SEA School-Wildwood Park Flood Storage Project Feasibility Study

Golden Valley, Minnesota

June 2021

Prepared for
Bassett Creek Watershed Management Commission

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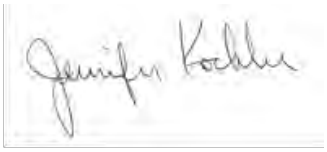
Certifications

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



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PE #: 47500

6/8/2021

Date

1.0 Executive summary

1.1 Background

The Bassett Creek Watershed Management Commission's (BCWMC) current Capital Improvement Program (CIP) (Table 5-3 in the 2015-2025 Bassett Creek Watershed Management Plan, as revised) includes BC-2, 3, 8, 10: Medicine Lake Road and Winnetka Avenue Area Long-Term Flood Mitigation Plan (MLRWA Plan) Project. The second phase of this CIP project is the SEA School-Wildwood Park Flood Storage Project (BC-10), the subject of this feasibility study. At the August 2020 meeting the Commission approved the BCWMC Engineer's proposal to conduct a feasibility study for this project.

The SEA School-Wildwood Park Flood Storage Project builds on the City of Golden Valley's Liberty Crossing flood mitigation and conveyance project that was completed in 2017 and the DeCola Ponds B & C flood mitigation project that was completed in spring 2020 in collaboration with the BCWMC. Both of these previous projects were implemented as recommended in the Medicine Lake Road and Winnetka Avenue Area Long-Term Flood Mitigation Plan Report (Barr, 2016). The City of Golden Valley city council is also supportive of the SEA School-Wildwood Park flood mitigation study (and the larger long-term flood mitigation plan) with the flood mitigation projects identified in the plan being included in the City of Golden Valley's CIP and in the City's 2021 Legislative Priorities. In 2020, the City of Golden Valley conducted a planning-level study for the SEA School-Wildwood Park flood mitigation study to begin stakeholder and public engagement efforts early to inform the direction of the concepts.

As is required for BCWMC CIP Projects, a feasibility study must be completed prior to BCWMC holding a hearing and ordering the project. This study examines the feasibility of developing flood storage volumes within Wildwood Park and on the adjacent School of Engineering & Arts (SEA school) property, developing additional water quality treatment volume, modifying existing storm sewer on Duluth Street, and modifying the existing storm sewer between DeCola Ponds D and E. The goal of the project is to reduce flooding on DeCola Ponds D, E, and F and to improve water quality by trapping additional sediment and pollutants in open water or filtration basins and expanded storage areas, thus minimizing sediment and nutrients passing downstream to Bassett Creek. The proposed project will also improve ecology and wildlife habitat, enhance active and passive recreation opportunities, and provide educational opportunities.

Three conceptual flood mitigation designs were investigated during this feasibility study. The first conceptual design examined a scenario utilizing subsurface storage with a permanent pool for water quality treatment and a meandering stream, wet meadows, and prairie habitat for flood storage. The second conceptual design incorporates a wet retention pond for water quality treatment and wet meadows, prairie habitat, and depressed turf areas for flood storage. The third conceptual design examined the benefits of iron enhanced biofiltration for water quality treatment and a combination of wet meadows, prairie habitat, and depressed turf areas for flood storage. Permitting requirements for each conceptual design were reviewed and cost estimates are provided.

The proposed SEA School-Wildwood Park Flood Storage Project was identified as a priority in the MLRWA Plan and is proposed as "Phase 2" of this CIP project to mitigate flooding and improve water quality in the

Medicine Lake Road and DeCola Ponds area. If ordered, the CIP calls for implementing the project in 2022 and 2023. The BCWMC CIP funding (ad valorem tax levied by Hennepin County on behalf of the BCWMC), is not the sole source of funding for this project. The remainder of the funding will come from a variety of sources, including the City of Golden Valley, Hennepin County, Minnesota Department of Natural Resources (MnDNR) Flood Damage Reduction Grant program, and other sources (e.g. other grants, as appropriate).

1.2 Site conditions

The SEA School and Wildwood Park are located in the City of Golden Valley south of Duluth Street and west of Kelly Drive. This area consists of deciduous forest, a wooded knoll, turfed green space, paved walking trails, and various sporting facilities (e.g., pickleball courts, playground) (Figure 2-1). The park is used heavily by the single family and multi-family residential communities surrounding the area. The SEA School students and teachers also utilize the park for the outdoor playground and for outdoor learning activities. As part of the City of Golden Valley's SEA School-Wildwood Park Planning Study completed in 2020, city staff engaged with facilities and teaching staff at the SEA school. The SEA School administrators support the flood storage project.

Modifications of the storm sewer between DeCola Ponds D and E are also included as part of this study. The existing storm sewer between DeCola Ponds D and E is located under Winnetka Heights Drive and between existing residential parcels. DeCola Ponds D and E are not listed as MnDNR public waters. Modifications to the storm sewer are not anticipated to have an impact on the normal water levels (NWLs) of DeCola Pond D or E. Adequate drainage easements already exist on the residential parcels on the south end of DeCola Pond D and the north end of DeCola Pond E for the storm sewer modifications. A temporary easement is anticipated for this outlet modification.

DeCola Ponds D and E discharge downstream to DeCola Pond F, which continues to Honeywell Pond and ultimately discharges to Bassett Creek. Currently, stormwater runoff from the SEA School-Wildwood Park parcels discharge either to DeCola Pond E or through storm sewer to Honeywell Pond. Any improvements to runoff water quality within the SEA School-Wildwood Park areas will result in improvements to the Main Stem of Bassett Creek which is currently listed as impaired. The affected use is aquatic life based on fish bioassessments, and although a stressor identification study has not been completed to determine the exact cause of this impairment, reductions in sediment and pollutant loads to the creek can likely help address this impairment.

As part of this study, wetland delineations on the SEA School/Wildwood Park properties and around DeCola Ponds D and E were completed. Topographic and tree surveys were also completed. Furthermore, desktop reviews of cultural resources, threatened and endangered species databases, and environmental databases were finalized. The results of these studies were utilized as much as applicable to define the conceptual designs and quantify impacts for this feasibility study. This information can be found in Section 3.1.

1.3 Project alternatives

The BCWMC Engineer evaluated three conceptual designs for developing flood storage volume within the SEA School and Wildwood Park properties. All three concepts incorporated various configurations of wet meadows, depressed turf, and prairie habitats to provide flood storage. The method used for water quality treatment varied between each concept. Concept 1 investigates the use of subsurface storage with a permanent pool to capture sediment and particulate contaminants. Concept 2 incorporates an open water retention pond to improve water quality and Concept 3 utilizes a biofiltration basin with iron enhance sand filtration (IESF) trenches to help remove particulate and dissolved contaminants.

In addition to expanding flood storage within varying footprints within the project area and providing various best management practices (BMPs) for water quality improvement, measures considered for potential implementation in all scenarios included the following:

- Re-aligning the SEA School Driveway so that the intersection aligns with Maryland Avenue North. This allows for additional flood storage volume to extend from Wildwood Park onto the SEA School property.
- Diverting the majority of stormwater runoff that currently discharges to the south end of DeCola Pond E to discharge into the proposed storage in Wildwood Park (modifying storm sewer on Duluth Street).
- Increasing the existing storm sewer between DeCola Ponds D and E to a 48"-diameter pipe to reduce flood levels.
- Restoring areas that are frequently inundated (≤ 2-year Atlas-14 event) as wetland habitats. All areas outside of this will be restored as prairie habitat or turfed habitat.
- Preserving trees on the large knoll in Wildwood Park. Some tree removal is expected within project area. However, upland areas will be restored with native vegetation and replanted with trees at a density potentially ranging from savanna (~35 trees/acre) to forest (~110 trees/acre) – to be determined during final design.
- Relocating the SEA School orchard trees.
- Replacing disturbed trails that may be impacted during construction with ADA-compliant trails to preserve park use, improve walking trail opportunities, and provide maintenance access.
- Protecting existing, highly used park infrastructure within the project area, such as the pickleball courts, the playground, and the sledding hill.

The alternatives are discussed in more detail in Sections 5.0 and 6.0.

1.4 Relationship to Watershed Management Plan

The BCWMC included the SEA School-Wildwood Park Flood Storage Project in its CIP, based on the following "gatekeeper" policy from the BCWMC Plan. Those items in bold italics represent those that directly apply to this project.

110. The BCWMC will consider including projects in the CIP that meet one or more of the following "gatekeeper" criteria.

- Project is part of the BCWMC trunk system (see Section 2.8.1, Figure 2-14 and Figure 2-15 of the report)
- ***Project improves or protects water quality in a priority waterbody***
- Project addresses an approved TMDL or watershed restoration and protection strategy (WRAPS)
- ***Project addresses flooding concern***

The BCWMC will use the following criteria, in addition to those listed above, to aid in the prioritization of projects:

- Project protects or restores previous Commission investments in infrastructure
- ***Project addresses intercommunity drainage issues***
- Project addresses erosion and sedimentation issues
- ***Project will address multiple Commission goals (e.g., water quality, runoff volume, aesthetics, wildlife habitat, recreation, etc.)***
- ***Subwatershed draining to project includes more than one community***
- ***Addresses significant infrastructure or property damage concerns***

The BCWMC will place a higher priority on projects that incorporate multiple benefits, and will seek opportunities to incorporate multiple benefits into BCWMC projects, as opportunities allow.

The SEA School-Wildwood Park Flood Storage Project meets multiple gatekeeper criteria— the project addresses flooding concerns (main objective) and the project will improve water quality by reducing the amount of sediment and pollutants that reach Bassett Creek. Additionally, this project will address intercommunity drainage concerns as multiple communities (the Cities of Golden Valley, Crystal, and New Hope) are within the project's subwatershed. In addition to meeting "gatekeeper" criteria, the project will address multiple Commission goals by capturing increased runoff volume, enhancing water quality, providing recreation opportunities, and improving wildlife habitat.

1.5 Project impacts and estimated costs

Potential impacts of the proposed project (increasing the flood storage and water quality treatment volumes within SEA School/Wildwood Park and increasing the storm sewer size between DeCola Ponds D and E) are summarized in Table 1-1.

Of the project impacts, the most significant consideration is the creation of additional flood storage volume, the impact on flood elevations. and reductions in the number of structures at risk of flooding. One of the main purposes of the proposed SEA School-Wildwood Park Flood Storage Project is to lower the flood depths on DeCola Ponds D, E, and F to protect structures around this area. The SEA School-

Wildwood Park Flood Storage Project would build on the Liberty Crossing and DeCola Ponds B &C Flood Mitigation Projects implemented by the City of Golden Valley and the BCWMC. These projects helped to lower the 100-year flood elevations on the Medicine Lake Road to allow the safe passage of emergency vehicles and reduced the number of structures at-risk of flooding around DeCola Ponds A, B, and C, along Medicine Lake Road, and within Rosalyn Court.

The proposed feasibility concept designs for the SEA School-Wildwood Park Flood Storage Project aim to improve upon the flood reductions resulting from the Liberty Crossing and DeCola Ponds B & C Flood Mitigation Projects. This project will focus on reducing flood elevations specifically on the downstream DeCola Ponds D, E, and F. The XP-SWMM hydrologic modeling results for this project indicate that for all three concepts, all ten structures are expected to no longer be at-risk of flooding during the 100-year event on DeCola Pond D. For DeCola Ponds E and F, three structures are removed from being at-risk for the 10-year and 25-year storm events. While reductions in the 50-year and 100-year flood elevations (-0.1 to -0.3 feet, respectively) on DeCola Ponds E and F are anticipated, the reductions in flood elevations do not result in a reduction the number of at-risk structures for these larger storm events. A future project identified in the Medicine Lake Road and Winnetka Avenue Long Term Flood mitigation plan (and included in the BCWMC CIP) is intended to have a more significant impact on flood reductions on DeCola Ponds E & F. That project is included under CIP #BC-10 and is slated to have a feasibility study completed in 2023 and if approved, constructed in 2025-2026.

For Concepts 1 and 2, the proposed projects will result in increased permanent pool volume and sediment storage volume on the Wildwood Park property, therefore, reducing sediment and particulate phosphorus loading to the main stem of Bassett Creek and all downstream water bodies, including the Mississippi River. For Concept 3, the proposed project will result in the inclusion of a biofiltration basin with iron-enhanced sand filtration (IESF) trenches on the Wildwood Park property, therefore, reducing sediment and particulate and dissolved phosphorus loading to downstream features. Section 6.0 presents estimates of existing pollutant loadings. It's estimated this project would remove an additional 1.6 to 4.1 pounds per year, depending on the concept.

To develop the flood storage volume, some tree removals within the project area will be required. Because a portion of the project area is within a public park and is a popular walking area, community resistance to tree removal is a concern. Wetland and upland restoration, including planting of new trees and shrubs, will occur in all areas disturbed by construction, and many existing trees will be preserved in key areas, such as the wooded knoll within Wildwood Park. The City of Golden Valley Forester has also stated that some of the trees recently planted may be candidates for transplanting. The existing orchard on the SEA School property that is currently in the anticipated disturbance limits will be relocated under all concept scenarios.

Table 1-1 presents the feasibility-level opinion of costs for implementing the various concepts for the 2022-2023 SEA School-Wildwood Park Flood Storage Project. This table also lists the 30-year annualized total phosphorus reduction costs (based on the estimated cost of the water quality improvement work only) and the project costs per acre foot of flood mitigation volume created.

The cost per pound of phosphorus removed for this project using the current P8 model analysis is high when compared to other BCWMC CIP projects—for example, previous high costs per pound of phosphorus removed for a BCWMC CIP project were $5,900 for the Northwood Lake Improvement Project and $9,600 for the DeCola Ponds B&C project. The high cost per pound of phosphorus removed for this project is due to do the fact that the SEA School-Wildwood Park Flood Storage Project's primary goal is to mitigate flooding and to mitigate the water quality treatment lost from diverting stormwater away from DeCola Ponds E and F. A major portion of the construction costs are for the creation of flood storage volume, for the restoration of the graded areas, and for the mitigation of lost water quality from re-routing stormwater runoff rather than for water quality improvement. Concept 1 is particularly high because water quality improvement includes the installation of subsurface storage to achieve the water quality treatment.

The BCWMC CIP includes $1.3 million for this project. Additional funding for this project will come from a DNR Flood Damage Reduction Grant, the city of Golden Valley, and other possible grants.

For a complete summary of the estimated impacts, permitting requirements, disposal of contaminated sediment, closure of pedestrian trails, and costs of the concepts, including the methodology and assumptions used for the cost estimate, refer to Section 6.0, Section 7.0, and Table 6-1.

Table 1-1 SEA School-Wildwood Park Flood Storage Impacts Summary

Category	Item	Existing Conditions	Concept 1: Underground Storage with Stream	Concept 2: Open Water	Concept 3: Wet Meadow
Flood Mitigation	Increase in Flood Mitigation Volume (ac-ft) (SEA School/Wildwood)	-	9.1	8.6	8.5
	# of Potentially At-Risk Structures (10-year)	9	6	6	6
	# of Potentially At-Risk Structures (100-year)	29	19	19	19
Water Quality	Increase in Water Quality Treatment Volume (ac-ft)	-	0.8	0.8	0.2
	Increase in Total Phosphorus Removal (lbs/yr)	-	1.6	1.8	4.1
Trees	Tree Removal Estimate SEA School/Wildwood Park	-	72	81	81
	Tree Removal Estimate between DeCola Ponds D and E	-	3	3	3
	# of Significant Trees Removed	110	48	57	57
	# of Orchard Trees Removed/Relocated	11	11	11	11
	Tree Planting Estimate	-	35 - 70	35 - 80	35 - 80
Restoration	Restored Wetland Area (ac)	-	0.6	0.3	0.8
	Restored Prairie Area (ac)	-	1.1	0.9	1.4
	Restored Turf Open Green Space (ac)	-	1.2	1.3	0.7
Project Costs	Feasibility Level Opinion of Cost	-	$ 4.1 million	$2.9 million	$3.1 million
	Cost per Acre-Ft of Flood Mitigation Volume	-	$451,900	$329,800	$360,000
	Annualized Cost per Pound of Total Phosphorus Removed (Water Quality Treatment)	-	$53,200	$5,700	$5,900

1.6 Recommendations

Although there is some variation in the flood mitigation volume between the three concepts (ranging from 8.5 to 9.1 acre-ft), the modeling demonstrated that the difference in the flood reduction in DeCola Ponds D, E, and F is minimal and does not change the number of structures at risk of flooding among the three concepts. Therefore, in terms of flood reduction benefits, Concepts 1, 2, and 3 perform equally.

Each of the concepts include opportunities to improve water quality and provide additional pollutant removal beyond the existing conditions. Concepts 1 and 2, which relied on wet retention for the removal of particulates, are estimated to remove 1.6 and 1.8 additional pounds of phosphorus per year, respectively. Concept 3, which relies on iron-enhanced sand filtration, is able to remove both particulate and dissolved total phosphorus and is estimated to remove an additional 4.1 pounds of total phosphorus per year.

Based on review of the project impacts and benefits for each of the three concepts, the overall project costs, and comments received from BCWMC staff, City of Golden Valley staff (e.g., Open Space and Recreation Commission, Environmental Commission), SEA School representatives, the neighborhood, park users, and the general public during the feasibility study process, the BCWMC Engineer recommends constructing Concept 3, with the following features with noted additional considerations during final design:

- Upsizing the outlet from DeCola Pond D with design and restoration in coordination with impacted property owners and City maintenance staff.
- Diverting runoff from Pennsylvania Ave and Duluth Street toward the water quality treatment and flood storage in the Wildwood Park/SEA School properties, including pretreatment of flows
- Providing an iron-enhanced sand filtration basin, considering a design that integrates vegetation/screening between the filtration trenches
- Developing approximately 8.5 acre-feet of flood storage, with an overflow berm and extended detention outlet in the northeast corner of the project area, discharging to the storm sewer system at the corner of Duluth Street and Kelly Drive
- Incorporating a low wet meadow habitat area, exploring opportunities to promotes better drainage toward the proposed outlet
- Replacing disturbed trails with an accessible looped walking trail around the site that is above the ~10 year event elevation or higher to make the trail more accessible, reduce maintenance, and provide maintenance access to the stormwater features. Additionally, the trail alignments and design should consider an east-west trail connection from Kelly Drive to the park interior (i.e. the playground), should consider future access and space needs around the pickleball courts, and consider future safe routes to school alignments along Kelly Drive.
- Restoring a variety of habitat types and replanting trees, to mitigate tree loss and provide shade in specific locations

- Realigning of the northern SEA School Driveway with Maryland Avenue, continuing to coordinate design with SEA School staff and evaluating specific items requested during final design. Also, phasing construction in this area to minimize impacts to SEA School access and operations.
- Preserving key park features in including the pickleball courts, the playground area, the wooded knoll, the sledding hill, and open turf areas for various recreation activities and gathering (e.g. the northeast corner of the park).

