PLSLWD Board Staff Report
May 13, 2025

Subject |	Acknowledge Patty Dronen Service to PLSLWD		
Board Meeting Date |	May 20, 2025	**Item No:**	W.1
Prepared By |	Joni Giese, Administrator		
Attachments |	None		
Proposed Action |	Discussion only		

Background

Patty Dronen has served as the District Administrative Assistant for the past four years.

Discussion

Patty will be retiring on Friday, June 13, 2025. In her years of service to the District, she has always been willing to jump in and assist wherever she is needed. While Patty wears too many hats to mention them all here, several highlights of her accomplishments over the years include taking lead in refreshing the District's website, organizing community clean water cleanup events, coordinating staff appreciation and teambuilding activities, taking lead in archiving district records, coordinating meeting logistics, onboarding new staff, ensuring prompt payment of invoices, and always being a professional, friendly, and helpful first contact for people calling or visiting the office.

We wish Patty the best in her retirement. She will be greatly missed.

PLSLWD Board Staff Report
May 13, 2025

Subject	Desilt Pond Outlet & High-Flow Bypass Improvement Feasibility Study		
Board Meeting Date	May 20, 2025	**Item No:**	W.2
Prepared By	Jeff Anderson, Water Resources Coordinator		
Attachments	Desilt Pond Outlet & High-Flow Bypass Improvement Feasibility Study		
Proposed Action	For discussion only		

Background

The ferric chloride (FeCl3) desiltation pond, initiated in 1978 and converted to the primary treatment pond in 2013, is a critical component of the water quality management system designed to reduce sediment deposition and phosphorus from County Ditch 13 into Spring Lake. Enhanced in 1998 with the addition of the Highway 13 Wetland and the FeCl3 Treatment System, the desilt pond functions as a basin for iron-bound phosphorus flocculation. In 2009 the District applied to renew the National Pollutant Discharge Elimination System permit administered by the Minnesota Pollution Control Agency which was approved in 2012. However, the system did not operate in 2011 and 2012 because it did not meet the requirements of the permit as it was exceeding water quality limits in public waters. During the years offline, the District worked on design changes that would meet the new MPCA permit along with options to improve efficiency. Several studies lead to major system modifications in 2013 and 2014 including transfer of FeCl3 approximately 900 feet underground to a new dosing site located in the diversion culvert flowing directly into the desiltation basin.

Building from the momentum of the soon to be completed Ferric Chloride System Assessment, District staff has requested EOR to develop a scope of services for a feasibility study assessing performance of the desiltation pond's treatment capacity and infrastructure in search for greater efficiencies. In August 2024, the Board of Managers approved an EOR Scope of Services to model scenarios assessing the performance of the system under various changes and report back to the Board after the initial modeling has been completed and analyzed.

Discussion

This feasibility study evaluates the system's current hydraulic condition and explores options to modify the pond's inlet, outlet, and high-flow bypass. The goals are to reduce bypass, increase treatment volumes, minimize floc resuspension due to carp, and improve system monitoring. Using updated PCSWMM modeling, survey and water monitoring data, the study assessed system performance from 2014 to 2022. Ten single-element modification scenarios were tested, including raising the High-Flow Bypass elevation and adding an additional inlet pipe, which showed significant improvements in treatment efficiency. Combined-element scenarios further explored modifications to multiple hydraulic controls, revealing for example that raising the High-Flow Bypass elevation to 913 ft and adding a 36-inch inlet pipe could increase treatment efficiency by 16.1%. While there are limited treatment benefits to converting the grouted-riprap overflow to a broad-crested weir, it could allow for better monitoring and carp control. The District engineer will present scenario results during the board workshop. The next

steps in the feasibility study will be to develop cost estimates, rank scenarios based on cost effectiveness and create a 30% sketch plan for preferred options.

Recommendation

For discussion only.

Budget Impact

The cost associated with both tasks of proposed activity is $51,000 and is covered under budget item 611-Ferric Chloride System Assessment.

