencoe (Hydric).
- The DNR Public Waters Inventory showed two DNR Public Wetlands (Unnamed 27-600 W and Unnamed 27-599 W) north of the site and one DNR Public Wetland (Unnamed 27-601 W) approximately 770 feet south of the site.
- The National Hydrography Dataset showed five Lake/Ponds within the site boundaries, as well as one Stream/River on the central and southeastern portion of the site.
- Nine wetlands were delineated within the site boundaries as summarized below in **Table 1**.

Table 1. Wetlands delineated on the Hollydale Golf Course

Wetland ID	Wetland Type			Dominant Vegetation	Size (Acres Onsite)
	Circular 39	Cowardin	Eggers and Reed		
1	Type 5	PUBGx	Excavated Open Water Wetland	Open water, narrow fringe of cattail, beggarticks, smartweed	0.48
2	Type 5	PUBGx	Excavated Open Water Wetland	Open water, narrow fringe of orange jewelweed, sandbar willow, redosier dogwood	0.09
3	Type 5	PUBGx	Excavated Open Water Wetland	Open water, duckweed	0.08
4	Type 3/2	PEM1C/PEM1A	Shallow Marsh, Wet Meadow	Cattail, reed canary grass and scattered green ash trees	0.04
5	Type 2	PEM1A	Wet Meadow	Fowl bluegrass, Kentucky bluegrass	0.08
6	Type 1/2/3/6	PFO1Ad/PEM1 Bd/PEM1Cd/PS S1Cd	Forested Seasonally Flooded Basin, Wet Meadow, Shallow Marsh, Shrub-Carr	Cattail and reed canary grass, orange jewelweed, arrowleaf tearthumb, redosier dogwood, black willow, stinging nettle, sedges	30.21
7	Type 5/2	PUBGx/PEM1A	Open Water, Wet Meadow	Open water with a narrow fringe of fowl bluegrass	0.18
8	Type 5	PUBGx	Open Water	Open water, duckweed	0.20
9	Type 5	PUBGx	Open Water	Open water with a narrow fringe of smartweed	0.21

2. OVERVIEW

The 156.7-acre Hollydale Golf Course was inspected on August 14, 2019 for the presence and extent of wetland. The property was located in Section 8, Township 118 North, Range 22 West, City of Plymouth, Hennepin County, Minnesota. The site was situated north of MN State Highway 55, west of Vicksburg Lane North (**Figure 1**). The property corresponded to the following Hennepin County PID's: 0811822340014 and 0811822310001.

The site consisted of a golf course with greens, fairways, cart paths, clubhouse, and maintenance buildings. Topography of the site was hilly, sloping from 1020 ft MSL on the northeast portion of the site to 964 ft MSL on the southeast portion. Surrounding land use consisted single-family housing developments, woodland, schools and commercial buildings south of the site.

Nine wetlands were delineated within the site boundaries. The delineated wetland boundaries and existing conditions are shown on **Figure 2**.

Appendix A of this report includes a Joint Application Form for Activities Affecting Water Resources in Minnesota, which is submitted in request for: (1) a wetland boundary, No-Loss and wetland type determination under the Minnesota Wetland Conservation Act (WCA), and (2) delineation concurrence under Section 404 of the Federal Clean Water Act.

3. METHODS

3.1 Wetland Delineation

Wetlands were identified using the Routine Determination method described in the Corps of Engineers Wetlands Delineation Manual (Waterways Experiment Station, 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0) as required under Section 404 of the Clean Water Act and the Minnesota Wetland Conservation Act.

Wetland boundaries were identified as the upper-most extent of wetland that met criteria for hydric soils, hydrophytic vegetation, and wetland hydrology. Wetland-upland boundaries were marked with pin flags that were located using Trimble Juno T41 GPS Units.

Soils, vegetation, and hydrology were documented at a representative location along the wetland-upland boundary. Plant species dominance was estimated based on the percent aerial or basal coverage visually estimated within a 30-foot radius for trees and vines, a 15-foot radius for the shrub layer, and a 5-foot radius for the herbaceous layer within the community type sampled.

Soils were characterized to a minimum depth of 24 inches (unless otherwise noted) using a Munsell Soil Color Book and standard soil texturing methodology. Hydric soil indicators used are from Field Indicators of Hydric Soils in the United States (USDA Natural Resources Conservation Service (NRCS) in cooperation with the National Technical Committee for Hydric Soils, Version 7, 2010).

Plants were identified using standard regional plant keys. Taxonomy and indicator status of plant species was taken from the 2015 National Wetland Plant List (U.S. Army Corps of Engineers 2014. National Wetland Plant List, version 3.2, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH).

4. RESULTS

4.1 Review of NWI, Soils, Public Waters, and NHD Information

The National Wetlands Inventory (NWI) (Minnesota Geospatial Commons 2009-2014 and U.S. Fish and Wildlife Service) showed six wetlands on the site (**Figure 3**).

The Soil Survey (USDA NRCS 2015) showed Muskego and Houghton (Hydric), Hamel (Partially Hydric), Klossner (Hydric), Cordova (Predominantly Hydric), Houghton (Hydric), Minnetonka (Hydric) and Glencoe (Hydric). Soil types are listed in **Table 2** on the following page and a map showing soil types is included as **Figure 4**.

Table 2. Soil types mapped on the Hollydale Golf Course

Symbol	Soil Name	Acres	% of Area	% Hydric	Hydric Category
L50A	Muskego and Houghton soils	37.88	24.13	100	Hydric
L44A	Nessel loam	22.33	14.22	10	Predominantly Non-Hydric
L22C2	Lester loam, 6 to 10 percent slopes, moderately eroded	21.62	13.77	2	Predominantly Non-Hydric
L37B	Angus loam	16.66	10.61	5	Predominantly Non-Hydric
L22D2	Lester loam, 10 to 16 percent slopes, moderately eroded	14.97	9.54	0	Non-Hydric
L36A	Hamel, overwash-Hamel complex, 0 to 3 percent slopes	11.22	7.15	45	Partially Hydric
L49A	Klossner soils	10.53	6.71	100	Hydric
L23A	Cordova loam, 0 to 2 percent slopes	9.29	5.92	95	Predominantly Hydric
L14A	Houghton muck	5.85	3.73	100	Hydric
L9A	Minnetonka silty clay loam	3.80	2.42	100	Hydric
L45A	Dundas-Cordova complex	2.14	1.36	30	Predominantly Non-Hydric
L40B	Angus-Kilkenny complex	0.68	0.44	5	Predominantly Non-Hydric
L24A	Glencoe clay loam	0.35	0.22	100	Hydric
L22F	Lester loam, morainic, 25 to 35 percent slopes	0.04	0.02	5	Predominantly Non-Hydric

The Minnesota DNR Public Waters Inventory (Minnesota Department of Natural Resources 2015) showed two DNR Public Wetlands (Unnamed 27-600 W and Unnamed 27-599 W) north of the site and one DNR Public Wetland (Unnamed 27-601 W) approximately 770 feet south of the site (**Figure 5**).

The National Hydrography Dataset (U.S. Geological Survey 2015) showed five Lake/Ponds within the site boundaries, as well as one Stream/River on the central and southeastern portion of the site (**Figure 6**).

4.2 Wetland Determinations and Delineations

Potential wetlands were evaluated during field observations on August 14, 2019. Nine wetlands were identified and delineated on the property (**Figure 2**). Corresponding data forms are included in **Appendix B**. The following descriptions of the wetlands and adjacent uplands reflects conditions observed at the time of the field visit. Herbaceous vegetation was actively growing. Precipitation conditions were within the normal range based on available 30-day rolling total precipitation and typical based on three-month antecedent precipitation data (**Appendix C**). A wetland boundary survey will be provided when it becomes available. Wetland descriptions are provided on the following page on **Table 3**.

Table 3. Delineated Wetland Descriptions - Hollydale Golf Course

Wetland ID	Circular 39	Cowardin	Eggers and Reed	Dominant Vegetation	Adjacent Upland Vegetation	Observed Drainage Features	Observed Hydrology Indicat	Mapped NWI Wetland	Mapped Soil Series	Size (Acres Onsite)	Comments
1	Type 5	PUBGx	Excavated Open Water Wetland	Open water, narrow fringe of cattail, beggarticks, smartweed	Mowed golf course green dominated by Kentucky bluegrass with a lesser amount of white clover	Isolated basin; no inlets or outlets observed	Saturation, High Water Table, Geomorphic Position, FAC Neutral Test	PUBGx	Houghton, Hamel, Lester	0.48	Wetland 1 is an ornamental pond that was excavated in upland as described in Section 4.4 of the report.
2	Type 5	PUBGx	Excavated Open Water Wetland	Open water, narrow fringe of orange jewelweed, sandbar willow, redosier dogwood	Mowed golf course green dominated by Kentucky bluegrass	Isolated basin; no inlets or outlets observed	Saturation, High Water Table, Geomorphic Position, FAC Neutral Test	None	Hamel	0.09	Wetland 2 is an ornamental pond that was excavated in upland as described in Section 4.4 of the report.
3	Type 5	PUBGx	Excavated Open Water Wetland	Open water, duckweed	Mowed golf course green dominated by Kentucky bluegrass with a lesser amount of white clover	Isolated basin; no inlets or outlets observed	Saturation, High Water Table, Geomorphic Position, FAC Neutral Test	PUBGx	Lester	0.08	Wetland 3 is an ornamental pond that was excavated in upland as described in Section 4.4 of the report.
4	Type 3/2	PEM1C/PEM1A	Shallow Marsh, Wet Meadow	Cattail, reed canary grass and scattered green ash trees	Meadow dominated by creeping charlie, reed canary grass, smooth brome and common milkweed with scattered common buckthorn	Wetland 4 extends offsite to the east and west, connecting with wetlands adjacent to the railroad tracks	Saturation, High Water Table, Geomorphic Position, FAC Neutral Test	None	Cordova	0.04	Wetland 4 was part of a linear wetland adjacent to the railroad.
5	Type 2	PEM1A	Wet Meadow	Fowl bluegrass, Kentucky bluegrass	Mowed golf course green dominated by Kentucky bluegrass	Wetland 4 extends offsite to the north, connecting with wetlands adjacent to the railroad tracks	Saturation, High Water Table, Geomorphic Position, FAC Neutral Test	None	Minnetonka	0.08	None
6	Type 1/2/3/6	PFO1Ad/PEM1Bd/PEM1Cd/PSS1Cd	Forested Seasonally Flooded Basin, Wet Meadow, Shallow Marsh, Shrub-Carr	Cattail and reed canary grass, orange jewelweed, arrowleaf tearthumb, redosier dogwood, black willow, stinging nettle, sedges	Mowed golf course green dominated by Kentucky bluegrass with a lesser amount of common plantain, white clover and dandelion	Flows into a ditch network that drains into Bassett Creek approximately 2,000 feet south of the site	Saturation, High Water Table, Geomorphic Position, FAC Neutral Test	PABG/PSS1Ad/PEM1Ad/PFO1Ad/R2UBFx	Muskego and Houghton, Minnetonka	30.21	Wetland 6 contained an extensive ditch network and shows evidence of drainage.
7	Type 5/2	PUBGx/PEM1A	Open Water, Wet Meadow	Open water with a narrow fringe of fowl bluegrass	Mowed golf course green dominated by Kentucky bluegrass	Contains several inlets from the surrounding drain tile network; no outlets were observed	Saturation, High Water Table, Geomorphic Position, FAC Neutral Test, Water-Stained Leaves	PUBGx	Klossner	0.18	None
8	Type 5	PUBGx	Open Water	Open water, duckweed	Mowed golf course green dominated by Kentucky bluegrass with a lesser amount of white clover and scattered white spruce and quaking aspen trees	Isolated basin; no inlets or outlets observed	Saturation, High Water Table, Geomorphic Position, FAC Neutral Test	PUBGx	Nessel, Angus	0.20	Wetland 8 is an ornamental pond that was excavated in upland as described in Section 4.4 of the report.
9	Type 5	PUBGx	Open Water	Open water with a narrow fringe of smartweed	Mowed golf course green dominated by Kentucky bluegrass	Drains though a tile into a ditch north of the site	Saturation, High Water Table, Geomorphic Position, FAC Neutral Test	PUBGx	Glencoe, Minnetonka	0.21	None

4.3 Other Areas

Other areas were investigated because they were: (1) observed to support a hydrophytic plant community, (2) had visible wetland hydrology indicators, (3) were shown as wetland on the NWI map, or (4) were depressional and mapped as hydric soil. Field investigation led to the conclusion that these areas were not wetland.

An area on the northern portion of the site was mapped as Cordova loam (Predominantly Hydric) on the soil survey (See **Figure 4**). This area was inspected in the field, and consisted of a hillslope golf course green dominated by Kentucky bluegrass, with a lesser amount of white clover, dandelion and white spruce trees.

An area on the central portion of the site was mapped with hydric soils including Houghton Muck (Hydric), Hamel (Partially Hydric) and Klossner (Hydric) on the soil survey (**See Figure 4**). This area was inspected in the field, and consisted of mowed golf course greens dominated by Kentucky bluegrass with a lesser amount of dandelion, common plantain, white clover and scattered white spruce trees. Although this area contained topographic depressions, it did not contain wetland plant communities, and was effectively drained by a network of drain tiles present onsite (**See Figure 2**). Because of the functional drainage system present within this area, Geomorphic Position does not apply. Although hydric soils were present, this area did not contain a wetland plant community, and did not meet one primary or two secondary indicators of wetland hydrology. Therefore, this area was determined to be upland.

4.4 Incidental Wetlands Discussion

The Hollydale Golf Course site contains numerous excavated ornamental ponds, and a separate memorandum will be prepared to establish the regulatory status of those ponds under the Minnesota Wetland Conservation Act and Section 404 of the Clean Water Act. Historic aerial photos and historic USGS Topography Maps will be provided at that time.

4.5 Request for Wetland Boundary and Jurisdictional Determination

Appendix A of this report includes a Joint Application Form for Activities Affecting Water Resources in Minnesota, which is submitted in request for: (1) a wetland boundary, No-Loss and wetland type determination under the Minnesota Wetland Conservation Act (WCA), and (2) delineation concurrence under Section 404 of the Federal Clean Water Act.

5. CERTIFICATION OF DELINEATION

The procedures utilized in the described delineation are based on the U.S. Army Corps of Engineers 1987 Wetlands Delineation Manual as required under Section 404 of the Clean Water Act and the Minnesota Wetland Conservation Act. This wetland delineation and report were prepared in compliance with the regulatory standards in place at the time the work was performed.

Site boundaries indicated on figures within this report are approximate and do not constitute an official survey product.

Delineation completed by: A Kyle Uhler, GIS & Remote Sensing Specialist
MN Certified Wetland Delineator

Will Effertz, Natural Resources Assistant

Report prepared by: Adam Cameron, Wetland Ecologist/GIS Specialist
MN Certified Wetland Delineator No. 1321

Report reviewed by: _____ Date: September 27, 2019
Mark Kjolhaug, Professional Wetland Scientist No. 000845

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Providing Sound, Balanced, Comprehensive Natural Resource Solutions

Memorandum

Date: November 18, 2019

To: Regulatory, U.S. Army Corps of Engineers
Nick McCabe, ISG
Ben Scharenbroich, City of Plymouth

Cc: Jake Walesch, Project Applicant
Ben Carlson, Board of Water and Soil Resources (BWSR)
Stacey Lijewski, Hennepin County

From: Adam Cameron, Kjolhaug Environmental Services Company (KES)
Rob Bouta, Kjolhaug Environmental Services Company

Re: Hollydale Golf Course, WCA/CWA Jurisdictional Summary
KES Project #2019-118

The 156.7-acre Hollydale Golf Course was inspected on August 14, 2019 by Kjolhaug Environmental Services (KES) staff to delineate wetlands on the subject property. The property was located in Section 8, Township 118 North, Range 22 West, City of Plymouth, Hennepin County, Minnesota. The site was situated north of MN State Highway 55, west of Vicksburg Lane North (**Figure 1**). The property corresponded to the following Hennepin County PID's: 0811822340014 and 0811822310001. The Hollydale Golf Course Wetland Delineation Report was submitted to the City of Plymouth and the U.S. Army Corps of Engineers on September 27, 2019.

The Hollydale Golf Course contains numerous excavated ponds that were created during the construction of the course, and during ongoing maintenance of the course. This memo is intended to address the status of wetlands on the subject property by providing a review of historic photos and soil survey data, as well as a summary of the anticipated regulatory status of the ornamental ponds under the Minnesota Wetland Conservation Act (WCA) and Section 404 of the Clean Water Act (CWA). The Joint Application Form has been included as **Appendix A**.

No-Loss Request & Review of Figures

Historic photos showing the site conditions from 1937 through 1971 have been included to document the site conditions prior to, during and after conversion of the subject property from

agricultural land to a golf course (**Appendix B**). As a part of construction of the golf course, ornamental ponds were excavated within areas of the site that appear to have been upland prior to pond construction. Therefore, the areas surrounding Wetland 1, 2, 3, 8 and 9 were assessed to determine whether the wetlands delineated in 2019 correspond with historic wetland. Historic aerial photography for ten years prior to construction of the golf course was assessed for wetland signatures. Photo interpretation and precipitation information (Based upon 3-Month Gridded Database) is provided below in **Table 1**.

Table 1. Aerial Photo Assessment for Wetland Signatures

Photo Date & Precipitation Conditions	WL 1	WL 2	WL 3	WL 8	WL 9	Comments
*September 8, 1937 Dry	NV	NV	NV	NV	NV	No wetland signatures observed.
*July 30, 1940 Normal	NV	NV	NV	CS/SS (1)	CS (1)	Signatures observed at the location of WL 8 and WL 9.
**May 8, 1945 Wet	NV/CS (1)	NV	NV/CS (1)	NV	NV/NC (2)	Signatures observed at the location of WL 1, WL 3 and WL 9.
*May 8, 1947 Normal	NV/CS (2)	NV	NV	NV	SS (3)	Signatures observed at the location of WL 1 and WL 9.
*October 15, 1953 Normal	NV	NV	NV	DO (2)	CS (4)	Signatures observed at the location of WL 8 and WL 9.
**May 7, 1956 Dry	NV	NV	NV	NV	NV	No wetland signatures observed.
*May 6, 1957 Dry	NV	NV	NV	NV	NV	No wetland signatures observed.
**May 8, 1960 Dry	NV	NV	NV	CS (3)	NV	Signature observed at the location of WL 8.
**April 23, 1962 Normal	CS/NV (3)	NV	NV	NV	DO/NV (5)	Signature observed at the location of WL 1 and WL 9.
*October 14, 1964 Wet	NV	NV	NV	NV	NV	No wetland signatures observed.
**November 18, 1967 Normal	N/A	N/A	N/A	N/A	N/A	Site has been converted to golf course.
Number of Years Assessed	10	10	10	10	10	-
Years Showing Wetland Signatures	3	0	1	3	5	-
Percent of Years Showing Wetland Signatures	30%	0%	10%	30%	50%	-
Wetland Determination	Historic Upland	Historic Upland	Historic Upland	Historic Upland	Historic Wetland	Wetland 1, 2, 3 and 8 were determined to be incidentally created in historic upland.

*Photo date provided by Historical Information Gatherers.
** Photo date provided by Minnesota Historical Aerial Photographs Online.

Historic Aerial Photography Review Summary

Wetland 1 is an artificial ornamental golf course pond excavated on dry land primarily for aesthetic reasons. Wetland 1 first appeared on aerial photography in 1984 after the area had been farmed, ditched, and drained. The golf course ponds have been maintained and have not been abandoned. Wetland 1 was expanded between 1984 and 1991 to provide a larger ornamental pond. Wetland 1 is located on soils mapped as Lester loam (2% hydric), Hamel complex (45% hydric) and Houghton muck (100% hydric) (See **Figure 3**). On average, these soil types are considered 49% hydric. This implies that the chance that Wetland 1 was excavated on dry land is greater than 50% because the mapped soil types are on average more likely than not to occupy upland landscape positions. This area was reviewed on historic aerial images, and showed wetland signatures in only 30% of years reviewed. Therefore, this area was determined to be non-wetland prior to conversion of the site to a golf course.

Wetland 2 is an artificial ornamental golf course pond excavated on dry land primarily for aesthetic reasons. Wetland 2 is believed to have been excavated from upland between 1984 and 1991, the time when Wetland 1 was expanded. Wetland 1 first appeared after the area had been farmed, ditched, drained, and converted to a golf course. The golf course ponds have been maintained and have not been abandoned. Wetland 2 is located on soils mapped as Hamel complex, which is considered 45% hydric. This implies that the chance that Wetland 2 was excavated on dry land is greater than 50% because most Hamel soils occupy upland landscape positions. This area was reviewed on historic aerial images, and showed wetland signatures in 0% of years reviewed. Therefore, this area was determined to be non-wetland prior to conversion of the site to a golf course.

Wetland 3 is an artificial ornamental golf course pond excavated on dry land primarily for aesthetic reasons. Wetland 3 first appeared on aerial photography in 1991 after the area had been farmed, ditched, drained, and converted to golf course. The golf course ponds have been maintained and have not been abandoned. Wetland 3 is located on soils mapped as Lester loam, which are considered only 2% hydric and generally occupy upland landscape positions. This area was reviewed on historic aerial images, and showed wetland signatures in only 10% of years reviewed. Therefore, this area was determined to be non-wetland prior to conversion of the site to a golf course.

Wetland 8 is an artificial ornamental golf course pond excavated on dry land primarily for aesthetic reasons. Wetland 8 first appeared on aerial photography in 1967, after golf construction in 1965. Prior to that, the area had been farmed. Wetland 8 is located on soils mapped as Angus and Nessel loams, which are considered only 5 and 10% hydric, respectively. This implies that Wetland 8 was excavated on dry land incidental to construction activity, the purpose of which was to create an ornamental golf course pond. This area was reviewed on historic aerial images, and showed wetland signatures in only 30% of years reviewed. Therefore, this area was determined to be non-wetland prior to conversion of the site to a golf course.

Wetland 9 is an artificial ornamental golf course pond, which first appeared on aerial photography in 1967 after golf construction in 1965. Wetland 9 is located on soils mapped as Glencoe clay loam and Minnetonka silty clay loam, which are both considered 100% hydric.

This area was reviewed on historic aerial images, and showed wetland signatures in 50% of years reviewed. Therefore, this area was determined to be historic wetland.

Wetland 7 was excavated within a Klossner Muck soil unit that appeared to be wetland on historic photos prior to conversion of the site to a golf course. Therefore, Wetland 7 was determined to be historic wetland.

Minnesota Wetland Conservation Act: Incidental Wetlands Determination

Based on a review of historic aerial photos dating back to 1937, KES has concluded that Wetland 1, 2, 3 and 8 were incidentally created in upland and are therefore not regulated under WCA according to MN WCA Rule 8420.0105 SCOPE Subp. 2.D. which states the following:

"This chapter does not regulate impacts to incidental wetlands. "Incidental wetlands" are wetland areas that the landowner can demonstrate, to the satisfaction of the local government unit, were created in nonwetland areas solely by actions, the purpose of which was not to create the wetland. Incidental wetlands include drainage ditches, impoundments, or excavations constructed in nonwetlands solely for the purpose of effluent treatment, containment of waste material, storm water retention or detention, drainage, soil and water conservation practices, and water quality improvements and not as part of a wetland replacement process that may, over time, take on wetland characteristics."

The Joint Application Form requesting a No-Loss under WCA has been included as **Appendix A**.

Section 404 of the Clean Water Act: Jurisdictional Summary

We evaluated delineated wetlands using the definition of waters of the United States set forth under 33 CFR Part 328.3 (November 13, 1986) to assess the potential for federal regulatory jurisdiction. This definition indicates the following are generally not considered to be waters of the United States:

1. Non-tidal drainage and irrigation ditches excavated on dry land.
2. Artificially irrigated areas which would revert to upland if the irrigation ceased.
3. Artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing.
4. Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons.
5. Waterfilled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States.

Based on the exclusions listed above, we submit that Wetlands 1, 2, 3 and 8 are not waters of the United States. We understand the definition of waters of the United States cited above will become effective in Minnesota on November 11, 2019, and assume the Corps will complete an Approved Jurisdictional Determination (AJD) in response to this request after that date.

The project area does not include any ditches, tributaries, or other watercourses located outside the limits of delineated wetlands, as all ditches and watercourses outside of wetlands have been placed into buried pipes and drain tile lines. Therefore, we believe that the AJD will only need to address Wetlands 1 to 9. Small wetlands on the site appear to be connected to large wetlands and downstream waters via buried pipes and drain tiles (see **Figure 2**).

Approvals Requested

At this time we are requesting a Notice of Decision under WCA for the No-Loss Application, and a letter from the U.S. Army Corps of Engineers confirming our determination of the jurisdictional status of Wetland 1, 2, 3 and 8 as unregulated. If you have any questions regarding this application, please do not hesitate to contact us.

Thank you.