The planning level cost for Concept 3 is $3.1 million (-20%/+30%). The planning level budget that the BCWMC and the City of Golden Valley have been using for budgeting is $2.7 – 3.0 million (-20%/+40%). The project will be funded by a variety of funding sources. The BCWMC proposes to use $1.3 million of its CIP funds to help pay for the SEA School-Wildwood Park Flood Storage Project. The CIP funds are raised through an ad valorem tax levied by Hennepin County on behalf of the BCWMC. For this project, $300,000 is proposed to be levied in 2022 and $1 million levied in 2023.

To make up the difference, other sources of funding for this project are required and include:

- City of Golden Valley,
- MnDNR Flood Damage Reduction Grants ($1.3 million through the state legislature/project bonding bill for this project),
- Other sources, including potential grants that could be applied for through the design process (e.g. Hennepin County Natural Resource Opportunity grants)

2.0 Background and objectives

The BCWMC's current Capital Improvement Program (CIP) (Table 5-3 in the 2015-2025 Bassett Creek Watershed Management Plan, as amended in 2018) includes projects BC-2, BC-3, BC-8, and BC-10, Medicine Lake Road and Winnetka Avenue Long Term Flood Mitigation Plan Project. This large CIP project is split into three separate phases, all located in the City of Golden Valley. In 2020, the City constructed Phase I, the DeCola Ponds B & C Improvement Project. Phase II, this project, the SEA School-Wildwood Park Flood Storage Project (BC-10), is slated for construction beginning in 2022. Phase III, the DeCola Pond F Flood Storage & Diversion Project, is slated for construction in 2025.

The BCWMC approved the 5-year (working) CIP at their March 2020 meeting, which includes implementation of Phase II, the SEA School-Wildwood Park Flood Storage Project. At their August 2020 meeting, the Commission approved the Commission Engineer's proposal to conduct a feasibility study for the SEA School/Wildwood Park Flood Storage Project.

The SEA School-Wildwood Park Flood Storage Project builds on the City of Golden Valley's Liberty Crossing flood mitigation and conveyance project, completed in 2017, and the DeCola Ponds B & C flood mitigation project, completed in spring 2020 in collaboration with the BCWMC. Both previous projects were implemented as recommended in the Medicine Lake Road and Winnetka Avenue Area Long-Term Flood Mitigation Plan Report (MLRWA Plan) (Barr, 2016). The City of Golden Valley city council supports the SEA School-Wildwood Park flood mitigation study (and the larger long-term flood mitigation plan), as evidenced by the inclusion of flood mitigation projects identified in the MLRWA Plan in the City of Golden Valley's CIP. Also, in 2020, the City of Golden Valley conducted a planning-level study for the SEA School-Wildwood Park flood mitigation project to begin early stakeholder and public engagement efforts to inform the direction of the concepts.

In 2016, the Cities of Golden Valley, New Hope, and Crystal developed a long-term flood mitigation plan (*Medicine Lake Road and Winnetka Avenue Area Long-Term Flood Mitigation Plan)* to address chronic flooding since the 1970s around the DeCola Ponds and on Medicine Lake Road, Winnetka Avenue, and other streets near the ponds. That plan outlined critical flood mitigation project locations and planning-level costs that could be used to direct future efforts. The study assessed eight (8) flood storage mitigation projects, including locations in Yunker Park (Crystal), Roslyn Court (New Hope), and the Liberty Crossing Development, Pennsylvania Woods/DeCola Ponds B and C, Isaacson Park/Sandburg Industrial Parcels, and the School of Engineering and Arts (from here forward referred to as the SEA School) (Golden Valley). These specific areas were analyzed as they are expected to have the most significant impact on flood elevation reductions.

The City of Golden Valley worked in partnership with a private developer for the construction of the first flood mitigation alternative at the Liberty Crossing Development. Construction was completed in 2017. Additionally, the city worked in partnership with the Minnesota Department of Natural Resources (MnDNR) and the BCWMC to implement the second project, the DeCola Ponds B & C Improvement Project, that expanded flood storage around DeCola Ponds B & C and established the connection to the storage developed as part of the Liberty Crossing development project. Project construction and

restoration was completed in 2020. In 2016, the City of Crystal also developed additional flood storage in Yunker Park.

These three projects lowered peak water surface elevations along the low point on Medicine Lake Road and DeCola Ponds A, B, and C. However, high water levels are also a concern for residents surrounding DeCola Ponds D, E, and F. Additional flood mitigation projects, such as the project discussed in this feasibility study, are needed to lower peak flood elevations on these ponds.

2.1 Project area description

The SEA School and Wildwood Park are located in the City of Golden Valley south of Duluth Street and west of Kelly Drive. This area consists of deciduous forest, a wooded knoll, turfed green space, paved walking trails, and various sporting facilities (e.g., pickleball courts, playground). The park is used heavily by the single family and multi-family residential communities in the surrounding area. The SEA School students and teachers also utilize the park for outdoor learning activities.

The SEA School-Wildwood Park area was selected as a potential flood mitigation site because of its proximity to the flooding problems, the publicly-owned land, the availability of open space to develop additional flood storage, and the opportunities to incorporate water quality treatment, develop habitat, and provide educational opportunities for the SEA School students, families, and park users.

This study also includes modifications of the storm sewer between DeCola Ponds D and E. The existing storm sewer between DeCola Ponds D and E is located under Winnetka Heights Drive and between existing residential parcels. Modifications to the storm sewer are not anticipated to have an impact on the normal water levels (NWLs) of DeCola Ponds D or E.

DeCola Ponds D and E discharge downstream to DeCola Pond F, which ultimately discharges to Bassett Creek. Currently, stormwater runoff from the SEA School/Wildwood Park parcels discharge either to DeCola Pond E through storm sewer on Duluth street (west of Kelly Drive) or through storm sewer towards Honeywell Pond. Any improvements to runoff water quality within the SEA School/Wildwood Park areas will result in improvements to the Main Stem of Bassett Creek, which is currently listed as impaired. The affected use is aquatic life based on fish bioassessments, and although a stressor identification study has not been completed to determine the exact cause of this impairment, reductions in sediment and pollutant loads to the creek can likely help address this impairment.

Figure 2-1 shows the SEA School/Wildwood Park and DeCola Ponds D and E project areas. Figure 2-2 shows the DeCola Ponds tributary watershed areas.

2.2 Goals and objectives

The goals and objectives of the feasibility study are to:

1. Review the feasibility of creating additional flood storage and water quality treatment areas in the SEA School/Wildwood Park project areas, and identify and evaluate three alternatives.

2. Develop three conceptual designs, including preliminary grading in AutoCAD Civil 3D, modeling hydrology and hydraulics using XP-SWMM, and modeling water quality improvements using P8.
3. Provide a planning level opinion of cost for design and construction of the alternatives.
4. Identify potential project impacts and permitting requirements.
5. Develop visual representations of the three alternatives for public input.

The goals and objectives of the flood mitigation project are to:

1. Create additional flood mitigation volume in the project area to help reduce flood elevations and flood damage to structures, properties, and infrastructure around DeCola Ponds D, E, and F.
2. Divert the majority of stormwater runoff from the storm sewer that runs along Duluth Street into the proposed flood storage volume on the SEA School and Wildwood Park properties. Stormwater runoff diverted to the SEA school/Wildwood Park properties will be detained and slowly released to the existing storm sewer at the intersection of Duluth Street and Kelly Drive, which will allow the stored volume to bypass DeCola Ponds E and F.
3. Provide water quality treatment best management practices to reduce sediment and phosphorus loading to the Main Stem of Bassett Creek and improve water quality in the downstream MnDNR public waters.
4. Preserve the significant trees on the wooded knoll located in the northeast corner of Wildwood Park. Preserve existing park features, such as the pickle ball court, the playground, and the sledding hill.
5. Restore natural habitat quality and species diversification by restoring wetland and upland habitat within the project disturbance limits, including investigation of various flooding frequencies for the restoration of habitat within the nature area (e.g., wetland meadows) and increased educational opportunities.
6. Replace disturbed trails with accessible trails that are positioned above the 10-year flood frequency event to ensure at least one loop of the Wildwood Park trails can be utilized following larger precipitation events for park users and for maintenance access. The trails will also allow the natural habitat and park features to be enjoyed more frequently by the public.
7. Modify the storm sewer between DeCola Ponds D and E to a 48" diameter pipe that will reduce the maximum water surface elevations for larger storm events on DeCola Pond D, while also ensuring no increase in downstream flood elevations.

2.3 Scope

The feasibility study addresses and includes the feasibility study criteria adopted by the BCWMC in October 2013:

- Analysis of multiple alternatives within the context of Commission objectives, including the following for each alternative:
    - Pros and cons analysis

- Cost estimate for construction and a "30-year cost"
- Analysis of life expectancy
- Summary of each alternative for the Commission to judge its merits
- Cost estimate for annualized cost per pound of pollutant removal
- Evaluation of new and/or innovative approaches
- Identification of permitting requirements

The BCWMC developed the above criteria when the BCWMC's CIP was limited to water quality improvement projects, so they do not specifically address flood mitigation aspects of CIP projects. Therefore, in addition to the criteria above, the following will also be analyzed as part of each alternative:

- Evaluate the flood reduction benefits of each alternative, including acre-feet of additional flood storage provided, lowering of 2, 10, 25, 50, and 100-yr flood elevations at key locations, and quantification of homes and other structures and infrastructure impacted (e.g., homes/households no longer within 1% annual chance floodplain, reduced inundation depth at adjacent roadways, etc.).

As is required for BCWMC CIP Projects, a feasibility study must be completed prior to BCWMC holding a public hearing and ordering the project. This feasibility study developed conceptual designs of the flood mitigation project, reviewed the permitting requirements, reviewed the field investigation results, and developed concept plans and cost estimates for the project.

The BCWMC completed a Resource Management Plan (RMP) in 2009 through which the U.S. Army Corp of Engineers (USACE) and the BCWMC agreed on a series of steps, work items, deliverables (called "protocols") that must be accomplished and submitted to complete the RMP process and USACE review/approval process. Although this project was not included in the RMP, the USACE has allowed the RMP protocols to be applied to other projects not specifically included in the RMP. With the completion of the protocols, we expect the USACE application process to move more quickly than it would otherwise. Most of the protocols must be addressed as part of the feasibility study, in addition to the usual tasks that would be performed as part of a BCWMC feasibility study. In general, the protocols require compliance with Section 106 of the National Historic Preservation Act, compliance with Section 404 of the Clean Water Act, and Clean Water Act Section 401 Water Quality Certification. Compliance with Section 106 typically requires a cultural resources inventory.

In addition to the tasks above, the feasibility study included identifying wetland impacts to meet the RMP pre-application protocols and gathering stakeholder input. The BCWMC Engineer worked with the BCWMC Administrator and City of Golden Valley staff to identify and implement effective measures for gathering input from the public and other affected stakeholders.

2.4 Considerations

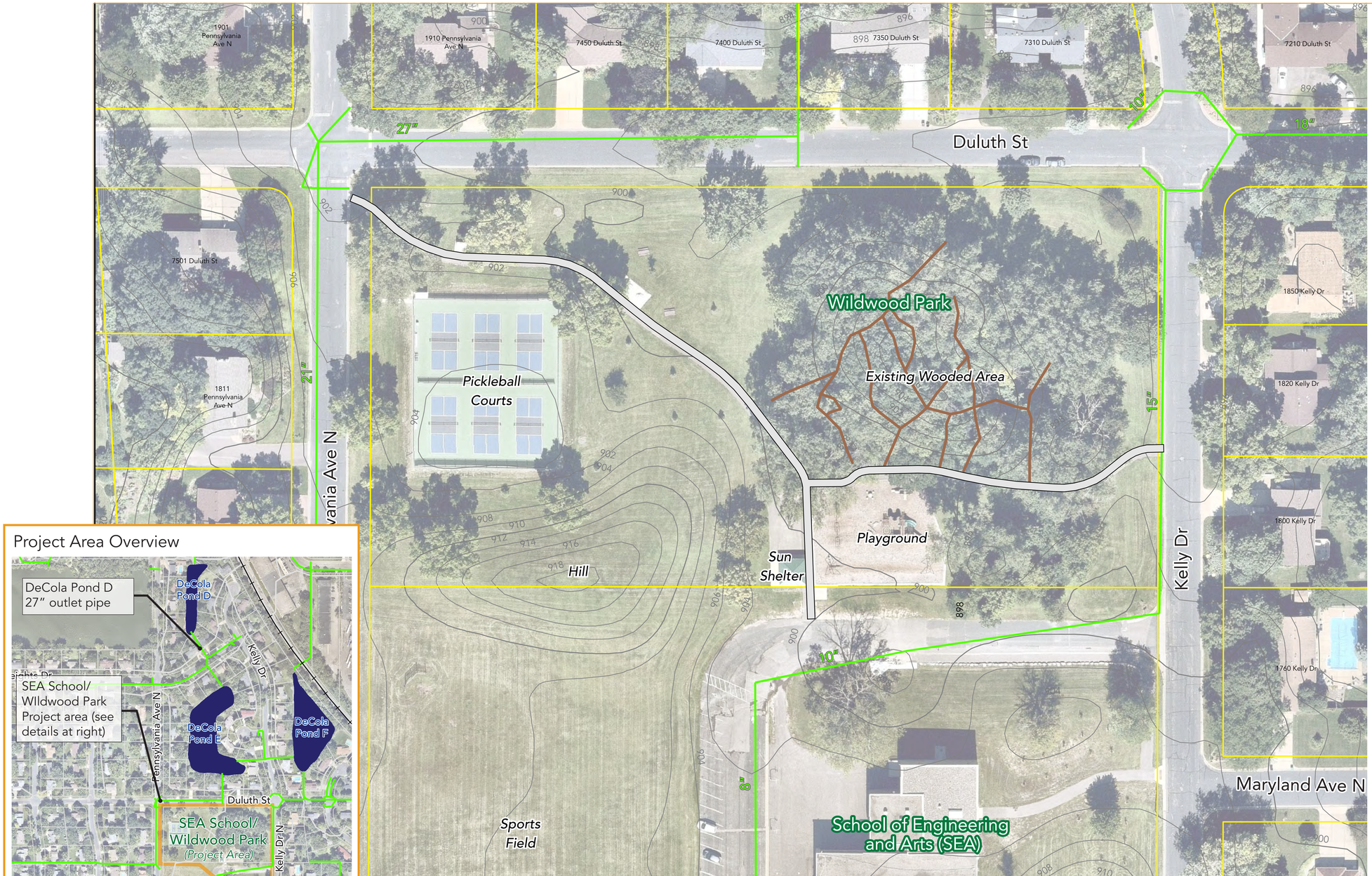
Key considerations for project alternatives included:

1. Maximizing the amount of flood storage up to the 100-year event.
2. Providing water quality best management practices.
3. Minimizing the permitting required to construct the project.

4. Maintaining or improving the functionality of DeCola Ponds D, E, and F, including water quality, flood control, and habitat functions.
5. Minimizing wetland impacts.
6. Balancing tree loss and flood storage development while preserving healthy, significant hardwood trees in upland areas.
7. Maintaining or improving the functionality/maintenance access of the walking trails, enhancing the SEA School/Wildwood Park user experience, and providing flood mitigation and water quality educational opportunities for students, neighborhood residents, and park users.
8. Although stormwater reuse was evaluated as part of this study, it was not identified as part of this project because the SEA School and Wildwood Park properties do not currently irrigate, and irrigation is not part of the long-term plan for either site.

The considerations listed above played a key role in determining final recommendations and will continue to play a key role through final design.

