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Memorandum

To: Bassett Creek Watershed Management Commission (BCWMC)
From: Barr Engineering Co. (Barr)
Subject: Item 5D: Hollydale Development – Plymouth, MN
BCWMC June 17, 2021 Meeting Agenda
Date: June 10, 2021
Project: 23270051.52 2021 2249

5D Hollydale Development – Plymouth BCWMC 2021-10

Summary:

Proposed Work: Site demolition, new 229 single-family home development with streets, house pads, utilities, and stormwater management
Basis for Review at Commission Meeting: Work in the floodplain
Impervious Surface Area: Increase 29.5 acres
Recommendation: Conditional Approval

General Project Information

The proposed project is located in the Plymouth Creek subwatershed at the former Hollydale Golf Course, generally bounded by Holly Lane North to the west, 45th Avenue North to the south, Yuma Lane North to the east, and 49th Place North to the north. The proposed project includes site demolition and construction of a 229 single-family home development including streets, house pads, utilities, and stormwater management (including stormwater reuse) resulting in 112 acres of land disturbance. The proposed project creates 34.7 acres of new and fully reconstructed impervious surfaces, including 5.2 acres of fully reconstructed impervious surfaces and an increase of 29.5 acres of impervious surfaces from 5.2 acres (existing) to 34.7 acres (proposed). Although the entire development is located in the Bassett Creek jurisdictional boundary, runoff from approximately eight percent of the site discharges north to the Elm Creek watershed.

Floodplain

The proposed project includes work in the BCWMC (Bassett Creek) 1% annual-chance (base flood elevation, 100-year) floodplain. The February 2021 BCWMC Requirements for Improvements and Development Proposals (Requirements) document states that projects within the floodplain must maintain no net loss in floodplain storage and no increase in flood level at any point along the trunk system (managed to at least a precision of 0.00 feet). The proposed project is adjacent to the Rockford Road storage area, which is part of the BCWMC trunk system and drains to Plymouth Creek. The 1% annual-chance (base flood elevation, 100-year) floodplain elevation of the Rockford Road storage area is

968.5 feet NAVD88. The proposed project will result in a net increase in floodplain storage of approximately 3.43 acre-feet from 81.13 acre-feet (existing) to 84.56 acre-feet (proposed).

The Requirements document also states that minimum building elevations (lowest) floor of new and redeveloped structures, must be at least 2.0 feet above the 100-year flood level. The lowest floor of all proposed homes are at least 2.0 feet above the 100-year floodplain elevation of the Rockford Road storage area as well as the 100-year high water level of all proposed stormwater ponds.

Wetlands

The existing site includes several wetlands throughout the existing golf course. The plans show some temporary or permanent impacts to multiple wetlands. The City of Plymouth is the local government unit (LGU) responsible for administering the Wetland Conservation Act; therefore, BCWMC wetland review is not required.

Rate Control

The BCWMC Requirements document states that projects that create more than one (1) acre of new or fully reconstructed impervious area *must manage stormwater such that peak flow rates leaving the site are equal to or less than the existing rate leaving the site for the 2-, 10-, and 100-year events, based on Atlas 14 precipitation amounts and using a nested 24-hour rainfall distribution*.

In existing conditions, stormwater runoff generally leaves the site in two directions: to the north to Elm Creek and to the south to Plymouth Creek (or the Medicine Lake Branch of Bassett Creek). In proposed conditions, stormwater will continue to generally leave the site in the same directions. Six stormwater ponds are proposed to provide detention and rate control for the site. Table 1 summarizes the existing and proposed peak discharge rates for the proposed project and shows that the proposed development meets the BCWMC requirements for rate control.

Table 1: Existing and Proposed Peak Discharge Rates

Runoff Direction	Area (acres)		2-Year Peak (cfs)		10-Year Peak (cfs)		100-Year Peak (cfs)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
To South (Plymouth Creek) (Wetland 6) [1]	125.4	126.5	77.0	21.1	174.5	47.3	427.7	105.4
To North (Elm Creek) (Wetland 9) [1]	11.3	10.2	5.4	0.9	19.6	5.6	49.7	18.8
Total (Sum)	136.7	136.7	82.4	22.0	194.1	52.9	477.4	124.2

[1] See enclosed Stormwater Reuse Map Figure provided by applicant

Volume Reduction and Water Quality

The BCWMC Requirements document states that projects on sites without restrictions that create one or more acres of new and/or fully reconstructed impervious surfaces shall capture and retain on-site 1.1

inches of runoff from the new and/or fully reconstructed impervious surfaces. If the applicant is unable to achieve the performance goals due to site restrictions, the MIDS flexible treatment options approach shall be used following the MIDS design sequence flow chart.