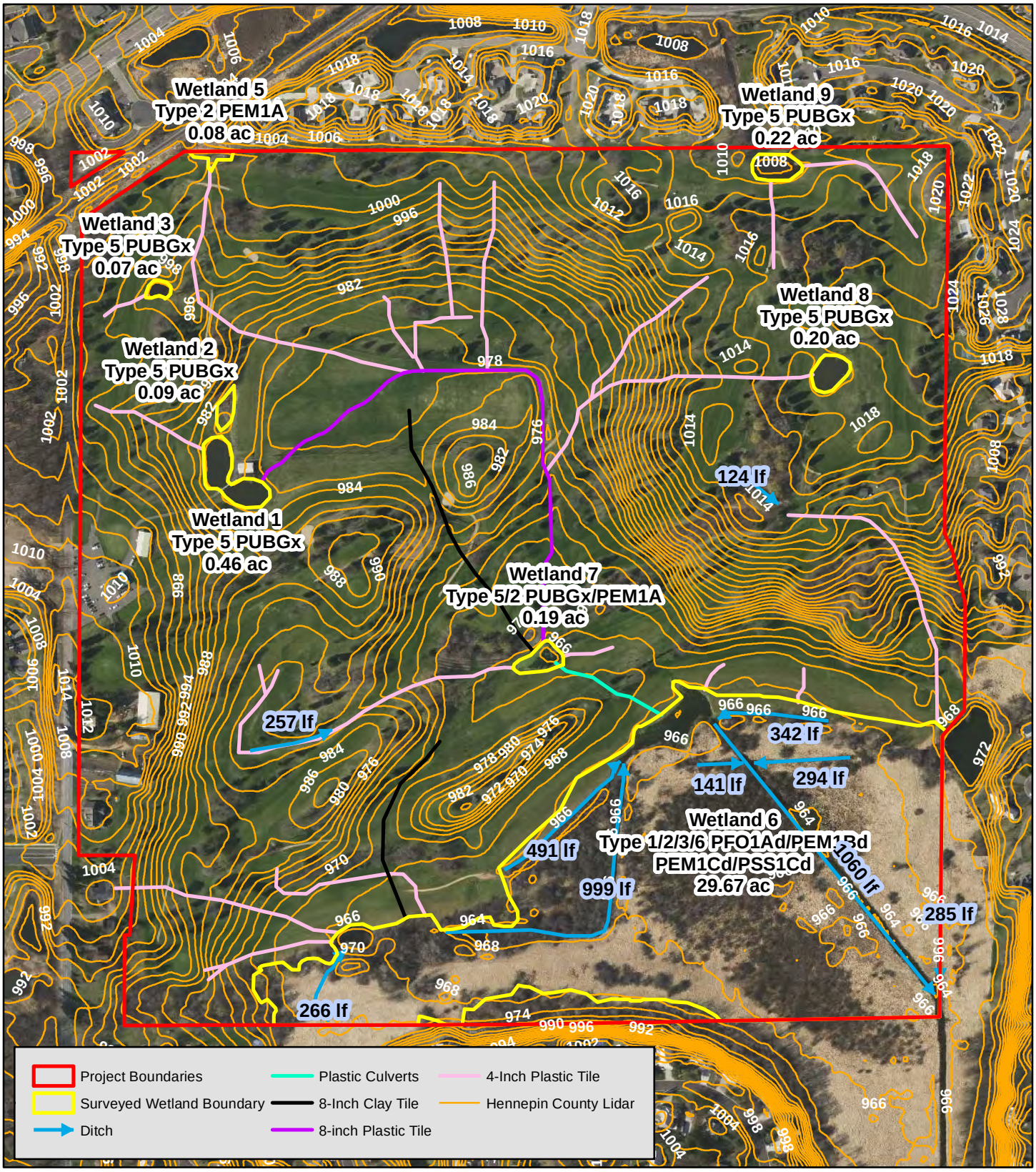


Figure 2 - Existing Conditions (2016 MNGEO Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

Hollydale Golf Course (KES 2019-113)
Plymouth, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

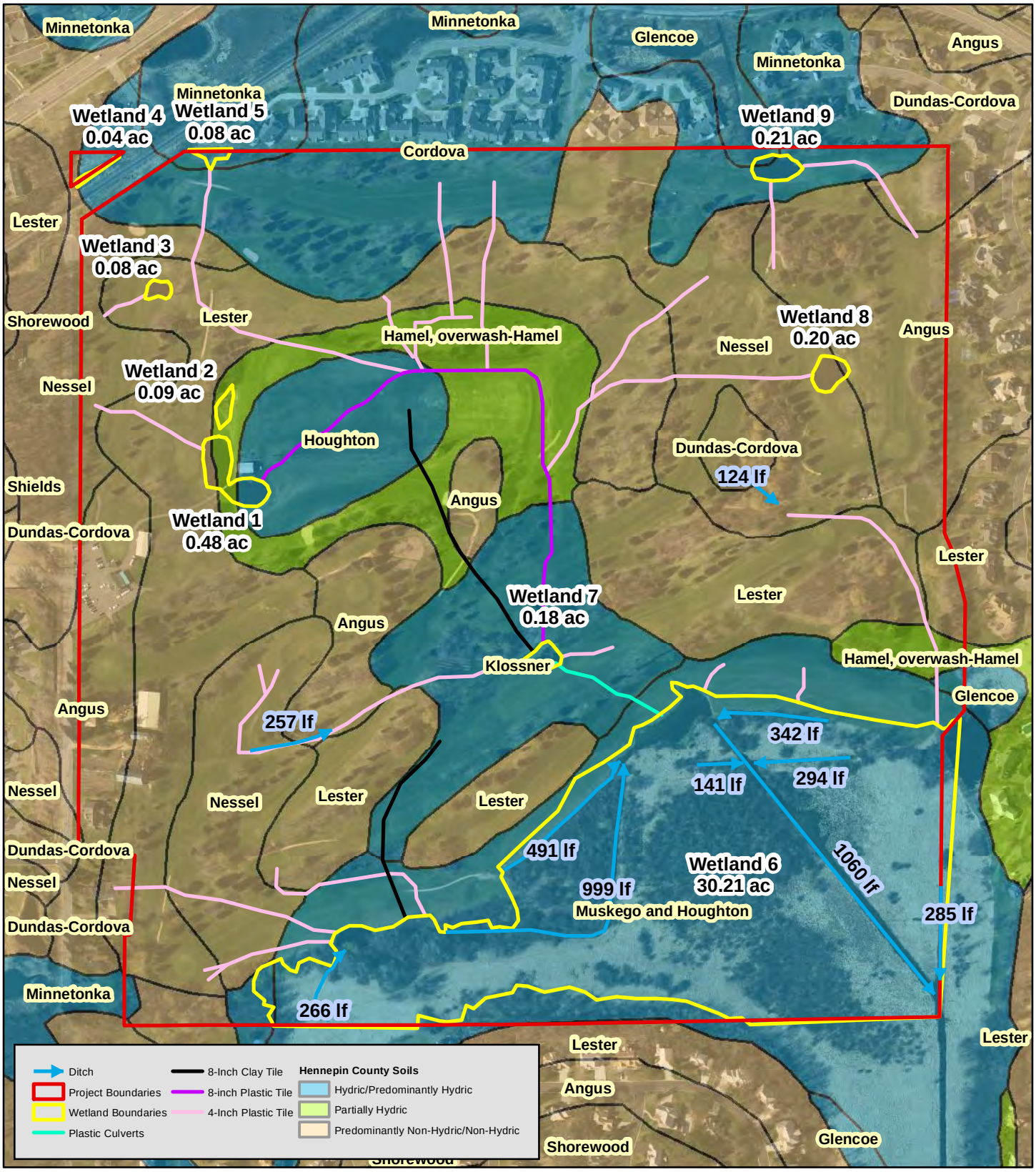


Figure 3 - Soil Survey Overlay Map

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons, Web Soil Survey

Hollydale Golf Course (KES 2019-113)
Plymouth, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Historic Aerial Photos (1937 MNGEO Photo)

N

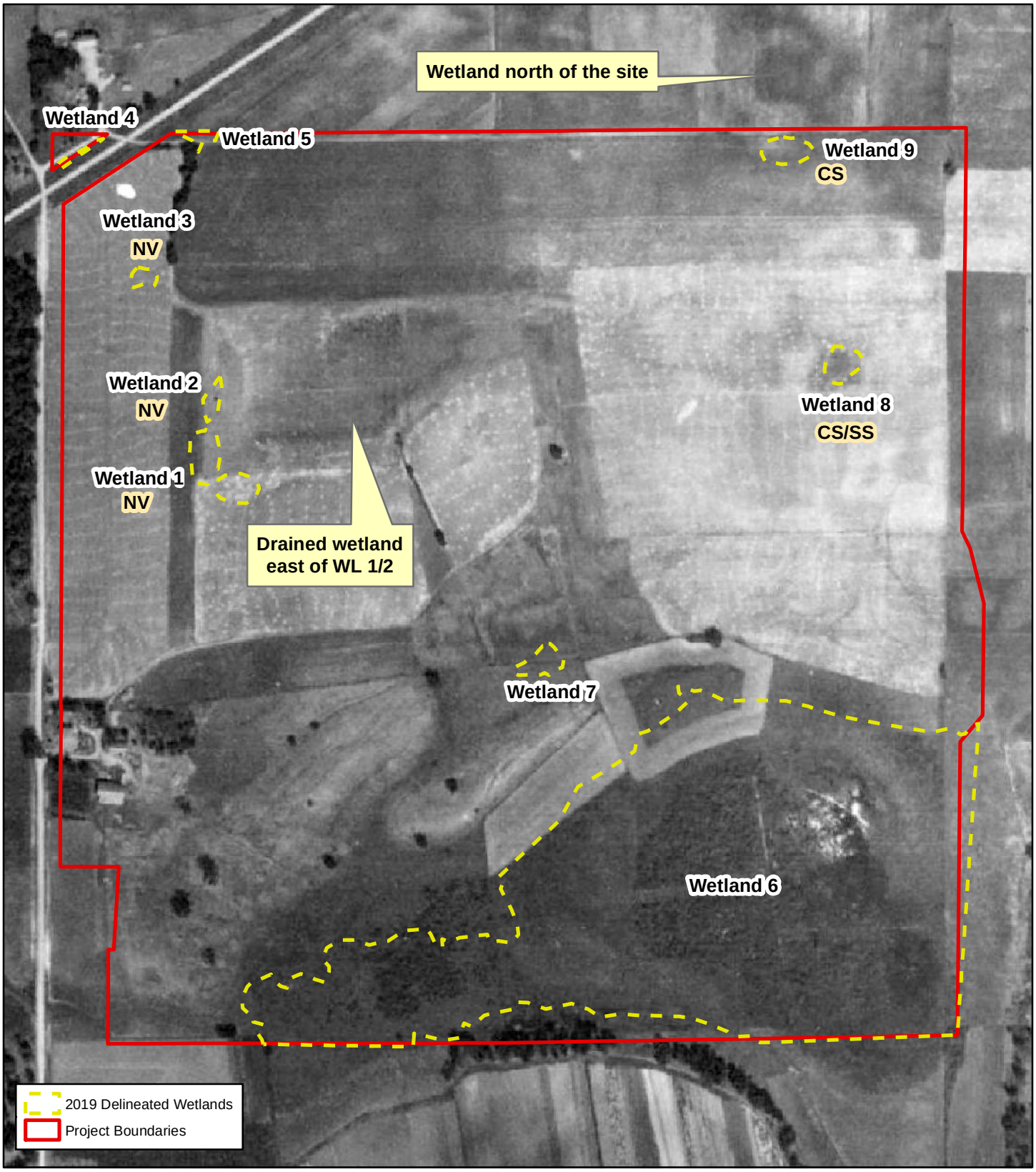
0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

Hollydale Golf Course (KES 2019-113)
Plymouth, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.



Historic Aerial Photos (1940 Historical Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: Historical Information Gatherers (HIG)

Hollydale Golf Course (KES 2019-113)
Plymouth, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

Historic Aerial Photos (1945 MNGEO Photo)

N

0 400 Feet

KJOLHAUG ENVIRONMENTAL SERVICES COMPANY

Source: MNGEO Spatial Commons

Hollydale Golf Course (KES 2019-113)
Plymouth, Minnesota

Note: Boundaries indicated on this figure are approximate and do not constitute an official survey product.

BOARD OF WATER AND SOIL RESOURCES

Minnesota Wetland Conservation Act
Notice of Decision

Local Government Unit: City of Plymouth	**County:** Hennepin
Applicant Name: Hollydale Golf Course Development, Inc .	**Applicant Representative:** Nick McCabe, ISG
Project Name: Hollydale Golf Course	**LGU Project No. (if any):** 2019-13
Date Complete Application Received by LGU: 10/01/19	
Date of LGU Decision: November 7, 2019	
Date this Notice was Sent: November 7, 2019	

WCA Decision Type - check all that apply

☒Wetland Boundary/Type ☐Sequencing ☐Replacement Plan ☐Bank Plan (not credit purchase)
☐No-Loss (8420.0415) ☐Exemption (8420.0420)
Part: ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H Subpart: ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9

Replacement Plan Impacts (replacement plan decisions only)

Total WCA Wetland Impact Area:
Wetland Replacement Type: ☐ Project Specific Credits: ☐ Bank Credits:
Bank Account Number(s):

Technical Evaluation Panel Findings and Recommendations (attach if any)

☒ Approve ☐ Approve w/Conditions ☐ Deny ☐ No TEP Recommendation

LGU Decision

☐ Approved with Conditions (specify below)[1] ☒ Approved[1] ☐ Denied
List Conditions:

Decision-Maker for this Application: ☒ Staff ☐ Governing Board/Council ☐ Other:

Decision is valid for: ☒ 5 years (default) ☐ Other (specify):

[1] *Wetland Replacement Plan approval is not valid until BWSR confirms the withdrawal of any required wetland bank credits. For project-specific replacement a financial assurance per MN Rule 8420.0522, Subp. 9 and evidence that all required forms have been recorded on the title of the property on which the replacement wetland is located must be provided to the LGU for the approval to be valid.*

LGU Findings – Attach document(s) and/or insert narrative providing the basis for the LGU decision[1].

☐ Attachment(s) (specify):
☒ Summary:
Wetland delineation report (prepared by Kjolhaug Environmental Services, dated September 27, 2019) for the 156.8 acre Hollydale Golf Course in Plymouth, MN. The project area consists of PID No. 0811822310001 (59.25 acres), 0811822340014 (69.88 acres), 0811822430002 (27.67 acres). Three additional parcels (PID No. 0811822340011 - 0.43 acres, 0811822340007 - 0.51 acres, and 0811822340009 - 0.91 acres) were added adjacent to the southwest project area during the TEP field review on October 11, 2019, resulting in the 158.65 acre total project area.

Wetland boundaries and types were found to be accurately defined in the wetland delineation report during the TEP field review on October 11, 2019. Minor report and map revisions were verbally requested by the TEP and the applicant's consultant provided the requested revisions, which included:

- Since the time of the delineation submittal, a land survey was completed. Wetland 4 (shown on previous Existing Conditions figure adjacent to the railway in the northwest portion of site) was determined to be located entirely offsite based on the land survey. The wetland acreage has also been updated to reflect the surveyed boundaries. Also, the wetland types were added to the final map. Refer to attached Figure 2 – Existing Conditions.
- Two small parcels were added to the project limits (residential homes/yards along the western edge of the project boundary). They were walked during the TEP meeting and do not contain wetlands.

[1] *Findings must consider any TEP recommendations.*

Attached Project Documents

☐ Site Location Map ☒ Project Plan(s)/Descriptions/Reports (specify): Figure 2 – Existing Conditions Map

Appeals of LGU Decisions

If you wish to appeal this decision, you must provide a written request within 30 calendar days of the date you received the notice. All appeals must be submitted to the Board of Water and Soil Resources Executive Director along with a check payable to BWSR for $500 *unless* the LGU has adopted a local appeal process as identified below. The check must be sent by mail and the written request to appeal can be submitted by mail or e-mail. The appeal should include a copy of this notice, name and contact information of appellant(s) and their representatives (if applicable), a statement clarifying the intent to appeal and supporting information as to why the decision is in error. Send to:

Appeals & Regulatory Compliance Coordinator
Minnesota Board of Water & Soils Resources
520 Lafayette Road North
St. Paul, MN 55155
travis.germundson@state.mn.us

Does the LGU have a local appeal process applicable to this decision?

☐ Yes[1] ☒ No

[1]*If yes, all appeals must first be considered via the local appeals process.*

Local Appeals Submittal Requirements (LGU must describe how to appeal, submittal requirements, fees, etc. as applicable)

Notice Distribution (include name)

Required on all notices:

☒ SWCD TEP Member: Stacey Lijewski	☒ BWSR TEP Member: Ben Carlson
☒ LGU TEP Member (if different than LGU contact): Ben Scharenbroich	
☒ DNR Representative: Leslie Parris	
☒ Watershed District or Watershed Mgmt. Org.: Bassett Creek WMC, c/o Laura Jester, Keystone Waters LLC Elm Creek WMC, c/o Judie Anderson	
☒ Applicant (notice only): Jake Walesch	☒ Agent/Consultant (notice only): Nick McCabe, ISG

Optional or As Applicable:

☐ Corps of Engineers:	
☐ BWSR Wetland Mitigation Coordinator (required for bank plan applications only):	
☒ Members of the Public (notice only): Adam Cameron, Kjolhaug Environmental Services Company	☐ Other:

Signature:	Date: 11/06/2019

This notice and accompanying application materials may be sent electronically or by mail. The LGU may opt to send a summary of the application to members of the public upon request per 8420.0255, Subp. 3.

BOARD OF WATER AND SOIL RESOURCES

Minnesota Wetland Conservation Act
Notice of Decision

Local Government Unit: City of Plymouth	**County:** Hennepin
Applicant Name: Hollydale Golf Course Development, Inc .	**Applicant Representative:** Nick McCabe, ISG
Project Name: Hollydale Golf Course	**LGU Project No. (if any):** 2019-13
Date Complete Application Received by LGU: 10/09/19	
Date of LGU Decision: December 13, 2019	
Date this Notice was Sent: December 13, 2019	

WCA Decision Type - check all that apply

☐Wetland Boundary/Type ☐Sequencing ☐Replacement Plan ☐Bank Plan (not credit purchase)
☒No-Loss (8420.0415) ☐Exemption (8420.0420)
Part: ☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H Subpart: ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9

Replacement Plan Impacts (replacement plan decisions only)

Total WCA Wetland Impact Area:
Wetland Replacement Type: ☐ Project Specific Credits: ☐ Bank Credits:
Bank Account Number(s):

Technical Evaluation Panel Findings and Recommendations (attach if any)

☒ Approve ☐ Approve w/Conditions ☐ Deny ☐ No TEP Recommendation

LGU Decision

☐ Approved with Conditions (specify below)[1] ☒ Approved[1] ☐ Denied
List Conditions:

Decision-Maker for this Application: ☒ Staff ☐ Governing Board/Council ☐ Other:

Decision is valid for: ☒ 5 years (default) ☐ Other (specify):

[1] *Wetland Replacement Plan approval is not valid until BWSR confirms the withdrawal of any required wetland bank credits. For project-specific replacement a financial assurance per MN Rule 8420.0522, Subp. 9 and evidence that all required forms have been recorded on the title of the property on which the replacement wetland is located must be provided to the LGU for the approval to be valid.*

LGU Findings – Attach document(s) and/or insert narrative providing the basis for the LGU decision[1].

☐ Attachment(s) (specify):
☒ Summary:
Applicant requested a No-Loss determination for delineated wetlands 1, 2, 3, and 8 on the 158.65-acre Hollydale Golf Course property in Plymouth, MN. The applicant's memorandum (prepared by Kjolhaug Environmental Services, dated October 9, 2019) claims these wetlands were historically excavated within upland areas, and therefore are not regulated under the WCA ("incidental wetlands" per MN Rules 8420.0105 Subp. 2D) and Section 404 Clean Water Act. Additional information was requested from the TEP at the October 11th meeting to further clarify/support the applicant's claim of incidental wetlands to the satisfaction of the LGU. The applicant's consultant is prepared a second submittal for TEP review dated November 18,

2019. The second memorandum showed sufficient evidence that Wetlands 1, 2, 3, and 8 were excavated in upland landscape positions based on a historic aerial photograph review and soil survey data.

[1] *Findings must consider any TEP recommendations.*

Attached Project Documents

☐ Site Location Map ☒ Project Plan(s)/Descriptions/Reports (specify): Figure 2 – Existing Conditions Map

Appeals of LGU Decisions

If you wish to appeal this decision, you must provide a written request within 30 calendar days of the date you received the notice. All appeals must be submitted to the Board of Water and Soil Resources Executive Director along with a check payable to BWSR for $500 *unless* the LGU has adopted a local appeal process as identified below. The check must be sent by mail and the written request to appeal can be submitted by mail or e-mail. The appeal should include a copy of this notice, name and contact information of appellant(s) and their representatives (if applicable), a statement clarifying the intent to appeal and supporting information as to why the decision is in error. Send to:

Appeals & Regulatory Compliance Coordinator
Minnesota Board of Water & Soils Resources
520 Lafayette Road North
St. Paul, MN 55155
travis.germundson@state.mn.us

Does the LGU have a local appeal process applicable to this decision?

☐ Yes[1] ☒ No

[1]*If yes, all appeals must first be considered via the local appeals process.*

Local Appeals Submittal Requirements (LGU must describe how to appeal, submittal requirements, fees, etc. as applicable)

Notice Distribution (include name)

Required on all notices:

☒ SWCD TEP Member: Stacey Lijewski	☒ BWSR TEP Member: Ben Carlson
☒ LGU TEP Member (if different than LGU contact): Ben Scharenbroich	
☒ DNR Representative: Leslie Parris	
☒ Watershed District or Watershed Mgmt. Org.: Bassett Creek WMC, c/o Laura Jester, Keystone Waters LLC	
☒ Applicant (notice only): Jake Walesch	☒ Agent/Consultant (notice only): Nick McCabe, ISG

Optional or As Applicable:

☐ Corps of Engineers:	
☐ BWSR Wetland Mitigation Coordinator (required for bank plan applications only):	
☒ Members of the Public (notice only): Adam Cameron, Kjolhaug Environmental Services Company	☐ Other:

Signature: B-SL	**Date:** 12/13/2019

This notice and accompanying application materials may be sent electronically or by mail. The LGU may opt to send a summary of the application to members of the public upon request per 8420.0255, Subp. 3.

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, ST. PAUL DISTRICT
180 FIFTH STREET EAST, SUITE 700
ST. PAUL, MN 55101-1678

10/07/2019

Regulatory File No. MVP-2019-02362-EJW

THIS IS NOT A PERMIT

Adam Cameron
2500 Shadywood Road, Suite 130
Orono, MN 55331

Dear Mr. Cameron:

We have received your submittal described below. You may contact the Project Manager with questions regarding the evaluation process. The Project Manager may request additional information necessary to evaluate your submittal.

File Number: MVP-2019-02362-EJW

Applicant: Hollydale GC Development, Inc.

Project Name: Hollydale Golf Course

Project Location: Section 17 of Township 118 North, Range 22, Hennepin County, Minnesota (Latitude: 45.0398950720736; Longitude: -93.4918868075282)

Received Date: 09/27/2019

Project Manager: Eric White
(651) 290-5357
Eric.J.White@usace.army.mil

Additional information about the St. Paul District Regulatory Program, including the new Clean Water Rule, can be found on our web site at http://www.mvp.usace.army.mil/missions/regulatory.

Please note that initiating work in waters of the United States prior to receiving Department of the Army authorization could constitute a violation of Federal law. If you have any questions, please contact the Project Manager.

Thank you.

U.S. Army Corps of Engineers
St. Paul District
Regulatory Branch

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Appendix B

Water Well Maps and Logs

Hollydale Residential Development EAW

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For each subsurface sewage treatment system in use or abandoned, describe the system:

a. An abandoned septic system previously serving the clubhouse on the Property might be located on the Property.

b. There are two restrooms located on the golf course that generate sewage that does not go to a facility permitted by the Minnesota Pollution Control Agency.

A depiction of the locations of the wells and private sewer systems is below:


MDH
Minnesota Department of Health
Minnesota Well Index
Search by
Zoom to
Tools
Base Maps
Other Links
Help
Layer Name
Layer
Label
Legend
Wells
Selected Wells
Public Wells
Domestic Wells
Irrigation Wells
Monitor Wells
Other Wells
Sealed Wells
Unverified Wells
Township Range Section
DWSMA
SWBCA
Zoom to see wells, TRS, DWSMA and SWBCA
DWSMA: The area managed by a public water supplier to protect their source water
SWBCA: Special Well and Boring Construction Area layer
Schmidt Lake Rd
Old Rockford Rd
Rockford Rd
Hollydale Golf Club
Turtle Lake Park
Turtle Lake
Elm Creek
UTM: 463837 (x), 4986043 (y) Latitude/Longitude: 45.02691 / -93.45905
Township: 118 North, Range: 22 West, Section: 9, Quarters: SW SE, City/Township: Plymouth
Minnesota Geological Survey, University of Minnesota and the M

Minnesota Unique Well Number

483951

County Hennepin
Quad Osseo
Quad ID 120C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 08/24/1992
Update Date 03/10/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
HOLLYDALE	118	22	W	8	DCA

Elevation **Elev. Method**

Address

Contact 4540 HOLLY PLYMOUTH MN 55446
Well 4710 HOLLY LA N PLYMOUTH MN 55446

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	63	YELLOW	SOFT
CLAY	63	84	BLUE	MEDIUM
SAND GRAVEL	84	130	BLK/RED	SOFT
ROCK LEDGE	130	143	BLACK	HARD
CLAY SANDY	143	190	RED	MEDIUM
SAND CLAY	190	230	ORN/RED	MEDIUM
CLAY	230	250	ORN/RED	MEDIUM
SAND CLAY	250	255	ORN/RED	MEDIUM
DOLOMITE LIMEROCK	255	290	ORN/RED	HARD

Remarks
WELL#2

Well Depth 290 ft. **Depth Completed** 290 ft. **Date Well Completed** 05/26/1992

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use irrigation **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Welded
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
6 in. To 261 ft.	lbs./ft.	10 in. To 261 ft.
		6 in. To 290 ft.

Open Hole From ft. To ft.

Screen? ☐ **Type** **Make**

Static Water Level
135 ft. land surface Measure 05/26/1992

Pumping Level (below land surface)
200 ft. 2 hrs. Pumping at 300 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		0 ft.	260 ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer
Last Strat Depth to Bedrock ft
Located by
Locate Method
System UTM - NAD83, Zone 15, Meters X Y
Unique Number Verification Input Date

Angled Drill Hole

Well Contractor
Ingleside Engr. 27355 DEHN, D
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Well Index Report | **483951** | Printed on 10/17/2019
HE-01205-15

Minnesota Unique Well Number

425096

County Hennepin
Quad Osseo
Quad ID 120C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 11/30/1991
Update Date 05/04/2015
Received Date

Well Name	Township	Range	Dir	Section	Subsection
WIKMAN,	118	22	W	8	BCCDAB

Elevation 987 ft. **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

C/W 4935 HOLLY LA N PLYMOUTH MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	22	YELLOW	MEDIUM
CLAY	22	71	BLUE	MEDIUM
SAND	71	92	BROWN	SOFT
CLAY GRAVEL	92	179	BLU/BRN	MEDIUM
CLAY	179	240	DARK	MEDIUM
SANDROCK	240	261	GREEN	HARD

Remarks

Well Depth 261 ft. **Depth Completed** 261 ft. **Date Well Completed** 12/19/1986

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Threaded
Drive Shoe? Yes ☒ No ☐ **Above/Below** 1 ft.

Casing Diameter	Weight	Hole Diameter
4 in. To 244 ft.	11 lbs./ft.	6.7 in. To 244 ft.
		4 in. To 261 ft.

Open Hole From 244 ft. To 261 ft.

Screen? ☐ **Type** **Make**

Static Water Level
95 ft. land surface Measure 12/19/1986

Pumping Level (below land surface)
110 ft. 3 hrs. Pumping at 30 g.p.m.

Wellhead Completion
Pitless adapter manufacturer MONITOR Model 4X5
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
cuttings		ft.	ft.
bentonite		ft. 244	ft.

Nearest Known Source of Contamination
50 feet Southwes Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 12/23/1986
Manufacturer's name
Model Number HP 0.5 Volt 230
Length of drop pipe 126 ft Capacity 12 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock St.Peter Sandstone Aquifer St.Peter
Last Strat St.Peter Sandstone Depth to Bedrock 240 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 460626 Y 4987994
Unique Number Verification Address verification Input Date 02/26/2015

Angled Drill Hole

Well Contractor
Ruppert & Son 27086 RUPPERT, C.JR
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Well Index Report | **425096** | Printed on 10/01/2019
HE-01205-15

Minnesota Unique Well Number

199186

County Hennepin
Quad Osseo
Quad ID 120C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 07/05/1991
Update Date 02/05/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
GUSTAFSON,	118	22	W	8	BBCDDB

Elevation 976 ft. **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

C/W 5185 HOLLY LA PLYMOUTH MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	34	YELLOW	MEDIUM
CLAY & SAND	34	80	GRAY	MEDIUM
CLAY	80	120	BLUE	MEDIUM
CLAY & ROCK	120	180	BROWN	HARD
CLAY	180	200	GRAY	HARD
CLAY & SAND	200	215	YELLOW	HARD
CLAY	215	250	GREEN	HARD
SHALE & SANDROCK	250	280	GREEN	HARD
SANDROCK	280	319	WHITE	HARD

Remarks

Well Depth 319 ft. **Depth Completed** 319 ft. **Date Well Completed** 09/13/1983

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Welded
Drive Shoe? Yes ☒ No ☐ **Above/Below** 1 ft.

Casing Diameter **Weight**
4 in. To 259 ft. 11 lbs./ft.

Open Hole From 259 ft. To 319 ft.

Screen? ☐ **Type** **Make**

Static Water Level
90 ft. land surface Measure 09/13/1983

Pumping Level (below land surface)
90 ft. 2 hrs. Pumping at 30 g.p.m.

Wellhead Completion
Pitless adapter manufacturer WHITEWATER Model SU 6.5
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		ft.	259 ft.

Nearest Known Source of Contamination
75 feet West Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 02/15/1983
Manufacturer's name AERMOTOR
Model Number SD12100 HP 1 Volt 230
Length of drop pipe 105 ft Capacity 15 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock St.Peter Sandstone Aquifer St.Peter-Jordan
Last Strat Jordan Sandstone Depth to Bedrock 250 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 460623 Y 4988370
Unique Number Verification Address verification Input Date 04/30/2015

Angled Drill Hole

Well Contractor
McAlpines Well Drilling of 1477 MCALPINE, G.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Well Index Report **199186** Printed on 10/01/2019
HE-01205-15

Minnesota Unique Well Number

181969

County Hennepin
Quad Osseo
Quad ID 120C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 05/04/2015
Received Date

Well Name	Township	Range	Dir	Section	Subsection
WESTGUARD,	118	22	W	8	BADCAD

Elevation 1002 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 5205 DUNKIRK LA PLYMOUTH MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	5	GRAY	SOFT
TOP SOIL	5	10	BLACK	SOFT
CLAY	10	110	GRAY	SOFT
CLAY	110	140	RED	MEDIUM
ROCKY CLAY	140	220	RED	MEDIUM
GOOD GRAVEL	220	235	RED	SOFT

Remarks

Well Depth 235 ft. **Depth Completed** 235 ft. **Date Well Completed** 09/17/1982

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter **Weight**
4 in. To 231 ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
2 in.	18	4 ft.	231 ft.	235 ft.