Project Area



LEGEND

- Parcels
- Existing Footpath
- Existing Park Trail
- Existing Storm Sewer

Contours

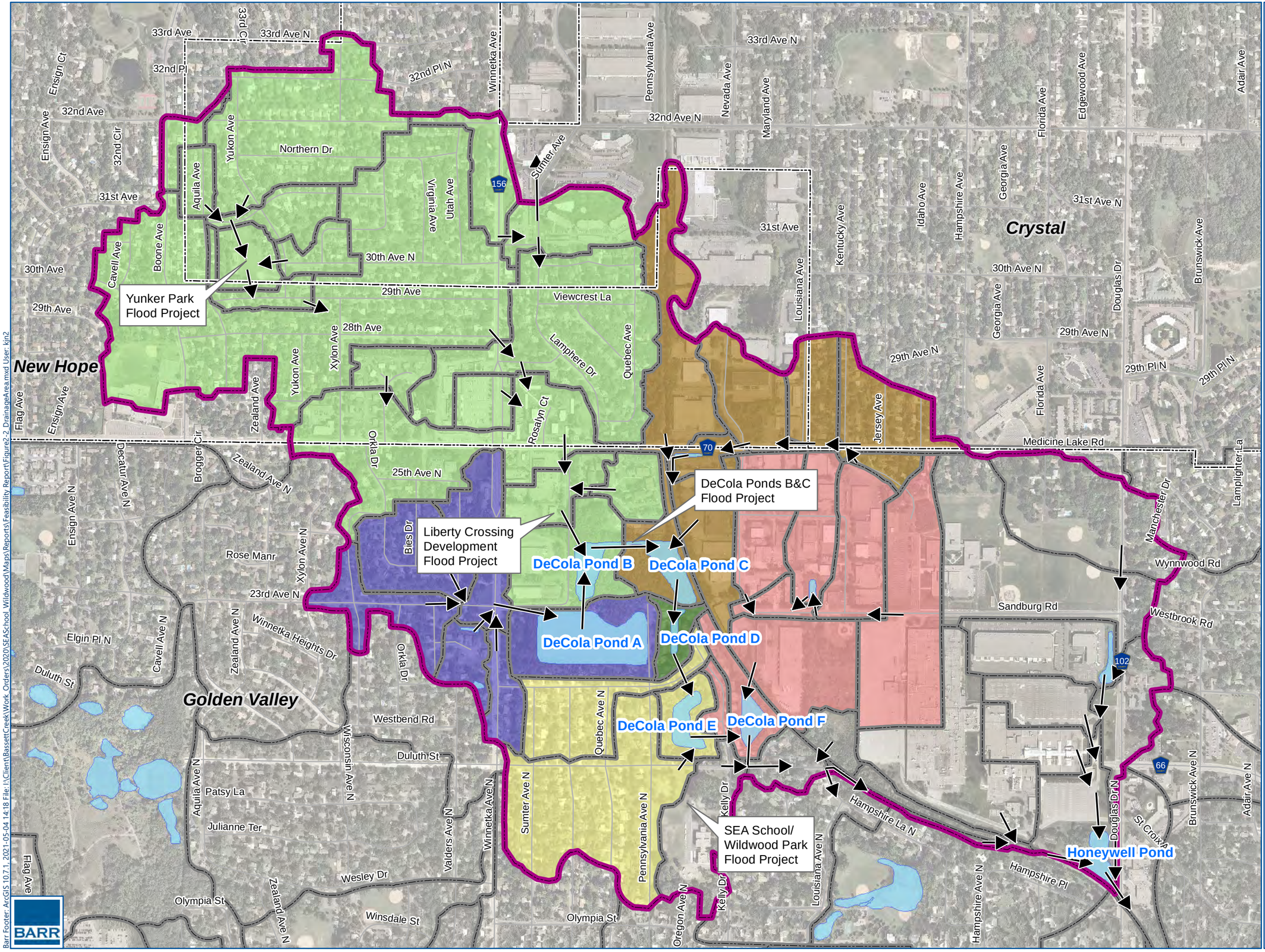
- 2-foot existing contour
- 10-foot existing contour

0 50 100 Feet

N

Project Area Overview

Figure 2-1



DECOLA PONDS
WATERSHED AREAS
Citie's of Golden Valley,
New Hope, and Crystal

FIGURE 2-2

3.0 Site conditions

3.1 Proposed Project Location and Characteristics

The 492-acre watershed area tributary to DeCola Ponds D and E drains portions of the cities of Crystal, New Hope, and Golden Valley (Figure 2-2). The watershed is fully-developed; the existing land use includes a mixture of single-family residential, commercial/industrial, parks and open spaces, multi-family residential, and open water.

Portions of the SEA School and Wildwood Park properties are tributary to DeCola Pond E. Runoff sheet flows from the portions of the property into storm sewer located on Pennsylvania Avenue North and Duluth Street, which ultimately discharges to DeCola Pond E. Portions of the SEA School property also discharge to storm sewer on Kelly Drive, which discharges to storm sewer that drains towards Honeywell Pond (bypassing DeCola Ponds E & F). Ultimately, this entire area drains to Bassett Creek.

This study also includes modifications of the storm sewer between DeCola Ponds D and E to reduce the maximum water surface elevations on DeCola Pond D during larger storm events without impacts to maximum water surface elevations on DeCola Pond E. The existing storm sewer between DeCola Ponds D and E is located under Winnetka Heights Drive and between existing residential parcels. The storm sewer varies in size from 27" to 30" in diameter. DeCola Ponds D and E are not listed as MnDNR public waters. DeCola Pond D and E are approximately 0.5 and 2.0 acres, respectively. Modifications to the storm sewer are not anticipated to have an impact on the normal water levels (NWLs) of DeCola Ponds D or E.

3.1.1 Existing Flooding Conditions

Significant flooding is an on-going concern for this area. The low point on Medicine Lake Road is one location that has experienced significant flooding in the past. The road runs east to west, and the low point is located at the boundary of Golden Valley and New Hope; the flooding at the low point created a complex intercommunity water management issue. Flooding at the low point presented significant public safety and access issues, as the depth of flooding did not allow for the passage of emergency vehicles. The flooding also resulted in damages to adjacent structures, such as the former VFW building (demolished, now part of Liberty Crossing), apartment buildings at Rosalyn Court, and the Dairy Queen.

Documented flooding impacts have been noted since the early 1970s. More recent examples of rainfall events that have resulted in notable flooding along Medicine Lake Road include:

- May 7 – 8, 2006: 4.0 inches of rainfall fell within 3.5 hours
- June 25, 2010: 3.0 – 3.7 inches (depending on watershed location) of rainfall fell within 1.9 hours
- June 21, 2013: 2.7 inches of rainfall fell
- July 28, 2015: 2.5 inches of rainfall fell within approximately 1.0 hours
- September 20, 2018: 4.5 inches of rainfall fell

Directly downstream of the Medicine Lake Road low point are the DeCola Ponds. The DeCola Ponds are a series of six ponds (DeCola Ponds A through F) that are connected by a storm sewer system. The series of

ponds were constructed in the 1960s; several were developed within an existing wetland area. The ponds were originally designed for the 50-year flood event, which was standard for that time. Historical, chronic flooding has been observed on the system of ponds, especially in DeCola Ponds D, E, and F. One home is known to flood on DeCola Pond A. One reason for the persistent chronic flooding is that approximately 18 homes were built with low floors and openings below the 50-year and 100-year flood events, which was common during this period of construction. The DeCola Ponds are not within a Federal Emergency Management Agency (FEMA) mapped floodplain, due to the size of the drainage area. However, property owners have filed five flood insurance claims in the past and eleven residents hold flood insurance policies.

Various studies and flood mitigation projects have been completed since 1979, aiming to alleviate the severe flooding that occurs within the cities of Golden Valley, New Hope, and Crystal. However, flooding continues to be an issue.

In 2017, the first flood mitigation projects that were investigated in the *Medicine Lake Road and Winnetka Avenue Area Long-Term Flood Mitigation Plan* (Barr, 2016) were implemented. In the upper DeCola Ponds watershed, the City of Crystal modified the storm sewer through Yunker Park and slightly expanded the flood mitigation storage in the park. Additionally, the City of Golden Valley constructed flood mitigation storage areas as part of the Liberty Crossing re-development project, located in the southeast quadrant of the intersection of Winnetka Avenue and Medicine Lake Road. Subsurface and surface storage areas were constructed on the site to hold and treat stormwater runoff from the direct watershed and from Medicine Lake Road overflows. In spring 2020, the construction of the DeCola Ponds B and C Improvement Project was completed by the city of Golden Valley and the BCWMC.

These three projects have a significant impact on the flood depths experienced at the Medicine Lake Road low point and the associated flooding of structures. The estimated existing 10-year and 100-year flood elevations on the Medicine Lake Road low point prior to the implementation of these projects were approximately 904.0 and 905.3 respectively (NAVD88). After the implementation of the flood mitigation projects in Yunker Park, on the Liberty Property, and the park areas surrounding DeCola Ponds B & C, the 10-year and 100-year flood elevations reduced to 901.5 and 902.2 respectively (NAVD88). The lowering of the flood elevations at the low point on Medicine Lake Road from these three projects had the following impact on flood depths and impacted structures:

- 10-year depth of flooding reduced from 3.5 feet to 1.0 foot
- Removal of 2 structures from being at-risk of flooding during the 10-year storm event
- 100-year depth of flooding reduced from 4.8 ft to 1.7 feet
- Removal of 5 structures from being at-risk of flooding during the 100-year storm event

Despite substantial flood reductions on Medicine Lake Road and DeCola Ponds A, B, and C, there are still a number of structures that are at-risk of flooding surrounding DeCola Ponds D, E, and F. Therefore, several additional flood mitigation projects, such as this SEA School-Wildwood Park Flood Storage Project, are needed to further reduce flooding on the DeCola Ponds.

3.1.2 Site access

Construction access will be straightforward because the project is located on public property (SEA School, Wildwood Park) or within a City of Golden Valley right-of-way or drainage and utility easement (Storm sewer between DeCola Ponds D and E). The City may need to obtain permanent and temporary easements from the SEA School for the work on the SEA School property.

Relatively few obstacles or infrastructure elements block access to the proposed work areas. Potential site access locations for SEA School/Wildwood Park are along Kelly Drive, Pennsylvania Avenue North, Duluth Street, or via the SEA School Drive. Site access for the modification of the storm sewer between DeCola Ponds D and E will be off of Winnetka Heights Drive.

3.1.3 Environmental Review

The BCWMC Engineer completed an environmental desktop review to assess the potential for contamination in the project area. The review included MPCA's What's in My Neighborhood (WIMN) web map of environmental sites (https://www.pca.state.mn.us/data/whats-my-neighborhood), Minnesota Department of Agriculture (MDA) WIMN map of known and potential sources of agricultural contamination, and a review of historical maps and aerial photos.

One petroleum release site was identified in the project area: The School of Engineering and Arts petroleum leak site #LS0020433 (Leak Site 20433). Other contaminated sites or releases identified were of deminimis quantity or downgradient of the project area, and unlikely to impact the soils or groundwater in the project area. Barr reviewed the MPCA files for Leak Site 20433. A petroleum release was discovered in 2017 during removal of a 6,000-gallon fuel oil underground storage tank (UST), which had been installed west of the south portion of the school building in 1998. During tank removal on June 29, 2017, soil sampling was completed on the north end of the UST basin below the tank and it indicated a minor release of diesel range organics (DRO) at a concentration of 15.5 mg/kg. The concentration was below MPCA guidelines for unregulated fill (100 mg/kg), indicating the soil is acceptable for reuse and does not pose a risk to human health. The tank was in good condition and the release was presumed to be from overfilling the tank. Perched groundwater was encountered at 7 feet below the ground surface, but no evidence of groundwater contamination was observed. No contaminated soil was reported to be removed. No staining or odors were detected from the soil collected from the UST removal samples.

A limited site investigation was completed by the consultant for the SEA School for the leak #LS0020433 in 2017 that included collection of six soil samples and soil vapor sampling near the former UST. Photoionization detector (PID) readings collected during the advancement of the soil borings did not exceed background concentrations (10 parts per million [ppm]) and no other evidence of impacts (odors or sheen were noted). Benzene, toluene, ethylbenzene, and xylenes (BTEX) and DRO were not detected in any of the six soil samples collected during the investigation. In addition, soil gas sampling and utility screening did not indicate petroleum impacts in the soil gas or utility features at the site. In summary, there is no indication the reported SEA School petroleum release impacted the soil, soil gas or groundwater at the site.

Based on review of historical aerial photos and topographical maps, apparent filling has occurred in Wildwood Park. Wetlands are indicated on topo maps through 1977 and subsequent development of the park occurred by the 1990s. Land disturbance is visible in 1945 and 1971 aerial photos in Wildwood Park, which also indicates filling. The source of fill at the site is unknown, so there is a potential for environmental impacts to be present in the fill soils in the project area. Based on the historical filling at the site, the BCWMC Engineer recommends field screening for environmental impacts and debris, and collection of soil samples for laboratory analysis be performed during geotechnical investigations as part of final design. Based on the investigation results, the BCWMC Engineer also recommends that either a response action plan or site contingency plan be prepared during final design to address potential impacts of contamination or debris that may be identified in the fill during the project construction and develop plans to appropriately manage and dispose of the soils.

3.1.4 Topographic, Utility, and Tree Surveys

The BCWMC Engineer subcontracted with Egan, Field and Nowak, Inc. (EFN) to complete a topographic, tree, and utility survey within the project extents in fall 2020. Topographic information was collected in Hennepin County NAD83 horizontal datum and NAVD88 vertical datum and was imported into AutoCAD Civil 3D to create an existing conditions surface for this feasibility study. Underground utilities were located based on the location of manhole structures, as-built/construction plan drawings from the City, and through a Gopher State One Call utility locate.

Trees larger than 4 inches in diameter were surveyed and the species, condition, and diameter data were collected. A total of 135 trees larger than 4 inches in diameter were surveyed at the project site. Eleven trees smaller than 4 inches in diameter were surveyed within the existing orchard on the SEA School property. The survey focused on the edges of the large, wooded knoll within Wildwood Park and did not include the entire knoll, as the goal is to preserve the trees in this area. Figure 3-1 shows the location of the surveyed trees. Since an expansive tree survey of the entire SEA School/Wildwood Park area was not completed, the tree removal summaries presented in Table 6-1 are only based on the surveyed trees located in the proposed excavation areas only.

Based on the survey data collected, trees were classified in accordance with the City of Golden Valley's tree ordinance (see Table 3-1). The survey showed that 54 of the surveyed trees 4" and greater in the project area are elm, 30 are poplar, 21 are birch, and 21 are maple. The remaining 9 trees consist of species such as spruce, ash, hackberry, and oak. Of the trees surveyed, 134 were found in good condition, and 12 in fair condition. Additionally, of the trees surveyed 4" and greater, 110 were significant and 0 were legacy. Section 6.6.3 discusses the anticipated impacts to the trees from the proposed project.

Table 3-1 City of Golden Valley Tree Ordinance Definitions

Tree Type[1]	Significant	Legacy	Other
Hardwood Deciduous	6" ≤ Diameter < 30"	Diameter ≥ 30"	Diameter < 6"
Softwood Deciduous	Diameter ≥ 12"	-	Diameter < 12"
Coniferous	4" ≤ Diameter < 24"	Diameter ≥ 24"	Diameter < 4"

[1] A healthy tree not considered a nuisance under City regulations

3.1.5 Wetland Delineations

The BCWMC Engineer completed a wetland delineation for the SEA School/Wildwood Park project area on September 14, 2020. The delineation area included segments of DeCola Pond D, DeCola Pond E, and Wildwood Park. The wetland delineation identified two wetlands (DeCola Pond D and E) within the project area. Descriptions and assessments of the wetlands are provided below. Appendix A provides the full wetland delineation report, including figures and wetland data sheets.

The wetland delineation report was prepared in accordance with the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual ("1987 Manual," USACE, 1987), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (USACE, 2010) and the requirements of the Minnesota Wetland Conservation Act (WCA) of 1991.

The delineated wetland boundary and sample points were surveyed using a Global Positioning System (GPS) with sub-meter accuracy. Wetlands were classified using the U.S. Fish and Wildlife Service (USFWS) Cowardin System (Cowardin et al., 1979), the USFWS Circular 39 system (Shaw and Fredine, 1956), and the Eggers and Reed Wetland Classification System (Eggers and Reed, 1977).

An approved jurisdictional determination request was sent to the USACE on January 18, 2021. Following USACE Review on March 10, 2021 the USACE determined they do not have jurisdiction over DeCola Ponds D and E. As a result, no permitting from the USACE would be required for the project.

3.1.5.1 Wetland Description

DeCola Ponds D and E are hydraulically connected through a culvert located under Winnetka Heights Dr. Water flows from DeCola Pond D into Pond E and then flows outside of the project area into DeCola Pond F, ultimately draining to the Main Stem of Bassett Creek. Both wetlands were classified as Type 4/deep marsh wetlands due to the depth of the water and lack of emergent vegetation (PUBH).

The wetlands are bordered by private residences that have altered the vegetation along the wetland boundary. Mowed lawns are maintained up to the wetland boundary and ornamental tree species have been planted in the surrounding area. Species identified along the wetland borders included reed canary grass (*Phalaris arundinacea*), jewel weed (*Impatiens capensis*), and water smartweed (*Persicaria amphibia*). Woody vegetation, such as boxelder (*Acer negundo*) and eastern cottonwood (*Populus deltoides*), and American elm (*Ulmus americana*) was also identified. No emergent vegetation was observed within the inundated area of the wetland boundary.

Using the Minnesota Routine Assessment Method (MnRAM) wetland assessment methodology, both DeCola Ponds D and E were classified as a Manage 2 wetlands, as the wetland is rated medium for aesthetics and low for amphibian habitat. Refer to Appendix A for the MnRAM Excel spreadsheet.

3.1.6 Threatened and Endangered Species

Through a license agreement (LA-898) with the MnDNR for access to the Natural Heritage Information System (NHIS) database, the BCWMC Engineer queried the NHIS database in October 2020 to assess if any rare species could potentially be affected by the proposed project. The NHIS database did not identify any state listed species within one mile of the project area.

The US Fish and Wildlife Service's (USFWS) Information, Planning, and Conservation System (IPaC) website identified one federally listed species potentially occurring in the project area: the northern long-eared bat (*Myotis septentrionalis;* threatened). No designated critical habitat for any federally listed species is located within the project area.

According to GIS data obtained from the MnDNR, there are no Minnesota County Biological Survey (MCBS) Sites located within one mile of the proposed project site. Additionally, no state-owned wildlife management areas (WMA), Scientific Natural Areas (SNA), or native plant communities are present within one mile of the proposed project area.

Impact Analysis

The northern long-eared bat hibernates in caves during the winter and uses forested areas for roosting and foraging during the bat's active season of April through September. Suitable roost trees for this species have trunks measuring greater than three inches diameter at breast height (DBH) with loose, peeling bark or crevices. Numerous trees exceeding three inches DBH exist in the project area. It is likely the project will require the removal of some trees within the project area. According to the MnDNR, the nearest hibernacula is approximately 13.6 miles southeast of the proposed project area and no maternity roost trees have been identified within one mile of the proposed project area. A prudent, but not mandatory, measure to avoid all direct impacts to the northern long-eared bat is to remove the proposed trees outside of the active season (outside of April—September).

In summary, this project is not expected to impact any state-listed species. In addition, the project may affect, but is not likely to adversely affect, the federally threatened northern long-eared bat and is not expected to cause a prohibited take of this species.