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Project Name |	Desilt Pond Outlet & High-Flow Bypass Improvement Feasibility Study	**Date** |	5/15/2025
To |	PLSLWD Board of Managers		
Cc |	Jeff Anderson, Water Resource Coordinator Joni Giese, District Administrator		
From |	Carl K. Almer, Bill Yu, & Paul Nation, PE		
Regarding |	Task 1 Findings		

Background

The Desiltation Pond and FeCl3 Treatment System have been modified over the years to meet MPCA permit reissuance requirements and improve overall system performance. Under current conditions runoff from County Ditch 13 (CD-13) enters the Desiltation Pond via a 36-inch inlet pipe. Flows that exceed the capacity of the inlet pipe are not treated, flowing directly to Spring Lake via the High-Flow Bypass. Runoff is injected with FeCl3 in the inlet pipe and binds with Phosphorus to form floc which settles out in the pond. Treated runoff discharges from the Desiltation pond via two (2) 12-inch CMPs and a grouted riprap overflow outlet.

The purpose of this study is to assess the performance of the system in its current hydraulic condition and to assess options for modification of the pond outlet and/or high-flow bypass to:

1. decrease bypass of the Desiltation Pond to increase treatment and phosphorus load reduction,
2. decrease resuspension of floc due to carp passage/occupation, and
3. improve the ability to accurately monitor discharge from the Desiltation Pond.

Methods

In order to accurately assess system performance, detail was added to the District's PCSWMM model. Survey data was collected at the pond inlet pipe, high-flow bypass, and pond outlets and incorporated into the model. Survey data collected is in the attached Figure 1 (existing conditions basemap).

To efficiently assess existing conditions and potential improvement scenarios, the PCSWMM model was "clipped" to the project area to speed up run times. The upstream boundary condition was set at the Highway 13 Wetland weir and continuously monitored level from Monitoring Station CD-2 was used as an inflow hydrograph. The downstream boundary condition was set using monitored Spring Lake water levels at a 15-minute time step, converted from NGVD 29 to NAVD 88. Rainfall and climate data was taken from the nearest Automated Surface Observing System (ASOS) weather station located at the Flying Cloud airport in Eden Prairie.

To assess potential improvement scenarios, the 2019 and 2021 growing seasons were chosen because they represented a wet year (2019) with high levels on Spring Lake and a dry year (2021) with low levels on Spring Lake.

In addition to growing season simulations, a 100-year, 24-hour storm event (7.4 inches) was also run to assess effects on upstream high-water levels. The boundary conditions for this event were set by running the storm event through the full drainage area to Spring Lake, with Spring Lake starting at an elevation of 909.85 (0.15-ft above weir control elevation) which is consistent with the FEMA assumption for establishment of the regulatory flood elevation. Further investigation of the starting

water elevation assumption for Spring Lake will be necessary to confirm that a FEMA Letter of Map Amendment or Revision (LOMA/LOMR) and/or MNDNR No-Rise Certificate will not be required to implement system modifications.

For purposes of this study, total phosphorus (TP) removal through the Desiltation Pond when FeCl3 is injected is assumed to be on average 35% with an average influent TP concentration of 0.30 mg/l.

Existing System Performance

Due to the inability to accurately monitor discharge from the Desiltation Pond outlet and high-flow bypass, past assessment of performance of the FeCl3 Treatment System has assumed that all flow 30-cfs or less, as measured at Monitoring Station CD-2, is treated with FeCl3. For this study, system performance was instead assessed by running the updated PCSWMM model for the years 2014-2022 to more accurately estimate the volume of runoff treated and pounds of TP removed. Table 1 summarizes the assumed TP removal based on the 30-cfs threshold and the estimated TP removal based on the modeled percent of runoff passing through the Desiltation Pond.

In 2014 the Desiltation Pond performed poorly, but this is to be expected since the Spring Lake water elevation peaked above 914 feet, and significant bypass occurred when the entire system was fully submerged for an extended period. On the other end of the spectrum, years 2021 and 2022 represent drought years with lower peak flow and no influence from the elevation of Spring Lake.

