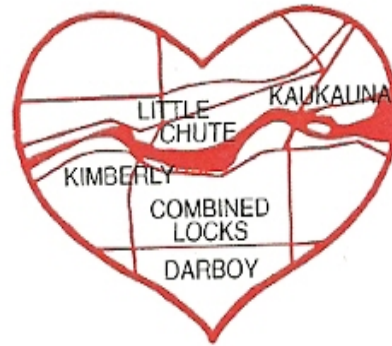


Water Quality Trading at Heart of the Valley MSD

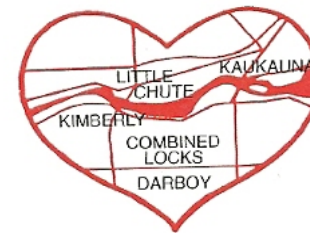


Government Affairs Seminar

February 21, 2019

Heart of the Valley Metropolitan Sewerage District

- Created in 1972 to design a sewerage system that includes a mainline interceptor sewer and treatment facility
- Heart of the Valley was officially recognized and approved by the DNR in 1974
- Kaukauna WWTF site selected for Heart of the Valley WWTF
- Member communities served include: Combined Locks, Darboy, Kaukauna, Kimberly, and Little Chute



HOVMSD current facility

- \$35M upgrade in 2006 due to age, obsolescence, and to meet ammonia limits
- Designed for 30 mg/L monthly and 45 mg/L weekly for TSS and BOD and 1 mg/L total phosphorus
- I/I was and still is an issue - peak flows in excess of 26 MGD are blended (4 events in 2018)
- The TMDL did not exist



HOVMSD Treatment Processes

- Preliminary treatment – flowmeter and sampling, screening, grit removal
- Primary treatment – chemically enhanced ballasted sedimentation - Actiflo
- Secondary treatment – Biostyr upflow biological aerated filter
- No secondary clarification
- Seasonal disinfection – sodium hypo and sodium bisulfite
- Effluent reuse – Approximately 38% of effluent is reused at Fox Energy Center in 2018

Draft permit / TMDL implications

- The phosphorus allocation comes with a compliance schedule giving us time to evaluate source reduction and compliance alternatives (including the monitoring of the sedimentation basin for phosphorus removal)
- TSS of 30 mg/L monthly and 45 weekly remains in permit but is effectively obsolete. The HOVMSD allocation for TSS is 801 ppd monthly average and 1345 ppd weekly average
- Compliance is no longer simply effluent mg/L – what does this mean for HOVMSD?
- With an average daily flow of 5.825 MGD in 2018 the effluent must average below 27.7 mg/L weekly and 16.5 mg/L monthly

Can HOVMSD meet the TMDL limits be met and how much is it going to cost?

- Membrane filtration estimated @ \$69.5M in 2013 dollars for HOV to meet BOTH suspended solids and phosphorus allocations
- 2014 pilot study using chemical addition and cloth disk filter technology. Compliance was achievable with capital cost estimated at \$9.5 M for 20 MGD with operating costs of \$82k annually
- HOVMSD was made aware that no compliance schedule was in the draft permit for suspended solids – solids became our immediate focus with watershed based approach being preferred over traditional bricks and mortar

Enter Outagamie County and FWWA

- Outagamie County and FWWA identified HOVMSD property and approached the District to build an engineered sedimentation basin with potential for grant funding its construction
- HOVMSD Commission approved collaborating on and funding the project before the WQ Trade was approved
- Fox Wolf Watershed Alliance produced written trading plan with all attachments including the data and information from HOVMSD with Outagamie County providing the technical design details

Effluent review / Credits needs

- HOVMSD analyzed DMR monthly data both with(grey) and without effluent reuse(yellow)
- This example shows that without effluent reuse HOVMSD would exceed allotted 801 lbs/day for the month

- Representative monthly data – 5 years reviewed

		Monthly	Weekly		Monthly	Weekly
		Effluent	Effluent		Effluent	Effluent
Month	Week	lbs/day	lbs/day		lbs/day	lbs/day
July		564.1			841.2	
	1 - 7		391.3			583.4
	8 - 14		521.4			777.5
	15-21		744.5			1110.3
	22-28		576.1			859.2