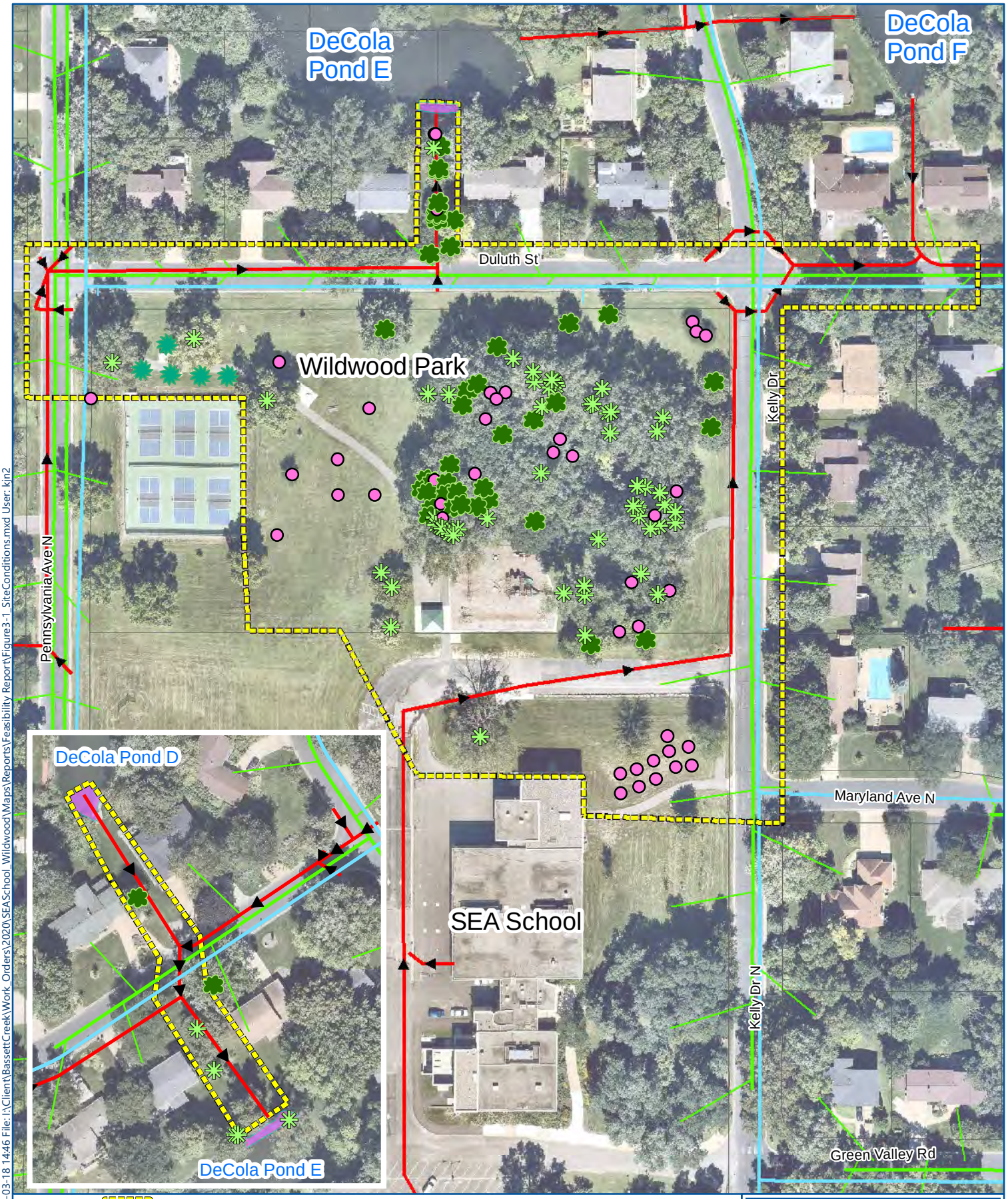
3.1.7 Cultural Resources

In October 2020, the BCMWC Engineer requested a file search from the Minnesota State Historic Preservation Office (SHPO) Standing Structures (Historic) and Archaeology Inventories for all public land survey sections located within one mile of the project area (the evaluated area).

SHPO responded to the data request with information indicating that there are numerous recorded historic and archaeological resources within the evaluated area. The file search identified 143 historical

inventory records and no archaeological inventory records within the evaluated area. Recorded resources largely consisted of residential buildings located in the adjacent neighborhood around the project area. No historical inventory records or archaeological records were identified within the project area or the immediate adjacent properties. The proposed project would not impact any previously recorded standing structures or archaeological sites.

This review only reflects currently known cultural resources; it is possible that unidentified cultural resources may be present within the project area. Further cultural resources evaluation may be required as part of future design and permitting efforts.



Barr Footer: ArcGIS 10.7.1, 2021-03-18 14:46 File: I:\Client\BassettCreek\Work_Orders\2020_SEASchool_Wildwood\Maps\Reports\Feasibility Report\Figure3-1_SiteConditions.mxd User: kjn2

4.0 Stakeholder input

4.1 Public Stakeholder Meetings

Because the flood mitigation concepts will impact Wildwood Park and the northern portion of the SEA School property, input from city staff, Robbinsdale Area Schools, and the public were compiled and considered before refining the flood mitigation concepts. As a result of the ongoing Covid-19 pandemic and public safety concerns, virtual events rather than in-person public open houses were held to gather public input.

4.1.1 Public Stakeholder Input – DeCola Ponds E & F Planning Study

Public stakeholder involvement for the proposed flood storage features on the SEA School and Wildwood Park properties began in early April 2020 as part of the City of Golden Valley's *DeCola Ponds E & F Planning Study*.

Public stakeholder involvement throughout the duration of the planning study included coordination with City of Golden Valley representatives, and virtual meetings with Robbinsdale Area School/SEA School representatives. This engagement intended to find out how the SEA School utilizes the school and park parcels, find out more about future facilities plans for the SEA School site, and discuss the background and purpose of the project.

Two virtual public engagement efforts were offered during the *DeCola Ponds E & F Planning Study*. The first virtual public engagement activity included an online video offering background information on the proposed project and an interactive map. After watching the video, participants were invited to complete an online survey. Within the survey, participants could describe their views on issues, concerns, and needs for the park area. The survey results allowed the City of Golden Valley to gain insight about the use of the park and school property, the community's perceived values of these resources, and the community's issues regarding the existing site. This first activity was made available from June 11 through June 26, 2020. A letter was mailed to residents informing them of the video and online survey. Web links were also made available on the SEA School Project webpage, the City website news feed, social media, and in an update in the weekly DeCola Ponds project news posting to promote participation in the survey.

This preliminary input was used to inform the development of the planning level concepts.

A second virtual public engagement effort was offered from September 17, 2020 through October 5, 2020, which presented three planning level concepts for flood storage on the SEA School/Wildwood Park properties. The designs were presented using a pre-recorded video posted on the City of Golden Valley's project webpage. A letter was mailed to residents informing them of the online presentation. Web links were made available on the SEA School Project webpage, the City website news feed, social media, and in an update in the weekly DeCola Ponds project news posting to promote review and feedback of the concepts. A CityNews story was also developed. Participants were encouraged to submit their thoughts and concerns on the planning level concepts through an online form. City staff followed up with individuals who provided input and wanted further discussion to clarify comments and answer questions.

A summary of the results of the public input from the planning study is compiled here: https://www.goldenvalleymn.gov/stormwater/pdf/SEA-School-Input-Report.pdf

These comments were considered as part of the development of the feasibility study concepts.

4.1.2 Public Stakeholder Input – SEA School-Wildwood Park Feasibility Study

4.1.2.1 City of Golden Valley Open Space and Recreation Commission

Golden Valley staff presented the feasibility study concepts to the members of the City of Golden Valley Open Space & Recreation Commission (OSRC) to solicit input at the March 23, 2021 meeting. The OSRC advises, recommends, and assists the Golden Valley City Council in policies and plans relating to open space needs, parks and recreation programs, trail systems, and Brookview Golf Course.

In general, the OSRC supported the project and members of the committee indicated preference for Concepts 2 and 3. A couple of the member indicated a preference for Concept 3 and one indicated preference for Concept 2. However, a few other members were concerned with the installation of open water (e.g., aesthetics and odor concerns). Questions/comments included consideration of natural surface trails and that the final design consider future access and space needs around the pickleball courts. Other comments included the addition of a park shelter to mitigate the loss of trees/shade, recognizing this could be a future amenity paid for by park funds.

4.1.2.2 Public Presentation and Virtual Open House

As part of this feasibility study, public input was also encouraged through posting a pre-recorded presentation describing the three feasibility designs, offering an online form to submit questions/comments, and hosting a virtual public open house. The pre-recorded presentation and online comment forms were available from March 29, 2021 through April 16, 2021.

The virtual public open house was hosted on April 8, 2021 using WebEx. WebEx allowed the group to host various "rooms" that were staffed by representatives from the City of Golden Valley, the BCWMC, and the BCWMC Engineer where the public could come and ask questions and discuss the project after watching the virtual video. The discussion rooms offered open conversation on:

- Flooding history and background
- Feasibility concept plans
- Transportation (realigned SEA School driveway, traffic safety, parking, trails, and sidewalks)
- Parks and recreation (park usage and amenities, pickleball, sports field, SEA School usage and partnership)

Public feedback received at the virtual public open house or through the online forms indicated general support for the project; however, the preferred feasibility concept varied.

General comments on the concepts as presented included:

- Liked improved diversity of habitat while still preserving turf areas for recreation; however, want to make sure design allows for well-established vegetation and a well-drained system rather than a muddy/mucky area with poorly established vegetation
- Concern about safety of the open water concept
- Some concern expressed about tree removal around the existing knoll and desire to replace trees for shade in select areas (e.g. near playground)
- Preference to preserve an east-west internal trail from Kelly Drive into the park
- Concern about access to parts of the park during construction
- Future in-person engagement during final design (assuming post-pandemic)
- Support for a looped walking trail around the park

A summary of the results of the public input from the feasibility study is compiled here: https://www.goldenvalleymn.gov/stormwater/pdf/SEA-School-Input-Report.pdf

4.1.3 City of Golden Valley Meeting with Robbinsdale Area Schools/SEA School

City of Golden Valley staff met with representatives of the Robbinsdale Area Schools and SEA School staff the week of March 29, 2021 to discuss the status and schedule of the SEA School-Wildwood Park Flood Storage Study, outlining the benefits of the proposed projects to their property and assessing the school's needs and concerns.

SEA School staff are supportive of the flood mitigation project and did not indicate a preference for a specific concept. Most comments from the staff were related to the design of the proposed realignment of the northern driveway (bus exit) that will be further evaluated as part of final design. Additionally, staff had comments about trails related to maintenance and expressed interest in extension of a trail along Kelly Drive all the way south to Olympia.

4.2 Technical Stakeholder Meeting

A technical stakeholder meeting with regulatory agencies was held virtually on December 16, 2020 to discuss the proposed SEA School-Wildwood Park Flood Storage project and to solicit feedback on and discuss permitting requirements. Attendees included representatives from the BCWMC, the City of Golden Valley, the United States Army Corps of Engineers (USACE) and the Minnesota Pollution Control Agency (MPCA). MnDNR staff were not included as DeCola Ponds D, E, or F are not mapped as public waters.

The BCWMC Engineer presented background information on the flooding, and the general goals and design concept for the SEA School-Wildwood Park Flood Storage Project, which was followed by discussion related to technical feedback and permitting input. The items discussed included:

- Review of project background and history
- Review of *DeCola Ponds E & F Planning Study*
- Review of site information compiled to-date and site investigation work completed
- Review of potential design concepts
- Discussion of regulatory issues and potential permit requirements

- Discussion of feasibility study

Section 6.5 summarizes the anticipated permitting requirements as discussed at the meeting.

5.0 Concepts Evaluated

This section outlines the components of each of the three conceptual designs developed and evaluated for the SEA School and Wildwood Park areas for this feasibility study. Section 6.0 summarizes the impacts of the conceptual designs

The primary focus of all three conceptual designs was to maximize the development of flood storage in the project area without significant impacts to the hardwood trees on the knoll and to maintain open turf areas to the largest extent possible. Each conceptual design also includes a BMP for water quality treatment.

5.1 Concept 1— Underground Storage with Stream

Figure 5-1 shows a visual representation of the proposed features of Concept 1. This alternative includes the following design components:

- Installing an underground storage chamber that includes 4 feet of permanent pool depth for water quality treatment and 3 feet of depth for flood storage. The use of underground storage allows for a larger area of turf to remain open for active and passive recreation and this area of turf would remain dry during all rain events.

- Installing a diversion manhole with a weir on Duluth Street to divert water into the proposed underground storage area. Under existing conditions, stormwater runoff that flows east along Duluth street is discharged into DeCola Pond E. Figure 5-2 shows a graphical depiction of how flow patterns would change from existing to proposed conditions.

- Constructing an intermittent stream feature downstream of the underground storage chamber that would flow full during frequent, smaller storm events (approximately a 0.5-inch rain event). The intermittent stream would be surrounded by wet meadow habitat designed to be fully inundated by a 2-year 24-hour design storm event (2.87 inches). This full inundation corresponds to a water surface elevation of approximately 894.0 ft MSL. A wet meadow is a type of wetland with soils that are saturated during the growing season due to periods of short inundation from storm events. The wet meadows will have standing water for approximately 1 day following storm events larger than the 25-year 24-hour design storm, but the soils will remain fairly saturated for longer durations. Vegetation in wet meadows can consist of a mix of grasses, rushes, sedges, and wildflowers.

- Restoring areas adjacent to the wet meadows, above elevation 894.0 ft MSL, with turf grass that would only be temporarily inundated for large, less frequent storm events (greater than 10-year 24-hour design storm event). Inundated turf areas would have standing water no longer than 8 hours for the 10-year 24-hour design storm event and 20 hours for the 100-year 24-hour storm event.

- Installing a backflow preventer in the storm sewer pipe downstream of the intermittent stream so that small storm events cannot discharge to a low-lying prairie basin through the pipe. Stormwater runoff would start to discharge into the prairie habitat basin if enough runoff pools in the wet meadow storage areas to overtop a berm with a minimum elevation of 895.0 ft MSL. Stormwater runoff would start to discharge to the prairie habitat for events greater than or equal to the 10-year 24-hour design storm event (4.29 inches). The prairie habitat would be inundated for approximately 36 hours for the 100-year 24-hour design storm event (7.42 inches).

- Installing an overflow berm with a top elevation of 897.2 ft MSL that runs along Duluth Street and Kelly Drive to maximize storage within the Wildwood Park and SEA School properties.

- Installing a 12-inch storm sewer outlet pipe downstream of the proposed park stormwater features that would discharge to the existing storm sewer at the intersection of Duluth Street and Kelly Drive. The small pipe diameter would allow for extended detention and slow draw down of the features in Wildwood Park. The existing storm sewer at the intersection of Duluth Street and Kelly Drive bypasses DeCola Ponds E and F and discharges downstream to Honeywell Pond and Bassett Creek.

- Re-aligning the existing SEA School driveway to align perpendicular to Maryland Avenue. This would help improve intersection safety and allow for the expansion of the prairie habitat storage area onto the SEA school property.

- Relocating the disturbed SEA School orchard adjacent to the existing playground.

- Incorporating a nature play area adjacent to the playground to provide nature education and play options to park users.

- Replacing disturbed trails with an ADA compliant looped trail system adjacent to Duluth Street, Kelly Drive, and the re-aligned SEA School driveway that would also connect existing park features (i.e., pickleball courts, playground, picnic shelter).

- Increasing the total flood mitigation volume by 9.1 ac-ft from existing conditions through excavation and regrading on the SEA School/Wildwood Park properties.

- Preserving trees and existing trails on the knoll in Wildwood Park. Tree removal is expected within project area. However, 1.1 acres of upland and prairie areas would be restored with native vegetation and replanted with trees at a density potentially ranging from savanna (approximately 35 trees/acre) to forest (approximately 110 trees/acre) – to be determined during final design.

- Restoring 0.6 acres of wetland habitat.

- Restoring 1.2 acres of open, turf areas.

- Modifying the existing storm sewer between DeCola Ponds D and E. The existing storm sewer would be increased to a 48" diameter pipe. The proposed storm sewer would decrease the amount of bounce on DeCola Pond D during storm events while not increasing the 10-year or 100-year 24-hour flood elevations on the downstream ponds.

5.2 Concept 2— Open Water

Figure 5-3 shows a visual representation of the proposed features of Concept 2. This alternative includes the following design components:

- Installing an open water area that includes 4 feet of permanent pool depth for water quality treatment and flood storage above the NWL. The open water area would also provide a new habitat type in the park inviting aquatic macrophytes and macroinvertebrates.

- Installing a diversion manhole with a weir on Duluth Street to divert water into the proposed open water pond area. Under existing conditions, stormwater runoff that flows east along Duluth street is discharged into DeCola Pond E.

- Restoring areas around the open water pond with wet meadow habitat designed to be fully inundated by a 2-year 24-hour design storm event (2.87 inches). This full inundation corresponds to a maximum water surface elevation of approximately 894.0 ft MSL. The inundation period for the 2-year 24-hour design storm event is approximately 36 hours.

- Restoring areas adjacent to the wet meadows above elevation 894.0 ft MSL with turf grass or native prairie grasses that would only be temporarily inundated for larger storm events (greater than the 10-year 24-hour design storm event). Inundated turf areas would have standing water no longer than 10 hours for the 10-year 24-hour design storm event and 18 hours for the 100-year 24-hour storm event.

- Installing a backflow preventer in the storm sewer pipe downstream of the open water area so that small storm events cannot discharge to a low-lying prairie basin through the pipe. Stormwater runoff would start to discharge into the prairie habitat basin if enough runoff pools in the wet meadow storage areas to overtop a berm with a minimum elevation of 895.0 ft MSL. Stormwater runoff would start to discharge to the prairie habitat for events greater than or equal to the 10-year 24-hour design storm event. The prairie habitat would be inundated for approximately 36 hours for the 100-year 24-hour design storm event (7.42 inches).

- Installing an overflow berm with a top elevation of 897.2 ft MSL that runs along Duluth Street and Kelly Drive to maximize storage within the Wildwood Park and SEA School properties.

- Installing a 12-inch storm sewer outlet pipe downstream of the proposed park stormwater features that would discharge to the existing storm sewer at the intersection of Duluth Street and Kelly Drive. The small pipe diameter would allow for extended detention and slow draw down of the features in Wildwood Park. The existing storm sewer at the intersection of Duluth

Street and Kelly Drive bypasses DeCola Ponds E and F and discharges downstream to Honeywell Pond and Bassett Creek.