Static Water Level
107 ft. land surface Measure 09/17/1982

Pumping Level (below land surface)
107 ft. 3 hrs. Pumping at 16 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		10 ft.	230 ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 09/17/1982
Manufacturer's name FAIRBANKS-MORSE
Model Number HP 0.5 Volt 230
Length of drop pipe 187 ft Capacity g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer Quat. buried
Last Strat gravel (+larger)-red Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 461135 Y 4988378
Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Ingleside Engr.	27355	PRAUGHT, V.

Minnesota Unique Well Number

790092

County Hennepin
Quad Osseo
Quad ID 120C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 11/01/2012
Update Date 05/22/2013
Received Date 01/07/2013

Well Name	Township	Range	Dir	Section	Subsection
OMEGA	118	22	W	8	ADDBDB

Elevation 1000 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

Well 5090 YUMA LA N PLYMOUTH MN 55447

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	13	BROWN	
GRAVEL & CLAY	13	51	GRAY	SOFT
GRAVEL	51	82	BROWN	SOFT
CLAY & GRAVEL	82	100	BROWN	HARD
GRAVEL & ROCK	100	133	YELLOW	HARD
SAND & GRAVEL	133	175	VARIED	MEDIUM
CLAY	175	175	GRAY	SOFT

Remarks

REGROUTED PER MDH ON 9-9-12 TOPPED OFF.

Well Depth 175 ft. **Depth Completed** 175 ft. **Date Well Completed** 08/22/2012

Drill Method Non-specified Rotary **Drill Fluid** Bentonite

Use irrigation **Status** Active

Well Hydrofractured? Yes ☐ No ☒ **From** **To**

Casing Type Single casing **Joint** Glued

Drive Shoe? Yes ☐ No ☒ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 154 ft.	1.9 lbs./ft.	8 in. To 175 ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set	
4 in.	18	10 ft.	154 ft.	174 ft.

Static Water Level

119 ft. land surface Measure 08/22/2012

Pumping Level (below land surface)

174 ft. 2 hrs. Pumping at 60 g.p.m.

Wellhead Completion

Pitless adapter manufacturer WELL SEAL Model SIMMONS

☐ Casing Protection ☒ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
high solids bentonite	9 Sacks	ft.	50 ft.

Nearest Known Source of Contamination

59 feet East Direction Sewer Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 08/30/2012

Manufacturer's name GRUNDFOS

Model Number 755100-16 HP 10 Volt 460

Length of drop pipe 140 ft Capacity 60 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat clay-gray Depth to Bedrock ft

Located by Minnesota Department of Health

Locate Method GPS SA Off (averaged) (15 meters)

System UTM - NAD83, Zone 15, Meters X 461921 Y 4988073

Unique Number Verification Info/GPS from data Input Date 08/27/2012

Angled Drill Hole

Well Contractor

Alberg Water Services, Inc. 2423 ALBERG, G.

Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

204209

County Hennepin
Quad Osseo
Quad ID 120C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 05/04/2015
Received Date

Well Name	Township	Range	Dir	Section	Subsection
MOONEY, JOHN	118	22	W	8	DAAABA

Elevation 1015 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 4925 VICKSBURG LA N PLYMOUTH MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
TOP SOIL	0	2		
CLAY	2	30	YELLOW	
CLAY	30	43	GRAY	
HARD PAN	43	67		
GRAVEL	67	92		
HARDPAN	92	113	RED	
MUDDY SAND &	113	158		
SAND & GRAVEL	158	171		

Remarks

AUG. 3, 1970 PUMP CHANGED TO 1 HP STA-RITE

Well Depth	Depth Completed	Date Well Completed
171 ft.	171 ft.	09/24/1969

Drill Method **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter	Weight
4 in. To ft.	lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** 948

Diameter	Slot/Gauze	Length	Set
4 in.	12	0 ft.	0 ft. ft.

Static Water Level

116 ft. land surface Measure 09/25/1969

Pumping Level (below land surface)

ft. hrs. Pumping at 30 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed 09/26/1969

Manufacturer's name AERMOTOR

Model Number HP 0.5 Volt

Length of drop pipe 144 ft Capacity g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat sand +larger Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)

System UTM - NAD83, Zone 15, Meters X 462000 Y 4987900

Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Mork Well Co. 02133

Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

204210

County Hennepin
Quad Osseo
Quad ID 120C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 02/10/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
AMUNDSON,	118	22	W	9	BCCBBD

Elevation 1020 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 5000 VICKSBURG LA N PLYMOUTH MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SEMIHARD CLAY	0	28	BROWN	
SOFT CLAY	28	72	BLUE	SOFT
HARDPACK SAND &	72	80		
PEASTONE & GRAVEL	80	125		
CLAY	125	137	BROWN	
CLAY & SAND	137	141		
PEASTONE	141	149		
POCKET OF WATER	149	150		
CEMENTED GRAVEL	150	178		
POCKET OF WATER	178	180	TAN	
CLAY AND GRAVEL	180	204		
DARK GREY CLAY	204	233	GRAY	
HARD CLAY	233	236		HARD
CLAY	236	255	GRAY	
CLAY & GRAVEL	255	264		
HEAVY GRAVEL	264	268		
BLUE SHALE &	268	276	BLUE	
PASTY SANDSTONE	276	281		
GREEN SHALE	281	287	GREEN	
VERY HARD LEDGE OF	287	295		
SOFT SPOT	295	312		

Remarks

Well Depth 312 ft. **Depth Completed** 296 ft. **Date Well Completed** 09/20/1968

Drill Method **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below** -4 ft.

Casing Diameter **Weight**
in. To 285 ft. lbs./ft.

Open Hole From 285 ft. To 296 ft.

Screen? ☐ **Type** **Make**

Static Water Level
117 ft. land surface Measure 09/20/1968

Pumping Level (below land surface)
ft. hrs. Pumping at 22 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP 1 Volt
Length of drop pipe ft Capacity 15 g.p. Typ Submersible

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock St.Peter Sandstone Aquifer St.Peter-Jordan
Last Strat Jordan Sandstone Depth to Bedrock 268 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 462114 Y 4988059
Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor
Hadden Well Co. 02164
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

204211

County Hennepin
Quad Osseo
Quad ID 120C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
JUNG, JOE	118	22	W	9	CCCCCB

Elevation 1013 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 4510 VICKSBURG LA N PLYMOUTH MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	38	BROWN	
CLAY SOME STONES	38	77	GRAY	
GRAVEL & CLAY	77	140	GRAY	
CLAY & GRAVEL	140	166	GRAY	
GRAVEL & CLAY	166	185	BROWN	
CLAY & SAND	185	200	RED	
CLAY & GRAVEL	200	230	GRAY	
SANDSTONE & SHALE	230	265	VARIED	

Remarks

Well Depth 265 ft. **Depth Completed** 265 ft. **Date Well Completed** 05/17/1974

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Threaded

Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 244 ft.	lbs./ft.	4 in. To 265 ft.

Open Hole From 244 ft. To 265 ft.

Screen? ☐ **Type** **Make**

Static Water Level

115 ft. land surface Measure 05/17/1974

Pumping Level (below land surface)

ft. hrs. Pumping at 30 g.p.m.

Wellhead Completion

Pitless adapter manufacturer BAKER Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed 05/20/1974

Manufacturer's name RED JACKET

Model Number HP 0.75 Volt

Length of drop pipe 147 ft Capacity 12 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock St.Peter Sandstone Aquifer St.Peter

Last Strat St.Peter Sandstone Depth to Bedrock 230 ft

Located by Minnesota Geological Survey

Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)

System UTM - NAD83, Zone 15, Meters X 462074 Y 4987130

Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Renner E.H. & Sons 27015

Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

434314

County Hennepin
Quad Osseo
Quad ID 120C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 11/30/1991
Update Date 05/05/2015
Received Date

Well Name	Township	Range	Dir	Section	Subsection
GULLICKSON,	118	22	W	17	ABDCAA

Elevation 989 ft. **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

C/W 16300 9 CR PLYMOUTH

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	125		
GRAVEL	125	150		
CLAY	150	189		
ROCK	189	215		

Remarks

Well Depth 215 ft. **Depth Completed** 215 ft. **Date Well Completed** 05/19/1987

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 189 ft.	1.89 lbs./ft.	4 in. To 215 ft.

Open Hole From 189 ft. To 215 ft.

Screen? ☐ **Type** **Make**

Static Water Level
90 ft. land surface Measure 05/19/1987

Pumping Level (below land surface)
110 ft. 20 hrs. Pumping at 20 g.p.m.

Wellhead Completion
Pitless adapter manufacturer WHITEWATER Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
well grouted, type unknown		ft. 189	ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 07/17/1987
Manufacturer's name MYERS
Model Number HP 0.75 Volt
Length of drop pipe 120 ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock St.Peter Sandstone Aquifer St.Peter
Last Strat St.Peter Sandstone Depth to Bedrock 189 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 461549 Y 4986795
Unique Number Verification Address verification Input Date 02/26/2015

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Torgerson Well Co.	27056	OTTEN, D.

Minnesota Unique Well Number

204290

County Hennepin
Quad Osseo
Quad ID 120C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 03/03/2017
Received Date

Well Name	Township	Range	Dir	Section	Subsection
POLLAND, J.C.	118	22	W	17	BDAACB

Elevation 990 ft. **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 4225 DUNKIRK LA PLYMOUTH MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DRIFT	0	260		
SANDSTONE	260	272		

Remarks

SEALED 12-09-2014 BY 1480.

Well Depth	Depth Completed	Date Well Completed
272 ft.	272 ft.	03/06/1973

Drill Method **Drill Fluid**

Use domestic **Status** Sealed

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 260 ft.	lbs./ft.	4 in. To 272 ft.

Open Hole From 260 ft. To 272 ft.

Screen? ☐ **Type** **Make**

Static Water Level
80 ft. land surface Measure 03/06/1973

Pumping Level (below land surface)
ft. hrs. Pumping at 60 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock St.Peter Sandstone Aquifer St.Peter
Last Strat St.Peter Sandstone Depth to Bedrock 260 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 461162 Y 4986640
Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor
Gess Henry Well Co. 27008
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

405052

County Hennepin
Quad Hamel
Quad ID 121D

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 05/05/2015
Received Date

Well Name	Township	Range	Dir	Section	Subsection
WENTLAND,	118	22	W	18	AADABC

Elevation 1007 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W 17535 ROCKFORD RD PLYMOUTH MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	92		
GRAVEL	92	111		
CLAY	111	120		
GRAVEL	120	153		
CLAY	153	164		
WATER SAND	164	179		

Remarks

Well Depth 179 ft. **Depth Completed** 179 ft. **Date Well Completed** 05/03/1984

Drill Method Non-specified Rotary **Drill Fluid**

Use domestic **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**

Drive Shoe? Yes ☒ No ☐ **Above/Below**

Casing Diameter	Weight
4 in. To 174 ft.	lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** stainless **Make** JOHNSON

Diameter	Slot/Gauze	Length	Set
4 in.	12	ft.	ft. ft.

Static Water Level

91 ft. land surface Measure 05/03/1984

Pumping Level (below land surface)

ft. 3 hrs. Pumping at 12 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
bentonite		ft.	ft.

Nearest Known Source of Contamination

80 feet East Direction Septic tank/drain field Type

Well disinfected upon completion? ☒ Yes ☐ No

Pump ☐ Not Installed Date Installed 05/04/1984

Manufacturer's name A.Y. MCDONALD

Model Number SM 75 HP 0.75 Volt 230

Length of drop pipe 147 ft Capacity 10 g.p. Typ Submersible

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Aquifer Quat. buried

Last Strat sand Depth to Bedrock ft

Located by Minnesota Geological Survey

Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)

System UTM - NAD83, Zone 15, Meters X 460358 Y 4986854

Unique Number Verification Address verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
R.E.S. Well Co.	27276	TORGERSON, S.

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Appendix C

Drainage Divide and Groundwater Information

Hollydale Residential Development EAW

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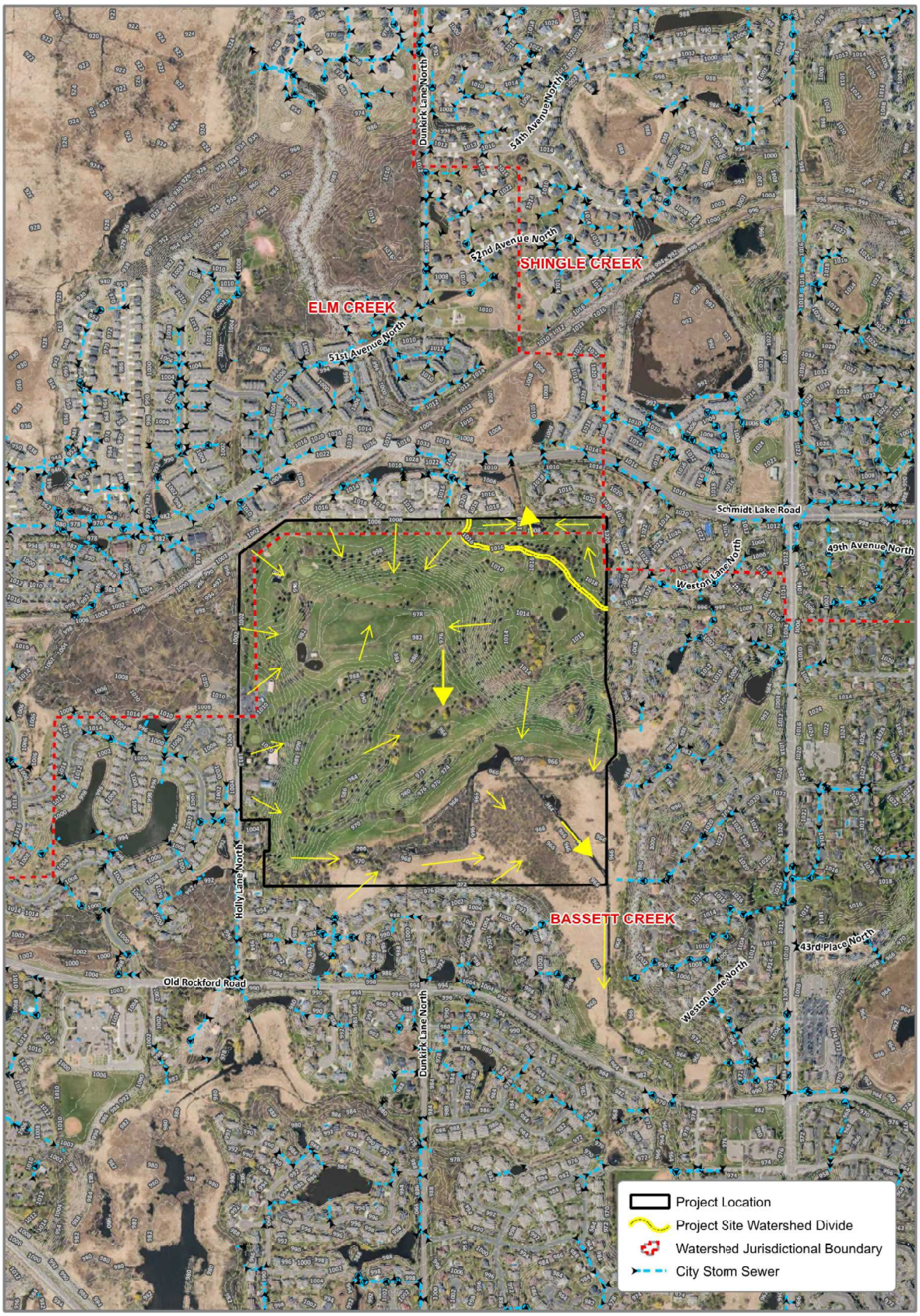
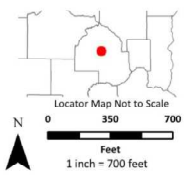
www.ae2s.com | Advance1 Engineering and Environmental Services, Inc.



Information depicted may include data unverified by AE2S. Any reliance upon such data is at the user's own risk. AE2S does not warrant this map or its features are either spatially or temporally accurate.
Coordinate System: HENNEPIN COUNTY | Edited by: jklabo | C:\Users\JKlabo\AE2S\Sathre - Documents\Hollydale Golf Course\GIS\Figure1_HollydaleResidentialDevelopment.mxd



WATERSHED BOUNDARIES

HOLLYDALE RESIDENTIAL DEVELOPMENT/HOLLYDALE GC DEVELOPMENT INC.
Plymouth | Hennepin County, MN

Date: 1/15/2020

Braun Intertec Corporation
11001 Hampshire Avenue S
Minneapolis, MN 55438

Phone: 952.995.2000
Fax: 952.995.2020
Web: braunintertec.com

January 14, 2020 Project B1904884.00

Mr. Jake Walesch
Hollydale GC Development, Inc.
10850 Old Country Road 15, Suite 200
Plymouth, MN 55441

Re: Planned Residential development
Former Hollydale Golf Course
4710 Holly Lane N
Plymouth, Minnesota

Dear Mr. Walesch:

It is our understanding that there is concern that the construction of new single family homes on the Former Hollydale Golf Course property will cause groundwater elevations to rise due to the weight and volume of the new planned houses in the vicinity of existing houses on adjacent properties.

Groundwater and surface water conditions are influenced by many factors. However, the weight and volume of houses that may be built is not one of those factors. Any excavation to construct a single family homes basement will accommodate the basement area, and is not displacing groundwater.

Groundwater flow is primarily lateral, with the water table surface elevation representing the equilibrium level of groundwater. The construction of the planned single family houses, in and of themselves, will not affect this equilibrium. The development plans and design, which are approved by the City of Plymouth and the local watershed authority, will take into account groundwater conditions and the affect that the planned development may have on localized groundwater/surface water conditions.

BRAUN INTERTEC CORPORATION

Mark D. Keefer, PG
Group Manager, Senior Scientist

For:
Christopher Thompson, PE
Principal Engineer

HAUGO GEOTECHNICAL SERVICES

January 15, 2020 Project Number: 19-0877

Mr. Jake Walesch
Hollydale GC Development Inc.
10850 Old County Road 15, Suite 200
Plymouth, MN 55441

Re: Water Level Summary, Hollydale Residential Development, 4710 Holly Lane North, Plymouth, Minnesota

Dear Mr. Walesch:

This letter provides a summary of water/groundwater conditions on the proposed Hollydale residential development site in Plymouth.

Background

Hollydale GC Development Inc. is proposing residential development on the site of the former Hollydale Golf Course in Plymouth Minnesota. As part of the process an Environmental Assessment Worksheet (EAW) is being prepared that, in general, provides information about the project and information about the potential environmental effects. We understand there is a concern from the neighboring property owners that by putting foundations in the ground on the Hollydale property, it will raise the water table or increase the groundwater in the adjacent neighborhood. The example given was if you put a rock in a glass of water, the water level will rise in a glass.

Water and Soil Conditions

Water Table All of the groundwater in Hennepin County originated as precipitation that soaked into the ground and eventually reached the water table and deeper aquifers. The water table is the boundary below which geologic materials (i.e. soil and bedrock) are completely saturated with groundwater. The interval between the land surface and groundwater table is the unsaturated zone. It's thickness in Hennepin County depends on the relationships between the water table and that of the surface topography. Where the elevations of the two coincide the water table is exposed at the land surface in the form of permanent wetlands, lakes and rivers. The water table below the Hollydale residential development is reported to be at or near elevation 960. (Geologic Atlas Hennepin County, Minnesota, County Atlas Series C-4, Plate 5).

Perched Water Often times water can be encountered on a project site at various depths and elevations above the water table. Water encountered above the water table does not constitute the "water table" and is referred to as "perched" water. Perched water is defined as groundwater occurring in a saturated zone separated from the main body of groundwater by unsaturated geologic materials. Perched water is often associated with sand pockets, sand layers or seams that are isolated from the "water table".

Soil Soil is an accumulation of mineral particles (grains) produced by the physical and chemical disintegration of rocks. Sandy soils have grain sizes that typically range from about

6 millimeters (about ¼ of an inch) to about 0.1 millimeters (about 1/32 of an inch). Silt and clay sized particles are smaller yet and particles sizes range from about 0.1 millimeters to 0.001 millimeters. Because soil particles are irregularly shaped there are spaces (voids) between the particles and these voids can be filled with air or water. For soils in the unsaturated zone the voids are filled with air and for soil in the saturated zone (i.e. below the water table) the voids are completely filled with water.

As mentioned above, soil particles vary in size and contain void spaces which allow water or air to move between the particles. Permeability is the ability of water to flow through a soil by moving through the void spaces. In general, the larger the voids spaces, such as in sandy soils, the easier it is for water to flow through the soil and the smaller the particle sizes the harder it is for water to flow through the soil. (Foundation Engineering Handbook, Robert W Day, 2006).

Discussion

The assertion that placing foundations on the soil will raise the groundwater levels are based on false assumptions. Although it is true that the water level will rise when a rock is placed in a glass container, this only applies if the container is impermeable so that the water is confined and no water can flow out of the container. In addition the rock must be of sufficient mass to displace enough water to cause a raise in the water level.

Neither of those conditions are valid for the Hollydale residential development site. The elevations across the project site varies from about 1020 to 964 which is above the reported water table. Footings for the proposed homes will likely be placed in the "unsaturated zone" above the water table and because of that the pressures associated with the footings will serve to displace the air in the void spaces as opposed to displacing water.

Soil, in general, is a permeable material because of the void spaces within the soil matrix and because of that the subsurface soil is a permeable system which will allow water to flow through the soil. Water below the site is therefore not confined.

The size and mass of the footings are not sufficiently large enough to impact subsurface soil conditions. The footings for a typical residential structure are commonly about 18 to 24 inches wide and the foundation loads associated with a typical residential structure are typically less than 2,000 pounds per square foot and often less than 1,500 psf. These structural loads are supported and distributed by the concrete footing and underlying soils so that at a depth of about 4 feet below the bottom of the footing the soils "feels" about 10 percent of the load applied at the top of the footing. This correspond to about 150 to 200 pounds which is about the weight of a typical person and, in our opinion, is not sufficient to impact the groundwater conditions below the site.

Conclusions

In accordance with City and State Building Codes we anticipate that the footings for the proposed homes will be placed in the "unsaturated zone" above the water table (i.e. the homes will not be constructed in or below the water table) and because of that it is unlikely that the pressures associated with the footings will impact the underlying soil and groundwater conditions.

We assume that a foundation drain tile system will be installed at each home which will collect surface water infiltration as well as perched water within sand seam(s) or more permeable

native soils and direct it to the storm sewer system and/or ponds on site. It is our opinion that foundation drain tile system(s) along with the required minimum grades for stormwater conveyance will reduce or eliminate the potential for perched water conditions to impact the homes.

It is our opinion that construction of the homes within the Hollydale residential development will not result in impacts to the water table below the project site or adjoining neighborhoods.

Disclaimer

Fluctuations in the groundwater level may occur due to rainfall, flooding, irrigation, spring thaw, drainage, and other seasonal and annual factors. The intensity and duration of these events or factors can impact groundwater levels. In addition, "extreme" weather rainfall, flooding, snow melt/spring thaw, etc., could result in higher groundwater levels. Design drawings and specifications and construction planning should recognize the possibility of fluctuations.

General

Haugo GeoTechnical Services, LLC has used the degree of skill and care ordinarily exercised under similar circumstance by members of the profession currently practicing in this locality. No warranty expressed or implied is made.

Thank you for the opportunity to assist you on this project. If you have any questions or need additional information, please contact or Paul Gionfriddo at 612-271-8185.

Sincerely,

Haugo GeoTechnical Services, LLC

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.

Paul Gionfriddo, P.E.
Senior Engineer
License Number 230903
Expires June 2020

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Appendix D

Soil and Groundwater Sampling and Analysis Results

Hollydale Residential Development EAW

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Phase II Environmental Site Assessment

Hollydale Golf Course
4710 Holly Lane North
Plymouth, Minnesota

Prepared for

Hollydale GC Development, Inc.

Project B1904484.00
November 24, 2019

Braun Intertec Corporation

BRAUN INTERTEC
The Science You Build On.

BRAUN INTERTEC
The Science You Build On.

Braun Intertec Corporation
11001 Hampshire Avenue S
Minneapolis, MN 55438

Phone: 952.995.2000
Fax: 952.995.2020
Web: braunintertec.com

November 24, 2019

Project B1904484.00

Mr. Jake Walesch
Hollydale GC Development, Inc.
10850 Old Country Road 15, Suite 200
Plymouth, MN 55441

Re: Phase II Environmental Site Assessment
Hollydale Golf Course
4710 Holly Lane North
Plymouth, Minnesota

Dear Mr. Walesch:

On behalf of Hollydale GC Development, Inc., Braun Intertec Corporation conducted a Phase II Environmental Site Assessment (Phase II ESA) of the above-referenced site (Site) in accordance with the authorized scope of services described in our proposal dated September 11, 2019. The Phase II ESA was prepared in association the proposed redevelopment of the Site. For a complete discussion of our assessment, please refer to the attached Phase II ESA report.

The objective of the Phase II ESA was to further delineate the mercury impacts related to the historic use of mercury-based fungicides and evaluate current soil and groundwater conditions at the Site related to the recognized environmental conditions (RECs) identified in the Phase I Environmental Site Assessment (Phase I ESA) conducted at the Site by Braun Intertec (Project B1904484), dated June 13, 2019.

This Phase II ESA was prepared on behalf of and for use by Hollydale GC Development, Inc. No other party has a right to rely on the contents of this Phase II ESA without the written authorization of Braun Intertec.

We appreciate the opportunity to provide our professional services to you for this project. If you have any questions or comments regarding this report or the project in general, please contact Mark Keefer at 952.995.2493.

Sincerely,

BRAUN INTERTEC CORPORATION

Mark D. Keefer, PG
Associate Principal – Senior Scientist

Attachment:
Phase II Environmental Site Assessment Report

Table of Contents

Description **Page**

Figures

Tables

Table of Contents (continued)

Appendices

A. Introduction

A.1. Authorization

Braun Intertec Corporation received authorization from Jake Walesch of Hollydale GC Development, Inc. to conduct a Phase II Environmental Site Assessment (ESA) of the Hollydale Golf Course located at 4710 Holly Lane North in Plymouth, Minnesota (Site), in accordance with the scope of services described in Braun Intertec's proposal dated September 11, 2019. The Phase II ESA was prepared in association with the proposed redevelopment of the Site.

This Phase II ESA was prepared on behalf of and for use by Hollydale GC Development, Inc. in accordance with the contract between Hollydale GC Development, Inc. and Braun Intertec. No other party has a right to rely on the contents of this Phase II ESA without the written authorization of Braun Intertec.

The assessment was conducted concurrently with the geotechnical evaluation of the site, the results of which are provided under separate cover and should be reviewed in conjunction with this report to understand both the geotechnical aspects and environmental aspects of the site and how they may impact one another.

A.2. Project Objective

The objective of the Phase II ESA was to further delineate the mercury impacts related to the historic use of mercury-based fungicides and evaluate current soil and groundwater conditions at the Site related to the recognized environmental conditions (RECs) identified in the Phase I Environmental Site Assessment (Phase I ESA) conducted at the Site by Braun Intertec (Project B1904484), dated June 13, 2019.

B. Site Background

B.1. Site Location and Description

The Site is located at 4710 Holly Lane North (see Figure 1). The Site is located within the southeast quarter of the southwest quarter of Section 8, Township 118 North, Range 22 West, in the city of Plymouth, Hennepin County, Minnesota.

The Site consists of three contiguous parcels totaling approximately 156.8 acres in size. The Site is developed for use as an 18-hole golf course. Structures include a clubhouse, well pump house, cart storage shed, barn, and two remote fairway restroom buildings.

According to the Phase I ESA, the north two parcels of the Site were historically used for a farmstead and agricultural purposes from at least 1937 until converted into a golf course in the 1960s. The southernmost parcel of the Site has always been undeveloped wooded marshland. The surrounding area land use has generally consisted of cultivated agricultural land progressively followed by residential development.

B.2. Proposed Development

The client is considering acquisition and redevelopment of the Site into residential housing.