The proposed project creates 34.7 acres of new and/or fully reconstructed impervious area. To meet the volume reduction requirements, the applicant incorporated stormwater reuse into the design, in part due to silty and clayey soils present throughout the site that limit infiltration potential. The proposed reuse plan includes taking stormwater from the largest stormwater pond (Pond 5S), located in the northwest quadrant of the site, and distributing it over multiple irrigation areas throughout the site (see enclosed Stormwater Reuse Map Figure provided by applicant).

The applicant used a stormwater reuse calculator developed by the Ramsey-Washington Metro Watershed District (RWMWD) to quantify the volume reduction provided by the reuse system. Barr is also a technical advisor to RWMWD and assisted with development of the reuse calculator. In the RWMWD stormwater reuse calculator, the applicant inputs 1) the watershed area tributary to the reuse system, 2) the directly connected imperviousness of the tributary watershed, 3) the prominent hydrologic soil group of the tributary watershed, 4) the estimated reuse storage volume, the irrigation area, and 5) whether the system goes offline and is drawn down at the end of the irrigation season. The reuse calculator uses the specified inputs to calculate the average annual volume of stormwater reused by the system over a 50-year period. This calculation assumes: an irrigation application rate of one inch per week, that the irrigation system is online from May through September, that irrigation is not used on days when it rains, and that any volume above the storage capacity of the reuse system leaves the system (pond). For each day within the 50-year period, the reuse calculator determines the runoff volume that enters the reuse system, the volume of water that leaves the reuse system based on irrigation demand, the volume that leaves via overflow of the system, and any augmentation of potable water needed to meet the irrigation demand. The total volume of each category is then averaged to calculate an average annual volume.

Because volume reduction rules are written for instantaneous volume (capture and retain 1.1 inches of runoff from new and reconstructed impervious), the RWMWD reuse calculator also provides a comparison between stormwater reuse volume and volume reduction via infiltration to calculate a stormwater reuse credit factor. The credit factor is used to provide an appropriate comparison of stormwater volume reduction and stormwater reuse. As shown in Table 2, the volume reduction goal for the development is 3.18 acre-feet. As shown in Table 3, the credit factor for this stormwater reuse system is 0.55, therefore the stormwater reuse volume required is 5.78 acre-feet. The applicant designed a reuse system with a volume of 6.7 acre-feet, which is greater than the required reuse volume. Therefore, the stormwater reuse system meets the BCWMC volume reduction and water quality requirements.

Table 2: Stormwater Volume Reduction Goal

New and Reconstructed Impervious (acres)	Volume Reduction Goal (formula)	Volume Reduction Goal (acre-feet)
34.7	Volume = Area * 1.1 inches runoff	3.18

Table 3: Stormwater Reuse Volume Required and Provided

Hydrologic Soil Group (HSG)	RWMWD Credit Factor for Stormwater Reuse	Stormwater Reuse Volume Required (formula)	Stormwater Reuse Volume Required (acre-feet)	Stormwater Reuse Volume Provided (acre-feet)
C	0.55	Stormwater Reuse = Volume Reduction / Credit Factor	5.78	6.70

Stormwater reuse has sparingly been used in the Bassett Creek watershed to meet volume reduction and water quality goals for development or redevelopment, and we have not reviewed an application that has used the RWMWD calculator in the past. However, we are familiar and comfortable with the calculator and appreciate the developer's approach to incorporating stormwater reuse into a design to meet the volume reduction and water quality goals of the BCWMC. The RWMWD recently updated their reuse calculator, therefore the values listed in Table 3 were modified slightly by transferring the applicant's input parameters into the latest version of the reuse calculator and revising one of the input values based on Comment 3b in the Recommendation Section.