- Re-aligning the existing SEA School driveway to align perpendicular to Maryland Avenue. This would help improve intersection safety and allow for the expansion of the prairie habitat storage area onto the SEA school property.
- Relocating the disturbed SEA School orchard adjacent to the existing playground.
- Incorporating a nature play area adjacent to the playground to provide nature education and play options to park users.
- Replacing disturbed trails with an ADA compliant looped trail system adjacent to Duluth Street, Kelly Drive, and the re-aligned SEA School driveway that would also connect existing park features (i.e., pickleball courts, playground, picnic shelter).
- Installing an ADA compliant floating platform off of the paved trail to allow access to the open water area for aesthetic enjoyment, habitat research, and school group activities.
- Increasing the total flood mitigation volume by 8.6 ac-ft from existing conditions through excavation and regrading on the SEA School/Wildwood Park properties.
- Preserving trees and existing trails on the knoll in Wildwood Park. Tree removal is expected within project area. However, 0.9 acres of upland and prairie areas would be restored with native vegetation and replanted with trees at a density potentially ranging from savanna (approximately 35 trees/acre) to forest (approximately 110 trees/acre) – to be determined during final design.
- Restoring 0.3 acres of wetland habitat.
- Restoring 1.3 acres of open, turf areas.
- Modifying the existing storm sewer between DeCola Ponds D and E. The existing storm sewer would be increased to a 48" diameter pipe. The proposed storm sewer would decrease the amount of bounce on DeCola Pond D during storm events while not increasing the 10-year or 100-year 24-hour flood elevations on the downstream ponds

5.3 Concept 3— Wet Meadow

Figure 5-4 shows a visual representation of the proposed features of Concept 3. This alternative includes the following design components:

- Installing a vegetated basin with iron-enhanced sand trenches (biofiltration basin) for water quality treatment. The biofiltration basin would not only assist with the removal of particulate contaminants, but would also remove dissolved contaminants.

- Installing a diversion manhole with a weir on Duluth Street to divert water into the proposed biofiltration basin area. Under existing conditions, stormwater runoff that flows east along Duluth street is discharged into DeCola Pond E.

- Installing a Hydrodynamic Separator (HDS) downstream of the weir diversion structure and upstream of the biofiltration basin for pre-treatment (e.g., removal of sediment and particulate solids).

- Installing a second diversion manhole with a weir on Duluth Street to divert storm water runoff that bypasses the biofiltration basin for larger storm events into the proposed wet meadow.

- Restoring proposed areas that are expected to be inundated during the 2-year 24-hour Atlas-14 storm event with wet meadow habitat. This inundation depth corresponds to a maximum water surface elevation of approximately 894.0 ft MSL. A wet meadow is a type of wetland with soils that are saturated during the growing season due to periods of short inundation from storm events. The wet meadows will have standing water for approximately 1-day following storm events larger than the 25-year 24-hour design storm event, but the soils will remain fairly saturated for longer durations. Vegetation in wet meadows can consist of a mix of grasses, rushes, sedges, and wildflowers.

- Restoring areas adjacent to the wet meadows above elevation 894.0 ft MSL with native prairie grasses.

- Restoring areas adjacent to the intersection of Duluth Street and Kelly Drive and areas adjacent to the existing pickleball courts with turf grass. Inundated turf areas would have standing water no longer than 8 hours for the 10-year 24-hour design storm event and 15 hours for the 100-year 24-hour storm event.

- Installing a backflow preventer in the storm sewer pipe downstream of the wet meadow so that small storm events cannot discharge to a low-lying prairie basin through the pipe. Stormwater runoff would start to discharge into the prairie habitat basin if enough runoff pools in the wet meadow storage areas to overtop a berm with a minimum elevation of 895.0 ft MSL. Stormwater runoff would start to discharge to the prairie habitat for events greater than or equal to the 10-year, Atlas-14 storm event. The prairie habitat would be inundated for approximately 36 hours for the 100-year 24-hour design storm event (7.42 inches).

- Installing an overflow berm with a top elevation of 897.2 ft MSL that runs along Duluth Street and Kelly Drive to maximize storage within the Wildwood Park and SEA School properties.

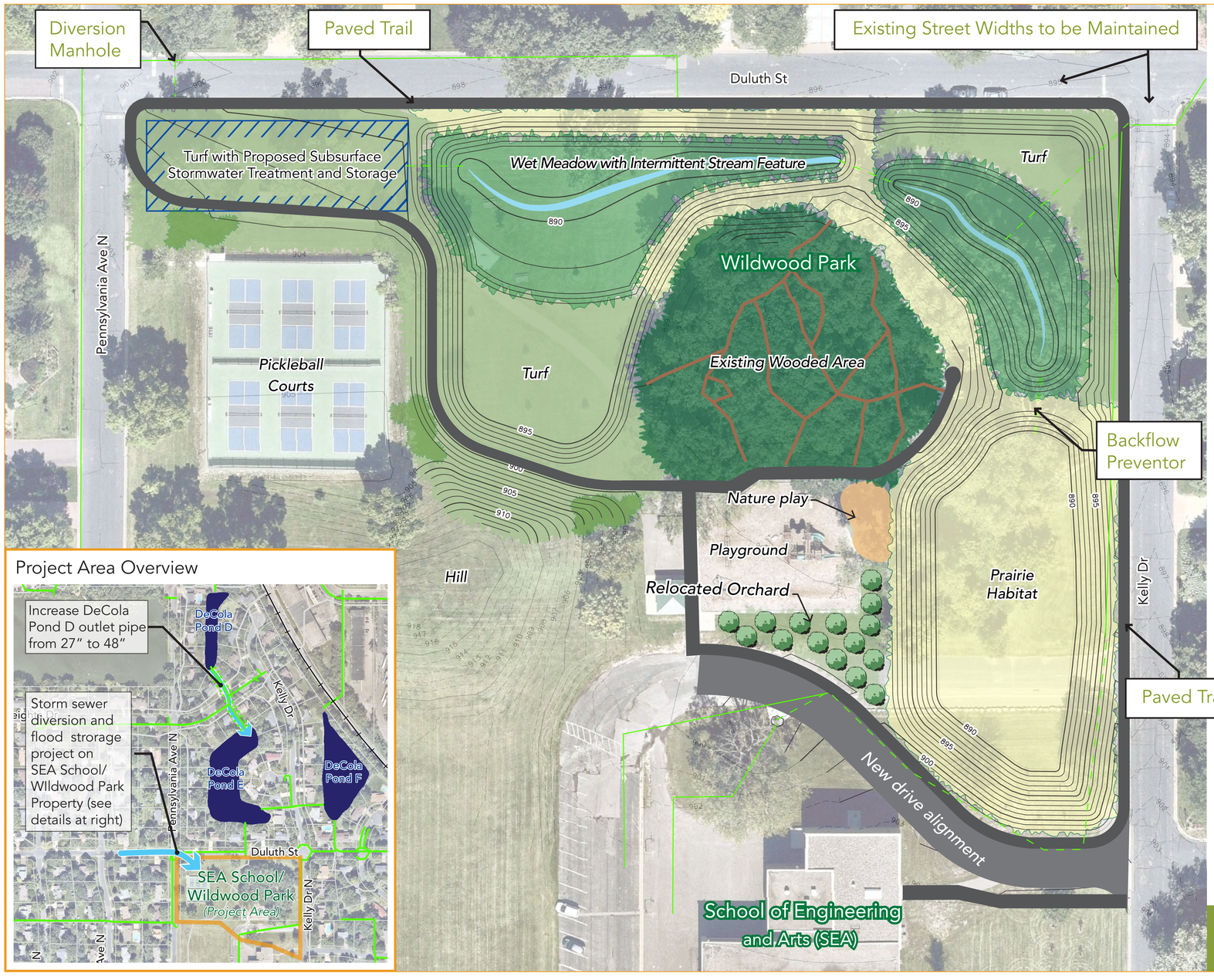
- Installing a 12-inch storm sewer outlet pipe downstream of the proposed park stormwater features that would discharge to existing storm sewer at the intersection of Duluth Street and Kelly Drive. The small pipe diameter would allow for extended detention and slow draw down of the features in Wildwood Park. The existing storm sewer at the intersection of Duluth Street and

Kelly Drive bypasses DeCola Ponds E and F and discharges downstream to Honeywell Pond and Bassett Creek.

- Re-aligning the existing SEA School driveway to align perpendicular to Maryland Avenue. This would help improve intersection safety and allow for the expansion of the prairie habitat storage area onto the SEA school property.
- Relocating the SEA School orchard adjacent to the existing playground.
- Incorporating a nature play area adjacent to the playground to provide nature education and play options to park users.
- Replacing disturbed trails with an ADA compliant looped trail system that is more interior to the park and offset from the roadways. This may promote more enjoyment of the new habitat types restored in the park.
- Increasing the total flood mitigation volume by 8.5 ac-ft from existing conditions through excavation and regrading on the SEA School/Wildwood Park properties.
- Preserving trees and existing trails on the knoll in Wildwood Park. Tree removal is expected within project area. However, 1.4 acres of upland and prairie areas would be restored with native vegetation and replanted with trees at a density potentially ranging from savanna (approximately 35 trees/acre) to forest (approximately 110 trees/acre) – to be determined during final design.
- Restoring 0.8 acres of wetland habitat.
- Restoring 0.7 acres of open, turf areas.
- Modifying the existing storm sewer between DeCola Ponds D and E. The existing storm sewer would be increased to a 48" diameter pipe. The proposed storm sewer would decrease the amount of bounce on DeCola Pond D during storm events while not increasing the 10-year or 100-year 24-hour flood elevations on the downstream ponds.

Concept 1: Underground Storage with Stream

Estimated Cost (-20%/+30%) = $4.1 Million



LEGEND

- Turf
- Wood Area
- Wet Meadow
- Prairie
- Orchard Trees
- Planting Areas
- Subsurface Treatment
- Existing 1' Contour
- Proposed 1' Contour
- Proposed 5' Contour
- Existing Storm Sewer
- Proposed Storm Sewer
- Existing Footpath
- Proposed Paved Trail

N

0 30 60

FEET

Figure 5-1

Concept Summary

Additional Flood Storage Created: 9.1 acre-feet

Improved Water Quality:
Additional 1.6 lbs/yr phosphorus removed

Restored Wetland and Prairie habitat:
1.7 acres total

Restored Turf Area:
1.2 acres total

Tree Removal:
45 trees total

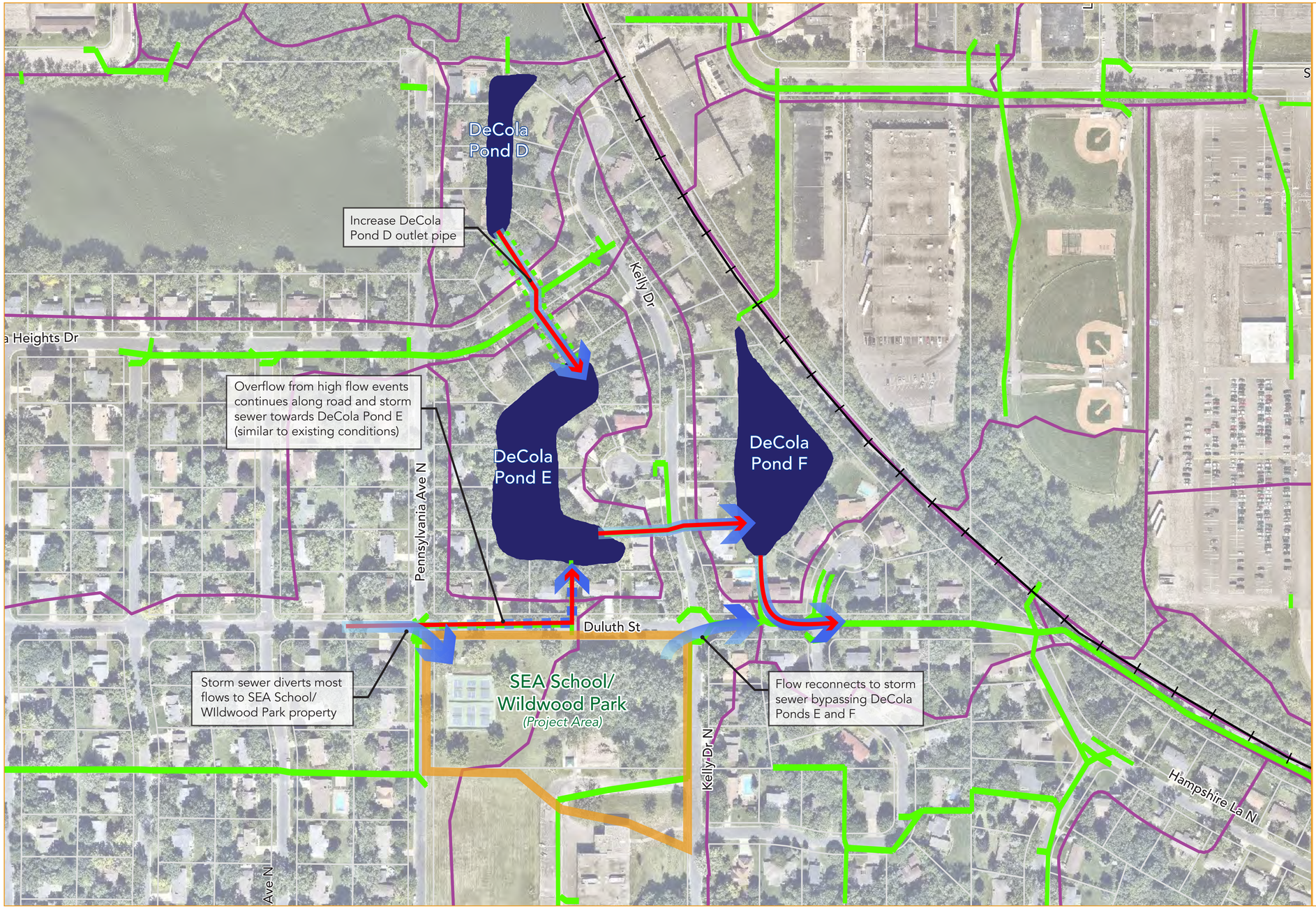
Reduction of Flood Level on Ponds:

DeCola Pond	10-yr	100-yr
D	- 0.6'	- 2.8'
E,F	- 0.8'	- 0.1'

At-Risk Flooded Structures (existing/proposed):

DeCola Pond	10-yr	100-yr
D	0/0	10/0
E,F	9/6	19/19

Proposed Flow Patterns



LEGEND

- Project Area
- Railroad
- Subwatersheds
- Parcels
- Storm Sewer
- Existing Flow Path
- Proposed Flow Pattern
- Overflow Path (during high flow events)

N

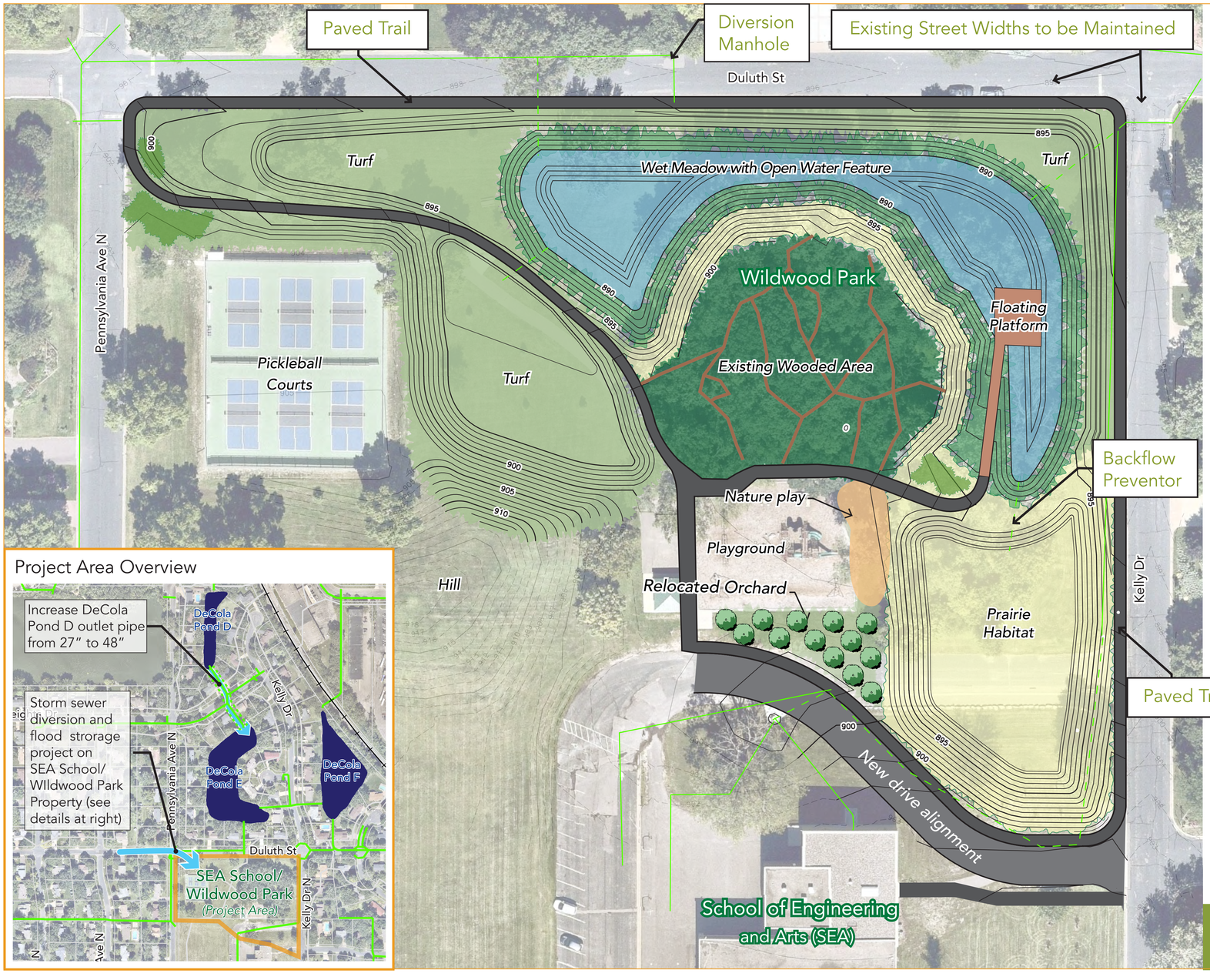
0 250 500

Feet

Figure 5-2

Concept 2: Open Water

Estimated Cost (-20%/+30%) = $2.9 Million



LEGEND

- Turf
- Wood Area
- Wet Meadow
- Prairie
- Open Water
- Orchard Trees
- Planting Areas
- Existing 1' Contour
- Proposed 1' Contour
- Proposed 5' Contour
- Existing Storm Sewer
- Proposed Storm Sewer
- Existing Footpath
- Proposed Paved Trail