HOVMSD review findings

- Three violations would have occurred over the 5 year review of actual effluent discharge
- Twenty four violations would have occurred had Fox Energy not reused HOVMSD effluent
- HOVMSD determined that for future planning we look at and plan for the worst case scenario

WORST CASE NEED no effluent withdrawal to Fox Energy		
Year	Monthly violations	Total Credits Needed
2012	6	836.1
2013	6	1209.5
2014	4	643.8
2015	3	1093.3
2016	5	1088.4
<i>Credit Offset Needed (Highest Annual Need)</i>		1209.5

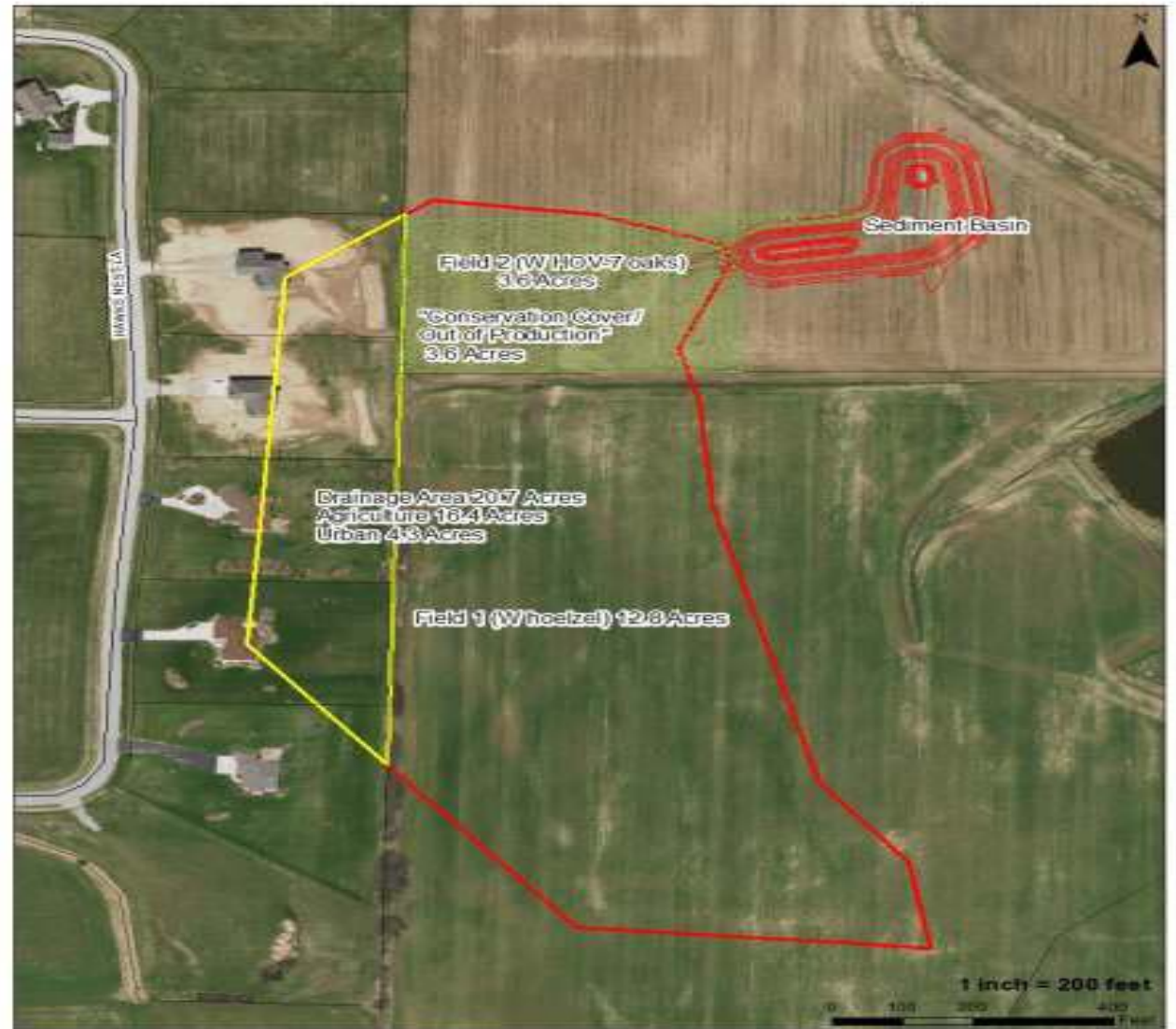
CURRENT ACTUAL NEED with effluent withdrawal to Fox Energy		
Year	Monthly violations	Total Credits Needed
2012	0	0
2013	2	496.2
2014	1	223.7
2015	0	0
2016	0	0
<i>Credit Offset Needed (Highest Annual Need)</i>		496.2

