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Appendix – Exhibits and Calculations

Project Overview

Woodhill Country Club is an existing golf club located in Orono and Wayzata, MN. The golf club falls within two separate LGU boundaries, Minnehaha Creek Watershed District (MCWD) and the city of Wayzata. All storm sewer trunkline replacement as well as pond 14 and 15 infill will fall under Minnehaha Creek Watershed jurisdiction. All proposed work on Pond 7/9 will fall under the city of Wayzata jurisdiction. The golf course encompasses a total of 193.63-acres with a total disturbed area of approximately 7.94 acres.

The project aims to create a more welcoming and enjoyable course for golfers of all ages and skill levels. The project will include the reconstruction of greens and tee box features to accommodate the revised course layout. Existing drainage structures and pipes will also be removed and replaced to ensure course drainage is maintained in the future.

Existing Site Conditions

The 193.63-acre property is located between Highway 12 and County Road 15 and consists of the existing golf course (maintained turf, sand bunkers, etc.) and surrounding undeveloped wooded areas. The golf course runoff drains southward towards existing wetland P10, adjacent to the entrance and southern portion of the course property via a series of ponds, swales, area drains and pipes. Eventually outletting to Ferndale Marsh and Lake Minnetonka The golf course hydrology consists of depressions, man-made ponds, and wetlands which is collected by numerous area drains pipe that tie-into a mainline storm sewer network. The existing storm sewer network and course hydrology can be found in **Appendix B – Existing Drainage Map**. The storm network starts at pond P12. Pond P12 is outletted by a 6" CMP pipe. This pipe runs north and ultimately outlets into Wetland P2. Wetland P2 is outletted by a 10" DIP pipe that runs east along the north side of the course and club house before turning south where it outlets into existing Wetland P10.

Soils

Soil borings were not completed for this project. NRCS Web Soil Survey indicates the presence of soils composed primarily of silt loams, clay loams, and muck throughout the site, which has been confirmed by the golf course superintendent who is familiar with the grounds. For our stormwater modeling purposes, we have assumed a Hydrologic Soil Classification of C/D for existing and proposed conditions.

See **Appendix A: NRCS Custom Resource Report**

Proposed Site Conditions

The proposed project will consist of minor grading and re-shaping of greens and tee-boxes, the reconstruction of surface and subsurface drainage, replacement of the trunkline storm sewer for course drainage, as well as the removal and limited reconstruction of the existing bituminous cart path. Grading work will not result in altered drainage patterns, and the course runoff is proposed to be routed identically to the existing conditions. The project proposed to also replace the entire irrigation system with a modern state of the art water sustainable irrigation system. The system will greatly enhance the quality of turf throughout the golf course, which will enhance the golf courses water quality.

In addition, the goal of the proposed drainage infrastructure replacements is to reconstruct existing conditions, with minor exceptions to better mimic natural drainage and/or to increase maintainability. Ponds/wetlands P12, P2, P10, P1 see no disturbance besides the replacement of inlet/outlet pipes to these ponds/wetlands and remain the same from a drainage perspective. Furthermore, large scale drainage connections are maintained, with the large east pond complex (pond P12) continuing to route through Wetland P2 before continuing into the south wetland complex (pond P10).

Ponds P14 and P15 currently do not have functioning outlets and are required to be pumped by golf course staff to lower water levels. P14 and P15 (WCA No-Loss) are proposed to be drained, filled with onsite soils and replaced with area drains and pipe that will connect into the trunkline storm sewer network and outlet into P2. An outlet control structure with compound functioning weir is proposed to be installed to mitigate the loss of storage from P14 and P15. Reference **Appendix F - Inundation and Rate Tables** for the proposed bounce and inundation for Wetland P2. We will be requesting a No-Loss Application to justify that the proposed work is within incidental wetlands and does not impact non-incidental wetlands. Pond P7/9 is proposed to be excavated and expanded from the existing condition to provide additional storage. An outlet control structure is also proposed to replace the existing 12” PVC outlet culvert that feeds into the pumphouse.

The proposed drainage pattern can be seen in **Appendix D - Proposed Drainage Map** and the proposed HydroCAD report can be seen in **Appendix E - Proposed HydroCAD Report.**

Erosion Control Rule

The total disturbance for the project is roughly 7.94 acres. A part of this disturbance will include bituminous cart path reconstruction. Please see the bituminous cart path plan in **Appendix G – Woodill CC Construction Documents** for the locations of the cart path improvements. All disturbed areas will have downgradient BMP’s such as silt fence or sediment control logs. The existing entrance is a gravel road that will be utilized as the site’s rock construction entrance. Please reference the construction plan set to see locations of downgradient BMP’s and location of the construction entrance.

Stormwater Management

The project proposes to reconstruct 0.43 acres of impervious surface (cart path) and remove 0.39 acres of impervious surface (cart path). As the project will result in less than 1.0 acre of reconstructed impervious, the Stormwater Management Rule does not apply. Please see **Appendix F Inundation and Rate Tables** for the inundation and bounce for Wetland P2 and the existing and proposed rates leaving the site.

Floodplain Alteration Rule

The project proposes excavating below the 100-year flood elevation in ponds P2 and P7/9 to provide additional storage. Please reference **Exhibit H – Floodplain Alteration** for existing and proposed OHW and 100-yr HWL contours, locations of proposed floodplain cut and fill between OHW and 100-yr HWL and the volumes of the cut and fill in these areas. There is no net fill between the OHW and 100-yr HWL for P2. There is no net fill for P7/9 between the OHW and the 100-yr HWL.

Waterbody Crossing and Structures

The project proposes replacing the existing outlet pipe for P12, inlet and outlet pipes for Wetland P2 and the existing inlet pipe for Wetland P10. We initially looked at not replacing any of the outlet/inlet pipes and tying the new network into them. However, all the outlet/inlet pipes are very old and showing signs of deterioration which would ultimately lead to further drainage issues down the road. The proposed alternatives to minimize impact for P12 outlet would be to do nothing. This alternative would continue to flood the adjacent gravel drive and not fix the drainage issues. The pond overflows during large rain events causing the adjacent gravel drive to flood. We are providing an outlet control structure to maintain rates for smaller storms by providing a small notch in the front of the OCS while providing a larger outlet to prevent flooding of the road and scouring of the pond bank/road during larger storms. An alternative for the inlet of P2 would be to leave the existing pipe in place and tie it into or to leave the entire storm run as is. The existing storm network throughout the golf course is relatively undersized for large storm events and is beyond its useful life. An alternative for outlet of P2 would leave the pipe in place. However, we are removing ponds 14 and 15 and routing that water into P2 which increases rates/volumes, it should also be noted that the existing outlet pipe is old, undersized and is past its useful life. To meet stormwater management rule 7.B, we needed to increase the outlet pipe size for P2. The alternative for P7/9 is to leave the pond as is. The current pond size can't handle larger rain events and requires the pump in the pumping house to stay on for extended periods of time. To create enough storage, we proposed to excavate the pond. With this being a rather tight area to work in, we are proposing to split the pond into two smaller cells to accommodate the tee boxes to the north. The golf course is not proposing to adjust the tee boxes. Please reference table **Appendix I – Waterbody Crossing and Structures.**

Summary

The proposed project meets MCWD/Orono & Wayzata requirements for grading and erosion control, stormwater management, floodplain alteration and the waterbody crossing and structures.