N

0 30 60

FEET

Figure 5-3

Concept Summary

Additional Flood Storage Created: 8.6 acre-feet

Improved Water Quality: Additional 1.8 lbs/yr phosphorus removed

Restored Wetland and Prairie habitat: 1.6 acres total

Restored Turf Area: 1.3 acres total

Tree Removal: 54 trees total

Reduction of Flood Level on Ponds:

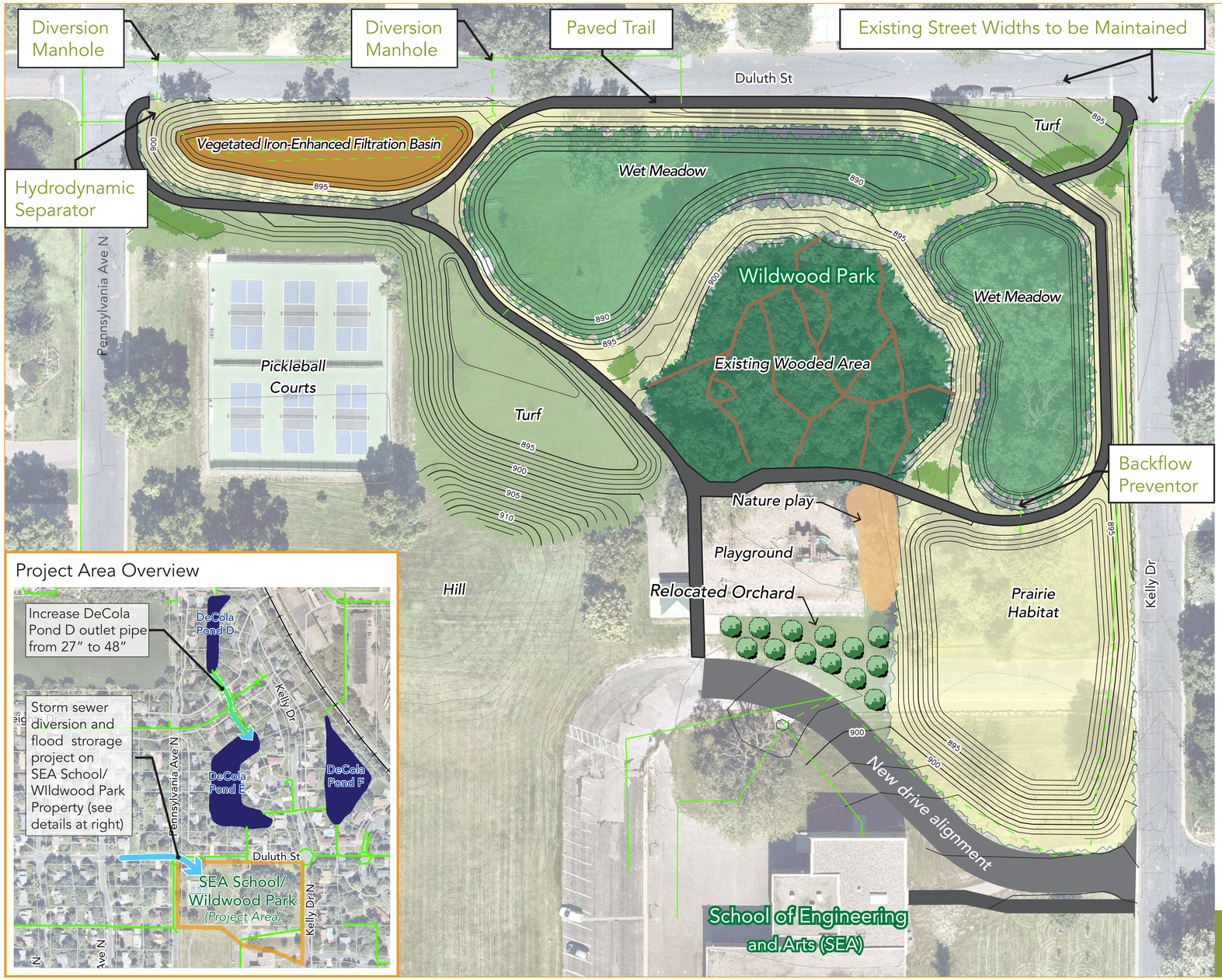
DeCola Pond	10-yr	100-yr
D	- 0.6'	- 2.8'
E,F	- 0.8'	- 0.1'

At-Risk Flooded Structures (existing/proposed):

DeCola Pond	10-yr	100-yr
D	0/0	10/0
E,F	9/6	19/19

Concept 3: Wet Meadow

Estimated Cost (-20%/+30%) = $3.1 Million



Project Area Overview

LEGEND

- Turf
- Wood Area
- Wet Meadow
- Prairie
- Vegetated Iron-Enhanced Filtration Basin
- Orchard Trees
- Planting Areas
- Existing 1' Contour
- Proposed 1' Contour
- Proposed 5' Contour
- Existing Storm Sewer
- Proposed Storm Sewer
- Existing Footpath
- Proposed Paved Trail

N

0 30 60

FEET

Figure 5-4

Concept Summary

Additional Flood Storage Created: 8.5 acre-feet

Improved Water Quality:
Additional 4.1 lbs/yr phosphorus removed

Restored Wetland and Prairie habitat:
2.3 acres total

Restored Turf Area:
0.7 acres total

Tree Removal:
54 trees total

Reduction of Flood Level on Ponds:

DeCola Pond	10-yr	100-yr
D	- 0.6'	- 2.8'
E,F	- 0.8'	- 0.1'

At-Risk Flooded Structures (existing/proposed):

DeCola Pond	10-yr	100-yr
D	0/0	10/0
E,F	9/6	19/19

6.0 Project Modeling Results and Potential Impacts

This section discusses the results of the hydrologic, hydraulic, and water quality modeling and provides information on potential project impacts, including permitting requirements. Table 6-1 summarizes the design features and potential impacts of the three concepts, in comparison to the project area's existing conditions.

6.1 Hydrologic, Hydraulic, and Water Quality Modeling

6.1.1 Available Models

Hydrologic and hydraulic information and water quality information are available for the project area in the form of a XP-SWMM hydrologic and hydraulic model and a P8 water quality model, respectively. The BCWMC completed the Phase 2 XP-SWMM model in 2017 for Bassett Creek and its contributing watersheds. The BCWMC developed the P8 model in 2012 for Bassett Creek and its contributing watersheds, and updates the model regularly.

The BCWMC Engineer used the 2017 BCWMC Phase 2 XP-SWMM model that was modified in 2019 to include the Liberty Crossing and the DeCola Ponds B&C development features. This XPSWMM model was modified again in 2020 to include updates to the existing channel east of the railroad along DeCola Pond C. This updated model was used to represent existing conditions for the project area and its flood elevation results were used as a basis of comparison for the proposed conceptual designs.

The updated existing conditions BCWMC Phase 2 XP-SWMM model was hydrologically and hydraulically modified to model the three conceptual designs. Watershed parameters, storage curves, storm sewer routing, and outlet control structures were revised to represent the proposed grading contours and culvert designs for the three concepts. Maximum flood elevations for the 1-, 2-, 10-, 25- and 100-year 24-hour recurrence intervals were analyzed and compared for the conceptual designs.

This study also included updating the P8 model with current site conditions for the DeCola Ponds areas. The BCMWC Engineer used the updated P8 water quality model to estimate the water quality improvement expected from each proposed SEA School/Wildwood Park alternative.

Final design efforts should include additional refinements to the XP-SWMM and P8 water quality modeling as the design progresses. The improvements that will ultimately be constructed should also be incorporated into the official BCWMC XP-SWMM model and the P8 model after completion of the project.

6.1.2 XP-SWMM Flood Elevation Results

Table 6-1 (the comparative matrix) provides the maximum 10-year and 100-year 24-hour flood elevations for existing conditions and the three conceptual designs for the following locations:

1) The low point on Medicine Lake Road
2) DeCola Ponds A, B, and C (ponds equalize during precipitation events)
3) DeCola Pond D
4) DeCola Ponds E and F

Table 6-2 provides the 10-year and 100-year flood elevations for existing conditions and the three conceptual designs for key flood areas within the cities of New Hope, Crystal, and Golden Valley. The key flood areas were originally defined in the 2016 *Medicine Lake Road and Winnetka Avenue Area Long-Term Flood Mitigation Plan* and are based on known historical flooding concerns.

A main purpose of the proposed SEA School-Wildwood Park Flood Storage Project is to lower the flood elevations on DeCola Pond D, E and F during larger storm events. Reductions in flood elevations can translate into reductions in flood risk for structures. Table 6-3 lists the potentially at-risk properties as originally identified in the 2016 *Medicine Lake Road and Winnetka Avenue Area Long-Term Flood Mitigation Plan*. The table summarizes the 10-year and 100-year flood elevations and depth of flooding over the low opening elevation at each structure for existing conditions (after the implementation of the Liberty Crossing and DeCola Ponds B&C Flood Mitigation Projects) and for each of the conceptual designs.

Under existing conditions, the structures on DeCola Pond D remain at risk of flooding for the 100-year storm event. Currently, no structures are at risk of flooding for events less than or equal to the 50-year storm event. For all three concepts, the ten homes on DeCola Pond D that are identified as at risk of flooding during the 100-year storm event are no longer at risk of flooding with the installation of the SEA School/Wildwood Park flood storage areas and the upsizing of the pipe between DeCola Ponds D and E. All three concepts are expected to lower the 100-year flood elevation on DeCola Pond D by approximately 2.80 feet from existing conditions.

All three concepts also reduce flood elevations on DeCola Ponds E and F. Under existing conditions, there are structures on DeCola Ponds E and F that are at-risk of flooding for events as small as the 10-year storm event. For all three concepts, the expanded flood storage area on the SEA School/Wildwood Park properties reduces the 10-year flood elevations on DeCola Ponds E and F by approximately 0.8 feet. This reduction in the 10-year flood elevations removes three structures from being at risk of flooding during the 10-year storm event (six structures remain at risk). For all three concepts, the flood elevations on DeCola Ponds E and F from the 25-year event are estimated to be reduced by 0.7 feet. This reduction in the 25-year flood elevations removes three structures from being at risk of flooding during the 25-year storm event (fifteen structures remain at risk of flooding).

The impact of the expanded flood storage on the SEA School/Wildwood Park properties will have minimal impact on reducing the flood elevations on DeCola Ponds E and F for the 100-year event because the primary driver of flooding at these ponds is the runoff volume from the area east of the railroad tracks that discharges into the northeast corner of DeCola Pond F and the direct watersheds to Ponds E and F. For the 100-year event, the flood elevations on DeCola Ponds E and F are estimated to be reduced by 0.1 feet for all three concepts. This reduction in flood elevations for the 100-year event does not result in removing structures from being at risk of flooding. A future project (Phase III) is intended to have a more significant impact on lowering the flood elevations and flood risk to structures on DeCola Ponds E and F.

Table 6-1: SEA School/Wildwood Park Flood Storage Project Concept Matrix Summary

Category	Item	Existing Conditions	Concept 1: Underground Storage with Stream	Concept 2: Open Water	Concept 3: Wet Meadow
Outlet Modifications	DeCola Pond D Normal Water Level (NWL)	892.2	892.2	892.2	892.2
	DeCola Pond E Normal Water Level (NWL)	888.2	888.2	888.2	888.2
	Storm Sewer Diameter (inches)	27 - 30	48	48	48
Flood Mitigation	Total Flood Mitigation Volume (ac-ft) (SEA School/Wildwood)	-	9.1	8.6	8.5
	10-Year Flood Elevation (DeCola Ponds A, B, & C)	898.5	898.5	898.5	898.5
	10-Year Flood Elevation (DeCola Pond D)	893.7	893.1	893.1	893.1
	10-Year Flood Elevation (DeCola Pond E)	893.2	892.4	892.4	892.4
	10-Year Flood Elevation (DeCola Pond F)	893.2	892.4	892.4	892.4
	# of Potentially At-Risk Structures (10-year)	9	6	6	6
	100-Year Flood Elevation (DeCola Ponds A, B, & C)	901.7	901.7	901.7	901.7
	100-Year Flood Elevation (DeCola Pond D)	899.8	896.9	897.0	897.0
	100-Year Flood Elevation (DeCola Pond E)	895.9	895.9	895.9	895.9
	100-Year Flood Elevation (DeCola Pond F)	895.9	895.8	895.8	895.8
	# of Potentially At-Risk Structures (100-year)	29	19	19	19
Water Quality	Open Water Surface Area (ac) (Wildwood Park)	-	-	0.5	-
	Permanent Pool Water Quality Treatment Volume (ac-ft)	-	0.8	0.8	-
	Biofiltration Basin Water Quality Treatment Volume (ac-ft)	-	-	-	0.2
	Total Phosphorus Removal (lbs/yr)	73.4	75.0	75.2	77.5
	Increase in Total Phosphorus Removal (lbs/yr)	-	1.6	1.8	4.1
Trees	Total # of Surveyed[1] Trees (> 4 inches) and Trees <4" in SEA School Orchard	146	146	146	146
	Total # of Surveyed[1] Trees SEA School/Wildwood Park	139	139	139	139
	Total # of Surveyed[1] Trees between DeCola Ponds D and E	7	7	7	7
	Tree Removal Estimate SEA School/Wildwood Park	-	72	81	81
	Tree Removal Estimate between DeCola Ponds D and E	-	3	3	3
	# of Significant Trees Removed	110	48	57	57
	# of Legacy Trees Removed	0	0	0	0
	# of Orchard Trees Removed/Relocated	11	11	11	11
	# of Dead/Dying Trees Removed	0	0	0	0
	Tree Planting Estimate	-	35 - 70	35 - 80	35 - 80
	Preservation of Trees on Knoll	Yes	Yes	Yes	Yes
Restoration	Restored Wetland Area (ac)	-	0.6	0.3	0.8
	Restored Prairie Area (ac)	-	1.1	0.9	1.4
	Restored Turf Open Green Space (ac)	-	1.2	1.3	0.7
Trails	Length of Trail to be Removed (ft)	-	1180	1180	1180
	Length of New Paved Trail (ft)	-	2400	2240	1600
	Length of New Floating Boardwalk/Platform (ft)	-	-	135	-
Project Costs	Feasibility Level Opinion of Cost	-	$ 4.1 million	$2.9 million	$3.1 million
	Feasibility Level Opinion of Cost Range (-20% to +30%)	-	$3.3 - 5.4 million	$2.3 - $3.7 million	$2.5 - 4.0 million
	30-Year Annualized Cost Estimate	-	$246,200	$171,500	$192,400
	Cost per Acre-Ft of Flood Mitigation Volume	-	$451,900	$329,800	$360,000
	Annualized Cost per Pound of Total Phosphorus Removed (Total Project)	-	$153,900	$98,000	$47,300
	Annualized Cost per Pound of Total Phosphorus Removed (Water Quality Treatment)	-	$53,200	$5,700	$5,900

[1] Does not reflect a complete survey of all trees in the SEA School/Wildwood Park areas; Trees on large, upland knoll and trees outside disturbance extents were not all included in the original survey as the goal was not to impact those trees as part of this flood mitigation project.

Table 6-2: Medicine Lake Road and Winnetka Avenue Project Area - Key Flood Areas and Flood Elevation Summary

Flood Area	Flood Area Description	Flood Elevation (ft-NAVD88)							
		Existing Conditions (Phase 2 XP-SWMM Model)[1]		Concept 1 - UG Storage w/ Stream		Concept 2 - Open Water		Concept 3 - Wet Meadow	
		10-yr	100-yr	10-yr	100-yr	10-yr	100-yr	10-yr	100-yr
1	Terra Linda Low Point	906.5	907.3	906.5	907.3	906.5	907.3	906.5	907.3
2	Medicine Lake Road Low Point/Rosalyn Court	901.5	902.2	901.5	902.2	901.5	902.2	901.5	902.2
3	Rhode Island Ave Low Point	898.9	901.7	898.9	901.7	898.9	901.7	898.9	901.7
4	Dover Hill Apartments	900.9	901.7	900.9	901.7	900.9	901.7	900.9	901.7
5	Decola Pond A	898.5	901.7	898.5	901.7	898.5	901.7	898.5	901.7
6	Decola Pond B	898.5	901.7	898.5	901.7	898.5	901.7	898.5	901.7
7	Decola Pond C	898.5	901.7	898.5	901.7	898.5	901.7	898.5	901.7
8	Decola Pond D	893.7	899.8	893.1	896.9	893.1	897.0	893.1	897.0
9	Decola Pond E	893.2	895.9	892.4	895.9	892.4	895.9	892.4	895.9
10	Decola Pond F	893.2	895.9	892.4	895.8	892.4	895.8	892.4	895.8
11	Medicine Lake Road East of Railroad	911.6	912.3	911.6	912.3	911.6	912.3	911.6	912.3
12	East of Railroad to Decola Pond C	900.1	901.6	900.1	901.6	900.1	901.6	900.1	901.6
13	East of Railroad at Low Point on Nevada	903.0	903.8	903.0	903.8	903.0	903.8	903.0	903.8
14	East of Railroad at Low Point on Sandburg	902.3	903.8	902.3	903.8	902.3	903.8	902.3	903.8
15	East of Railroad to Decola Pond F	898.6	901.2	898.6	901.2	898.6	901.2	898.6	901.2
16	Honeywell Pond	883.4	886.4	883.3	886.3	883.3	886.3	883.3	886.3

[1] Existing conditions flood elevations include the Liberty Crossing and DeCola Ponds B&C flood mitigation projects and includes modifications to channel east of DeCola Pond C.