2015 to 2019 represent more normal precipitation years, with annual treatment percentages ranging from 84% to 100%. Reduced performance can be attributed to ditch flows exceeding the Desiltation Pond's 36-inch inlet pipe capacity and/or when the water elevation of Spring Lake is high creating a tailwater or fully submerging the weir. The PCSWMM more accurately estimates the bypass volume under tailwater conditions. The 30-cfs or less treatment assumption is still a reasonable estimate but generally leads to an overestimation of TP removal under tailwater conditions.

Table 1. Assumed versus Modeled TP Removal

Year	Treatment Date Range	Total Inflow Volume (ac-ft)	Runoff Treated (%)	Runoff Bypassed (%)	Modeled TP Removal (lbs)	30-CFS TP Removal (lbs)
2014	4/29 – 11/12	9,409	36%	64%	963	1,173
2015	4/11 – 11/12	2,527	99%	1%	716	709
2016	3/24 – 11/11	3,791	100%	0%	1,076	1,076
2017	3/16 – 11/30	5,142	88%	12%	1,293	1,363
2018	3/20 – 11/16	5,870	89%	11%	1,488	1,517
2019	4/4 – 10/5	5,629	84%	16%	1,343	1,462
2021	4/6 – 11/2	833	100%	0%	239	239
2022	3/15 – 6/29	1,067	100%	0%	305	305

Note: The date range covers the period during which both CD2 flow and Spring Lake level data are available. These data serve as boundary conditions for the model.

Potential System Modifications

Potential modifications to the hydraulic components of the Desiltation Pond and High-Flow Bypass were considered with the primary goal of decreasing bypass of the pond to improve TP removal. The following four control elements were considered for modification, both individually and in combination.

- **High-flow bypass (HFB)** – Increasing the control elevation from 911.65 to 912.5 and 913.0
- **36-inch inlet pipe** – Adding a second parallel 24-inch or 36-inch inlet pipe
- **Grouted riprap outlet** – Reconstructing the outlet as a sharp-crested (sheet pile) or broad-crested (concrete) weir and increasing the control elevation from 910.25 to 910.5 and 911.0
- **12-inch secondary outlet pipes (2)** – Adding an additional 12-inch or replacing the existing 12-inch pipes with 24-inch pipes

Single-Element Modification Scenarios

A total of 10 single-element modification scenarios were explored, and performance was compared to existing conditions for 2019 and 2021 monitored flows. Table 2 summarizes the treatment benefits for the Desiltation Pond and the high-water levels (HWLs) of the upstream ditch for 2019 monitored flows. Note that peak flows to the Desiltation Pond above 35-cfs approaches the 4-hour pond residence time goal for floc settling, which may result in some floc settling in the downstream channel instead of within the pond (Figure 6, Ferric Chloride Treatment System Evaluation, EOR 2010). Significant increases in volumes above 35-cfs may pose a regulatory (permit reissuance) challenge.

The results for 2019 monitored flows indicate that adding an extra Desiltation Pond inlet pipe (Scenarios 7-8) and raising the elevation of the High-Flow Bypass (Scenarios 9-10) have the most decrease in bypass and increase TP removal. The scenarios related to the Desiltation Pond outlet (pipes or grouted riprap overflow) modification had minimal impact on performance. None of the scenarios explored increased the Desiltation Pond High Water Level (HWL) for 2019, but several scenarios increase the HWL in the upstream ditch back to the Highway 13 Wetland weir. While the scenarios for the grouted riprap overflow had minimal impact on treatment, improvements should still be considered to improve the ability to monitor flow at the outlet and to mitigate carp migration into the pond to minimize resuspension of floc.

The modeling results for 2021 indicate that the existing system treated 100% of flows and no bypass occurred. Therefore, the single-element modification scenarios would have no benefit on similar dry years with low tailwater from Spring Lake.

Combined-Element Modification Scenarios

After running the single-element modification scenarios, an additional 8 scenarios were tested for potential modification of multiple hydraulic controls to mitigate the effect of Spring Lake tailwater in wet years. These combined-element modification scenarios included modifications to the Desiltation Pond grouted riprap outlet, adding an extra Desiltation Pond inlet pipe, and raising the High-Flow Bypass. Results are summarized in Table 3.