B.3. Previous Site Investigations

Braun Intertec completed a Phase I ESA at the Site in June 2019, the results of which are presented in the report entitled: *Phase I Environmental Site Assessment, Hollydale Golf Course, 4710 Holly Lane North, Plymouth, Minnesota*, prepared by Braun Intertec, dated June 13, 2019 (Project B1904484) (2019 Phase I ESA).

The Phase I ESA identified the following recognized environmental conditions in connection with the Site:

- Petroleum products stored in two aboveground storage tanks (ASTs) with no secondary containment were observed on the Site. There is a potential for petroleum releases from the ASTs, which is considered a recognized environmental condition.

- The use of the Site included storage, mixing, and application of various agricultural chemicals on the Site. Some chemicals were still stored on the Site. There is a potential for agricultural chemical releases to the soil and groundwater at the Site from spills during mixing, transport, or storage, which is considered a recognized environmental condition.

- The agricultural chemicals used and stored on the Site historically included mercury based fungicide. Repeated historical application of the fungicide results in an accumulation of mercury in the soils overtime. The resulting accumulation of mercury in the soils from repeated fungicide applications is considered a recognized environmental condition.

Due to the historic use of mercury fungicide at the Site, Braun Intertec collected shallow soil from two of the existing golf course greens for total mercury analysis. Elevated concentrations of mercury above the relevant soil standards were detected in the shallow soil (0-0.5 feet below ground surface (bgs)) samples collected at both of the sampled golf course greens. However, the detected concentrations of mercury in the deeper samples collected at the sampled greens were at concentrations below the soil SRVs/SLVs and were at levels typical of background concentrations of mercury.

B.4. Published Geologic Information

B.4.a. Topography

According to the United States Geological Survey (USGS) 7.5-minute topographic map series, Osseo, Minnesota quadrangle, the Site is located at an elevation of approximately 965 to 1,000 feet above mean sea level.

B.4.b. Geology

The referenced publications indicate that the unconsolidated sediment in the Site vicinity are postglacial organic deposits, which consist of peat and organic-rich sediment and can include small bodies of open water; and Pleistocene age loamy till deposits, which are loam in texture with a few beds and lenses of stratified sediment. The loamy till deposits are underlain by Superior lobe stratified sediment or till and are generally at a depth of more than 50 feet. This deposit includes small areas of thick, fine, loamy colluvium sediment (Meyer and Hobbs, 1989). The depth to bedrock in the Site vicinity ranges from approximately 200 to approximately 350 feet below land surface (Bloomgren et al., 1989). The uppermost bedrock units in the Site vicinity are the St. Peter Sandstone Formation, which is described as fine-to medium grained friable quartz sandstone in the upper most portions; and the Shakopee Formation, which is described as sandy dolostone and is the uppermost formation in the Prairie du Chien Group (Olsen and Bloomgren, 1989).

B.4.c. Hydrogeology

Based on the referenced publications, the groundwater in the vicinity of the Site occurs from near surface to approximately 40 feet below land surface (Kanivetsky, 1989). According to published geologic information, the regional groundwater flow direction within the unconsolidated deposits in the vicinity of the Site is generally to the east (Kanivetsky, 1989).

C. Scope of Services

The following tasks were conducted at the Site as part of this Phase II ESA:

- Coordinated with Braun Intertec's geotechnical drilling crew to clear public utilities through Gopher State One Call and private utilities for the investigation locations.
- Coordinated with Braun Intertec's geotechnical drilling crew to complete soil borings and install temporary groundwater monitoring wells.
- Advanced three environmental soil borings (ST-1 through ST-3) and collected soil samples.
- Advanced six hand auger borings (HA-1, HA-2, ST-4, ST-7, ST-14, and ST-21) to collect soil samples.
- Installed two temporary monitoring wells in two of the soil borings (ST-1 and ST-3) and collected groundwater samples.
- Conducted environmental monitoring during drilling and screened soil samples collected from the borings for the presence of organic vapors using a photoionization detector (PID). Visual and olfactory observations regarding potential contamination were also made and recorded.
- Analyzed representative samples of soil and groundwater for one or more of the following parameters: volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), diesel range organics (DRO), Resource Conservation and Recovery Act (RCRA) metals, Total Mercury, and Organochlorine Pesticides.
- Evaluated the data and prepared this report.

C.1. Deviations from Work Plan/Proposal

Two hand augers (HA-1 and HA-2) were advanced beneath the existing ASTs located at the Site instead of the originally proposed one so that each tank could be evaluated for signs of release.

Hand augers were advanced in select greens, fringes, and tee boxes in addition to adjacent geotechnical borings (ST-4, ST-7, ST-14, and ST-21) in order to collect soil samples for Total Mercury within potentially affected areas with minimal damage to the existing golf course.

Groundwater was not observed in ST-2 and therefore a sample was not collected.

D. Investigation Methods and Procedures

The field work relating to the investigation was conducted between October 10 and October 14, 2019. Prior to beginning the field investigation, public utilities were cleared through Gopher State One Call and private utilities were cleared through a subcontracted private utility locator.

Field methods and results are discussed in the following sections. Soil boring logs are provided in Appendix A, laboratory analytical report(s) is (are) provided in Appendix B, and Braun Intertec Standard Operating Procedures (SOPs) are provided in Appendix C.

Three push probe soil borings (designated ST-1 through ST-3), two temporary groundwater monitoring wells (ST-1 and ST-3), and six hand auger borings (designated as HA-1, HA-2, ST-4, ST-7, ST-14, and ST-21) were advanced at the Site as follows:

- Soil borings ST-1 through ST-3 were advanced to depths of 30 feet bgs at the Site in the area of the ASTs, maintenance buildings, and agricultural mixing area, respectively.
- Temporary monitoring wells were installed in soil borings ST-1 and ST-3.
- Hand auger borings HA-1 and HA-2 were advanced to a depth of 2.5 feet bgs directly beneath the ASTs.
- Hand auger borings ST-4, ST-7, ST-14, and ST-21 were advanced to a depth of 2.5 feet bgs in select greens, fringes, and tee boxes.

The soil boring and hand auger locations are shown on Figure 2.

D.1. Soil Evaluation

D.1.a. Soil borings

Braun Intertec advanced three soil borings, designated as ST-1 through ST-3, at the Site to depths of 30 feet bgs.

The soil borings were advanced using a hollow-stem auger rig. Soil borings were performed with a core-and-auger drill equipped with 3 1/4-inch inside-diameter hollow-stem auger. Soil sampling for the borings was conducted in general accordance with American Society for Testing and Materials (ASTM) D 1586, "Penetration Test and Split-Barrel Sampling of Soils." The boreholes were advanced with the hollow-stem auger to the desired test depths. A 140-pound hammer falling 30 inches was then used to drive the standard 2-inch split-barrel sampler a total penetration of 1 1/2 feet below the tip of the hollow-stem auger. After advancing the tooling, the split-barrel sampler was removed from the borehole and the soil sample was retrieved for field screening and classification. The process was then repeated to the termination depths of the borings.

Prior to arrival onsite, the drill rig and sampling equipment were cleaned with a high pressure, hot water sprayer. Between sampling locations, non-dedicated sampling equipment was cleaned with a soap and water scrub followed by a clean water rinse.

This investigation includes soil borings advanced to depths of 15 feet or deeper. Upon completion, soil borings were sealed in accordance with MDH regulations. Following temporary well use, the well materials were removed, and the boreholes were sealed in accordance with MDH regulations. The asphalt surface at the boring location was patched.

D.1.b. Hand Auger Borings

Six hand auger borings, designated HA-1, HA-2, ST-4, ST-7, ST-14, and ST-21, were advanced at the Site. HA-1 and HA-2 were advanced directly beneath the ASTs located at the Site. ST-4, ST-7, ST-14, and ST-21 were advanced in select greens, fringes, and tee boxes. A hand-driven bucket auger was used to advance the hand auger borings to depths of 2.5 feet bgs.

D.1.c. Soil Classification and Monitoring

Soils samples from the soil borings and hand auger borings were visually and manually classified in the field by an environmental technician using ASTM D 2487 "Unified Soils Classification System" and ASTM D 2488 "Recommended Practice for Visual and Manual Description of Soils." Additionally, soils from the soil borings were classified at the Braun Intertec soils laboratory by a geotechnical engineer using ASTM D 2487 and ASTM D 2488.

Soil samples retrieved were examined by an environmental technician, who was a certified asbestos inspector by Minnesota Department of Health (MDH), for unusual staining, odors, and other apparent signs of contamination. In addition, the soil samples were screened for the presence of organic vapors using a PID. The PID was equipped with a 10.6-electron-volt lamp and calibrated to an isobutylene standard. The PID was used to perform direct measurement and a headspace method of field analyses, as recommended by the MPCA in Petroleum Remediation Program Guidance Document 4-04 (July 2018).

D.1.d. Soil Analyses

Selected soil samples were collected from the soil borings and hand auger borings for laboratory analysis as identified in the following table. Samples were submitted to Pace Analytical laboratory from Minneapolis, Minnesota.

Soil Boring/Hand Auger Sample Name	Sampling Depth (feet bgs)	Rationale	Analytical Parameters
ST-1	2-3	Adjacent to existing ASTs.	VOCs, DRO, PAHs, and 8 RCRA metals
ST-2	2-3	Near maintenance buildings.	VOCs, DRO, PAHs, and 8 RCRA metals
ST-3	0-0.5; 1-2	In washout from agricultural chemical mixing area.	VOCs, 8 RCRA metals, and organochlorine pesticides
HA-1	0-0.5, 2-2.5	Beneath existing AST.	VOCs, DRO, PAHs, and 8 RCRA metals
HA-2	2-2.5	Beneath existing AST.	VOCs, DRO, PAHs, and 8 RCRA metals
ST-4, ST-7, ST-14, ST-21	0-0.5, 1-2	In select greens, fringes, and tee boxes.	Total Mercury

D.2. Groundwater Evaluation

Temporary monitoring wells were installed in two of the soil borings (ST-1 and ST-3) to evaluate groundwater conditions at the Site. The wells were permitted with the MDH. The temporary monitoring well locations are shown on Figure 2.

D.2.a. Temporary Monitoring Wells

After the soil borings were advanced 5 feet into the water table, temporary monitoring wells were constructed using 1-inch-diameter PVC riser and 5-foot long, 10-slot screens.

D.2.b. Temporary Monitoring Well Sampling

The temporary monitoring wells were sampled using a length of new polyethylene tubing equipped with a check ball valve. Water samples retrieved were examined by the field technician for unusual odors, petroleum-like sheen, and other apparent signs of contamination. The groundwater samples were placed directly into laboratory supplied containers, preserved appropriately, and submitted to the laboratory for chemical analysis.

D.2.c. Groundwater Analyses

The groundwater samples collected from the temporary wells were submitted to Pace Analytical laboratory from Minneapolis, Minnesota and analyzed for a combination of the following parameters:

- VOCs using EPA Method 8260
- PAHs using EPA Method 8270
- Dissolved eight RCRA Metals using EPA Methods 6010 and 7471
- DRO using the WDNR Method

E. Investigation Results

E.1. Geologic Conditions

Soil boring logs with descriptions of the various soil strata encountered during the soil boring operations and water level information are contained in Appendix A. The depths shown as changes between the soil types are approximate. The actual changes may be transitional, and the transition depths are likely to be horizontally variable.

Sandy clay and clay with sand were encountered from the ground surface to depths of 4 to 8 feet bgs and was underlain by gray clay till.

E.2. Hydrogeology

Groundwater was encountered at approximately 25 to 30 feet bgs.

E.3. Field Screening

Soil recovered from the soil borings and hand augers was screened by the field technician for evidence of contamination, including odors, staining, and the presence of debris. No odors, staining, or debris were

observed in the soils recovered from any of the three drill rig auger borings, however odors and staining were observed in the top six inches of both hand augers HA-1 and HA-2.

Organic vapor/PID readings were recorded for soil samples collected from each borings. Observed organic vapor concentrations ranged from 0.1 to 0.4 parts per million (ppm) in the soil borings, which are considered to be general background readings. Elevated PID readings of up to 134 ppm in HA-1 and 441 ppm in HA-2 were observed in the top six inches of soil. Soil screening PID results are included on the boring logs in Appendix A.

Groundwater samples were examined by the field technician for evidence of contamination, including unusual odors, petroleum-like sheen, and other apparent signs of contamination. No odors, sheens, or other signs of contamination were observed in the groundwater recovered from any of the temporary monitoring wells.

E.4. Soil Analytical Results

This section provides a discussion of soil analytical results. A summary of the soil analytical results is provided in Table 1. Figure 3 shows analytical result exceedances, where applicable, for the soil samples. The complete laboratory reports with chain-of-custody forms are included in Appendix B.

The soil analytical results can be compared with the Soil Reference Values (SRVs) and Screening Soil Leaching Values (SLVs) which are also listed on Table 1. SRVs and SLVs are allowable risk-based contaminant concentrations derived by the Minnesota Pollution Control Agency (MPCA) using risk assessment methodology, modeling, and risk management policy to guide investigation and cleanup actions. SRVs relate to direct-contact exposure scenarios and SLVs relate to potential leaching of contaminants to groundwater. Concentrations of contaminants in soil, SRVs, and SLVs are expressed in units of milligrams per kilogram (mg/kg).

The following provides a summary of the soil analytical results.

- No VOCs were detected at concentrations greater than or equal to the laboratory reporting limits, with the exception of n-Butylbenzene and 1,3,5-Trimethylbenzene, which were detected at concentrations above laboratory reporting limits but below applicable regulatory standards.

- Varying concentrations of PAHs were detected in three of the five soil samples analyzed. The concentrations of the detected PAHs were below the applicable regulatory standards.

- Varying concentrations of the eight RCRA metals were detected in each of the soil samples analyzed. None of the metal concentrations exceeded the respective Residential SRVs and SLVs with the exception of arsenic, which exceeded the SLV in samples ST-1 (2-3), ST-2 (2-3), ST-3 (0-0.5), and ST-3 (1-2); and mercury, which exceeded the Residential SRV in the surficial sample taken at ST-7 (0-6") but not the 1-2' sample.

- DRO was detected in three of the five soil samples analyzed at concentrations below the MPCA unregulated fill criterion of 100 mg/kg, with the exception of the surficial sample HA-1 (0-0.5), which detected DRO at a concentration of 18,100 mg/kg.

- The 1-2' sample at location HA-1 had a greatly reduced DRO concentration of 21.0 mg/kg, which is below the MPCA guidance for unregulated fill materials.

- No organochlorine pesticides were detected at concentrations greater than or equal to the laboratory reporting limits.

E.5. Groundwater Analytical Results

This section provides a discussion of the groundwater analytical results. A summary of the groundwater analytical results is provided in Table 2. For comparison purposes, Table 2 includes current Drinking Water Criteria (DWC) from the Minnesota Department of Health (MDH) Human Health-Based Water guidance applicable to groundwater. Drinking Water Criteria include a combination of MDH Health Risk Limits (HRLs), MDH Health Based Values (HBVs), MDH Risk Assessment Advice (RAA), and Maximum Contaminant Levels (MCLs) established by the Environmental Protection Agency (EPA). There are no established criteria for DRO and GRO for water that is not collected directly from wells used as drinking water sources. Concentrations of contaminants in water and Drinking Water Criteria are expressed in units of micrograms per liter (µg/L).

The complete laboratory reports with chain-of-custody forms are included in Appendix B.

The following provides a summary of the groundwater analytical results.

- No VOCs, SVOCs, or DRO were detected at concentrations greater than or equal to the laboratory reporting limits.

- No metals were detected at concentrations greater than or equal to the laboratory reporting limits with the exception of barium. However, the detected concentrations of barium are below the MDH drinking water criteria.

E.6. Quality Assurance/Quality Control

Samples were placed in clean, laboratory supplied containers, preserved, labeled, and transported to the Pace Analytical Services laboratory under refrigerated conditions using chain-of-custody procedures. Analyses were performed using EPA or other recognized standard procedures.

A quality assessment of field procedures and analytical laboratory reports was performed to evaluate potential effects on data quality used to support project objectives. All applicable Braun Intertec SOPs were followed as prescribed unless otherwise noted in this report.

F. Conclusions

Braun Intertec conducted environmental monitoring and analytical sampling of three geotechnical soil borings and six hand auger borings at Hollydale Golf Course. The findings of this environmental investigation are as follows:

- Mercury contamination was observed in the shallow soils (0-6” bgs) in the greens. Based on the samples collected, this contamination does not appear to extend beyond the top 6” of soil or to the tee boxes.

- Contamination, including staining, odors, elevated PIDs, and analytical results for DRO exceeding applicable regulatory standards, was observed in the shallow soils (0-6”) beneath the ASTs located on the Site. Based on field observations and samples collected, this contamination does not appear to extend beyond the top 2’ of soil.

- There was no evidence of contamination by organochlorine pesticides observed in the samples collected around the agricultural chemical mixing area.

- There was no evidence of contamination in the groundwater observed in the samples collected at the Site.

G. Recommendations

Based on the results of this assessment, the following recommendations are provided:

- Petroleum-related compounds have been identified in the soil at the Site. According to Minnesota Statute 115.061, the property owners and/or responsible parties associated with this release may have a duty to notify the MPCA via the Minnesota Department of Public Safety, Division of Emergency Management (DEM) Duty Officer.

- Additional investigation of the release(s) likely will be required by the MPCA to define the magnitude and extent of contamination, to evaluate soil re-use and/or disposal options, and/or to obtain applicable liability assurances from the MPCA for the proposed development.

- Braun Intertec recommends that the Site be enrolled in the MPCA Petroleum Brownfields Program (PBP) and/or the Minnesota Department of Agriculture and MPCA Voluntary Investigation and Cleanup (VIC) Programs to facilitate the redevelopment and to obtain applicable assurances from the MPCA regarding the soil and/or groundwater impacts.

- Braun Intertec recommends that a Response Action Plan (RAP) be prepared to provide procedures for the management of non-petroleum and petroleum-contaminated soil and/or groundwater that will be encountered during redevelopment.

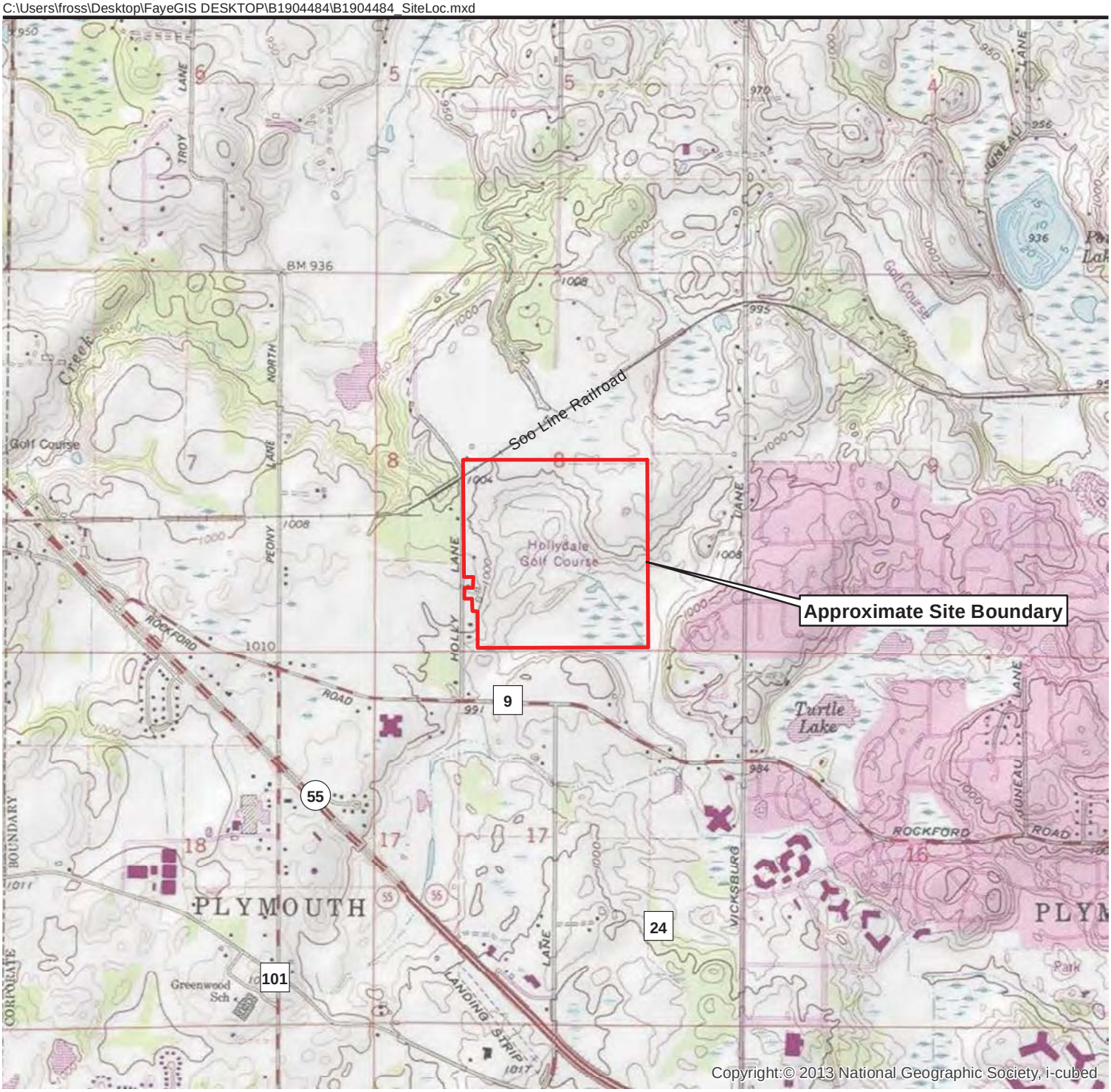
- The RAP document should be submitted to the MPCA for review and approval prior to the start of construction.

H. Assessment Limitations

The analyses and conclusions submitted in this report are based on field observations and the results of laboratory analyses of soil and groundwater samples collected from the soil borings completed for this project.

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

C:\Users\fross\Desktop\FayeGIS DESKTOP\B1904484\B1904484_SiteLoc.mxd



Approximate Site Boundary

Data Source:
USGS Quadrangle

N

0 1,000 2,000
Feet

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Minneapolis, MN 55438
952.995.2000
braunintertec.com

Project No:
B1904484

Drawing No:
B1904484_SiteLoc

Drawn By:	FER
Date Drawn:	5/23/2019
Checked By:	MPE
Last Modified:	5/23/2019

Hollydale Golf Course

4710 Holly Lane North

Plymouth, Minnesota

Site Location Map

Figure 1

DENOTES APPROXIMATE LOCATION OF GEOTECHNICAL SOIL BORING

DENOTES APPROXIMATE LOCATION OF GEOTECHNICAL/ENVIRONMENTAL SOIL BORING

DENOTES APPROXIMATE LOCATION OF HAND AUGER SOIL BORING

N

150' 0 300'

SCALE: 1" = 300'

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Drawing Information

Project No: B1904484.00

Drawing No: B1904484-00

Drawn By:	BJB
Date Drawn:	10/4/19
Checked By:	MK
Last Modified:	10/30/19

Project Information

Hollydale Golf Course

4710 Holly Lane N.

Plymouth, Minnesota

Soil Boring Location Sketch

Figure 2

F:\2019\B1904484-00.dwg,Phase II,10/30/2019 11:34:52 AM

NOTES

Minnesota Pollution Control Agency (MPCA) SRVs updated June 2009 and SLVs updated June 2013.
Analytical results in milligrams per kilogram (mg/kg)
Indicated depth is feet below ground surface.
[1] = DRO/GRO concentrations greater than 100 mg/kg are not suitable for reuse as unregulated fill per February 2012 MPCA guidance c-rem1-01.
DRO = Diesel Range Organics
mg/kg = Milligrams per kilogram
SRV =Soil Reference Value
SLV = Soil Leaching Value
SRV =Soil Reference Value
Arsenic Residential SRV = 9 mg/kg
Arsenic Screening SLV = 5.8 mg/kg
Mercury Residential SRV = 0.5 mg/kg

Exceeds Residential SRV
Exceeds Screening SLV
Exceeds 100 mg/kg for DRO

DENOTES APPROXIMATE LOCATION OF GEOTECHNICAL SOIL BORING

DENOTES APPROXIMATE LOCATION OF GEOTECHNICAL/ENVIRONMENTAL SOIL BORING

DENOTES APPROXIMATE LOCATION OF HAND AUGER SOIL BORING

N

150' 0 300'

SCALE: 1" = 300'

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Last Modified:	10/30/19

Project Information

Hollydale Golf Course

4710 Holly Lane N.

Plymouth, Minnesota

Soil Analytical Results

Figure 3

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NOTES

Minnesota Pollution Control Agency (MPCA) SRVs updated June 2009 and SLVs updated June 2013.
Analytical results in milligrams per kilogram (mg/kg)
Indicated depth is feet below ground surface.
[f] = DRO/GRO concentrations greater than 100 mg/kg are not suitable for reuse as unregulated fill per February 2012 MPCA guidance c-rem1-01.
DRO = Diesel Range Organics
mg/kg = Milligrams per kilogram
SRV =Soil Reference Value
SLV = Soil Leaching Value
SRV =Soil Reference Value
Arsenic Residential SRV = 9 mg/kg
Arsenic Screening SLV = 5.8 mg/kg
Mercury Residential SRV = 0.5 mg/kg

DENOTES APPROXIMATE LOCATION OF GEOTECHNICAL SOIL BORING

DENOTES APPROXIMATE LOCATION OF GEOTECHNICAL/ENVIRONMENTAL SOIL BORING

DENOTES APPROXIMATE LOCATION OF HAND AUGER SOIL BORING

Exceeds Residential SRV
Exceeds Screening SLV
Exceeds 100 mg/kg for DRO

N

30' 0 60'

SCALE: 1"= 60'

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Drawn By:	JAG
Date Drawn:	10/4/19
Checked By:	MK
Last Modified:	10/30/19

Hollydale Golf Course

4710 Holly Lane N.

Plymouth, Minnesota

Soil Analytical Results

Figure 3A

Table 1
Soil Analytical Results
Hollydale Golf Course
Plymouth, Minnesota
Project B1904484.00