Table 6-3: Medicine Lake Road and Winnetka Avenue Project Area - At-Risk[1] Properties

Address[1]	City	Property Type	Flood Area	Elevation of Lowest Opening (ft - NAVD88)[2]	Existing Conditions[5]				Concept 1 - Underground Storage w/ Stream				Concept 2 - Open Water				Concept 3 - Wet Meadow			
					10-Year Flood Elevation (ft - NAVD88)[3]	100-Year Flood Elevation (ft - NAVD88)[3]	10-year Flood Depth (ft)[4]	100-year Flood Depth (ft)[4]	10-Year Flood Elevation (ft - NAVD88)[3]	100-Year Flood Elevation (ft - NAVD88)[3]	10-year Flood Depth (ft)[4]	100-year Flood Depth (ft)[4]	10-Year Flood Elevation (ft - NAVD88)[3]	100-Year Flood Elevation (ft - NAVD88)[3]	10-year Flood Depth (ft)[4]	100-year Flood Depth (ft)[4]	10-Year Flood Elevation (ft - NAVD88)[3]	100-Year Flood Elevation (ft - NAVD88)[3]	10-year Flood Depth (ft)[4]	100-year Flood Depth (ft)[4]
7145 SANDBURG RD	GOLDEN VALLEY	Business	15	901.00	898.6	901.2	0.0	0.2	898.6	901.2	0.0	0.2	898.6	901.2	0.0	0.2	898.6	901.2	0.0	0.2
7825 MEDICINE LAKE RD	GOLDEN VALLEY	Business	2	903.95	901.5	902.2	0.0	0.0	901.5	902.2	0.0	0.0	901.5	902.2	0.0	0.0	901.5	902.2	0.0	0.0
7775 MEDICINE LAKE RD	GOLDEN VALLEY	Business	2	904.68	901.5	902.2	0.0	0.0	901.5	902.2	0.0	0.0	901.5	902.2	0.0	0.0	901.5	902.2	0.0	0.0
2740 ROSALYN CT	NEW HOPE	Multi-Residential	2	903.43	901.5	902.2	0.0	0.0	901.5	902.2	0.0	0.0	901.5	902.2	0.0	0.0	901.5	902.2	0.0	0.0
2710 ROSALYN CT	NEW HOPE	Multi-Residential	2	904.63	901.5	902.2	0.0	0.0	901.5	902.2	0.0	0.0	901.5	902.2	0.0	0.0	901.5	902.2	0.0	0.0
2700 ROSALYN CT	NEW HOPE	Multi-Residential	2	904.40	901.5	902.2	0.0	0.0	901.5	902.2	0.0	0.0	901.5	902.2	0.0	0.0	901.5	902.2	0.0	0.0
2730 ROSALYN CT	NEW HOPE	Multi-Residential	2	904.49	901.5	902.2	0.0	0.0	901.5	902.2	0.0	0.0	901.5	902.2	0.0	0.0	901.5	902.2	0.0	0.0
7500 WINNETKA HEIGHTS DR	GOLDEN VALLEY	Residential	5	899.98	898.5	901.7	0.0	1.7	898.5	901.7	0.0	1.7	898.5	901.7	0.0	1.7	898.5	901.7	0.0	1.7
2155 KELLY DR	GOLDEN VALLEY	Residential	8	900.32	893.7	899.8	0.0	0.0	893.1	896.9	0.0	0.0	893.1	897.0	0.0	0.0	893.1	897.0	0.0	0.0
2145 KELLY DR	GOLDEN VALLEY	Residential	8	899.84	893.7	899.8	0.0	0.0	893.1	896.9	0.0	0.0	893.1	897.0	0.0	0.0	893.1	897.0	0.0	0.0
2135 KELLY DR[6]	**GOLDEN VALLEY**	**Residential**	**8**	**899.31**	**893.7**	**899.8**	**0.0**	**0.4**	**893.1**	**896.9**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**
2125 KELLY DR[6]	**GOLDEN VALLEY**	**Residential**	**8**	**898.73**	**893.7**	**899.8**	**0.0**	**1.0**	**893.1**	**896.9**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**
7350 WINNETKA HEIGHTS DR[6]	**GOLDEN VALLEY**	**Residential**	**8**	**898.31**	**893.7**	**899.8**	**0.0**	**1.4**	**893.1**	**896.9**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**
7400 WINNETKA HEIGHTS DR[6]	**GOLDEN VALLEY**	**Residential**	**8**	**898.43**	**893.7**	**899.8**	**0.0**	**1.3**	**893.1**	**896.9**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**
7450 WINNETKA HEIGHTS DR[6]	**GOLDEN VALLEY**	**Residential**	**8**	**898.37**	**893.7**	**899.8**	**0.0**	**1.4**	**893.1**	**896.9**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**
2120 PENNSYLVANIA AVE N[6]	**GOLDEN VALLEY**	**Residential**	**8**	**899.18**	**893.7**	**899.8**	**0.0**	**0.6**	**893.1**	**896.9**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**
2140 PENNSYLVANIA AVE N[6]	**GOLDEN VALLEY**	**Residential**	**8**	**897.98**	**893.7**	**899.8**	**0.0**	**1.8**	**893.1**	**896.9**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**
2200 PENNSYLVANIA AVE N	**GOLDEN VALLEY**	**Residential**	**8**	**898.06**	**893.7**	**899.8**	**0.0**	**1.7**	**893.1**	**896.9**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**
2220 PENNSYLVANIA AVE N	**GOLDEN VALLEY**	**Residential**	**8**	**897.26**	**893.7**	**899.8**	**0.0**	**2.5**	**893.1**	**896.9**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**
2240 PENNSYLVANIA AVE N	**GOLDEN VALLEY**	**Residential**	**8**	**897.09**	**893.7**	**899.8**	**0.0**	**2.7**	**893.1**	**896.9**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**	**893.1**	**897.0**	**0.0**	**0.0**
7820 TERRA LINDA DR	NEW HOPE	Residential	1	905.80	906.5	907.3	0.7	1.5	906.5	907.3	0.7	1.5	906.5	907.3	0.7	1.5	906.5	907.3	0.7	1.5
1920 PENNSYLVANIA AVE N	GOLDEN VALLEY	Residential	9	892.43	893.2	895.9	0.8	3.5	892.4	895.9	0.0	3.4	892.4	895.9	0.0	3.4	892.4	895.9	0.0	3.5
7450 DULUTH ST	GOLDEN VALLEY	Residential	9	892.71	893.2	895.9	0.5	3.2	892.4	895.9	0.0	3.2	892.4	895.9	0.0	3.2	892.4	895.9	0.0	3.2
7400 DULUTH ST	GOLDEN VALLEY	Residential	9	891.18	893.2	895.9	2.0	4.7	892.4	895.9	1.2	4.7	892.4	895.9	1.2	4.7	892.4	895.9	1.2	4.7
7350 DULUTH ST	GOLDEN VALLEY	Residential	9	891.99	893.2	895.9	1.2	3.9	892.4	895.9	0.4	3.9	892.4	895.9	0.4	3.9	892.4	895.9	0.4	3.9
7310 DULUTH ST	GOLDEN VALLEY	Residential	9	897.37	893.2	895.9	0.0	0.0	892.4	895.9	0.0	0.0	892.4	895.9	0.0	0.0	892.4	895.9	0.0	0.0
1925 KELLY DR	GOLDEN VALLEY	Residential	9	890.96	893.2	895.9	2.2	5.0	892.4	895.9	1.4	4.9	892.4	895.9	1.5	4.9	892.4	895.9	1.4	5.0
1945 KELLY DR	GOLDEN VALLEY	Residential	9	893.24	893.2	895.9	0.0	2.7	892.4	895.9	0.00	2.6	892.4	895.9	0.00	2.6	892.4	895.9	0.00	2.7
1965 KELLY DR	GOLDEN VALLEY	Residential	9	892.36	893.2	895.9	0.8	3.6	892.4	895.9	0.0	3.5	892.4	895.9	0.1	3.5	892.4	895.9	0.0	3.6
2005 KELLY DR	GOLDEN VALLEY	Residential	9	893.47	893.2	895.9	0.0	2.4	892.4	895.9	0.0	2.4	892.4	895.9	0.0	2.4	892.4	895.9	0.0	2.4
2015 KELLY DR	GOLDEN VALLEY	Residential	9	893.93	893.2	895.9	0.0	2.0	892.4	895.9	0.0	1.9	892.4	895.9	0.0	1.9	892.4	895.9	0.0	2.0
2035 KELLY DR	GOLDEN VALLEY	Residential	9	894.29	893.2	895.9	0.0	1.6	892.4	895.9	0.0	1.6	892.4	895.9	0.0	1.6	892.4	895.9	0.0	1.6
2065 KELLY DR	GOLDEN VALLEY	Residential	9	894.88	893.2	895.9	0.0	1.0	892.4	895.9	0.0	1.0	892.4	895.9	0.0	1.0	892.4	895.9	0.0	1.0
2080 KELLY DR	GOLDEN VALLEY	Residential	10	895.75	893.2	895.9	0.0	0.2	892.4	895.8	0.0	0.05	892.4	895.8	0.0	0.1	892.4	895.8	0.0	0.1
2060 KELLY DR	GOLDEN VALLEY	Residential	10	894.16	893.2	895.9	0.0	1.8	892.4	895.8	0.0	1.6	892.4	895.8	0.0	1.6	892.4	895.8	0.0	1.7
2040 KELLY DR	GOLDEN VALLEY	Residential	10	894.31	893.2	895.9	0.0	1.6	892.4	895.8	0.0	1.5	892.4	895.8	0.0	1.5	892.4	895.8	0.0	1.5
2020 KELLY DR	GOLDEN VALLEY	Residential	10	893.70	893.2	895.9	0.0	2.2	892.4	895.8	0.0	2.1	892.4	895.8	0.0	2.1	892.4	895.8	0.0	2.1
2000 KELLY DR	GOLDEN VALLEY	Residential	10	892.21	893.2	895.9	1.0	3.7	892.4	895.8	0.2	3.6	892.4	895.8	0.2	3.6	892.4	895.8	0.2	3.6
1940 KELLY DR	GOLDEN VALLEY	Residential	10	893.28	893.2	895.9	0.0	2.6	892.4	895.8	0.0	2.5	892.4	895.8	0.0	2.5	892.4	895.8	0.0	2.6
1920 KELLY DR	GOLDEN VALLEY	Residential	10	892.68	893.2	895.9	0.5	3.2	892.4	895.8	0.0	3.1	892.4	895.8	0.0	3.1	892.4	895.8	0.0	3.2
1925 MARYLAND AVE N	GOLDEN VALLEY	Residential	10	891.48	893.2	895.9	1.7	4.4	892.4	895.8	0.9	4.3	892.4	895.8	0.9	4.3	892.4	895.8	0.9	4.4
1935 MARYLAND AVE N	GOLDEN VALLEY	Residential	10	899.38	893.2	895.9	0.0	0.0	892.4	895.8	0.0	0.0	892.4	895.8	0.0	0.0	892.4	895.8	0.0	0.0
2400 RHODE ISLAND AVE N (Garage)	GOLDEN VALLEY	Multi-Residential	4	903.74	900.9	901.7	0.0	0.0	900.9	901.7	0.0	0.0	900.9	901.7	0.0	0.0	900.9	901.7	0.0	0.0
2400 RHODE ISLAND AVE N (Garage)	GOLDEN VALLEY	Multi-Residential	4	903.75	900.9	901.7	0.0	0.0	900.9	901.7	0.0	0.0	900.9	901.7	0.0	0.0	900.9	901.7	0.0	0.0

1 - Properties determined to be at-risk of flooding based on comparison of modeled flood elevations and surveyed low openings.
2- Lowest openings determined from 2014 survey (Barr), 2006 survey (from New Hope/Stantec), and 1978 survey (Barr, verified in 2014)
3 - Flood elevation based on XP-SWMM modeling utilizing the Atlas 14 precipitation depths and nested storm distribution
4 - Flood depth above low opening of structure, based on difference between the flood elevation and the lowest opening of structure
5- BCWMC Phase 2 XP-SWMM model was updated to include the Liberty Crossing and DeCola Ponds B&C flood mitigation projects and includes updates to channel east of DeCola Pond C.
6- Structure removed from being at-risk during the 100-year storm event

6.1.3 P8 Water Quality Modeling Results

Although the primary goal of the SEA School/Wildwood Park project is to create additional flood mitigation volume, there is also an opportunity to improve the water quality.

As discussed previously, the proposed design for the SEA School-Wildwood Park flood mitigation study includes the diversion of stormwater runoff away from DeCola Ponds E and F into the proposed features for extended detention. This means the diverted volume would no longer be treated in DeCola Ponds E and F. Thus, a main goal of the water quality design for the SEA School/Wildwood Park features included the mitigation of this water quality treatment loss. A secondary goal was to treat above the mitigation standards to further protect downstream waterbodies.

The BCWMC Engineer estimated the pollutant (total phosphorus) removals for the SEA School/Wildwood Park area for each conceptual design alternative using the BCWMC P8 model. The model was updated to reflect existing conditions. The model was then updated to reflect the proposed rerouting of watersheds and additional permanent pool and flood pool volumes provided by each of the concepts.

Under current conditions, the P8 model estimates that approximately 73.4 pounds of total phosphorus are removed annually in DeCola Ponds D, E, and F and the downstream pond (Honeywell Pond). With implementation of Concept 1, the total phosphorus removal rate would increase to approximately 75.0 pounds per year (additional removals of 1.6 pounds of total phosphorus per year). The implementation of Concept 2 would increase the total phosphorus removal rate to approximately 75.2 pounds per year (additional removal of 1.8 pounds of total phosphorus removal per year). With the implementation of Concept 3, the total phosphorus removal rate would increase to approximately 77.5 pounds of total phosphorus per year (additional 4.1 pounds of total phosphorus removal per year).

The Main Stem of Bassett Creek is currently listed as impaired. The affected use is aquatic life based on fish bioassessments. Although a stressor identification study has not been completed to determine the exact cause of this impairment, reductions in sediment and pollutant loads to the creek can likely help address this impairment.

6.2 Wetland and Upland Creation and Restoration

For all three concepts, various habitat types will be created on the SEA School/Wildwood Park properties. Depending on the concept, these habitat types include wet meadows, prairie, open water, turfed open green space, and a planted biofiltration basin. The restoration type will be determined based on the frequency and duration of inundation.

In all concepts, areas that are expected to be inundated by the 2-year 24-hour and smaller events will be restored as a type of wetland known as a wet meadow. These enhanced wetland areas would allow for increased water quality treatment and enriched habitat communities for animal and plant species. The total created wetland areas for each concept are summarized in Table 6-1.

Areas outside of the 2-year inundation would either be restored with native prairie species or turfed open green space depending on the activity use for the area. The total created prairie and turfed green space areas for each concept are summarized in Table 6-1.

For all conceptual designs, some tree removal would be required in the disturbed area to create the additional flood storage and to install the storm sewer between DeCola Ponds D and E. However, the upland areas would be restored with native plants, shrubs, and trees. The density of trees in these restored areas would be determined during final design, although it is anticipated that the tree density that would be replanted would range from a savannah type ecosystem (approximately 35 trees per acre) to a forest ecosystem (approximately 110 trees per acre). These trees should provide shade and aesthetically pleasing views for park users and provide habitat for upland dwelling wildlife. Existing trees would be preserved in areas outside the disturbed area and only a limited number of trees would be removed from the wooded knoll in Wildwood Park.

6.3 Open Water Area Creation

Concept 2 includes the development of approximately 0.5 acres of open water within Wildwood Park. This open water area is proposed to have a maximum depth of 4 feet, with a 10-foot wide safety bench installed around the entire periphery of the pond for safety reasons. The open water area would provide permanent pool volume for water quality treatment and allow for the introduction of aquatic habitat into the park. For park users, the concept proposes the installation of a floating platform down to the water surface. This would allow for passive enjoyment of the open water area and can also allow for student participation in environmental learning activities at the SEA School.

6.4 Easement acquisition

Nearly all of the proposed work is located on City of Golden Valley property, right-of-way, or within existing drainage and utility easements. However, permanent or temporary easements are anticipated for this project:

- The City may need to obtain permanent and temporary easements from the SEA School for the work on the SEA School property. The BCWMC Engineer assumed no cost to the City for obtaining the required easements.
- A temporary construction easement on residential land will be needed to accommodate access, construction staging, and the installation of storm sewer pipe between DeCola Ponds D and E. The planning level opinions of cost include the estimated cost of obtaining these easements.

6.5 Permits required for the project

The proposed project is expected to require the following permits/approvals, regardless of the selected concept:

- Construction Stormwater General Permit from the Minnesota Pollution Control Agency (MPCA)
- Compliance with the MPCA's guidance for managing contaminated material and debris-containing fill

- Compliance with the Minnesota Wetland Conservation Act
- Stormwater Management Permit from the City of Golden Valley
- Right-of-Way Management Permit from the City of Golden Valley

6.5.1 Section 404 Permit and Section 401 Certification

According to Section 404 of the Clean Water Act (CWA), the U.S. Army Corps of Engineers (USACE) regulates the placement of fill and certain dredging activities in jurisdictional wetlands and other waters of the United States. Jurisdictional wetlands and other waters are those that the USACE determines to have a significant nexus with navigable waters. A jurisdictional determination request was sent to the USACE to determine if DeCola Ponds D and E are jurisdictional. The USACE determined that DeCola Pond D and E are not jurisdictional and do not require a Section 404 permit or 401 certifications.

6.5.2 Construction Stormwater General Permit

A National Pollutant Discharge Elimination System (NPDES)/State Disposal System (SDS) Construction Stormwater General Permit from the MPCA authorizes stormwater runoff from construction sites. A Construction Stormwater General Permit is required as the proposed project will disturb more than one acre of soil. Preparation of a stormwater pollution prevention plan explaining how stormwater will be controlled within the project area during construction will be required as part of this permit.

6.5.3 Guidance for Managing Contaminated Soils and Debris-Containing Fill

Phase II investigations indicate the soils in the project area meet the MPCA's guidelines for unregulated fill, with the exception of debris-containing fill, which should be disposed at a permitted landfill. Debris-free soils with no field evidence of environmental impacts must be managed in accordance with MPCA's Best Management Practices for the Off-Site Reuse of Unregulated Fill (MPCA, 2012) and the provisions of the Response Action Plan and Site Contingency Plan (Barr, 2015).

6.5.4 Minnesota Wetland Conservation Act

The Minnesota Wetland Conservation Act (WCA) was enacted to protect wetlands not protected under the MnDNR's public waters work permit program. The WCA regulates filling and draining of all wetlands and regulates excavation within Type 3, 4, and 5 wetlands. The WCA is administered by a local governmental unit (LGU), and it is expected that the city of Golden Valley will be the LGU for WCA-regulated wetland impacts associated with the proposed project.

6.5.5 Stormwater Management Permit

The City of Golden Valley requires Stormwater Management Permits for land-disturbing activities that remove soils or vegetation, including but not limited to clearing, digging, dredging, draining, or filling. This permit would be required for projects that construct, expand, or modify a stormwater quality treatment facility or stormwater BMP. It is anticipated the City of Golden Valley would require a Stormwater Management Permit for the proposed project.