Sedimentation pond design- Outagamie County

- Performed all engineering and design based on NRCS Technical Standard 350 with enhancements
- Generated all Snap Plus modeling of solids migration and pond solids capture - this was performed for each year of the trade agreement
- Performed all necessary surveying work and on site for all basin construction/observation

Drainage area detail

- Sedimentation basin shown in red with sediment traps
- Yellow area to the left is residential – 4.3 acres
- Light green is cropland converted to conservation cover – 3.6 acres
- Red/yellow line is not owned by HOVMSD and actively farmed – 12.6 acres



Preconstruction overview (Drone footage)

- Site was mowed and shows orientation and location of detention pond
- The browned out area has been taken out of production and is now planted in permanent vegetative cover
- The now constructed detention pond is mowed and is the bean shaped area



Basin design/ features

- Sediment traps at the front and back end of the basin – estimated 5 year duration before dredging is necessary
- Between sediment traps are gravel spreader bars put in place to minimize short circuiting
- Between the gravel spreader bars is shallow water ponding area. Encourages wetland vegetation growth maximizing dissolved phosphorus uptake
- USGS installed flumes on inbound and outbound flows along with composite samplers



Basin design/ features

- Blue arrow shows normal pond overflow pipe – flume and sampler not visible on backside – flow exits to existing grass waterway
- Rip rapped area is a basin bypass for 25+ year rain events
- Design removal predicted to be 80% but with added design elements should beat the estimate



Additional facts/ details

- HOVMSD has worked with Outagamie County in the past. Permanent grass waterways/drainage ways were installed in 2013/4 on all District property
- The Trading Plan was officially approved by DNR June 5, 2018
- HOVMSD received its new NPDES permit effective January 1, 2019
- Basin is fully operational with 2019 being the first full year of water quality monitoring of its discharge

HOVMSD Project Pros

- Project addresses immediate TSS compliance as HOVMSD navigates its first 5 year permit term under the TMDL
- HOVMSD avoids immediate major capital infrastructure cost and sewer rate increases for bricks and mortar debt service
- Improved property and soil management with the addition of a Nutrient Management Plan on all HOVMSD property
- Watershed based project addressed impairment of the Fox River and water quality “outside the fence”
- Low capital/project costs – \$64,000

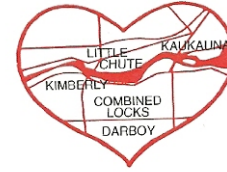
HOVMSD Project Cons

- Required to implement a nutrient management plan on all crop acreage it owns and leases for crop production (256 total / 228 tillable)
- Biosolids land application - limited by soil phosphorus content – anticipate reduction in frequency and application rates – more acreage necessary for biosolids disposal
- Permanent loss of rental revenue due to pond construction and vegetative cover acreage
- Labor/Maintenance – monthly inspections, additional groundskeeping, annual inspection by registered PE, dredging sediment traps

Water quality trading /Bumps in the road

- The 3.6 acres planted in conservation cover was added to the project in order to accumulate enough credits needed by HOVMSD
- Fall construction not recommended – poor initial seed germination and establishment of vegetation - reseeding was required. Spring 2018 soil wash out at the head of the basin required reinforcement/repairs
- Water Quality Trading as it stands appears to favor rural medium and smaller sized wastewater utilities
- Trading calculations are not helpful - 2:1 trade ratio, 80% recovery, etc.
- Trading is viable - think outside the box, identify and collaborate with other stakeholders - be creative!

Thank you to our partners!



- FWWA – Jessica Schultz, Executive Director
- Outagamie County – Jeremy Freund PE and Wesley Kotila EIT
- Brown county - Nick Peltier, Agronomist
- Tilth Agronomy – Bill Schaumberg
- Wisconsin DNR – Keith Marquardt
- Outagamie County Highway Department
- Glen Guerts – retired HOVMSD Director

Questions/Discussion ?

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