Compound/Parameter	CAS No.	Sample Identifier and Date Collected															Residential Soil Reference Value (SRV) (mg/kg)	Screening Soil Leaching Value (SLV) (mg/kg)
		ST-1 (2-3)	ST-2 (2-3)	ST-3 (0-0.5)	ST-3 (1-2)	ST-4 (0-6'')	ST-4 (1-2')	ST-7 (0-6'')	ST-7 (1-2')	ST-14 (0-6'')	ST-14 (1-2')	ST-21 (0-6'')	ST-21 (1-2')	HA-1 (0-0.5)	HA-1 (2-2.5)	HA-2 (2-2.5)		
		Near ASTs	Wash Area	Wash Area Drainage	Wash Area Drainage	Tee Box	Tee Box	Green	Green	Green	Green	Tee Box	Tee Box	Below AST	Below AST	Below AST		
		10/10/2019	10/10/2019	10/10/2019	10/10/2019	10/10/2019	10/10/2019	10/10/2019	10/10/2019	10/10/2019	10/10/2019	10/10/2019	10/10/2019	10/14/2019	10/14/2019	10/14/2019		
Volatile Organic Compounds (VOCs) (mg/kg)																		
n-Butylbenzene	104-51-8	<0.0648	<0.0582	<0.0658	<0.0658	---	---	---	---	---	---	---	---	**0.359**	<0.0618	<0.0584	30	NE
1,3,5-Trimethylbenzene	108-67-8	<0.0648	<0.0582	<0.0658	<0.0658	---	---	---	---	---	---	---	---	**0.431**	<0.0618	<0.0584	3	2.7
All other reported VOCs	---	<RL	<RL	<RL	<RL	---	---	---	---	---	---	---	---	<RL	<RL	<RL	---	---
Polycyclic Aromatic Hydrocarbons (PAHs) (mg/kg)																		
Acenaphthene	83-32-9	<0.0119	**0.0242**	---	---	---	---	---	---	---	---	---	---	<0.261	<0.0122	<0.0120	1,200	81
Anthracene	120-12-7	<0.0119	**0.0547**	---	---	---	---	---	---	---	---	---	---	**0.586**	<0.0122	<0.0120	7,880	1,300
Benz(a)anthracene	56-55-3	<0.0119	**0.242**	---	---	---	---	---	---	---	---	---	---	<0.261	<0.0122	<0.0120	cPAH	cPAH
Benzo(b)fluoranthene	205-99-2	<0.0119	**0.34**	---	---	---	---	---	---	---	---	---	---	<0.261	<0.0122	**0.0186**	cPAH	cPAH
Benzo(k)fluoranthene	207-08-9	<0.0119	**0.143**	---	---	---	---	---	---	---	---	---	---	<0.261	<0.0122	<0.0120	cPAH	cPAH
Benzo(a)pyrene	50-32-8	<0.0119	**0.235**	---	---	---	---	---	---	---	---	---	---	<0.261	<0.0122	<0.0120	cPAH	cPAH
Benzo(g,h,i)perylene	191-24-2	<0.0119	**0.171**	---	---	---	---	---	---	---	---	---	---	<0.261	<0.0122	<0.0120	NE	NE
Chrysene	218-01-9	<0.0119	**0.306**	---	---	---	---	---	---	---	---	---	---	<0.261	<0.0122	**0.0139**	cPAH	cPAH
Dibenz(a,h)anthracene	53-70-3	<0.0119	**0.0472**	---	---	---	---	---	---	---	---	---	---	<0.261	<0.0122	<0.0120	cPAH	cPAH
Fluoranthene	206-44-0	<0.0119	**0.676**	---	---	---	---	---	---	---	---	---	---	**0.299**	<0.0122	**0.0125**	1,080	670
Fluorene	86-73-7	<0.0119	**0.0303**	---	---	---	---	---	---	---	---	---	---	**0.485**	<0.0122	<0.0120	850	110
Indeno(1,2,3-cd)pyrene	193-39-5	<0.0119	**0.145**	---	---	---	---	---	---	---	---	---	---	<0.261	<0.0122	<0.0120	cPAH	cPAH
Phenanthrene	85-01-8	<0.0119	**0.397**	---	---	---	---	---	---	---	---	---	---	**2.55**	<0.0122	<0.0120	NE	NE
Pyrene	129-00-0	<0.0119	**0.534**	---	---	---	---	---	---	---	---	---	---	**3.33**	<0.0122	<0.0120	890	440
All other reported PAHs	---	<RL	<RL	<RL	<RL	<RL	<RL	<RL	<RL	<RL	<RL	<RL	<RL	<RL	<RL	<RL	---	---
BaP Equivalent[c]	---	**0.0**	**0.4**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	2	1.4
Metals (mg/kg)																		
Arsenic, Total	7440-38-2	**7.5**	**6.7**	**10.5**	**7.6**	---	---	---	---	---	---	---	---	**3.7**	**5.5**	**5.4**	9	5.8
Barium, Total	7440-39-3	**124** [1]	**101**	**245**	**122**	---	---	---	---	---	---	---	---	**123**	**94.9**	**84.5**	1,100	1,700
Cadmium, Total	7440-43-9	<0.090	<0.088	**0.41**	**0.094**	---	---	---	---	---	---	---	---	**0.41**	<0.18	**0.31**	25	8.8
Chromium, Total[e]	7440-47-3	**23.0**	**18.5**	**17.4**	**28.0**	---	---	---	---	---	---	---	---	**9.8**	**14.3**	**15.4**	44,000/87[e]	1,000,000,000/36[e]
Lead, Total	7439-92-1	**11.5**	**13.9**	**46.6**	**10.8**	---	---	---	---	---	---	---	---	**34.4**	**8.0**	**23.1**	300	2,700
Mercury, Total	7439-97-6	**0.095**	**0.022**	**0.27**	**0.035**	**0.048**	**0.026**	**1.0**	**0.03**	**0.28**	<0.023	**0.063**	**0.04**	**0.11**	**0.063**	**0.087**	0.5	3.3
Selenium, Total	7782-49-2	**0.93**	**0.8**	**1.0**	**0.63**	---	---	---	---	---	---	---	---	<1.2	<1.2	<1.1	160	2.6
Silver, Total	7440-22-4	<0.56	<0.55	<0.58	<0.57	---	---	---	---	---	---	---	---	<0.62	<0.60	<0.56	160	7.9
Other Parameters (mg/kg)																		
Diesel Range Organics (DRO)	---	<9.7	**59.1** [2]	---	---	---	---	---	---	---	---	---	---	**18,100**	**21.0**	<8.2	NE[f]	NE[f]
Organochlorine Pesticides (mg/kg)																		
Organochlorine Pesticides	---	---	---	---	<RL	<RL	---	---	---	---	---	---	---	---	---	---	---	---

Notes

Minnesota Pollution Control Agency (MPCA) SRVs updated June 2009 and SLVs updated June 2013.

mg/kg = Milligrams per kilogram.

< = Not detected at or above the laboratory reporting limit indicated.

--- = Not analyzed or calculated for this parameter or not applicable.

RL = Reporting limits for other parameters that are not listed individually in this table because their concentrations were below reporting limits provided in the laboratory report.

NE = Regulatory limit not established for this parameter.

cPAH = Individual regulatory limit not established for this carcinogenic PAH; included in BaP equivalent calculation.

[c] = Benzo(a)pyrene (BaP) equivalent is calculated based on the concentration and weighted toxicity of cPAHs; MPCA; 2009. If no cPAHs were detected above reasonable laboratory reporting limits the BaP equivalent is reported as 0 mg/kg per MPCA Remediation Division Policy; June 2011.

[e] = Reported result is total chromium, regulatory limit for chromium III and chromium VI are provided.

[f] = DRO/GRO concentrations greater than 100 mg/kg are not suitable for reuse as unregulated fill per MPCA Guidance Document c-rem1-01 "Best Management Practices for the Off-Site Reuse of Unregulated Fill" (February 2012).

[1] [M6] Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

[2] [T6] High boiling point hydrocarbons are present in the sample.

Exceeds Residential SRV
Exceeds Screening SLV
Exceeds 100 mg/kg for DRO/GRO

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Table 2
Groundwater Analytical Results
Hollydale Golf Course
Plymouth, Minnesota
Project B1904484.00

Compound/Parameter	CAS No.	Sample Identifier, Depth to Groundwater, and Date Collected		Drinking Water Criteria (µg/L)	Source-Date
		ST-1 (W)	ST-3 (W)		
		~25-30 ft bgs	~25-30 ft bgs		
		10/10/2019	10/10/2019		
Volatile Organic Compounds (VOCs) (µg/L)					
All reported VOCs	---	<RL	<RL	---	---
Semi-Volatile Organic Compounds (SVOCs) (µg/L)					
All reported SVOCs	---	<RL	<RL	---	---
BaP Equivalent[c]	---	**0.0**	**0.0**	0.1	HBV-18
Metals (µg/L)					
Arsenic, Dissolved	7440-38-2	<20.0	<20.0	10	MCL
Barium, Dissolved	7440-39-3	**124**	**229**	2,000	HRL-93
Cadmium, Dissolved	7440-43-9	<3.0	<3.0	0.5	HRL-15
Chromium, Dissolved[d]	7440-47-3	<10.0	<10.0	20,000/100[d]	HRL-94
Lead, Dissolved	7439-92-1	<10.0	<10.0	15	MCL
Mercury, Dissolved	7439-97-6	<0.20	<0.20	2	MCL
Selenium, Dissolved	7782-49-2	<20.0	<20.0	30	HRL-93
Silver, Dissolved	7440-22-4	<10.0	<10.0	30	HRL-93
Other Parameters (µg/L)					
Diesel Range Organics (DRO)	---	<120	---	NE[e]	---

Notes

Drinking Water Criteria = The most conservative value for chronic or cancer exposures provided from the following sources including the Minnesota Department of Health (MDH) Health Risk Limit (HRL), MDH Health Based Value (HBV), MDH Risk Assessment Advice (RAA) or Maximum Contaminant Level (MCL). The date of promulgation is provided, if available. Values updated April 2019.

µg/L = Micrograms per liter.

< = Not detected at or above the laboratory reporting limit indicated.

--- = Not analyzed or calculated for this parameter or not applicable.

RL = Reporting limits for other parameters that are not listed individually in this table because their concentrations were below

NE = Regulatory limit not established for this parameter.

[c] = Benzo[a]pyrene (BaP) equivalent is calculated based on the concentration and weighted toxicity of cPAHs; Minnesota Pollution Control Agency; 2009. If no cPAHs were detected above reasonable laboratory reporting limits the BaP equivalent is reported as 0 mg/kg per MPCA Remediation Division Policy; June 2011.

[d] = Reported result is total chromium, criteria for chromium III and chromium VI are provided.

[e] = No applicable standard exists. When sampling water directly from drinking water wells, refer to the Minnesota Department of Health's (MDH's) document entitled *Guidance for Evaluating Health Risks for Gasoline and Diesel Contaminated Drinking Water,* dated November 2018.

Exceeds Drinking Water Criteria

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Appendix E

SHPO Correspondence and Cultural Resources Review

Hollydale Residential Development EAW

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DEPARTMENT OF ADMINISTRATION
STATE HISTORIC PRESERVATION OFFICE

October 31, 2019

Mr. Rob Bouta
Kjolhaug Environmental Services Company
2500 Shadywood Rd, Suite 130
Orono, MN 55331

RE: Hollydale Residential Development - 4701 Holly Ln North
Demolish existing buildings related to golf course, a house and farmstead and construct development on same site
T118 R22 S8 S
Plymouth, Hennepin County
SHPO Number: 2020-0129

Dear Mr. Bouta:

Thank you for consulting with our office during the preparation of an Environmental Assessment Worksheet for the above-referenced project.

Based on our review of the project information, we conclude that there are no properties listed in the National or State Registers of Historic Places and no known or suspected archaeological properties in the area that will be affected by this project.

Please note that this comment letter does not address the requirements of Section 106 of the National Historic Preservation Act of 1966 and 36 CFR § 800. If this project is considered for federal financial assistance, or requires a federal permit or license, then review and consultation with our office will need to be initiated by the lead federal agency. Be advised that comments and recommendations provided by our office for this state-level review may differ from findings and determinations made by the federal agency as part of review and consultation under Section 106.

Please contact our Environmental Review Program at (651) 201-3285 if you have any questions regarding our review of this project.

Sincerely,

Sarah J. Beimers
Environmental Review Program Manager

Nienow Cultural Consultants
200 Plato Blvd, East.
St. Paul, MN 55107

September 23, 2019

Hollydale GC Development, Inc.
c/o Jake Walesch
10850 Old County Road 15, Suite 200
Plymouth, MN 55441

Re: Phase Ia for Hollydale Project.

Dear Mr. Walesch,

Thank you for the opportunity to complete an Archaeological Literature Review *Phase Ia* for your residential development project located in Plymouth, Minnesota. Nienow Cultural Consultants has completed its Phase Ia and found there are no archaeological sites within the project area. Furthermore, as will be highlighted below, *Nienow Cultural Consultants does not recommend any additional archaeological survey be completed for this specific project*. This recommendation is based on project area geography, known archaeological sites, research previously completed within two miles, and clear evidence of project area disturbance based on site history and aerial photography.

Project Location

The project area is located in Township 118N, Range 22W, Section 8. The project will consist of approximately 157 acres currently occupied by the Hollydale Golf Course.

Recorded Archaeological Sites within Two Miles

An archaeological literature review was conducted by visiting both the Minnesota Office of the State Archaeologist (see figure) as well as the State Historic Preservation Office. A total of five archaeological sites have been previously identified within two miles of the project area and are reported in the table below. Please note an additional site was found which was not represented on the OSA database review map (this was brought to the OSA's attention and will be fixed).

Site Number/Name	Distance from Golf Course	Type of Site	No. of Artifacts	Landform	Reference
21HE0248 Vicksburg Lane I&II	2.25 Miles NE of Golf Course	Pre-Contact	Lithic Scatter Debitage	Wetland/Forest Now a Park	Christina Harrison HE-94-18 (Report)
21HE0253 Wayzata School	1 Mile NW of Golf Course	Pre-Contact	2 Secondary Chert Flakes	Upland Terrace Elm Creek to the north of where artifacts were found.	Christina Harrison HE-94-26 (Report)
21HE0258 Ostrum Terrace	2.5 Miles N of Golf Course	Pre-Contact	1 Chert Decortication Flake	Ridgeline west of Elm Creek.	Christina Harrison HE-95-15 (Report)
21HE0259 Oetjen Peninsula	1.75 Miles N of Golf Course	Pre-Contact	1 Flake-Basal Segment Decortication Flake	Terrace west of Elm Creek.	Christina Harrison HE-95-15 (Report)
21HE0261 CSAH 61	1.75 Miles SE of Golf Course	Pre-Contact	1 Corner Notched Point	Terrace east of Plymouth Creek.	Scott Anfinson MCH-84-01

The majority of the archaeological sites identified within two miles come from work completed by Christina Harrison of Archaeological Research Services. Her report is entitled "Cultural Resource Investigations Conducted Along the Proposed Maple Grove Southwest Interceptor, City of Maple Grove, Hennepin County, Minnesota" and was prepared for the City of Maple Grove. These results show no archaeological sites within one mile of the project area. Furthermore, all the sites are small lithic scatters or individual find spots primarily located immediately adjacent to creeks (Elm and Plymouth). Elm creek flows approximately one half to three quarters of a mile away to the northwest and west of the project area. An intermittent creek appears between one half and three quarters of a mile to the south.

Historic Aerials and Topographic Maps

Turn of century topographic maps indicate the property likely in farm production by 1902. Historic aerials show the property in agricultural fields by 1937 with a wetland in the southeast corner. By 1947, more than a third of the wetland (western third) was being utilized for agricultural use, with fields directly abutting it on all sides within the project area. Efforts to drain the area and contain the wetland continue into the 1960s including the creation of a drainage channel by 1955 (based on the 1955 topography map) and clearly visible on the 1964 aerial. By 1965, the golf course is in place with fairways immediately adjacent to the wetland along its northern and western edges. The golf course as a whole shows significant modification to the landscape including man made water features, fairways, greens, sand traps, etc.

Recommendation

Based on an archaeological literature review, *Nienow Cultural Consultants does not recommend any additional archaeology for this project*. Archaeological sites near the property are represented by small lithic scatters and individual find spots most often found immediately adjacent to creeks, which are not, or were previously, present in the project area. Additionally, the property has been in either agricultural or golf course use for more than one hundred years and aerial photographs show large scale alterations/disturbances to the landscape, which would have significantly impacted any archaeological material which may have been present.

We are happy to answer any additional questions you may have. If an archaeological survey is ultimately desired for this work, we would be happy to provide a quote which would factor in work already completed.

Finally, this archaeological literature review is only for archaeological sites and does not include any information related to the farmstead located in the southwest corner of the project area. We would recommend an architectural historian or historian be consulted if work on this portion of the property is required.

Sincerely,

Jeremy L. Nienow, Ph.D., RPA
Owner / Principal Investigator
Nienow Cultural Consultants

Attachments:
References Cited
Project Area with Archaeological Sites within Two Miles
1937, 1947, 1964, 1972, 2003 Aerial Photography

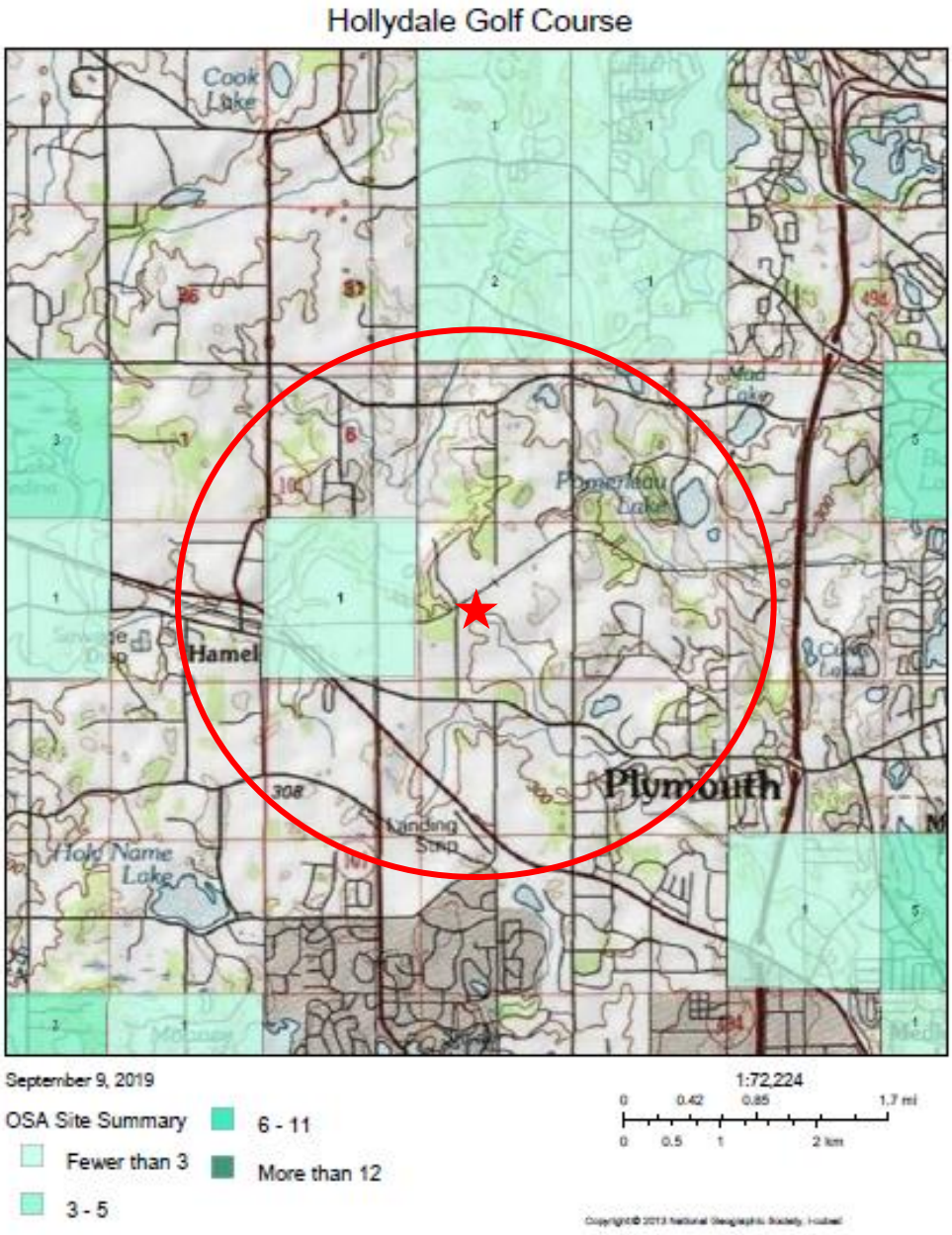
References Cited

Anfinson, Scott

n.d. Archaeological Site form for 21HE261. Site form cites work of Scott Anfinson, specifically report MCH-84-01.

Harrison, Christina

1995 Cultural Resource Investigations Conducted Along the Proposed Maple Grove Southwest Interceptor, City of Maple Grove, Hennepin County, Minnesota. Archaeological Research Services. Report Prepared for the City of Maple Grove.



Project Location (Star) with Sites Within Two Miles.

1937 Aerial Image of Project Area.

1947 Aerial Image of Project Area.

1964 Aerial Image of Project Area

1972 Aerial Image of Project Area

2003 Aerial Image of Project Area

Rob Bouta

From: Beimers, Sarah (ADM) <sarah.beimers@state.mn.us>
Sent: Wednesday, September 25, 2019 7:52 AM
To: Rob Bouta
Cc: Jake Walesch; Jeremy Nienow
Subject: RE: Phase Ia Archaeological Letter Report - Proposed Hollydale Residential Development, Plymouth, MN

Rob,
Thank you for contacting our office. We appreciate early consultation with our office during preparation of an EAW for the project you describe, however, we do not have the capability to accept e-mail submittals at this time. Please submit a hard copy of the Phase 1a report with a cover letter explaining the project and a specific request for our review and comment. Alternatively, you may use the form available on our "Submitting a Project for Review" webpage. Once we receive the hard copy submittal, we will log in for a 30-day review.
Please contact me if you have any questions.
Sarah

DEPARTMENT OF ADMINISTRATION

Sarah Beimers | Environmental Review Program Manager
Minnesota State Historic Preservation Office
203 Administration Building
50 Sherburne Avenue
Saint Paul MN 55155
(651) 201-3290
sarah.beimers@state.mn.us

From: Rob Bouta <robb@kjolhaugenv.com>
Sent: Tuesday, September 24, 2019 4:41 PM
To: Beimers, Sarah (ADM) <sarah.beimers@state.mn.us>
Cc: Jake Walesch <jake@jakewalesch.com>; Jeremy Nienow <jeremy.nienow@gmail.com>
Subject: Phase Ia Archaeological Letter Report - Proposed Hollydale Residential Development, Plymouth, MN

Sarah,

I am submitting the attached Phase Ia Archaeological Letter Report to your office in advance of an EAW that is being prepared for the 157-acre Hollydale Residential Development proposed in the City of Plymouth, Hennepin County, Minnesota.

Nienow Cultural Consultants (NCC) prepared the attached Phase Ia Report to investigate cultural resources on the Hollydale Residential Development site, which is currently occupied by the Hollydale Golf Course. After completing their review, NCC recommended no further archaeological work on this project. The Report found that archaeological "sites near the property are represented by small lithic scatters and individual find spots most often found immediately adjacent to creeks, which are not, or were previously, present in the project area. Additionally, the property has been in either agricultural or golf course use for more than one hundred years and aerial photographs show large scale alterations/disturbances to the landscape, which would have significantly impacted any archaeological material which may have been present."

We are requesting a response from your office within 30 days of the date of this email to indicate whether the State Historic Preservation Office agrees that no further archaeological work is recommended on this site, and whether your office has other concerns regarding historical features and residential development proposed on this site.

We would appreciate your timely response to the attached report and the recommendation contained therein.

Thank you,

Rob Bouta, CSE, WDC
Senior Environmental Scientist
Kjolhaug Environmental Services Company
2500 Shadywood Road, Suite 130, Orono, MN 55331
RobB@kjolhaugenv.com
Office: 952-401-8757 Ext. 105
Mobile: 612-581-0546
http://www.kjolhaugenv.com

Please mail the completed form and required material to:

State Historic Preservation Office
203 Administration Building
50 Sherburne Ave
St. Paul, MN 55155

DEPARTMENT OF ADMINISTRATION

Request for Project Review by the State Historic Preservation Office (SHPO)

(●) This is a new submittal
( ) This is additional information relating to SHPO Project #: _____

DATE: 9/30/2019

I. GENERAL PROJECT INFORMATION

Project Title: Hollydale Residential Development

Project Address (or Location): 4701 Holly Lane N, Plymouth, MN 55446 (45.038832, -93.496717)

City / Township (circle one): City of Plymouth Zip: 55446 County: Hennepin

Legal Description: Township 118 Range 22 E/W (circle one) Section 8 Quarter-section S 1/2

II. PROJECT CONTACT INFORMATION

Project Contact Name: Rob Bouta Title: Senior Environmental Scientist

Company/Agency: Kjolhaug Environmental Services Company

Street Address: 2500 Shadywood Road, Suite 130 Phone Number: 952-401-8757

City: Orono State: MN Zip: 55331 Email: robb@kjolhaugenv.com

III. FEDERAL AND/OR STATE INVOLVEMENT

Federal Agency (if applicable): None verified. The project may need a Section 404 permit from the U.S. Army Corps of Engineers.
(Agency providing funds, licenses, or permits)
Permit or Project Reference #: TBD if needed

State Agency (if applicable): None. Project requires an EAW. City of Plymouth is the RGU.
(Agency providing funds, licenses, or permits)
Permit or Project Reference #: No reference number available yet.

Local Agency (if applicable): City of Plymouth is the RGU for the EAW and the LGU for local WCA administration.

(Continued on Reverse Side)

Please refer to the **Instructions for Completing the Request for Project Review Form.** Submit one *Request for Project Review* form for each project. Project submittals will not be accepted via fax or e-mail. For questions regarding the SHPO review process, please visit our website or contact Kelly Gragg-Johnson, Review and Compliance Specialist, at 651-201-3455 or kelly.graggjohnson@state.mn.us.

IV. PROJECT DESCRIPTION AND BOUNDARIES

A) REQUIRED FOR ALL PROJECTS

☑ Write a detailed description of the proposed project. (See attached.)

Hollydale Residential Development is proposed on 158.46 acres of land. The project will be mass graded to create up to 319 single-family lots on land that has been occupied by a golf course since 1965.

☑ Attach a map of project location, with project area(s) clearly marked. Road names must be included and legible.

B) Architecture

Are there any buildings or structures within the project area? ◉ Yes ○ No

If **No**, continue to the Archaeology section below. If **Yes**, submit all of the following information:

☑ List all buildings and structures within the project area and the year they were built. (See attached.)

GOLF COURSE: Clubhouse, Large golf course machine shed, Small golf course machine shed
FARMSTEAD (See photos); Home, barn, shed, small shed, large machine shed; PLUS one more home.

☑ Photographs of ***each*** building and structure located within the project area, along with a photo key. Include streetscape images, if applicable. All photographs must be clear, crisp, focused, and taken at ground level. Aerial photos are insufficient.

☑ List known historic buildings or structures located within the project area (i.e., individual properties or districts which are listed in the National Register or which meet the criteria for listing in the National Register). (See attached.)

None known. The farmstead has existed since at least 1937. Most existing buildings will be removed.

C) Archaeology

Does the proposed undertaking involve ground-disturbing activity? ◉ Yes ○ No

If **No**, this form is complete. If **Yes**, submit all of the following information:

☑ Attach the relevant portion of a 1:24000-scale USGS topographic map (photocopied or computer generated) ***with the project boundary marked***.

☑ Description of current and previous land use and disturbances: (See attached.)

See attached Phase Ia Archaeological Letter Report.

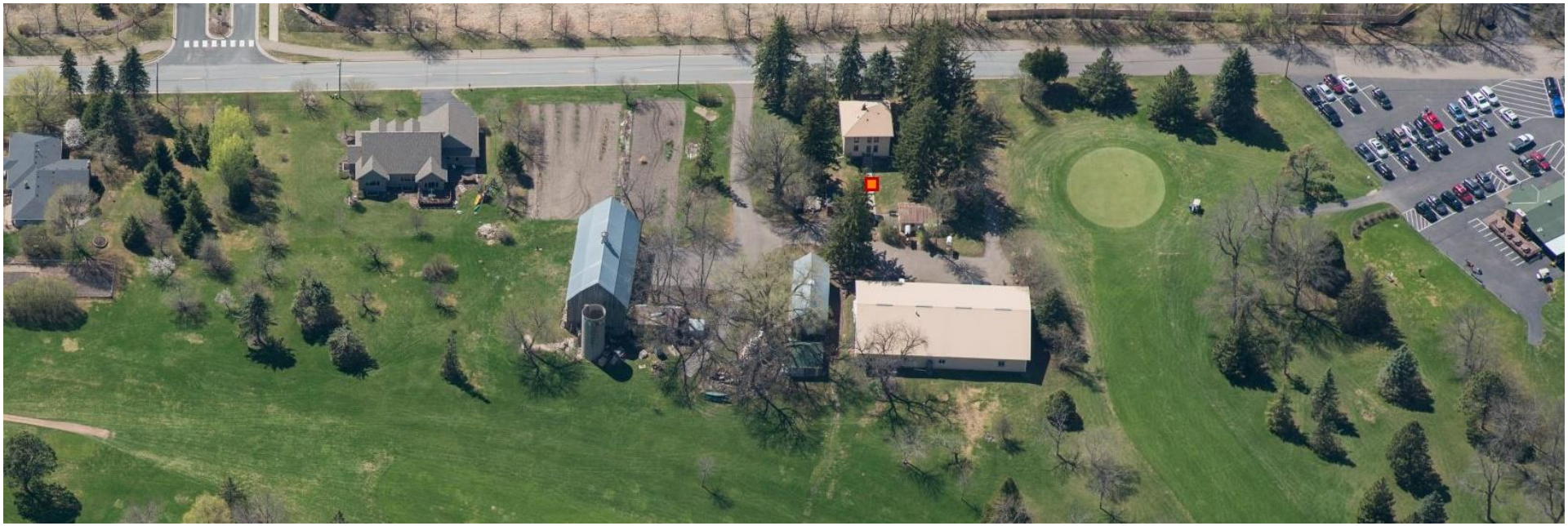
☑ Any available information concerning known or suspected archaeological resources within the project area. (See attached.)