Similar to the findings of the single-element tests, the Desiltation Pond outlet structure characteristics do not significantly affect treatment benefits. The main drivers are the High-Flow Bypass elevation and the Desiltation Pond inlet capacity. Adding a second 36-inch inlet pipe provides about 2 percent more treatment than adding a 24-inch pipe. Raising the High-Flow Bypass elevation to 913 ft and adding the 36-inch pipe, treatment efficiency increases from 96.0% to 99.8% compared to raising the high-flow bypass alone.

Adding a 24-inch inlet pipe in combination with raising the High-Flow Bypass elevation to 913 ft increases the upstream ditch HWL from 913.38 ft to 913.93 ft and extends the HWL time above the Highway 13 Wetland weir elevation (912.26) from 35 hours to 49 hours, potentially increasing the risk for bypass, erosion and carp migration around the east end of the weir. Adding a second 36-inch inlet pipe instead of a 24-inch increases the upstream ditch HWL from 913.38 ft to 913.79 ft while leaving the exceedance duration over the Highway 13 Wetland weir unchanged.

100-yr, 24-hour HWL Event Analysis

All of these scenarios were also modeled for the 100-year, 24-hour storm event and results demonstrate similar treatment improvements to those of the 2019 continuous simulation. Adding a 24-inch or 36-inch inlet pipe to the Desiltation Pond increased treatment by 10.2% and 18.7%, respectively, while raising the High-Flow Bypass elevation to 912.5-ft and 913.0-ft increased treatment by 24.1% and 37.4%, respectively. Combined scenarios delivered treatment increases ranging from 38.5% to 48.7%.

Although these modifications increase the initial peak HWL, none of the individual or combined scenarios raise the 100-year, 24-hour upstream peak HWL, as this peak water level remains controlled by Spring Lake tailwater. These preliminary findings indicate that FEMA LOMA/LOMR and MNDNR No-Rise proceedings should not be necessary to implement the contemplated modifications.

Conclusions

Based on these modeling results, hydraulic modifications can improve system performance under Spring Lake tailwater conditions. Of the scenarios explored, raising the High-Flow Bypass control elevation to 913.0 appears to be the single most effective modification to improve system performance (Scenario 10 with a 12.4% increase in treated flow).

Considering multiple modifications including raising the Desiltation Pond outlet elevation, adding and additional Desiltation Pond inlet pipe, and raising the High-Flow Bypass elevation could further improve system performance (Scenarios 11-18 with a range in additional treated flow of 13.2% to 16.1%).

Converting the existing grouted-riprap overflow to a broad-crested weir would not increase Phosphorus treatment but raising the control elevation would increase residence time affording additional flocculation time within the pond as well as allowing low flows to discharge through both 12-inch pipes as originally intended. In additional, this would improve the ability to construct a carp barrier to exclude the pond as spawning habitat, reduce the resuspension and downstream migration of floc, and improve the ability to accurately monitor flows.

Next Steps

As per Task 2 of the approved scope of work, with Step 5 added as a second Board checkpoint, the next steps of this feasibility study include:

1. Further investigation and refinement of the modification scenarios
2. Determining the best approach for achieving the potential modifications from a constructability standpoint
3. Preparing preliminary cost estimates for each scenario providing benefit
4. Ranking the modification scenarios based on cost versus increase in treatment
5. Board discussion and selection of a preferred option
6. Preparation of 30% sketch plan for the preferred option

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Table 2. Single-Element Scenarios for 2019 Monitored Flows