Erosion and Sediment Control

The proposed project results in more than 10,000 square feet of land disturbance; therefore, the proposed project must meet the BCWMC erosion and sediment control requirements. Proposed temporary erosion and sediment control features include rock construction entrances, silt fence, inlet protection, and concrete washouts. Permanent erosion and sediment control features include riprap armoring at pipe outlets, stabilization with seed and mulch, and erosion control blanket.

Recommendation

Conditional approval based on the following comments:

1. The applicant must demonstrate that the change in land use does not result in any increase in flood level at any point along the trunk system.
2. The HydroCAD models must be revised as follows to demonstrate that the proposed project meets BCWMC rate control requirements:
    a. The tributary watershed to CB A24 and CBMH A23 must be removed from catchment 5S and be added to catchment B8 and/or B5.
    b. The tributary watershed to CB A22 and CBMH A21 must be removed from catchment 5S and added to catchment A10.

c. The tributary watershed to CBMH F3 and CBMH F4 must be removed from catchment 1S and added to catchment 4S.

d. The routing of catchments D6, D7, D7_100, D8, and D9 and catch basins CB_D6, CB_D7, CB_D8, and CB_D9 does not match the plans and must be modified accordingly.

e. The routing of catch basins CB_A10, CB_A11, CB_A12, CB_C10, CB_19, and CB_C8 does not match the plans and must be modified accordingly.

f. The slope of the outlet pipe(s) from the following ponds does not match the plans and must be modified accordingly for Pond 1N, Pond 1S, Pond 2S, Pond 3S, Secondary outlet of Pond 4S, and Pond 5S.

g. The applicant should confirm whether the outlet structure grate and emergency overflow are intentionally set at the same elevation at Pond 1S, Pond 2S, and Pond 5S. Typically an emergency overflow is set higher than the outlet control structure.

3. The RWMWD stormwater reuse calculator must be revised as follows to demonstrate that the proposed project meets BCWMC volume reduction and water quality goals:

    a. The RWMWD recently updated their reuse calculator, therefore the updated calculator should be used to quantify the equivalent volume reduction provided. Due to limitations with the calculator, the stormwater reuse volume required must be manually calculated (rather than determined by the reuse calculator) by dividing the standard volume reduction requirement by the RWMWD Credit Factor for Stormwater Reuse.

    b. It appears that the reuse system will draw water from the dead storage volume, therefore it appears that the system will not go offline and drain down (below the normal water level) at the end of the irrigation season. Thus, Cell C15 of the Reuse Inputs Summary Tab should be revised from 1 to 0. Alternatively, clarification must be provided for how the system draws down at the end of each irrigation season.

    c. Any future modifications to the size of Pond 5S, the irrigation area, or the reuse system must be reviewed by the BCWMC to confirm compliance with BCWMC requirements.

    d. The applicant must provide a general schedule (or phasing plan) for implementation of the stormwater reuse system to demonstrate that stormwater BMPs will be in place and provide stormwater treatment in accordance with the BCWMC requirements during all phases of development.

4. Inlet protection must be provided and shown at the following locations for erosion control:

    a. Sheet EC1: the catch basin on lot 202 and the flared-end section between lots 7 and 8

    b. Sheet EC2: the existing catch basin at the intersection of Hollydale Lane North and the new 47th Ave North and the catch basins north of lots 204 and 231

    c. Sheet EC3: the catch basin on lot 97 and the catch basin north of lot 173

    d. Sheet EC4: the catch basin east of lot 174 and the two catch basins on Lot 75

e. Sheet EC5: the catch basins on and west of lot 136, the catch basins on and north of lot 135, and the high flow flared-end section between lots 184 and 185

5. The applicant should confirm whether inlet protection is needed at the following locations for erosion control:

    a. Sheet EC1: the draintile catch basin on the southeast corner of Lot 2 and the draintile catch basin between lots 123 and 191

    b. Sheet EC2: the draintile catch basins on lots 104, 231, and 210

    c. Sheet EC3: the draintile catch basin between lots 99 and 100, the draintile catch basin between lots 81 and 82, and the catch basin (or manhole) between lots 152 and 153

    d. Sheet EC4: the draintile catch basins between lots 79 and 80, between lots 76 and 75, between lots 75 and 74, between lots 74 and 73, between lots 53 and 54, between lots 54 and 55, between lots 56 and 57, between lots 58 and 59, and between lots 58 and 60

    e. Sheet EC5: the catch basin between lots 35 and 36 and the draintile catch basin between lots 40 and 41