See attached Phase Ia Archaeological Letter Report.

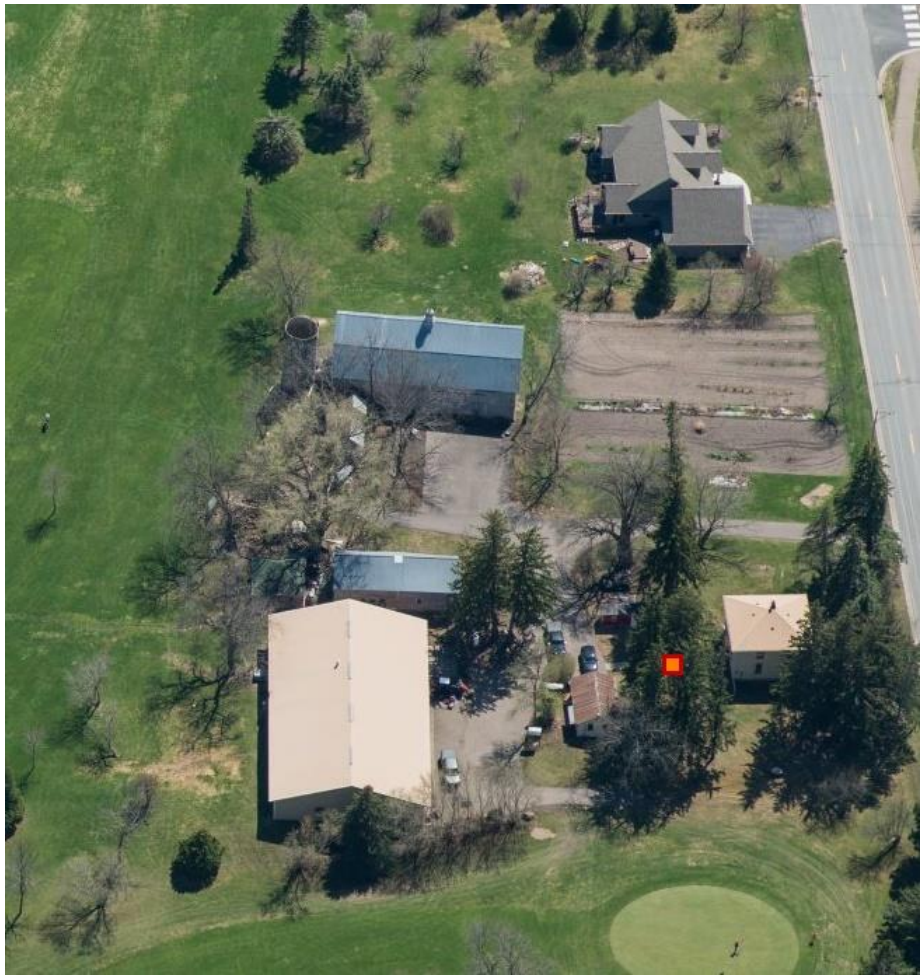
Streetside photo of 4640 Holly Lane N, Plymouth, MN (Source: Google maps)

Streetside photo of 4640 Holly Lane N, Plymouth, MN (Source: Google maps)

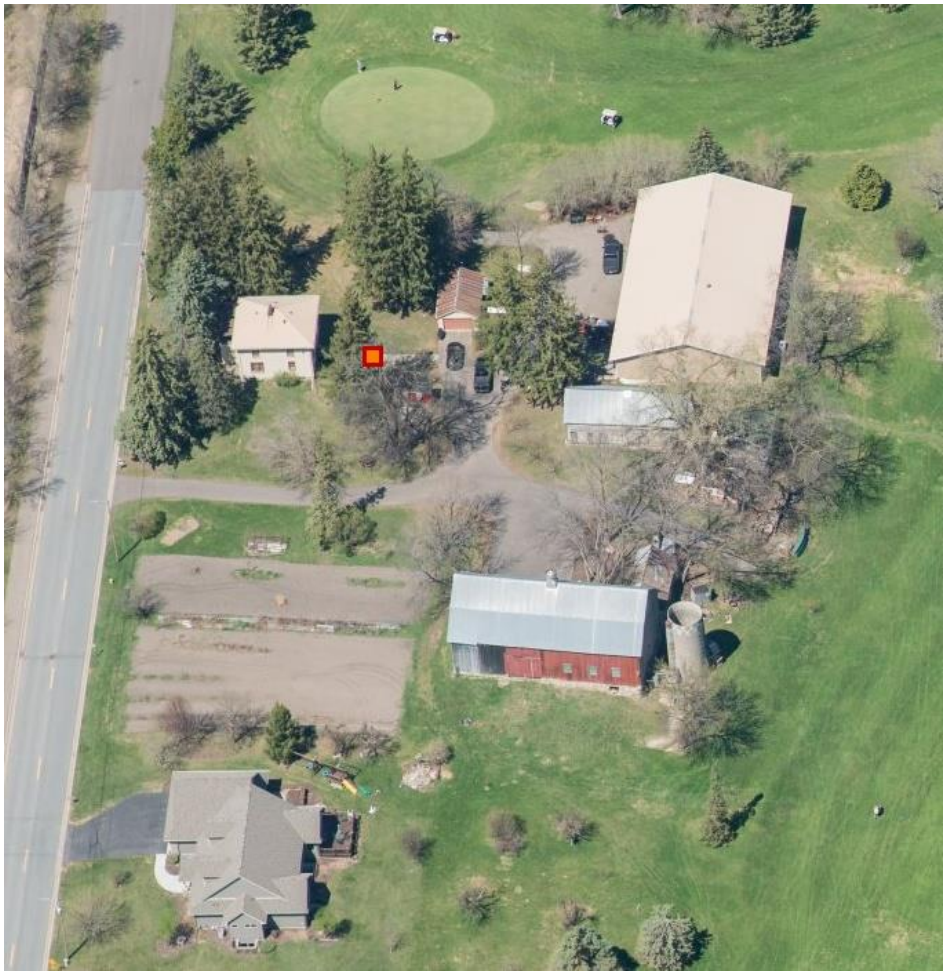
Oblique aerial photo of 4640 Holly Lane N, Looking East (Source: Hennepin County online property map)



Oblique aerial photo of 4640 Holly Lane N, Looking West (Source: Hennepin County online property map)



Looking South



Looking North

Oblique aerial photo of 4640 Holly Lane N (Source: Hennepin County online property map)

Appendix F
Traffic Study

Hollydale Residential Development EAW

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Memorandum

SRF No. 13137.00

To: Chris LaBounty, PE
City of Plymouth

From: Matt Pacyna, PE, Principal
Tom Sachi, PE, Associate

Date: January 7, 2020

Subject: Hollydale Golf Course Redevelopment Traffic Study

Introduction

SRF has completed a traffic study for the proposed redevelopment of the Hollydale Golf Course generally located in the northeast quadrant of the Old Rockford Road and Holly Lane intersection in Plymouth, Minnesota (see Figure 1: Project Location). The main objectives of this study are to review existing operations within the study area, evaluate traffic impacts to the adjacent roadway network, and recommend any necessary improvements to accommodate the proposed development and ensure safe and efficient operations for all transportation users. The following sections provide the assumptions, analysis, and study conclusions offered for consideration.

Existing Conditions

The existing conditions were reviewed to establish a baseline to identify any future impacts associated with the proposed development. The evaluation of existing conditions contains various data collection efforts, including traffic volumes, observations, vehicular speeds, and intersection sight distance. The analysis also includes an existing intersection capacity analysis, all of which are outlined in the following sections.

Traffic Volumes

Vehicle turning movement and pedestrian/bicyclist counts were collected by SRF during the a.m., school departure, and p.m. peak periods the week of September 23, 2019 at the following intersections:

- Schmidt Lake Road and Peony Lane
- Schmidt Lake Road and Holly Lane
- Schmidt Lake Road and Comstock Lane
- Schmidt Lake Road and Vicksburg Lane
- Old Rockford Road and Vicksburg Lane
- Old Rockford Road and Dunkirk Lane
- Old Rockford Road and Holly Lane
- Old Rockford Road and Jewel Lane
- Old Rockford Road and Peony Lane
- Holly Lane and 46th Avenue

Note that area schools were in session and the golf course was still active during the data collection efforts. Historical (year 2017 and 2018) average daily traffic (ADT) volumes within the study area were provided by MnDOT or were estimated based on the data collected by SRF in September 2019.

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SRF Consulting Group, Inc.

Project Location

Holydale Golf Course Redevelopment Traffic Study
City of Plymouth

001913137
November 2019

Figure 1

Observations

Observations were completed to identify roadway characteristics (i.e. roadway geometry, speed limits, and traffic controls) within the study area along roadways and at key intersections. Currently, Old Rockford Road is a two-lane undivided roadway with select turn lanes and a 45-mile per hour (mph) speed limit within the study area. Vicksburg Lane and Schmidt Lake Road are four-lane undivided roadways with 45-mph and 40-mph speed limits, respectively. Peony Lane is a four-lane divided roadway with select turn lanes and a 45-mph speed limit.

Both Peony Lane and Vicksburg Lane are functionally classified as "A-minor arterials"; Schmidt Lake Road is classified as an "other arterial" and Old Rockford Road is functionally classified as a "major collector." Other study roadways are functionally classified as "local" streets.

The Old Rockford Road and Schmidt Lake Road intersections with Peony Lane and Vicksburg Lane are signal controlled, while the Old Rockford Road and Dunkirk Lane intersection is all-way stop controlled. All remaining study intersections are side-street stop controlled. Existing geometrics, traffic controls, and volumes within the study area are shown in Figure 2.

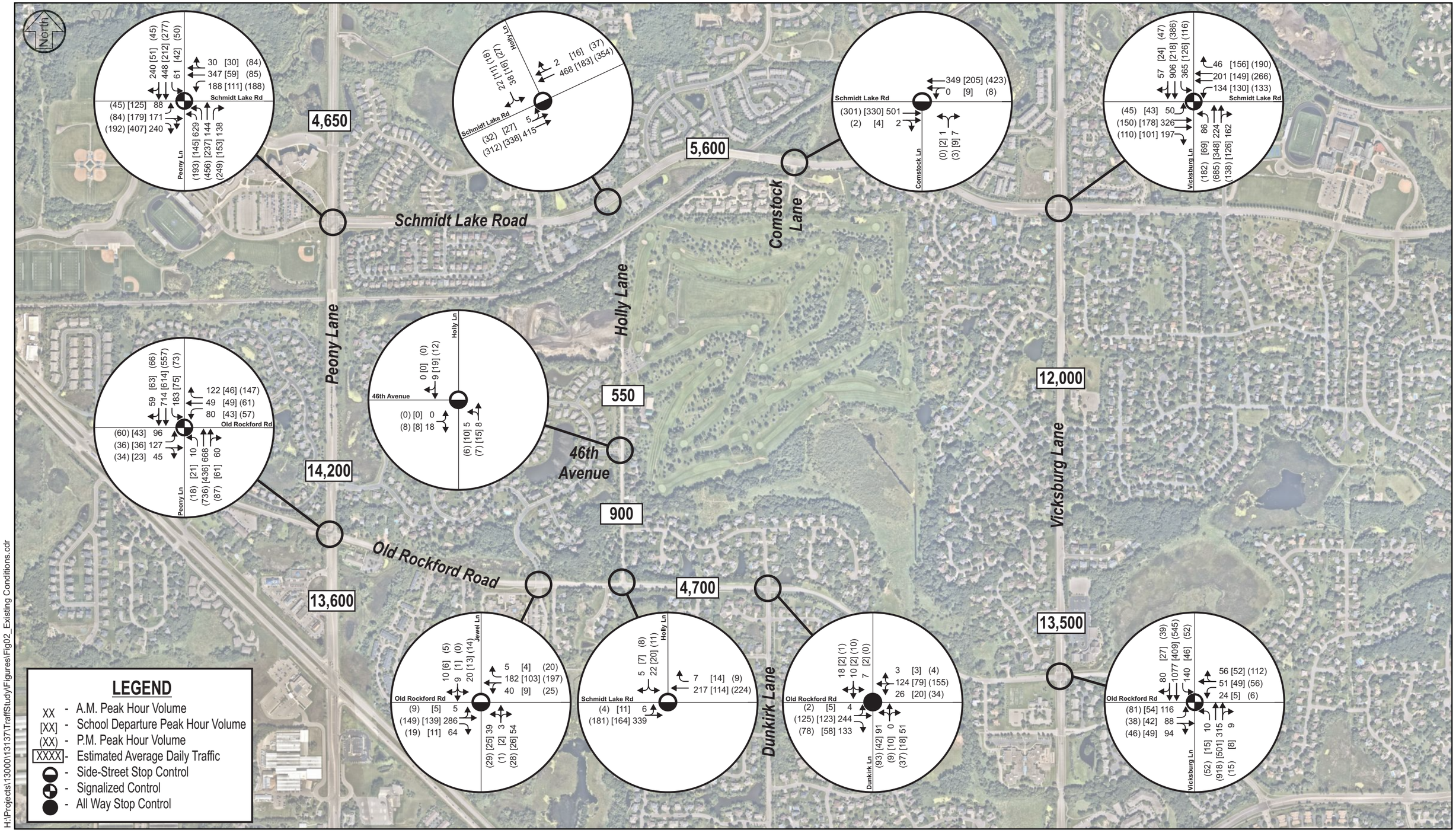
Vehicle Speeds

Vehicular speed data was collected along Schmidt Lake Road, west of Comstock Lane, by the City of Plymouth between October 13, 2019 and October 24, 2019. No data from October 16, 2019 to October 18, 2019 was used in this analysis as it was during the 2019 Minnesota Educator Association (MEA) break. Note that data trends were consistent between weeks.

This data was collected to determine if vehicles traveling along Schmidt Lake Road are exceeding the current posted speed limit, which may impact a motorists ability to safely identify an approaching vehicle and/or to complete a turn maneuver. The following information, provided by the City, illustrates the observed average and 85th percentile speeds along Schmidt Lake Road. Note that the 85th percentile is the speed at which 85 percent of the motorists are traveling at or below and is the primary metric used to determine the speed limit of a roadway:

- Eastbound Schmidt Lake Road
  - Average Speed - 45.0 mph
  - 85th Percentile Speed - 49.8 mph
- Westbound Schmidt Lake Road
  - Average Speed - 43.8 mph
  - 85th Percentile Speed - 48.9 mph

Based on the data collected, the majority of motorists are traveling over the posted speed limit along Schmidt Lake Road, just west of Comstock Lane. The current posted speed limit within this area is 40 mph.



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001913137
November 2019

Existing Conditions

Hollydale Golf Course Redevelopment Traffic Study
City of Plymouth

Figure 2

Sight Distance Review

SRF reviewed sight distance at the two primary intersections that the majority of the proposed development traffic is expected to utilize. In particular, sight distance was reviewed for southbound vehicles on Holly Lane making a left- or right-turn maneuver onto Old Rockford Road and for northbound vehicles on Comstock Lane making a left- or right-turn onto Schmidt Lake Road.

The geometric design guidelines shown in Table 1 are from the *AASHTO Policy on Geometric Design of Highways and Streets, 7th Edition*, which identifies the sight distance needed to complete various maneuvers based on the speed of the roadway. Stopping sight distance is the distance required for a vehicle traveling at a certain speed to stop prior to the intersection or other obstruction within the roadway. The intersection sight distance in Table 1 is the distance required for a vehicle on the side street to perform a left-turn maneuver from a stop condition. Note that the sight distance guidelines for 50 mph is shown in Table 1, and would reflect the observed travel speeds on Schmidt Lake Road or distances for a speeding vehicle on Old Rockford Road.

Table 1. Geometric Design Guideline

Design Feature	Sight Distance by Speed		
Speed	40 mph	45 mph	50 mph
Stopping Sight Distance	305 feet	360 feet	425 feet
Intersection Sight Distance	445 feet	500 feet	555 feet

The observed sight distance at the Holly Lane approach to Old Rockford Road is shown in Pictures 1, 2, and 3. Based on this assessment, there are no sight distance issues for vehicles looking to the east. However when a vehicle is stopped at the stop bar and looking west, the foliage partially impacts the sight distance. Therefore, either removing foliage or relocating the stop bar to improve sight distance should be considered along Holly Lane at Old Rockford Road.

Picture 1 – Looking East

Picture 2 – Looking West (At Stop Bar)

Picture 3 – Looking West (Stopped Beyond Stop Bar)

The observed sight distance at the Comstock Lane approach to Schmidt Lake Road is shown in Pictures 4, 5, and 6. Based on this assessment, there are no sight distance issues for vehicles looking to the east. However, when a vehicle is stopped at the stop bar looking west, the crest of the roadway from the railroad bridge limits sight distance to the west.

Picture 4 – Looking East

Picture 5 – Looking West (At Stop Bar)

Picture 6 – Looking West (Stopped Beyond Stop Bar)

The current estimated sight distances for vehicles on the side-street approaches at Holly Lane and Comstock Lane for each direction are shown in Table 2. Comparing these estimates with the guidelines from Table 1, there is insufficient sight distance for vehicles on Comstock Lane looking west to make a left-turn maneuver to westbound Schmidt Lake Road. The existing stopping sight distance is also marginal in this location given the observed vehicle speeds along the corridor, although if vehicles along Schmidt Lake Road were traveling at the posted speed limit of 40 mph, there would be sufficient stopping sight distance. Further discussion regarding the Comstock Lane and Schmidt Lake Road intersection is provided later in this memorandum.

Table 2. Sight Distance Estimates

Intersection	Looking West	Looking East
Schmidt Lake Road/Comstock Lane	~375 to 425 feet	>600 feet
Old Rockford Road/Holly Lane	>600 feet	>600 feet

Intersection Capacity Analysis

An existing intersection capacity analysis was completed using Synchro/SimTraffic software (V9.2) and the Highway Capacity Manual, *6th Edition* to establish a baseline condition to which future traffic operations could be compared. Capacity analysis results identify a Level of Service (LOS) which indicates how well an intersection is operating. Intersections are graded from LOS A through LOS F. The LOS results are based on average delay per vehicle, which correspond to the delay threshold values shown in Table 3. LOS A indicates the best traffic operation, while LOS F indicates an intersection where demand exceeds capacity. Overall intersection LOS A though LOS D is generally considered acceptable in the Twin Cities area.

Table 3. Level of Service Criteria for Signalized and Unsignalized Intersections

LOS Designation	Signalized Intersection Average Delay/Vehicle (seconds)	Unsignalized Intersection Average Delay/Vehicle (seconds)
A	≤ 10	≤ 10
B	> 10 - 20	> 10 - 15
C	> 20 - 35	> 15 - 25
D	> 35 - 55	> 25 - 35
E	> 55 - 80	> 35 - 50
F	> 80	> 50

For side-street stop/yield-controlled intersections, special emphasis is given to providing an estimate for the level of service of the side-street approach. Traffic operations at an unsignalized intersection with side-street stop/yield control can be described in two ways. First, consideration is given to the overall intersection level of service. This takes into account the total number of vehicles entering the intersection and the capability of the intersection to support these volumes. Second, it is important to consider the delay on the minor approach. Since the mainline does not have to stop, the majority of delay is attributed to the side-street approaches. It is typical of intersections with higher mainline traffic volumes to experience high-levels of delay (i.e. poor levels of service) on the side-street approaches, but an acceptable overall intersection level of service during peak hour conditions.

Results of the existing intersection capacity analysis shown in Table 4 indicate that all study intersections currently operate at an acceptable overall LOS C or better during the a.m., school departure, and p.m. peak hours, except for the Schmidt Lake Road and Peony Lane intersection during the a.m. peak hour, which operates at an unacceptable overall LOS E. This intersection is the primary access to Wayzata High School and experiences significant queueing and delays for approximately 15 to 30 minutes prior to school starting. It was observed that northbound left-turn queues extend beyond the 400-foot left-turn lane storage approximately five (5) percent of the a.m. peak hour. Additionally, southbound queues extend over 600 feet approximately 15 to 20 percent of the a.m. peak hour, which extend through the north access to the high school. These queues are generally observed to occur during the 15 minutes prior to school starting and remain minimal during the remainder of the a.m. peak hour.

Table 4. Existing Intersection Capacity Analysis

Intersection	A.M. Peak Hour		School Departure Peak Hour		P.M. Peak Hour	
	LOS	Delay	LOS	Delay	LOS	Delay
Schmidt Lake Road and Peony Lane	E	56 sec.	D	37 sec.	B	19 sec.
Schmidt Lake Road and Holly Lane (1)	A/C	16 sec.	A/B	12 sec.	A/B	12 sec.
Schmidt Lake Road and Comstock Lane (1)	A/B	11 sec.	A/B	11 sec.	A/A	9 sec.
Schmidt Lake Road and Vicksburg Lane	C	24 sec.	B	16 sec.	C	21 sec.
Old Rockford Road and Peony Lane	B	19 sec.	B	12 sec.	B	15 sec.
Old Rockford Road and Jewel Lane (1)	A/C	17 sec.	A/B	12 sec.	A/B	12 sec.
Old Rockford Road and Holly Lane (1)	A/B	13 sec.	A/B	11 sec.	A/B	11 sec.
Old Rockford Road and Dunkirk Lane (2)	B	11 sec.	A	8 sec.	A	9 sec.
Old Rockford Road and Vicksburg Lane	C	20 sec.	B	11 sec.	B	16 sec.
Holly Lane and 46th Avenue (1)	A/A	8 sec.	A/A	8 sec.	A/A	8 sec.

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst approach LOS. The delay shown represents the worst side-street approach delay.

(2) Indicates an unsignalized intersection with all-way stop control, where the overall LOS is shown.

While the Schmidt Lake Road and Peony Lane intersection operates at an overall LOS D during the school departure peak hour, the eastbound approach (from the high school parking lot) can experience delays of over 60 seconds for 15 to 20 minutes exiting the high school. Maximum queues were observed to extend over 1,250 feet during this time period and were typically a rolling queue as vehicles continued to exit the school. However, queues and delays exiting the high school remained minimal during the remainder of the peak hour. No other significant delay or queuing issues were observed in the field or traffic simulation at the study intersections.

Proposed Development

The proposed development is generally bounded by Holly Lane to the west and residential developments to the north, south, and east. Major roadways near the proposed development include Schmidt Lake Road to the north, Vicksburg Lane to the east, and Old Rockford Road to the south. The existing Hollydale Golf Course would be replaced with up to 319 single family homes. There are currently two different site plan configurations, which are illustrated in Figures 3A and 3B. Note that Figure 3A represents Concept 2, Figure 3B represents Concept 3, and there is no Concept 1. These were the only concepts submitted to the City for review. Further discussion regarding the traffic operations and safety associated with each of these site plans is provided later in this memorandum.

There are two primary access locations to the proposed development. One location is at Holly Lane and Old Rockford Road and the other at Comstock Lane and Schmidt Lake Road. However, depending on the site plan, there are different internal roadway configurations to route to these two primary access locations. The proposed development was assumed to be fully-constructed by the end of year 2024.

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SRF Consulting Group, Inc.

Site Plan Option A

Hollydale Golf Course Redevelopment Traffic Study
City of Plymouth

Figure 3A

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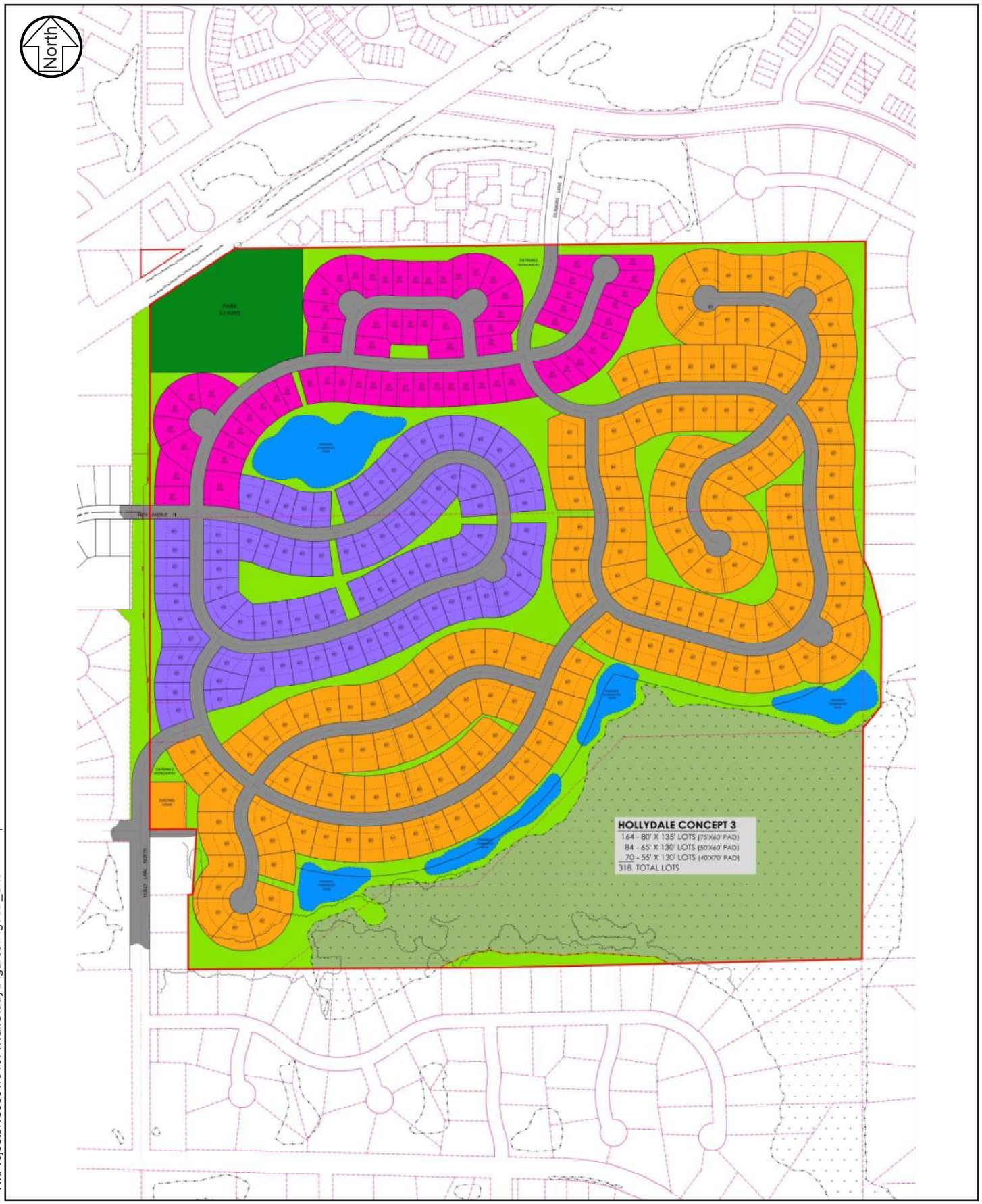
November 2019



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SRF Consulting Group, Inc.