Scenario #	Scenario Modifications	Treatment Volume (ac-ft)	Bypass Volume (ac-ft)	Volume over 35 cfs (ac-ft)	Increase in Treatment volume (ac-ft)	Treatment (%)	Modeled TP Removal (lbs)	Decrease in Bypass (%)	Increase in Treatment (%)	Upstream HWL (ft)	Hwy 13 Wetland Weir Submergence (hrs)**
0	*Existing**	*4,703*	*926*	*86*	--	*83.6%*	*1,343*	--	--	*913.38*	*35*
1	Sharp-crested Weir (910.5)	4,707	920	89	4	83.6%	1,344	0.6%	0.1%	913.38	35
2	Sharp-crested Weir (911.0)	4,659	968	70	-44	82.8%	1,330	-4.6%	-0.8%	913.40	6
3	Broad-crested Weir (910.5)	4,719	909	95	16	83.9%	1,347	1.8%	0.3%	913.38	35
4	Broad-crested Weir (911.0)	4,693	934	77	-10	83.4%	1,340	-0.9%	-0.2%	913.38	35
5	12" Outlet Pipes (x3)	4,703	926	86	0	83.6%	1,343	0.0%	0.0%	913.38	35
6	24" Outlet Pipes (x2)	4,706	922	87	3	83.6%	1,344	0.4%	0.1%	913.38	35
7	36" + 24" Inlet Pipes	4,994	634	218	291	88.7%	1,426	31.6%	5.2%	913.05	24
8	36" + 36" Inlet Pipes	5,178	449	318	475	92.0%	1,478	51.5%	8.4%	912.64	9
9	HFB (912.5)	5,243	386	192	540	93.2%	1,497	58.4%	9.6%	913.01	36
10	HFB (913.0)	5,402	227	326	699	96.0%	1,542	75.5%	12.4%	913.44	115

** Existing conditions includes a 36" inlet, 12" outlets (2), grouted riprap outlet (910.25), and HFB (911.65)*

*** The lowest elevation of the Highway 13 Wetland weir is 912.26*

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Table 3. Combined-Element Scenarios for 2019 Monitored Flows

Scenario #	Scenario Modifications	Treatment Volume (ac-ft)	Bypass Volume (ac-ft)	Volume Over 35 cfs (ac-ft)	Increase in Treatment Volume (ac-ft)	Treatment (%)	Modeled TP Removal (lbs)	Decrease in Bypass (%)	Increase in Treatment (%)	Upstream HWL (ft)	Hwy 13 Wetland Weir Submergence (hrs)**
0	*Existing**	*4,703*	*926*	*86*	--	*83.6%*	*1,343*	--	--	*913.38*	*35*
11	HFB (912.5) + 24" Inlet	5,445	171	88	742	97.0%	1,555	81.5%	13.2%	913.62	31
12	HFB (912.5) + 36" Inlet	5,551	65	27	848	98.8%	1,585	92.9%	15.1%	913.53	23
13	HFB (913.0) + 24" Inlet	5,522	93	137	819	98.3%	1,577	89.9%	14.6%	913.93	49
14	HFB (913.0) + 36" Inlet	5,602	15	73	899	99.7%	1,600	98.4%	16.0%	913.79	35
15	HFB (912.5) + 24" Inlet + Broad-crested Weir (910.5)	5,457	160	90	754	97.2%	1,558	82.7%	13.4%	913.62	31
16	HFB (912.5) + 36" Inlet + Broad-crested Weir (910.5)	5,556	61	31	853	98.9%	1,586	93.4%	15.2%	913.53	23
17	HFB (913.0) + 24" Inlet + Broad-crested Weir (910.5)	5,527	90	134	824	98.4%	1,578	90.3%	14.7%	913.93	49
18	HFB (913.0) + 36" Inlet + Broad-crested Weir (910.5)	5,606	11	77	903	99.8%	1,601	98.8%	16.1%	913.79	35

** Existing conditions includes a 36" inlet, 12" outlets (2), grouted riprap outlet (910.25), and HFB (911.65)*

*** The lowest elevation of the Highway 13 Wetland weir is 912.26*

PLSLWD Board Staff Report
May 13, 2025

Subject	County Ditch 13 Drainage Authority: Initial Analysis Discussion
Board Meeting Date	May 20, 2025 **Item No:** W.3
Prepared By	Joni Giese, District Administrator
Attachments	None
Proposed Action	Discussion only

Background

Scott County reached out to PLSLWD to inquire if the District would be interested in taking on the role of drainage authority for County Ditch 13.

Discussion

Administrator Giese is in the process of analyzing potential benefits and drawbacks associated with taking on the role of drainage authority for County Ditch 13. She will share her initial analysis at the workshop and solicit requests for additional information from the Managers in order to inform decision-making that will occur at a future meeting.

Recommended Action

No action requested.

Budget Impact

To be determined.