6.5.6 Right-of-Way Management (ROW) Permit

The City of Golden Valley requires a Right-of-Way (ROW) permit for temporary obstructions to travel ways and for the planting of trees, shrubs, or other landscaping features over 12-inches high. It is anticipated that City of Golden Valley would require a ROW permit for the proposed project.

6.6 Other project impacts

6.6.1 Temporary Closure of Walking Trails and Playground

SEA School and Wildwood Park contain paved trails that connect to Kelly Drive and Pennsylvania Avenue. Since a portion of the walking trails will be impacted by the construction activities, it will be necessary to close the trails during construction activity. Additionally, because construction will occur directly adjacent to the playground, the playground will be temporarily closed. Trail and playground closure signs and barricades will be installed, and a pedestrian detour route will be determined during final design. Every effort will be made to minimize the duration of the trail and playground closures, including considering winter construction to minimize impacts to park users.

6.6.2 Temporary Closure of SEA School Driveway

All three concepts propose the re-alignment of the SEA School driveway. During the driveway re-alignment, road closure signs and barricades will be installed. Vehicle detour routes will be determined during final design. Every effort will be made to minimize the duration of the driveway closure, including working during months when school is not in session and/or considering weekend construction to minimize impacts to school traffic.

6.6.3 Tree Removals

For the proposed conceptual designs 75 - 84 of the surveyed trees are estimated for removal (those located within the project disturbance/grading limits on the SEA School/Wildwood Properties and for the storm sewer install between DeCola Ponds D and E). Of the trees estimated for removal, 48 - 57 are classified as significant (by Golden Valley ordinance). Eleven of these trees are also part of an existing orchard on the SEA School property. All of the trees located in the existing orchard will be relocated to a new orchard area adjacent to the playground. It is expected that residents and community members may have concerns about the tree removals. To address these concerns, it will be essential to show and describe the restoration efforts that will be implemented to mitigate the tree losses. Additionally, the City of Golden Valley Forester indicated that some recently planted trees may be viable for transplanting. Specific details on site restoration can be found in Section 6.2.

6.6.4 Impacts to Bats

Preservation of bat species in Minnesota has recently become an important issue. White Nose Syndrome (WNS) has been attributed to the deaths of millions of bats in recent years across the United States, and all four species that hibernate in Minnesota are susceptible to the disease (MnDNR, 2015). Bats typically hibernate in sheltered areas such as caves, but some bats nest in trees during summer months. Extensive tree removals are to be avoided when bats are in their active season (April – September) so that nests or foraging areas are not inadvertently destroyed. During final design, there should be additional

consultation with the US Fish and Wildlife Service or MnDNR regarding the timing of any tree removals and the potential impacts to bats.

7.0 Project cost considerations

This section presents the feasibility-level opinion of cost of the evaluated alternatives, discusses potential funding sources, and provides an approximate project schedule.

7.1 Opinion of Cost

The opinion of cost is a Class 4 feasibility-level cost estimate as defined by the American Association of Cost Engineers International (AACI International) and uses the assumptions listed below and detailed in the following sections.

1. The cost estimate assumes a 25% construction contingency.
2. Costs associated with design, permitting, and construction observation (collectively "engineering") is assumed to be 25% of the estimated construction costs.
3. Although much of the project area is located on City of Golden Valley property, right-of-way, or within a drainage and utility easement, a temporary construction easement may be necessary south of DeCola D for the modification to the storm sewer pipe between DeCola Ponds D and E; a minor cost was included for a construction easement in the feasibility-level opinion of cost. The BCWMC Engineer assumed no cost to the City for obtaining the required easements on the SEA School property.

The Class 4 level cost estimates have an acceptable range of between -15% to -30% on the low range and +20% to +50% on the high range. Based on the development of concepts and initial vetting of the concepts by the City of Golden Valley, it is not necessary to utilize the full range of the acceptable range for the cost estimate; and we assume the final project costs may be between -20% and +30% of the estimated project budget.

The feasibility-level total construction cost estimates, 30-year annualized total construction cost estimates, cost per acre-foot of flood mitigation volume, and annualized costs per pound of total phosphorus removed for each recommended concept are summarized in Table 6-1. These costs do not include the cost of feasibility design. Appendix B provides detailed cost-estimate tables for all three concepts.

7.1.1 Temporary easements

Nearly all of the proposed work is located on City of Golden Valley property, right-of-way, or within existing drainage and utility easements. However, a temporary construction easement on residential land will be needed to accommodate access, construction staging, and the installation of storm sewer pipe between DeCola Ponds D and E.

The City may need to obtain permanent and temporary easements from the SEA School for the work on the SEA School property. The BCWMC Engineer assumed no cost to the City for obtaining the required easements.

7.1.2 Wetland mitigation

The wetland delineation for DeCola Ponds D and E and the SEA School/Wildwood Park areas identified wetlands at the pond peripheries. The goal of the proposed alternatives is to minimize the amount of wetland impacts, restore all impacted wetland areas to the existing wetland type, and develop new wetland habitat in the disturbed extents. Therefore, it is not anticipated that the project will incur additional costs for wetland mitigation.

7.1.3 Maintenance considerations

Operation and maintenance (O&M) activities will be the responsibility of the City of Golden Valley. This section provides an overview of the anticipated maintenance activities for each concept design. The O&M recommendations include specific inspection/maintenance activities and frequency, and estimated annual costs based on existing project data. The City of Golden Valley may have alternative unit costs for each O&M task based on annual staffing and equipment availability. The following table summarizes the recommended maintenance activities for the proposed project features and the anticipated annual costs.

Table 7-1 Estimated Operations and Maintenance Tasks and Annual Costs

Feature	O&M Task	Frequency	Estimated Annual Cost
Biofiltration Basin with Iron-Enhanced Sand Trenches	Inspect basin for trash, debris, soil accumulation, presence of weeds, depth of mulch, condition of plants, blockages in inlet/outlet structures, presence of plowed snow (winter only), standing water (>48 hours)	Once per month (growing season), twice per winter and following rain events >2″	$9,000/basin
	Remove weeds from basin; remove all vegetative growth from iron-enhanced sand trenches	Once per month (growing season)	
	Remove and replace dead or diseased plants, remove invasive plants	At least once per year	
	Remove trash, debris, and sediment from energy dissipation structures, inlet structure, outlet structure, and basin	Infrequent (as needed)	
	Draintile jetting when prolonged inundation is observed (standing water > 48 hours)	Infrequent (as needed)	
	Replace mulch in bare areas	Infrequent (as needed)	
	Remove and replace iron-enhanced sand trenches	Every 15+ years	
Stormwater Ponds; Inlet/Outlet Structures	Inspect stormwater ponds for accumulation of trash, debris, and sediment; inspect slopes for presence of weeds, erosion, invasive species, and condition of plants; inspect inlet structures for structural damage or blockage	At least once per year and following rain events >2″	$5,000/pond
	Inspect outlet control structures, storm sewer pipes, sumps, weirs, and orifices for accumulation of trash, debris, and sediment; inspect for water surface elevations not dropping to normal water level (blocked outlet); inspect for structural damage	At least four times per year and following rain events >2″	
	Inspect diversion manholes for trash, debris, and sediment accumulation in the structures; inspect for storm sewer pipe blockages; inspect for structural damage	At least once per year and following rain events >2″	
	Remove trash and debris from stormwater ponds; remove weeds and invasive species and provide seed/sod; remove and replace dead or diseased plants	At least once per year and following rain events >2″	
	Remove trash, debris and sediment from diversion manholes and outlet control features with vacuum truck hose	At least once per year and following rain events >2″	
	Survey bottom of dead storage stormwater ponds to estimate volume of sediment accumulation	Every 10 years	
	Dredge accumulated sediment in stormwater ponds	Every 10+ years	
Underground Storage	Inspect underground storage area for accumulation of trash, debris, oil, sediment, structural damage, blocked inlet/outlet pipes; Measure sediment depth; Inspect ground surface for depressions or sink holes	At least once per year and following events >2″	$1,000/storage area
	Remove accumulated trash, debris, oil, and sediment in storage area with vac truck hose	Infrequent (as needed)	
Wet Meadow and Prairie Habitat Areas	Inspect wet meadow and prairie habitats for trash, debris, soil accumulation, presence of weeds, condition of plants, blockages in inlet/outlet structures, presence of plowed snow (winter only), standing water (>48 hours)	Once per month (growing season), twice per winter and following rain events >2″	$2,500/Area
	Remove weeds from wet meadow and prairie habitats	Once per month (growing season)	
	Remove and replace dead or diseased plants, remove invasive plants	At least once per year	

7.1.4 30-year cost

The 30-year cost for each alternative is calculated as the future worth of the initial capital cost (including contingency and engineering costs) plus the future worth of annual maintenance and significant maintenance at the end of the alternative's estimated useful life. A 4% rate of inflation is assumed. The annualized cost for each alternative is calculated as the value of 30 equal, annual payments of the same future worth as the 30-year cost. The 30-year annualized cost estimates for each concept are presented in Table 6-1.

7.1.5 Annualized pollutant reduction cost

Section 6.1.3 and Table 6-1 show the estimated annual loading reductions for total phosphorus (TP) for each recommended conceptual design alternative. The BCWMC Engineer estimated the total phosphorus load reductions by modifying the BCWMC P8 model to include the proposed alternatives and comparing to existing conditions.

The annualized pollutant-reduction cost for each alternative is presented in two ways. The first value is the annualized 30-year total project cost (including both flood and water quality portions of the project) divided by the annual load reduction. The second value is the estimated annualized 30-year water quality treatment project cost divided by the annual load reduction. The water quality treatment project cost was estimated by summing the itemized project costs related to water quality improvement, comparing this to the total project cost, and utilizing that fraction of the total project cost. The 30-year annualized total phosphorus removal cost was analyzed using two different methods since the project goal is primarily for flood mitigation and secondarily for water quality improvement.

The cost per pound of phosphorus removed for this project using the current P8 model analysis is high compared to other BCWMC CIP projects—for example, previous high costs per pound of phosphorus removed for BCWMC CIP projects were $5,900 for the Northwood Lake Improvement Project and $9,600 for the DeCola Ponds B&C Flood Mitigation Project (water quality improvement components). The high cost per pound of phosphorus removed for this project is due to do the fact that the SEA School-Wildwood Park Flood Storage Project's primary goal is to mitigate flooding and to mitigate the water quality treatment lost from diverting stormwater away from DeCola Ponds E and F. A major portion of the construction costs are for the creation of flood storage volume, for the restoration of the graded areas, and for the mitigation of lost water quality from re-routing stormwater runoff rather than for water quality improvement. Concept 1 is particularly high because water quality improvement includes the installation of subsurface storage to achieve the water quality treatment.

7.1.6 Miscellaneous costs

Miscellaneous costs that may arise during final design might relate to park recreational or educational improvements. Since the proposed project area is within an existing park and adjacent to a school, final design may uncover opportunities to improve trash management, pet waste management, tree management, park safety and/or incorporate other recreational amenities such as overlooks, sun shelters, benches, and wildlife habitat/features. The inclusion of educational signage or interactive features could also be considered as part of final design due to the large number of patrons that utilize the park,

including students, neighborhood residents, and residents that travel to the park from outside of the neighborhood for sporting activities (e.g., pickle ball). These additional features may not be applicable for BCWMC CIP funding, so funding may need to be coordinated with the City of Golden Valley.

7.2 Funding sources

As described in Section 8.0 below, the Commission Engineer recommends implemented Concept 3. The planning level estimated cost for Concept 3 is $3.1 million (-20%/+30%) (see Section 8.0). The BCWMC proposes to use $1.3 million of its CIP funds to help pay for the SEA School-Wildwood Park Flood Storage Project. The CIP funds are raised through an ad valorem tax levied by Hennepin County on behalf of the BCWMC. For this project, $300,000 is proposed to be levied in 2022 and $1 million levied in 2023. As a result, the BCWMC CIP funds alone will not fully cover the implementation of this project. Other sources of funding for this project are required and include:

- City of Golden Valley,
- MnDNR Flood Damage Reduction Grants (through the state legislature/project bonding bill),
- Other sources, including potential grants (e.g. Hennepin County Natural Resource Opportunity grants)

The current amount allocated thorough the MnDNR Flood Damage Reduction Grant for this project is $1.3 million.

7.3 Project schedule

The BCWMC will hold a public hearing in September 2021 on this project. Pending the outcome of the hearing, the BCWMC would officially order the project, enter into an agreement with the City of Golden Valley to design and construct the project, and certify to Hennepin County a final 2022 tax levy for this project.

The construction work would likely begin in the fall or winter of 2022, as tree removal should occur in the period from October through March, outside of the northern long-eared bat's active season (April through September). Additionally, excavation during the winter would be appropriate to complete the major earthwork during periods with less frequent runoff events. However, construction phasing should also consider minimizing impacts to the SEA School as the driveway realignment will affect bus traffic at the school. Construction would be completed in spring/summer 2023.

If project construction is scheduled for fall or winter 2022, spring or summer 2022 bidding is recommended. This would give contractors adequate scheduling time to complete the project at a reasonable price. In the intervening time, the City would gather public input, prepare the final design, and obtain permits.

8.0 Alternatives assessment and recommendations

Table 8-1 provides an overview of the main project impacts and benefits for each Concept based on the details outlined in the previous sections (also summarized in Table 1-1). For a complete summary of the estimated impacts, permitting requirements, closure of pedestrian trails, and costs of the concepts, including the methodology and assumptions used for the cost estimate, refer to Section 6.0, Section 7.0, and Table 6-1.

Based on review of the project impacts for each of the three concepts, the overall project costs, and comments received from BCWMC staff, City of Golden Valley staff (e.g., Open Spaces and Recreation Commission, Environmental Commission), SEA School representatives, the neighborhood, park users, and the general public during the feasibility study process, the BCWMC Engineer recommends constructing Concept 3.

While Concept 1 results in the development of the most flood mitigation volume when compared to Concepts 2 and 3, the difference in the flood reduction in DeCola Ponds D, E, and F is only a maximum of 0.05 feet during the 100-year 24-hour event. This difference in flood elevations on DeCola Ponds D, E, and F does not change the number of structures at risk of flooding. Therefore, in terms of flood reduction benefits, Concepts 1, 2, and 3 perform equally.

The existing permanent pools in DeCola Ponds E and F already provide a significant amount of pollutant removal; however, the addition of new flood storage areas in wet meadows and prairies and the inclusions of dead pool storage or biofiltration results in an increase in the treatment provided by the project. Concept 3 provides the largest total phosphorus removal of the three concepts analyzed and relies on iron-enhanced sand filtration, which is an added benefit because the material would be able to remove a portion of the dissolved fraction of the total phosphorus.

Although tree preservation is targeted for certain areas within Wildwood Park (e.g. the existing knoll in the northeast corner of the park), tree impacts are expected for all three concepts. Concept 3 proposes the removal of only 9 additional trees from that of Concept 1.

The planning level budget that the BCWMC and the City of Golden Valley have been using for budgeting is $2.7 – 3.0 million (-20%/+40%). Concept 3 has a point opinion of cost of $3.1 million (-20%/+30%), which falls within the range of the original planning level budget.

Through discussions with BCWMC and City representatives, SEA School representatives, the neighborhood, park users, and the general public, the following items will also be considered during the final design of Concept 3:

- Coordinating the upsizing and restoration of the DeCola D outlet with impacted property owners
- Including additional pre-treatment considerations for stormwater runoff diverted from Pennsylvania Ave and Duluth Street toward the water quality treatment and flood storage in the Wildwood Park/SEA School properties.

- Integrating vegetation/screening between the filtration trenches in the proposed iron-enhanced sand filtration basin.
- Exploring opportunities to promote better drainage towards the proposed outlets in the wet meadow habitat areas.
- Providing an accessible looped walking trail around the site that is above the ~10 year event elevation or higher to make the trail more accessible and reduces maintenance. Additionally, the trail alignments and design should consider an east-west trail connection from Kelly Drive to the park interior (i.e. the playground), should consider future access and space needs around the pickleball courts, and consider future safe routes to school alignments along Kelly Drive.
- Restoring a variety of habitat types and replanting of trees, to mitigate loss of trees and provide shade in specific locations
- Continuing to coordinate design of the realignment of the northern SEA School driveway to Maryland Avenue with SEA School staff and evaluate specific items requested during final design. Also, phasing construction in this area to minimize impacts to SEA School access and operations.
- Preserving key park features in including the pickleball courts, the playground area, the wooded knoll, the sledding hill, and open turf areas for various recreation activities (e.g. the northeast corner of the park).
- Providing flood mitigation and water quality educational opportunities for students, neighborhood residents, and park users.

Table 8-1 SEA School-Wildwood Park Flood Storage Impacts Summary

Category	Item	Existing Conditions	Concept 1: Underground Storage with Stream	Concept 2: Open Water	Concept 3: Wet Meadow
Flood Mitigation	Increase in Flood Mitigation Volume (ac-ft) (SEA School/Wildwood)	-	9.1	8.6	8.5
	# of Potentially At-Risk Structures (10-year)	9	6	6	6
	# of Potentially At-Risk Structures (100-year)	29	19	19	19
Water Quality	Increase in Water Quality Treatment Volume (ac-ft)	-	0.8	0.8	0.2
	Increase in Total Phosphorus Removal (lbs/yr)	-	1.6	1.8	4.1
Trees	Tree Removal Estimate SEA School/Wildwood Park	-	72	81	81
	Tree Removal Estimate between DeCola Ponds D and E	-	3	3	3
	# of Significant Trees Removed	110	48	57	57
	# of Orchard Trees Removed/Relocated	11	11	11	11
	Tree Planting Estimate	-	35 - 70	35 - 80	35 - 80
Restoration	Restored Wetland Area (ac)	-	0.6	0.3	0.8
	Restored Prairie Area (ac)	-	1.1	0.9	1.4
	Restored Turf Open Green Space (ac)	-	1.2	1.3	0.7
Project Costs	Feasibility Level Opinion of Cost	-	$ 4.1 million	$2.9 million	$3.1 million
	Cost per Acre-Ft of Flood Mitigation Volume	-	$451,900	$329,800	$360,000
	Annualized Cost per Pound of Total Phosphorus Removed (Water Quality Treatment)	-	$53,200	$5,700	$5,900

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