Site Plan Option B

Hollydale Golf Course Redevelopment Traffic Study
City of Plymouth

Figure 3B

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November 2019

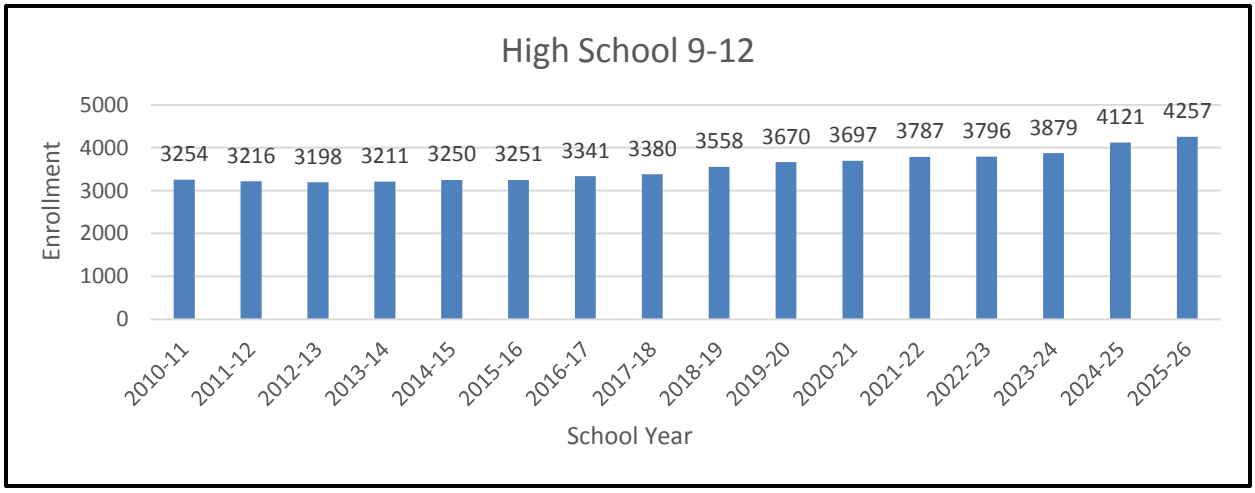
Traffic Forecasts

Traffic forecasts were developed for year 2025 (the year following full-build out of the proposed development) and year 2040 no build and build conditions. The following information provides an overview of the traffic forecast development process.

General Background Growth

To account for general background growth in the area, an annual growth rate of one (1) percent was applied to the existing peak hour traffic volumes to develop year 2025 and year 2040 background forecasts. This growth rate was developed using a combination of historical average daily traffic (ADT) volumes from surrounding roadways as published by MnDOT dating back to 2001, the 2040 City of Plymouth Transportation Plan traffic forecasts included in the City's 2040 Comprehensive Plan, and the historical/projected student enrollment provided by the school district for Wayzata High School from 2010/2011 to 2025/2026, which is shown in Chart 1.

Chart 1: High School Enrollment Projections



Adjacent Developments

The Timbers Edge development, located immediately to the west of the proposed development, was assumed to be completed by the year 2024. A traffic study was completed for this adjacent development consisting of 47 single-family homes. No homes were built at the time of the existing data collection, therefore the amount of trips generated by this development as shown in the traffic study and Table 5, were included as part of the future intersection capacity analysis. The adjacent development is expected to generate a total of approximately 35 a.m. peak hour, 40 school departure peak hour, 46 p.m. peak hour, and 444 daily trips. These estimates were developed using the *ITE Trip Generation Manual, Tenth Edition*.

Table 5. Adjacent Development Trip Generation Estimate

Land Use Type *(ITE Code)*	Size	A.M. Peak Hour Trips		School Departure Peak Hour Trips		P.M. Peak Hour Trips		Daily Trips
		In	Out	In	Out	In	Out	
Single-Family Housing *(210)*	47 DU	9	26	25	15	29	17	444

Note that following the completion of the Timbers Edge traffic study, the developer reduced the number of homes to 40 units. Using the traffic study number of homes of 47 represents a conservative estimate of trips generated in the future years by the adjacent development.

Travel Pattern Changes

The proposed development would construct a new north-south roadway connection between Old Rockford Road and Schmidt Lake Road by connecting Comstock Lane to Holly Lane, albeit with different internal roadway configurations depending on the selected site plan. To understand the potential impacts to area travel patterns the new roadway connection was added to the transportation system within the Hennepin County Regional Travel Demand Model to understand how many non-development vehicles would be expected to utilize this new north-south roadway connection. Based on this analysis, approximately 50 to 100 (non-development) daily trips would be expected to utilize the new north-south roadway connection between Old Rockford Road and Schmidt Lake Road. These trips are mainly expected to be from residents located immediately west of the proposed development in the Wyndemere Farms housing development and other homes within the immediate adjacent area. This magnitude indicates that there will not be a significant amount of cut-thru traffic within the proposed development as it relates to the new north-south roadway connection. This roadway connection would primarily serve the proposed development.

Existing Golf Course Trip Generation

The proposed development will replace the former Hollydale Golf Course. In order to account for the existing traffic to/from the golf course, information provided by the golf course and estimates from the *ITE Trip Generation Manual, Tenth Edition* were utilized to understand the peak hour and daily traffic volumes associated with the golf course. Based on information provided, there is a maximum of eight (8) tee times per hour, with up to four (4) individuals per tee time. Using this information, it can be estimated that up to 32 vehicles per hour could be expected to enter and exit the golf course under peak conditions. However, it is likely that during the a.m. peak hour, fewer vehicles may exit as fewer golfers are expected to exit the course between 7:30 and 8:30 a.m.

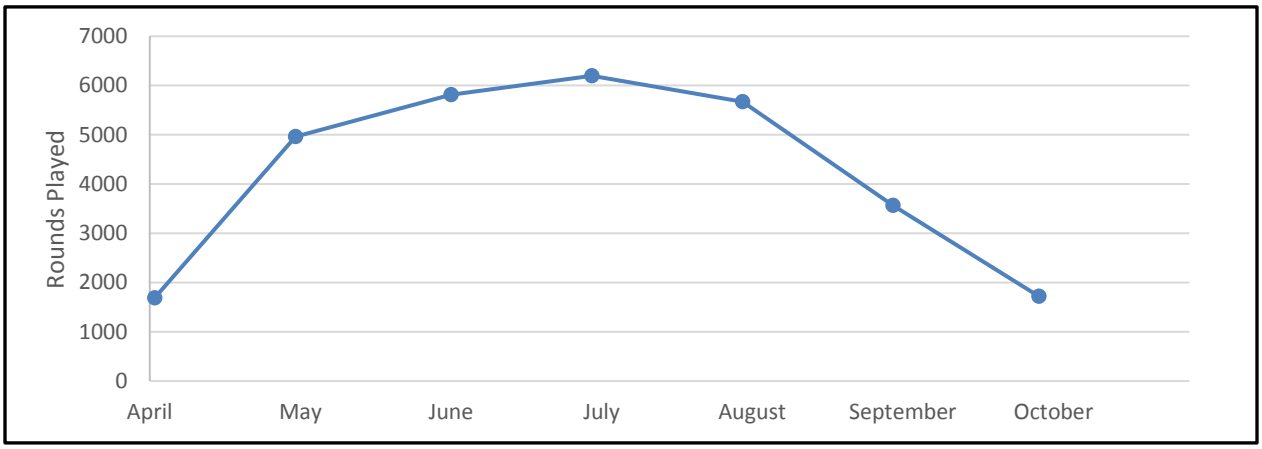
Note that golf league information was also provided by the course. Leagues typically operate between May and August and can increase the number of golfers using the course at once, as they can have up to 60 golfers begin within an hour by sending groups to all 18 holes. Therefore, based on the peak tee time information and league information, the peak hour and daily trip generation for the golf course was estimated and summarized in Table 6. The daily trips were estimated using the *ITE Trip Generation Manual*, *Tenth Edition* although this number may fluctuate depending on the amount of league play on specific days.

Table 6. Peak Golf Course Trip Generation Estimates

Land Use Type *(ITE Code)*	A.M. Peak Hour Trips		School Departure Peak Hour Trips		P.M. Peak Hour Trips		Daily Trips
	In	Out	In	Out	In	Out	
Existing Golf Course (Peak Summer)	32	24	32	32	60	32	550
Existing Golf Course (September)	8	4	15	19	7	12	300

The golf course trip generation information represents the peak golf operations between May and August. Therefore, a review of the monthly average rounds played for the previous 13 years was completed to determine the typical September activity, which coincides with the traffic data collected as part of this study. The data indicates a reduction in rounds played during the fall months and the course is typically closed between December and March. A summary of the average golf rounds played by month is illustrated in Chart 2.

Chart 2: Average Golf Rounds Played



As identified within Chart 2, the rounds played in September can be expected to be approximately 55 to 60 percent lower than the peak rounds played during the summer months. However, since the traffic data was collected at the end of September, the rounds played were reduced even further as a result of colder weather and shorter daylight. The data is consistent with the traffic data collected in September 2019 as part of this study and is also summarized in Table 6.

Although traffic counts were collected during September when golf course traffic is lower than during the peak summer months, this data still represents a typical roadway peak condition, as nearby Wayzata High School was in session and there were no holidays or special events during the collection period. Under the future analysis, the golf course trips are planned to be removed prior to adding the proposed and adjacent development trips. Since data was collected during September, only the course trips active during September will be removed from the existing counts and not the peak golf course trips to ensure that background volumes are not artificially lowered.

Proposed Development Trip Generation

The trip generation estimate for the proposed development was developed using the *ITE Trip Generation Manual, Tenth Edition* and includes trips for the a.m., school departure, and p.m. peak hours, as well as on a daily basis. The proposed development, as shown in Table 7, is expected to generate approximately 236 a.m. peak hour, 270 school departure peak hour, 316 p.m. peak hour, and 3,011 daily trips. The trip generation for the proposed development is expected to be relatively consistent throughout the year and will not fluctuate like the golf course use.

To understand the change in trip generation to the site as compared to the golf course use, the existing golf course trip generation information from both the peak summer and September periods were included in Table 7. The net new trips to the site are expected to range between 180 and 224 a.m. peak hour, 206 and 236 school departure peak hour, 224 and 297 p.m. peak hour, and 2,461 and 2,711 daily trips, depending on the time of the year.

Table 7. Proposed Development Trip Generation Estimates

Land Use Type *(ITE Code)*	Size	A.M. Peak Hour Trips		School Departure Peak Hour Trips		P.M. Peak Hour Trips		Daily Trips
		In	Out	In	Out	In	Out	
September Trip Generation								
Single-Family Housing *(210)*	319 DU	59	177	170	100	199	117	3,011
Existing Golf Course	18 holes	(-8)	(-4)	(-15)	(-19)	(-7)	(-12)	(-300)
Net New Trips		**51**	**173**	**155**	**81**	**192**	**105**	**2,711**
Peak Summer Trip Generation								
Single-Family Housing *(210)*	319 DU	59	177	170	100	199	117	3,011
Existing Golf Course	18 holes	(-32)	(-24)	(-32)	(-32)	(-60)	(-32)	(-550)
Net New Trips		**27**	**153**	**138**	**68**	**139**	**85**	**2,461**

The trips generated by the adjacent and proposed development were distributed throughout the study area based on the directional distribution shown in Figure 4. This distribution was developed based on existing area travel patterns, data from the Hennepin County Regional Travel Demand Model and the 2040 Plymouth Transportation Plan, and engineering judgment. The resultant year 2025 and 2040 no build and build condition traffic forecasts are shown in Figures 5 through 8. Note that the no build conditions include the general background growth, adjacent development traffic, and the golf course operations, but not traffic generated by the proposed development.

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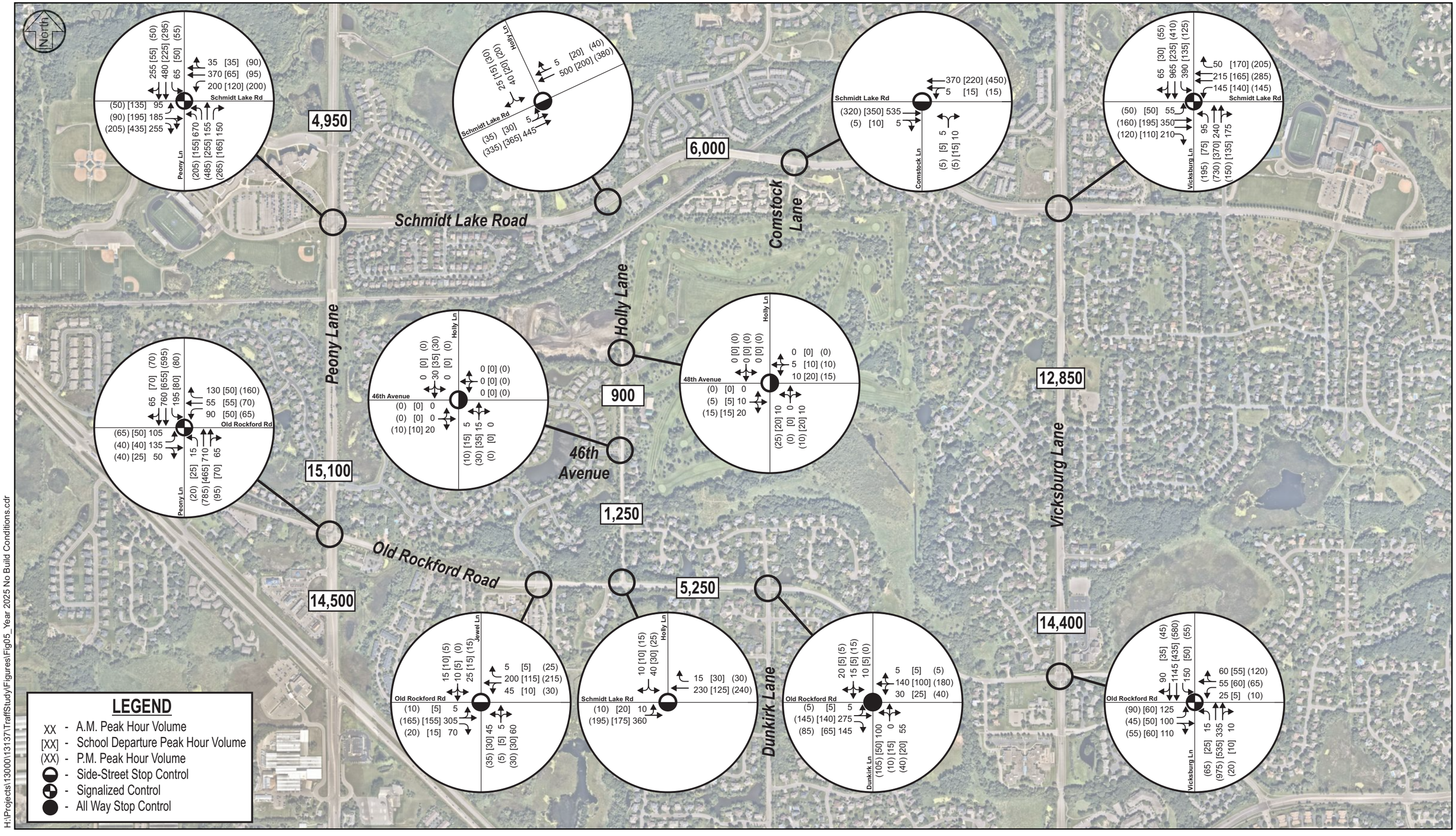
Directional Distribution

Holydale Golf Course Redevelopment Traffic Study
City of Plymouth

001913137
November 2019

Figure 4



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Year 2025 No Build Conditions

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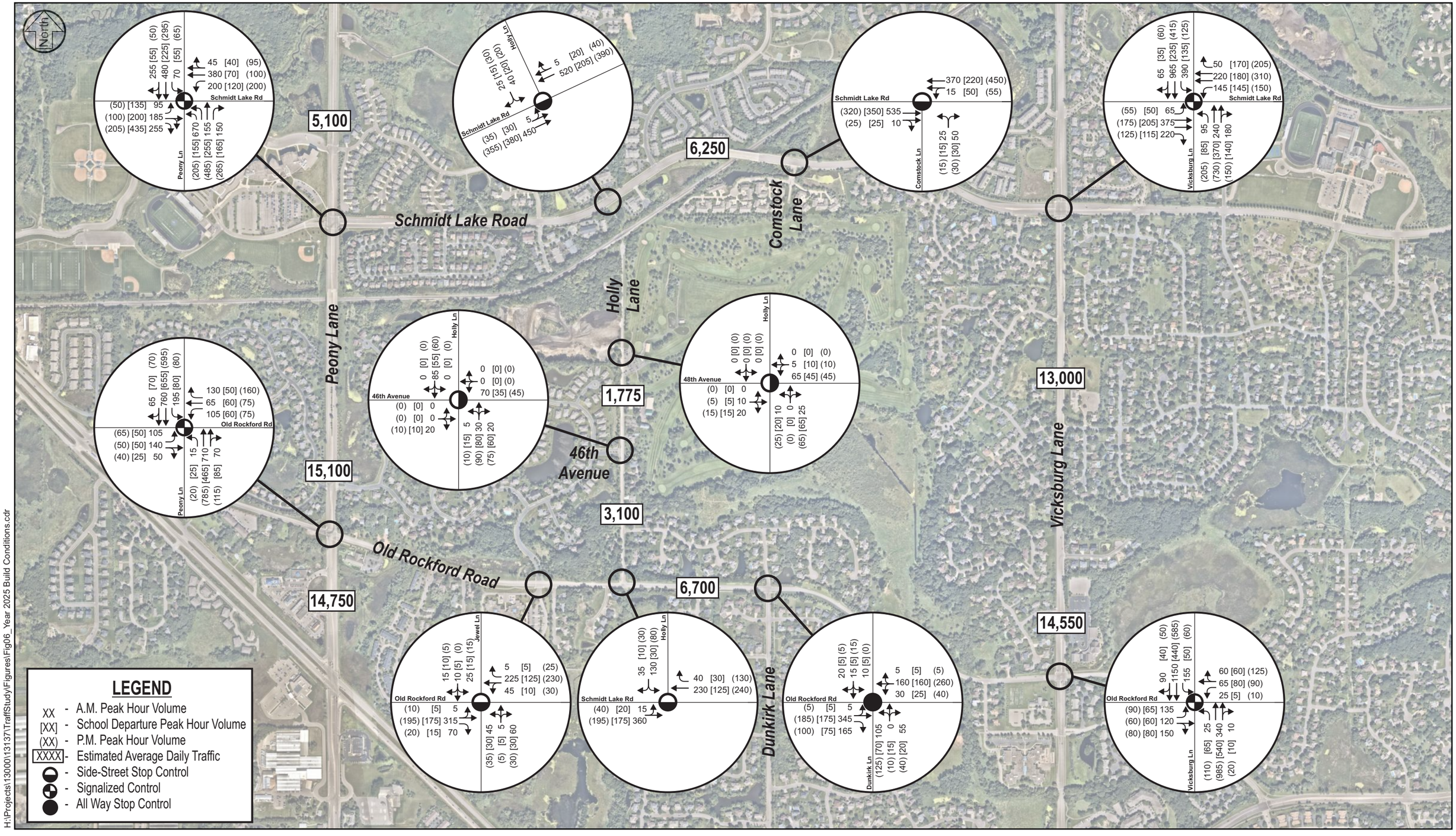
Figure 5



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Year 2025 Build Conditions

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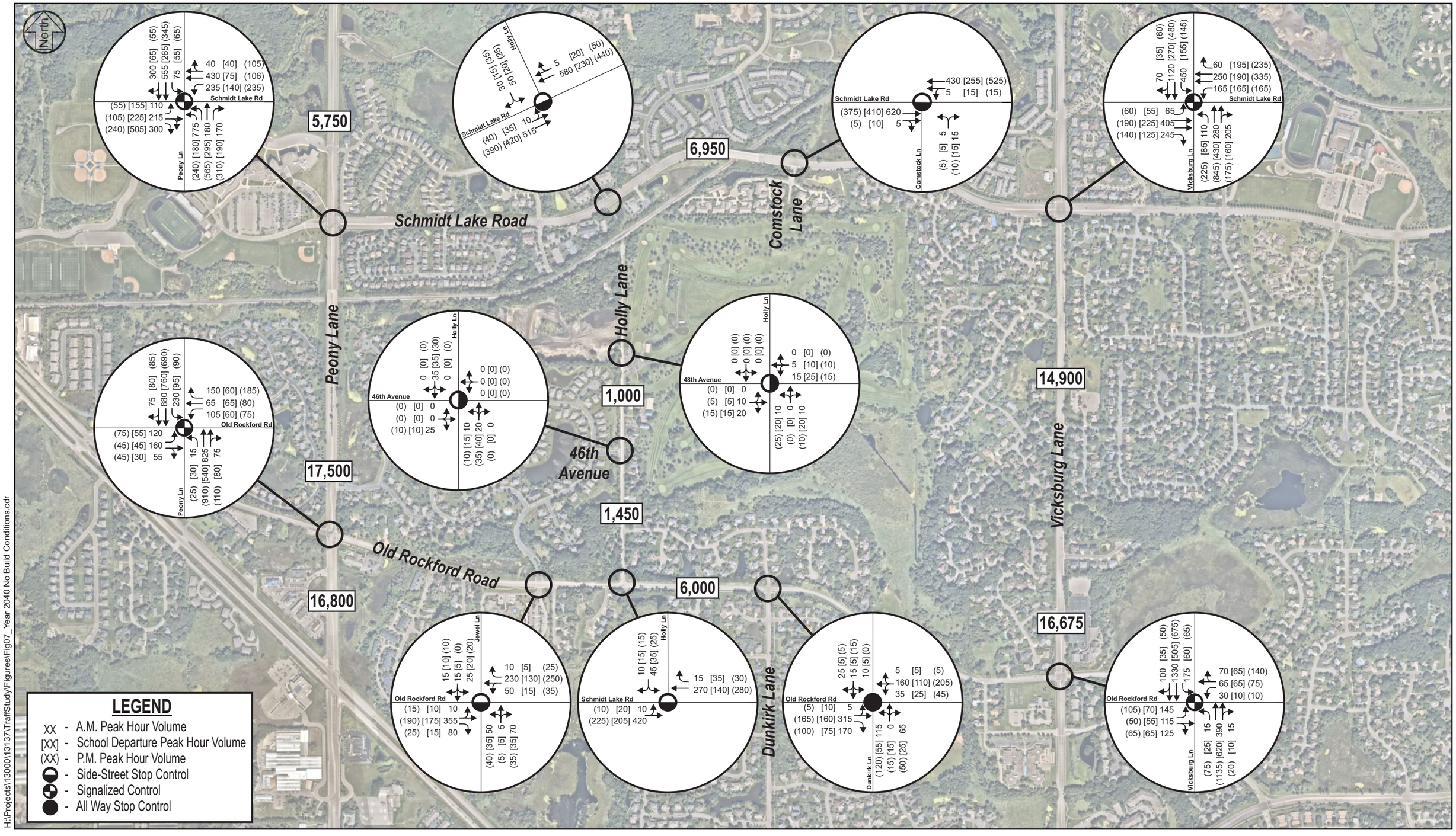
Figure 6



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Year 2040 No Build Conditions

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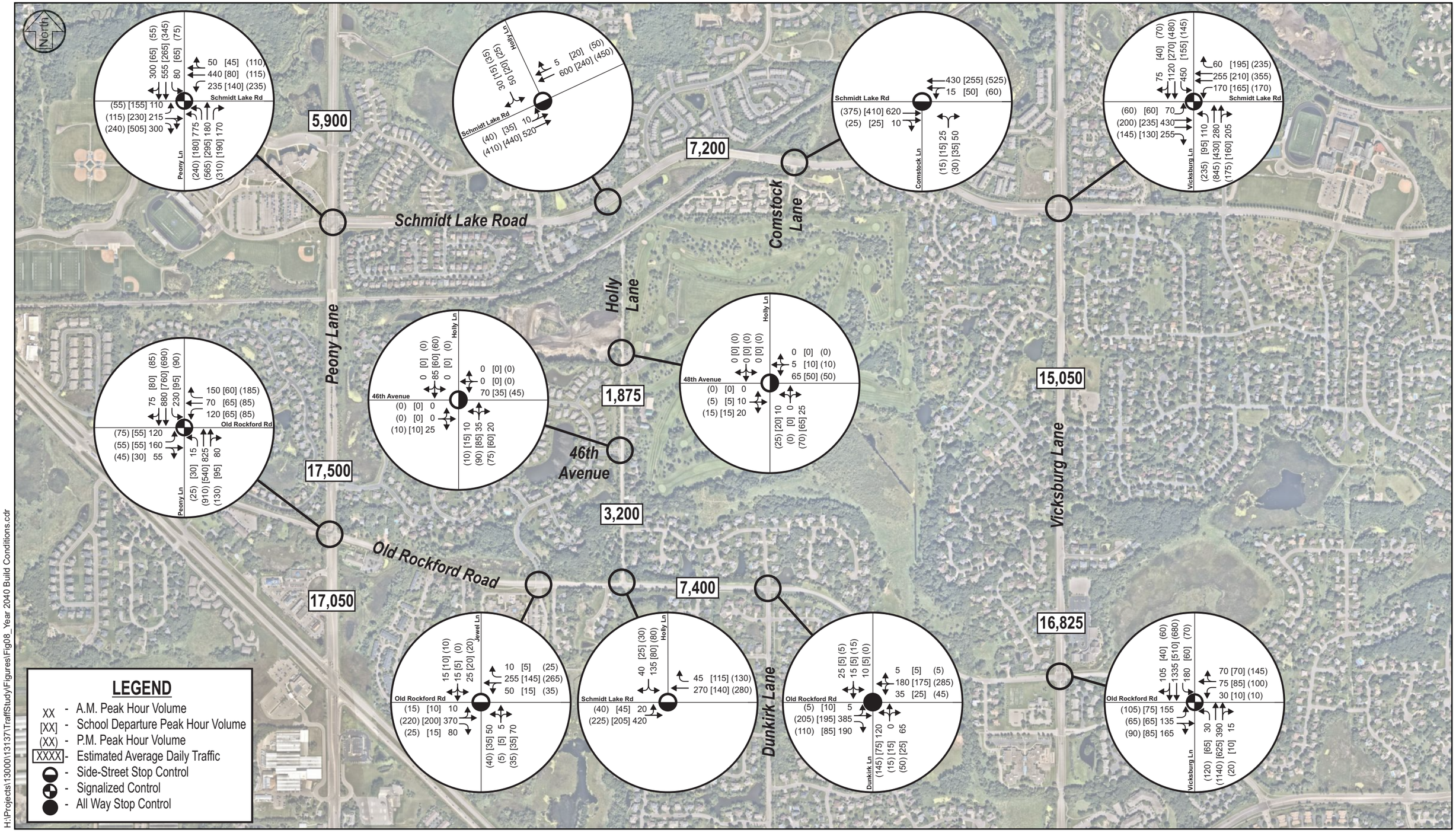
Figure 7



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Year 2040 Build Conditions

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Figure 8

Planned City Infrastructure Improvements

Previous studies have been completed for the Peony Lane and Schmidt Lake Road intersection near Wayzata High School. Results of those previous studies have indicated that there are additional improvements that could be completed to improve intersection operations during both school arrival and departure periods, including adding a southbound right-turn lane and an additional eastbound right-turn lane. Those improvements have yet to be constructed as there are some trade-offs with potential increased pedestrian crossing distance and the fact that the majority of the delay is incurred internally to the school for only short durations.

However, the City has budgeted for some intersection improvements in the year 2020 to help address increased delays and improve safety in the area. Currently, the City is planning to construct a southbound right-turn lane along Peony Lane. Additionally, the existing crosswalk on the north side of the intersection of Peony Lane and 51st Avenue N is planned to be removed and the inside northbound lane along Peony Lane is planned to be removed via striping as there is only one northbound through-lane on Peony Lane currently. While these improvements are planned within the City budget for year 2020 and would be expected to have impacts on the overall intersection capacity analysis, they are not taken into account within this study to determine if this improvement is still necessary for the intersection.

Future Intersection Capacity Analysis

The no build conditions are reviewed to understand how the study area is expected to operate, regardless of the proposed development under both a near- and long-term condition. The build conditions illustrate how the proposed development impacts operations within the study area under each condition. The future intersection capacity analyses were completed using Synchro/SimTraffic software. The following sections provide an overview of the intersection capacity analysis under year 2025 and year 2040 no build and build conditions.

Year 2025 No Build Intersection Capacity Analysis

Results of the year 2025 no build intersection capacity analysis shown in Table 8 indicates that all study intersections are expected to continue to operate at an acceptable overall LOS D or better during the a.m., school departure, and p.m. peak hours, except for the Schmidt Lake Road and Peony Lane intersection during the a.m. peak hour, which operates at an unacceptable overall LOS E. The existing queuing at the Schmidt Lake Road and Peony Lane intersection is expected to continue under year 2025 no build conditions during both the a.m. and school departure peak hours. During the a.m. peak hour, the northbound queues extend beyond the left-turn lane storage approximately five (5) to 10 percent of the peak hour and southbound queues extend beyond the north high school access 20 to 25 percent of the peak hour. This represents an increase of approximately five (5) percent as compared to the existing conditions. Note that if the planned City infrastructure improvements are completed, the intersection capacity analysis would be expected to change.