6. The outlet velocity appears to exceed 8 feet-per-second when the pipe is flowing full at the following locations:

    a. Sheet UP6: FES O1

    b. Sheet UP7: FES A20, FES J1, and FES P1

    c. Sheet UP8: FES A1 and FES E1

    d. Sheet UP9: FES N1

    e. Sheet UP10: FES Q1 and FES O3

    Flatter slopes, drop structures, or other energy dissipation methods must be used to provide an average outlet velocity of no more than 8 feet-per-second (if riprap is used), to limit potential erosion. Note: The invert elevation of the flared end sections should be at or below the normal water level (NWL) of the receiving water body to provide energy dissipation and minimize potential erosion, therefore we recommend lowering the pipe at the upstream structure to flatten the pipe and reduce outlet velocities.

7. Sheet UP7: The applicant should consider moving FES L1 to between lots 132 and 133 to minimize potential erosion due to the current angle of entry of the pipe into the pond. Alternatively, riprap or other armoring must be extended to the opposite bank of the pond at this location.

8. Notes to address the following BCWMC erosion and sediment control requirements must be included on the plans. Alternatively, if a separate stormwater pollution prevention plan (SWPPP) has been prepared that addresses the following requirements, it must be submitted for review.

    a. Require that soils tracked from the site be removed from all paved surfaces within 24 hours of discovery throughout the duration of construction.

b. Require that all exposed soil areas be stabilized as soon as possible, but in no case later than 14 days after the construction activity has temporarily or permanently ceased or within 7 days if the project is within 1 mile of a special or impaired water.

c. Require a temporary vegetative cover consisting of a suitable, fast-growing, dense grass seed mix spread at a minimum at the MnDOT-specified rate per acre. If temporary cover is to remain in place beyond the present growing season, two-thirds of the seed mix shall be composed of perennial grasses.

d. Require a permanent vegetation cover consisting of sod, a suitable grass-seed mixture, or a combination thereof. On slopes greater than or equal to 3 feet horizontal: 1 foot vertical, seeded areas shall be either mulched or covered by fibrous blankets to protect seeds and limit erosion.