Table 8. Year 2025 No Build Intersection Capacity Analysis

Intersection	A.M. Peak Hour		School Departure Peak Hour		P.M. Peak Hour	
	LOS	Delay	LOS	Delay	LOS	Delay
Schmidt Lake Road and Peony Lane	E	72 sec.	D	41 sec.	C	20 sec.
Schmidt Lake Road and Holly Lane (1)	A/C	18 sec.	A/B	13 sec.	A/B	12 sec.
Schmidt Lake Road and Comstock Lane (1)	A/B	12 sec.	A/B	11 sec.	A/B	11 sec.
Schmidt Lake Road and Vicksburg Lane	C	25 sec.	B	18 sec.	C	23 sec.
Old Rockford Road and Peony Lane	C	21 sec.	B	11 sec.	B	16 sec.
Old Rockford Road and Jewel Lane (1)	A/C	18 sec.	A/B	12 sec.	A/B	13 sec.
Old Rockford Road and Holly Lane (1)	A/C	15 sec.	A/B	11 sec.	A/B	11 sec.
Old Rockford Road and Dunkirk Lane (2)	B	11 sec.	A	9 sec.	B	10 sec.
Old Rockford Road and Vicksburg Lane	C	24 sec.	B	12 sec.	B	17 sec.
Holly Lane and 46th Avenue (1)	A/A	9 sec.	A/A	9 sec.	A/A	9 sec.

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst approach LOS. The delay shown represents the worst side-street approach delay.

(2) Indicates an unsignalized intersection with all-way stop control, where the overall LOS is shown.

During the afternoon departure peak hour, the eastbound queuing and delay issues are expected to continue for the peak 15 minutes after school ends with maximum queues reaching 1,500 feet. However, these queues are internal to the school site and do not affect the area roadway network. Although these queues are expected to increase as enrollment increases, they typically only occur for 15 to 30 minutes, which is relatively common at schools. Therefore, no mitigation is recommended to accommodate the year 2025 no build condition.

Year 2025 Build Intersection Capacity Analysis

Results of the year 2025 build intersection capacity analysis shown in Table 9 indicates that all study intersections are expected to continue to operate at an acceptable overall LOS D or better during the a.m., school departure, and p.m. peak hours, except for the Schmidt Lake Road and Peony Lane intersection during the a.m. peak hour, which operates at an unacceptable overall LOS E. The queuing at the Schmidt Lake Road and Peony Lane intersection is expected to continue under year 2025 build conditions during both the a.m. and school departure peak hours and operate similar to year 2025 no build conditions. The impact to the Schmidt Lake Road and Peony Lane intersection from the proposed development is relatively small given that the majority of users of the proposed development are destined to/from the south or east. Therefore, there is not expected to be any significant impact as a result of the proposed development that would require any specific mitigation under year 2025 build conditions from an intersection capacity perspective. Note that if the planned City infrastructure improvements are completed, the intersection capacity analysis would be expected to change.

Table 9. Year 2025 Build Intersection Capacity Analysis

Intersection	A.M. Peak Hour		School Departure Peak Hour		P.M. Peak Hour	
	LOS	Delay	LOS	Delay	LOS	Delay
Schmidt Lake Road and Peony Lane	E	78 sec.	D	45 sec.	C	21 sec.
Schmidt Lake Road and Holly Lane (1)	A/C	18 sec.	A/B	13 sec.	A/B	13 sec.
Schmidt Lake Road and Comstock Lane (1)	A/B	14 sec.	A/B	12 sec.	A/B	12 sec.
Schmidt Lake Road and Vicksburg Lane	C	26 sec.	B	18 sec.	C	23 sec.
Old Rockford Road and Peony Lane	C	22 sec.	B	13 sec.	B	17 sec.
Old Rockford Road and Jewel Lane (1)	A/C	19 sec.	A/B	13 sec.	A/B	13 sec.
Old Rockford Road and Holly Lane (1)	A/C	19 sec.	A/B	12 sec.	A/B	13 sec.
Old Rockford Road and Dunkirk Lane (2)	B	14 sec.	A	9 sec.	B	11 sec.
Old Rockford Road and Vicksburg Lane	C	29 sec.	B	13 sec.	B	19 sec.
Holly Lane and 46th Avenue (1)	A/B	10 sec.	A/B	10 sec.	A/B	10 sec.
Holly Lane and 48th Avenue (1)	A/A	9 sec.	A/A	9 sec.	A/B	10 sec.

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst approach LOS. The delay shown represents the worst side-street approach delay.

(2) Indicates an unsignalized intersection with all-way stop control, where the overall LOS is shown.

The change in operations at the primary access locations to the proposed development (i.e. the Old Rockford Road/Holly Lane and Schmidt Lake Road/Comstock Lane intersections) are expected to increase by approximately one (1) to four (4) seconds during the peak hours. From a queuing perspective, the 95th percentile southbound left-turn queue at the Old Rockford Road and Holly Lane intersection is expected to be approximately three (3) to four (4) vehicles during the a.m. peak hour; on average, this queue is expected to be two (2) vehicles. The average and 95th percentile queues exiting the site at Comstock Lane are expected to be approximately one (1) and two (2) vehicles, respectively.

Based on the expected queues and intersection operations, there is not expected to be a need for a traffic control modification at either the Old Rockford Road/Holly Lane or Schmidt Lake Road/Comstock Lane intersections from a capacity perspective. Although mitigation should be considered to address the sight distance issue at the Schmidt Lake Road and Comstock Lane intersection. Further discussion regarding potential mitigation is documented later in this memorandum.

Note that a preliminary review of signal warrant criteria indicates that neither the Old Rockford Road/Holly Lane or Schmidt Lake Road/Comstock Lane intersections are expected to meet traffic signal or multi-way stop warrants based on traffic volumes. This analysis was completed based on Site Plan Option A, however, both site plans are expected to result in similar operations from an intersection capacity perspective.

Year 2040 No Build Intersection Capacity Analysis

Results of the year 2040 no build intersection capacity analysis shown in Table 10 indicates that all study intersections are expected to continue to operate at an acceptable overall LOS C or better during the a.m., school departure, and p.m. peak hours, except for the Schmidt Lake Road and Peony Lane intersection during the a.m. and school departure peak hours, which operate at an unacceptable overall LOS F and LOS E, respectively. As enrollment increases continue, the Schmidt Lake Road and Peony Lane intersection is expected to operate more over capacity during the a.m. peak hour arrival period, resulting in delays over two (2) minutes on average per vehicle. During the a.m. peak hour, the northbound queues extend beyond the left-turn lane storage approximately 40 percent of the peak hour and southbound queues are expected to extend beyond the north high school access 50 percent of the a.m. peak hour. Note that if planned City infrastructure improvements are completed, the intersection capacity analysis would be expected to change.

Table 10. Year 2040 No Build Intersection Capacity Analysis

Intersection	A.M. Peak Hour		School Departure Peak Hour		P.M. Peak Hour	
	LOS	Delay	LOS	Delay	LOS	Delay
Schmidt Lake Road and Peony Lane	F	130 sec.	E	68 sec.	C	27 sec.
Schmidt Lake Road and Holly Lane (1)	A/C	22 sec.	A/B	14 sec.	A/B	14 sec.
Schmidt Lake Road and Comstock Lane (1)	A/B	13 sec.	A/B	12 sec.	A/B	11 sec.
Schmidt Lake Road and Vicksburg Lane	C	32 sec.	B	19 sec.	C	25 sec.
Old Rockford Road and Peony Lane	C	26 sec.	B	13 sec.	C	21 sec.
Old Rockford Road and Jewel Lane (1)	A/C	23 sec.	A/B	13 sec.	A/B	14 sec.
Old Rockford Road and Holly Lane (1)	A/C	17 sec.	A/B	11 sec.	A/B	12 sec.
Old Rockford Road and Dunkirk Lane (2)	B	13 sec.	A	9 sec.	B	10 sec.
Old Rockford Road and Vicksburg Lane	C	31 sec.	B	14 sec.	C	21 sec.
Holly Lane and 46th Avenue (1)	A/A	9 sec.	A/A	9 sec.	A/A	9 sec.

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst approach LOS. The delay shown represents the worst side-street approach delay.

(2) Indicates an unsignalized intersection with all-way stop control, where the overall LOS is shown.

During the school departure peak hour, the eastbound queuing and delay issues are expected to continue during the peak 15 minutes after school ends, with maximum queues reaching 2,500 feet. Given the magnitude of the queueing and delay issues expected during the a.m. and after school peak hours at the Schmidt Lake Road and Peony Lane intersection, the following improvements could be considered to improve intersection operations:

- Reconstruct the eastbound approach to provide a left-, thru, and dual right-turn lanes.
- Construct a southbound right-turn lane.

With the addition of these improvements, delays and queues during the a.m. and after school peak hours can be expected to operate at or near an acceptable LOS for the majority of the peak hours. These improvements are consistent with improvements identified in the *Wayzata High School Expansion Traffic Study* completed by SRF in 2014 and align with the southbound right-turn lane improvements the City has planned for this intersection. No other area improvements are needed to accommodate year 2040 no build conditions within the study area from an intersection capacity perspective.

Year 2040 Build Intersection Capacity Analysis

Results of the year 2040 build intersection capacity analysis shown in Table 11 indicates that all study intersections are expected to continue to operate at an acceptable overall LOS C or better during the a.m., school departure, and p.m. peak hours, except for the Schmidt Lake Road and Peony Lane intersection during the a.m. peak hour and after school peak hour, which operates at an unacceptable overall LOS F and LOS E, respectively. The Schmidt Lake Road and Peony Lane intersection is expected to operate well over capacity during the a.m. peak hour arrival period, resulting in delays over two (2) minutes on average per vehicle. During the a.m. peak hour, the northbound queues extend beyond the left-turn lane storage approximately 40 percent of the peak hour and southbound queues are expected to extend beyond the north high school access 50 percent of the peak hour, similar to the year 2040 no build conditions. However, the change in operations as a result of the proposed development is minimal.

Table 11. Year 2040 Build Intersection Capacity Analysis

Intersection	A.M. Peak Hour		School Departure Peak Hour		P.M. Peak Hour	
	LOS	Delay	LOS	Delay	LOS	Delay
Schmidt Lake Road and Peony Lane	F	133 sec.	E	71 sec.	C	27 sec.
Schmidt Lake Road and Holly Lane (1)	A/C	23 sec.	A/B	14 sec.	A/B	14 sec.
Schmidt Lake Road and Comstock Lane (1)	A/C	15 sec.	A/B	13 sec.	A/B	12 sec.
Schmidt Lake Road and Vicksburg Lane	C	32 sec.	B	19 sec.	C	26 sec.
Old Rockford Road and Peony Lane	C	30 sec.	B	14 sec.	C	21 sec.
Old Rockford Road and Jewel Lane (1)	A/C	24 sec.	A/B	14 sec.	A/B	14 sec.
Old Rockford Road and Holly Lane (1)	A/C	24 sec.	A/B	13 sec.	A/B	14 sec.
Old Rockford Road and Dunkirk Lane (2)	C	17 sec.	B	10 sec.	B	12 sec.
Old Rockford Road and Vicksburg Lane	C	35 sec.	B	15 sec.	C	23 sec.
Holly Lane and 46th Avenue (1)	A/B	10 sec.	A/B	10 sec.	A/B	10 sec.
Holly Lane and 48th Avenue (1)	A/A	9 sec.	A/A	9 sec.	A/B	10 sec.

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst approach LOS. The delay shown represents the worst side-street approach delay.

(2) Indicates an unsignalized intersection with all-way stop control, where the overall LOS is shown.

The City should continue to consider the improvements identified under the year 2040 no build conditions for the Schmidt Lake Road and Peony Lane intersection. Note that if the recommended and planned City infrastructure improvements are completed, the intersection capacity analysis would be expected to change, however, the proposed development would be expected to have minimal impact on overall operations, with minimal (one to two seconds) changes in delays.

As compared to the year 2040 no build condition, side street delays are expected to increase by approximately one (1) to two (2) seconds during the peak hours at the Schmidt Lake Road/Comstock Lane intersection and operations are not expected to significantly change as a result of the proposed development. The side-street delays on Holly Lane at Old Rockford Road are expected to increase by approximately seven (7) seconds during the a.m. peak hour and side-street operations along Holly Lane at Old Rockford Road are expected to operate near the LOS C/D threshold, which is acceptable. During the school departure and p.m. peak hours, the delays are expected to increase by one (1) to two (2) seconds.

The side-street queues at both the Schmidt Lake Road/Comstock Lane and Old Rockford Road/Holly Lane intersections are expected to be similar to year 2025 build conditions. During the a.m. peak hour, the average and 95th percentile southbound left-turn queue at the Old Rockford Road and Holly Lane intersection is expected to be approximately two (2) and four (4) vehicles, respectively. The average and 95th percentile queues exiting the site at Holly Lane and Comstock Lane during the peak hours are expected to be approximately one (1) and two (2) vehicles, respectively. There is not expected to be any delay or queuing issues caused by the increase in eastbound left-turn volume along Old Rockford Road for vehicles entering the site.

Note that a preliminary review of warrant criteria indicates that neither the Old Rockford Road/Holly Lane or Schmidt Lake Road/Comstock Lane intersections are expected to meet either traffic signal or multi-way stop warrants based on the year 2040 build conditions. Note that in order to meet traffic signal warrants at the Old Rockford Road and Holly Lane intersection, either mainline volumes would need to increase by approximately 30 percent or side-street left-turn volumes would need to increase by approximately 50 percent. In order to meet signal warrants at the Schmidt Lake Road and Comstock Lane intersection, side-street left-turn volumes would need to increase by approximately 10 times of what they are expected to be under future conditions.

Based on the expected operations, there is not expected to be a need for a geometric or traffic control modification at either the Old Rockford Road/Holly Lane or Schmidt Lake Road/Comstock Lane intersections from an intersection capacity perspective.

Other Considerations

From an intersection capacity perspective, there are only a few considerations identified for the Schmidt Lake Road and Peony Lane intersection. However, to address some of the other concerns within the area, particularly vehicular speeds along Schmidt Lake Road and sight distance at Comstock Lane, the following items are offered for consideration.

Three-Lane Consideration

There are currently about 5,600 vehicles per day (vpd) that travel along Schmidt Lake Road between Peony Lane and Vicksburg Lane. In the future, it is estimated that the daily traffic volume could increase to 7,200 vehicles per day under year 2040 build conditions. Given these daily traffic volumes, Schmidt Lake Road could be converted from a four-lane undivided facility to a three-lane facility (i.e. a two-lane facility with a shared center two-way left-turn lane) to help reduce vehicular speeds.

In addition to reviewing the daily traffic volumes, the peak hour directional volumes also are a key component to consider in this situation. The Federal Highway Administration (FHWA) has provided the following guidelines for when to consider reducing a four-lane roadway to three-lanes based on the peak hour direction volumes:

- Probably Feasible - Less than 750 peak hour vehicles in one direction
- Consider Cautiously - 750 to 875 peak hour vehicles in one direction
- Feasibility Less Likely - Over 875 peak hour vehicles in one direction

A review of the future forecasts indicates that no single direction of travel along Schmidt Lake Road between Peony Lane and Vicksburg Lane is expected to exceed 750 vehicles during any peak hour under existing, year 2025 build, or 2040 build conditions. Therefore, the peak hour volumes fall within the probably feasible category for Schmidt Lake Road.

Three-lane facilities are best suited for roadways that have less than 15,000 vpd. Typically, a four-lane facility is justified with daily volumes over 15,000 vpd, which Schmidt Lake Road is not expected to exceed. This type of facility not only improves safety for motorists, but also can increase safety for pedestrians crossing Schmidt Lake Road as it eliminates the multi-threat of a four-lane facility. Left-turning motorists are provided a center left-turn lane, which should reduce sideswipe and rear-end type crashes. Additionally, research completed by FHWA indicates that three-lane sections can reduce vehicular speeds between two (2) to four (4) mph, which may reduce average speeds to the posted speed limit of the roadway.

Schmidt Lake Road and Comstock Lane

While no intersection capacity issues are expected at the Schmidt Lake Road and Comstock Lane intersection, there is an existing sight distance issue, particularly for vehicles making a northbound left-turn onto Schmidt Lake Road. Given this sight distance issue, the following three alternatives were identified for consideration at the intersection:

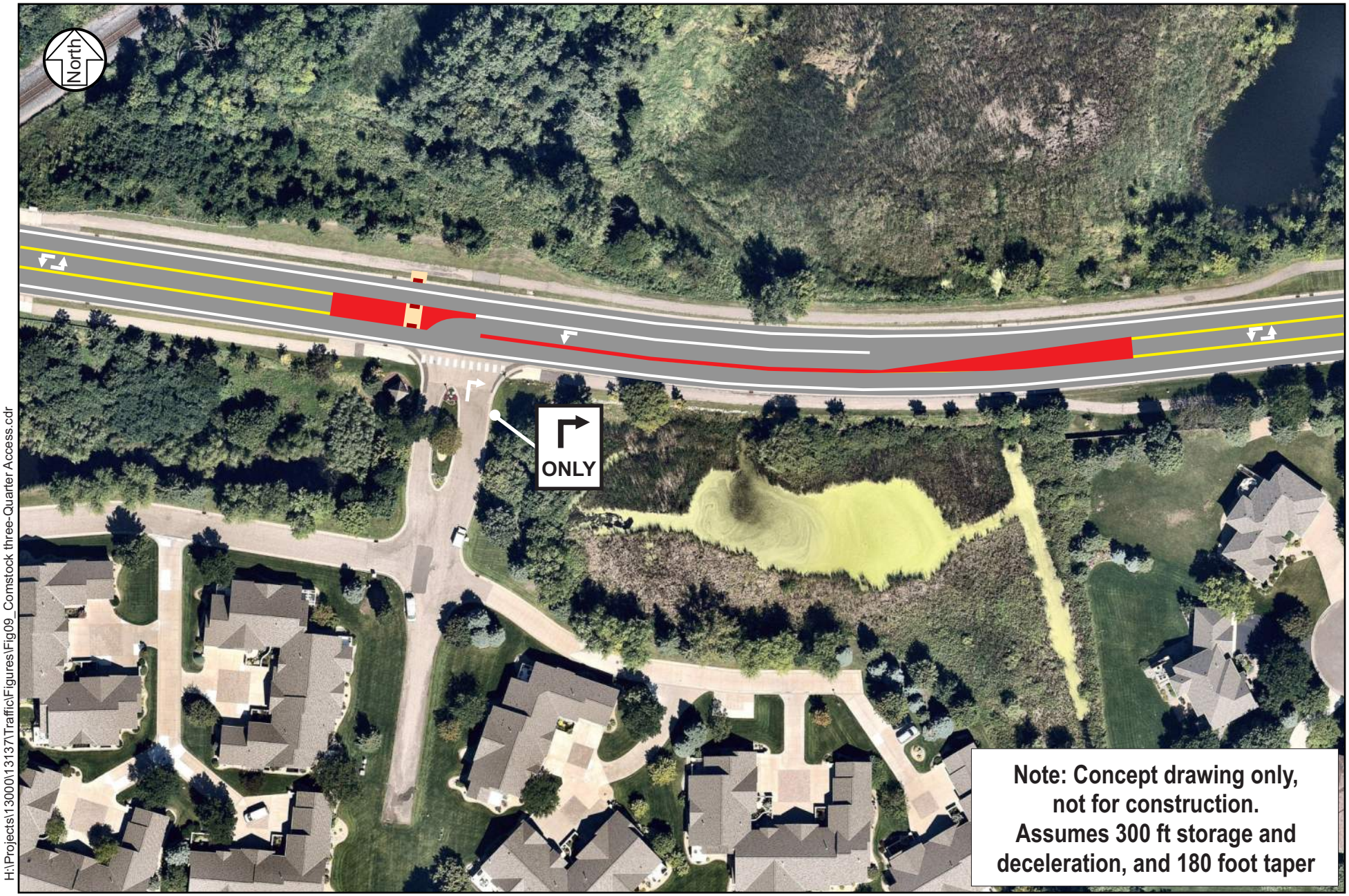
- Stop Control on all approaches (All-Way Stop Control)
- Roundabout
- Three-Quarter Access

If the three-lane section along Schmidt Lake Road were implemented, the all-way stop control is not expected to provide acceptable overall intersection operations during the a.m. peak hour. Additionally, the all-way stop control could pose safety risks, as there are low side-street volumes as compared to the mainline, which may lead to mainline vehicles ignoring the stop control. Additionally, the intersection is not expected to meet multi-way stop warrants, indicating that an all-way stop is not warranted for this intersection.

While the roundabout would be expected to provide overall acceptable operations, there are geometric considerations that may pose challenges to constructing a roundabout. Additionally, since this intersection is not expected to meet any signal warrants, typically roundabouts are also not justified.

A three-quarter access at the intersection would eliminate the northbound left-turn movement, therefore eliminating the sight-distance issues associated with this maneuver. Currently, this maneuver is made by approximately less than 10 vehicles per day. Since the development concepts show an indirect connection of Comstock Lane to Holly Lane, vehicles destined to the northwest could travel to Old Rockford Road to head that direction. The three-quarter access would allow for a single lane in the east and west directions along with a westbound left-turn lane. On the west side of the intersection, a median refuge could be provided for pedestrians to cross Schmidt Lake Road. This configuration would be expected to improve safety for all users by providing a refuge area for pedestrians and eliminating the sight distance issue. Furthermore, there is the potential that installation of the median could help reduce vehicular speeds along Schmidt Lake Road.

A concept of this configuration is shown in Figure 9. There would not be expected to be any intersection capacity issues as a result of the three-quarter geometric configuration. Note that under future build conditions the left-turn restriction at Comstock Lane would result in additional southbound right-turns along Holly Lane (between 15 to 25 depending on the peak hour). However, minimal (approximately one (1) second) increases in delay are expected as a result of these additional right-turns. Queues would be expected to remain similar or increase by one (1) vehicle.



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SRF Consulting Group, Inc.

Comstock Lane Three-Quarter Access Concept

Holydale Golf Course Redevelopment Traffic Study
City of Plymouth

Figure 9

001913137
January 2020

Note that the City of Plymouth Public Safety requires a development of this size to have a second access point beyond the planned access at Old Rockford Road, which leads to the planned connection via Comstock Lane. It is important to note that other access alternatives to the development were considered but were dismissed due to potential conflicts with the railroad and potential park development. Preliminary information from the railroad authority and from public safety indicates that extending Holly Lane to Schmidt Lake Road via an at-grade crossing of the existing railroad tracks in the northwest quadrant of the development is not likely to be allowed and not a safe alternative. Additionally, the area for this potential connection is currently slated for park land within the development.

Site Plan Review

A review of the two site plans was completed to evaluate the benefits and impacts from a transportation perspective. The first site plan, referred to as Option A, extends Holly Lane north-south beyond 48th Avenue to the newly constructed park in the northwest quadrant of the proposed development, which reduces circulation for residents by creating a more direct route. The second site plan, referred to as Option B, does not connect Holly Lane beyond 46th Avenue, which would require motorists destined to the north (i.e. the Timber's Edge development) to travel through the proposed development to reach their destination. However, Option B reduces connectivity for the existing property north of the Timber's Edge development, which results in more vehicular circulation for these residents. Although there is expected to be a more circuitous path for residents in Option B, this may have a traffic calming effect and reduce vehicular speed as compared to Option A, which is more direct and straight. Based on feedback from City staff, straight neighborhood roadways similar to Dunkirk Lane north of Schmidt Lake Road have a tendency for speeding vehicles, which reduces public safety.

In terms of traffic controls along Holly Lane, it is currently show that under either site plan option, Holly Lane would remain as a free-flowing roadway, with the side-streets of 46th Avenue and 48th Avenue as stop-controlled. It is not anticipated that all-way stop control warrants will be met for either of these intersections due to the low volumes expected. Therefore, installation of four-way stops is not recommended.

Pedestrian connectivity is expected to be provided with both options, as the trail along the west side of Holly Lane can be extended under each scenario to connect to the newly constructed park. Additionally, this trail can be extended along the north side of the development to reach Comstock Lane. If/when the three-quarter access and pedestrian refuge are constructed at the Schmidt Lake Road and Comstock Lane intersection, this would provide a safe and efficient trail connection from the north and south sides of Schmidt Lake Road to allow residents easier access to area parks.

Summary and Conclusions

The following study summary, conclusions, and recommendations are offered for your consideration.

1) The average and 85th percentile speeds of motorists observed along Schmidt Lake Road are approximately 45 and 50 mph, respectively; the posted speed limit is 40-mph.

2) There is currently a sight distance issue for northbound left-turning vehicles at Comstock Lane at Schmidt Lake Road. The current intersection sight distance does not meet AASHTO guidelines based on the observed vehicle speeds along Schmidt Lake Road.

3) Either removing foliage or relocating the stop bar to improve sight distance should be considered along Holly Lane at Old Rockford Road to improve the sight distance for southbound left-turning vehicles.

4) The existing intersection capacity analysis indicates that all study intersections currently operate at an acceptable overall LOS C or better during the a.m., school departure, and p.m. peak hours, except for the Schmidt Lake Road and Peony Lane intersection during the a.m. peak hour, which operates at an unacceptable overall LOS E. The unacceptable operations generally occur for approximately 15 to 30 minutes prior to school starting.

5) The existing Hollydale Golf Course would be replaced with up to 319 single family homes and was assumed to be fully constructed by the end of year 2024.

6) Traffic forecasts were developed for year 2025 and year 2040 no build and build conditions and included the following key assumptions:

   a) An annual growth rate of one (1) percent was applied to the existing peak hour traffic volumes to develop year 2025 and year 2040 background forecasts.

   b) The Timbers Edge development, located immediately to the west of the proposed development, was assumed to be completed by the year 2024.

   c) Approximately 50 to 100 (non-development) daily trips would be expected to utilize the new north-south roadway connection between Old Rockford Road and Schmidt Lake Road through the proposed development.

   d) The proposed development is expected to generate approximately 236 a.m. peak hour, 270 school departure peak hour, 316 p.m. peak hour, and 3,011 daily trips. The net new trips to the site (i.e. excluding the golf course trip generation) are expected to range between 180 and 224 a.m. peak hour, 206 and 236 school departure peak hour, 224 and 297 p.m. peak hour, and 2,461 and 2,711 daily trips, depending on the time of the year.

7) The following information provide an overview of the intersection capacity analysis findings under year 2025 and year 2040 no build and build conditions and potential mitigation.

   a) Given the magnitude of the queueing and delay issues expected during the a.m. and after school peak hours at the Schmidt Lake Road and Peony Lane intersection under future no build conditions, **the following improvements could be considered to improve intersection operations if the City's planned infrastructure improvements are not completed:**

      i) Reconstruct the eastbound approach (i.e. the high school approach) to provide a left-, thru, and dual right-turn lanes.

      ii) Construct a southbound right-turn lane.

   b) There is not expected to be any significant impact as a result of the proposed development that would require any specific mitigation under year 2025 and year 2040 build conditions from an intersection capacity perspective.

   c) Based on the expected queues and intersection operations, there is not expected to be a need for a traffic control modification at either the Old Rockford Road/Holly Lane or Schmidt Lake Road/Comstock Lane intersections from a capacity perspective. Although mitigation should be considered to address the sight distance issue at the Schmidt Lake Road and Comstock Lane intersection.

8) Given the current and future traffic volumes along Schmidt Lake Road, the roadway should be converted from a four-lane undivided facility to a three-lane facility (i.e. a two-lane facility with a shared center two-way left-turn lane) to help reduce vehicular speeds.

9) **The Schmidt Lake Road and Comstock Lane intersection should be converted to a three-quarter access in order to alleviate the sight-distance issues for northbound left-turning vehicles at Comstock Lane.** This configuration would prohibit the northbound left-turn maneuver from occurring (which would impact approximately 10 motorists per day under existing conditions), while also providing the opportunity to facilitate an enhanced pedestrian crossing of Schmidt Lake Road and further reduce travel speeds along Schmidt Lake Road.

10) Both site plan options are considered reasonable from an area traffic operations perspective and one option is not considered more favorable than the other. See discussion on pros and cons as it relates to the traffic on Holly Lane.

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