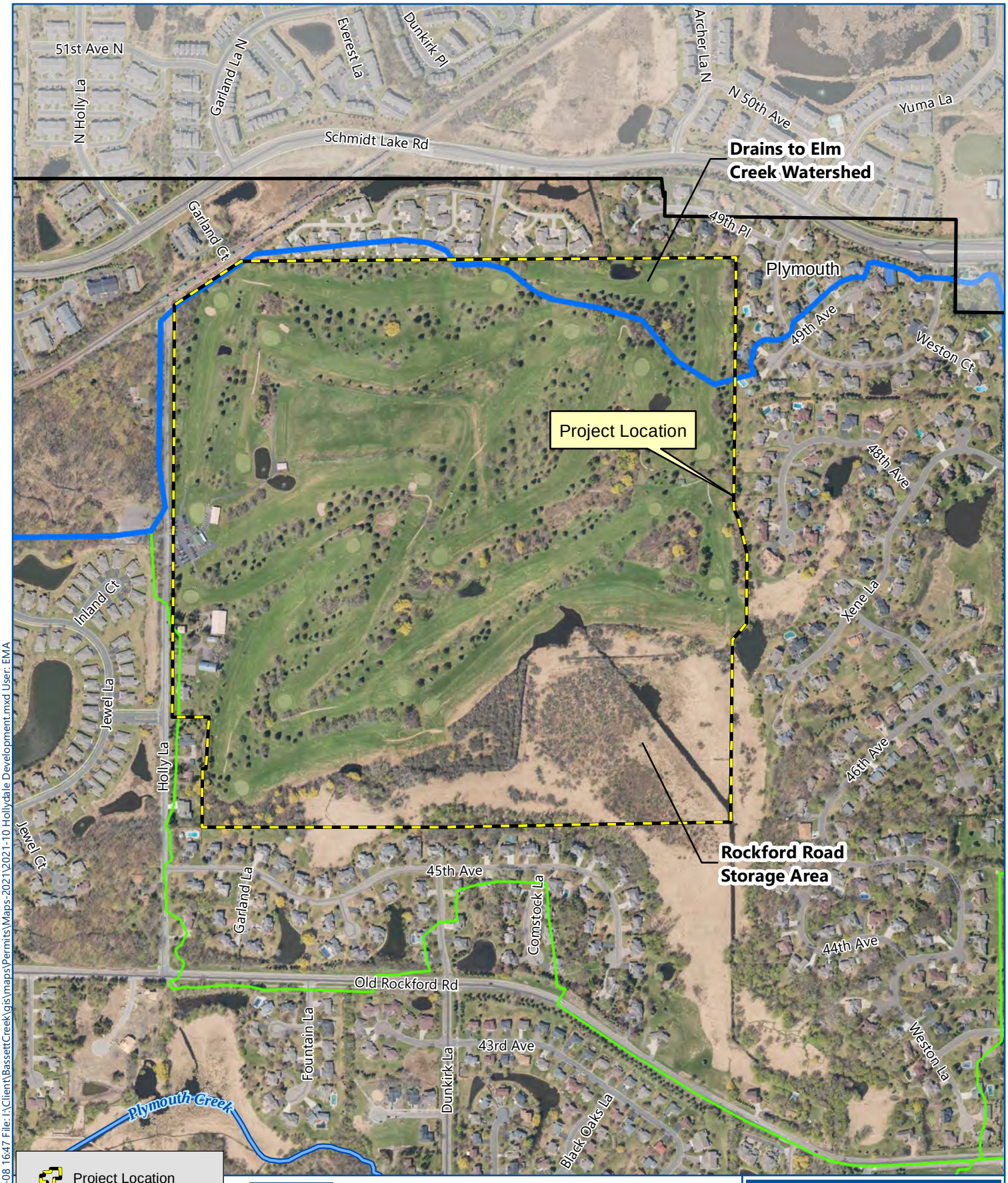
e. Require that temporary or permanent mulch be uniformly applied by mechanical or hydraulic means and stabilized by disc-anchoring or use of hydraulic soil stabilizers.

9. Riprap that is used for stormwater energy dissipation must be placed over a suitably graded filter material or filter fabric to ensure that soil particles do not migrate through the riprap and reduce its stability. A detail or note must be included on the plans to address this requirement.

10. An agreement must be established between the owner and the City of Plymouth for the reuse system and the stormwater management features to ensure maintenance and continued operation of the reuse system. The City of Plymouth should also consider requiring a drainage easement over areas irrigated with stormwater reuse as these areas are being used to meet the stormwater management requirements.

11. The BCWMC encourages the owners and/or managers of this property to develop and implement a winter deicer and chloride management plan to reduce environmental, structural, and landscaping degradation caused by the overuse of salt. More information is available at https://www.bassettcreekwmo.org/developer/winter-maintenance.

12. Revised drawings (paper copy and final electronic files) and supplemental submittal information must be provided to the BCWMC Engineer for final review and approval.



Project Location
Municipality
BCWMC Legal Boundary
Major Subwatershed
BCWMC Hydrologic Boundary
Bassett Creek

BARR

N

0 300 600 Feet

Bassett Creek Watershed Management Commission

BCWMC #2021-10
HOLLYDALE DEVELOPMENT
Plymouth, MN

LOCATION MAP

Barr Footer: ArcGIS 10.8.1, 2021-06-08 16:47 File: I:\Client\BassettCreek\gis\maps\Permits\Maps-2021\2021-10 Hollydale Development.mxd User: EMA

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: NAD 1983 HARN Adj MN Hennepin Feet | Edited by: llamoore | C:\Users\LLaMoore\AE2S\Sathre - Hollydale Golf Course\GIS\Fig4_Stormwater Reuse Map.mxd

Locator Map Not to Scale

Figure 4

STORMWATER REUSE MAP

HOLLYDALE DEVELOPMENT

SATHRE-BERGQUIST,INC

Plymouth | Hennepin County, MN

Date: 4/19/2021