

Hillsdale Wastewater Treatment Plant

SRF Project Plan Public Hearing



June 10, 2014

Presented by: Jeff Pugh, PE
and Elaine Venema, PE



Synopsis/Agenda

- Purpose of Presentation
- Project Background
- Need For Wastewater System Improvements
- Analysis of Alternatives
- Environmental Review Process
- Projected Impact on User Charges
- Anticipated Project Schedule
- Discussion, Q/A

Purpose of the Presentation

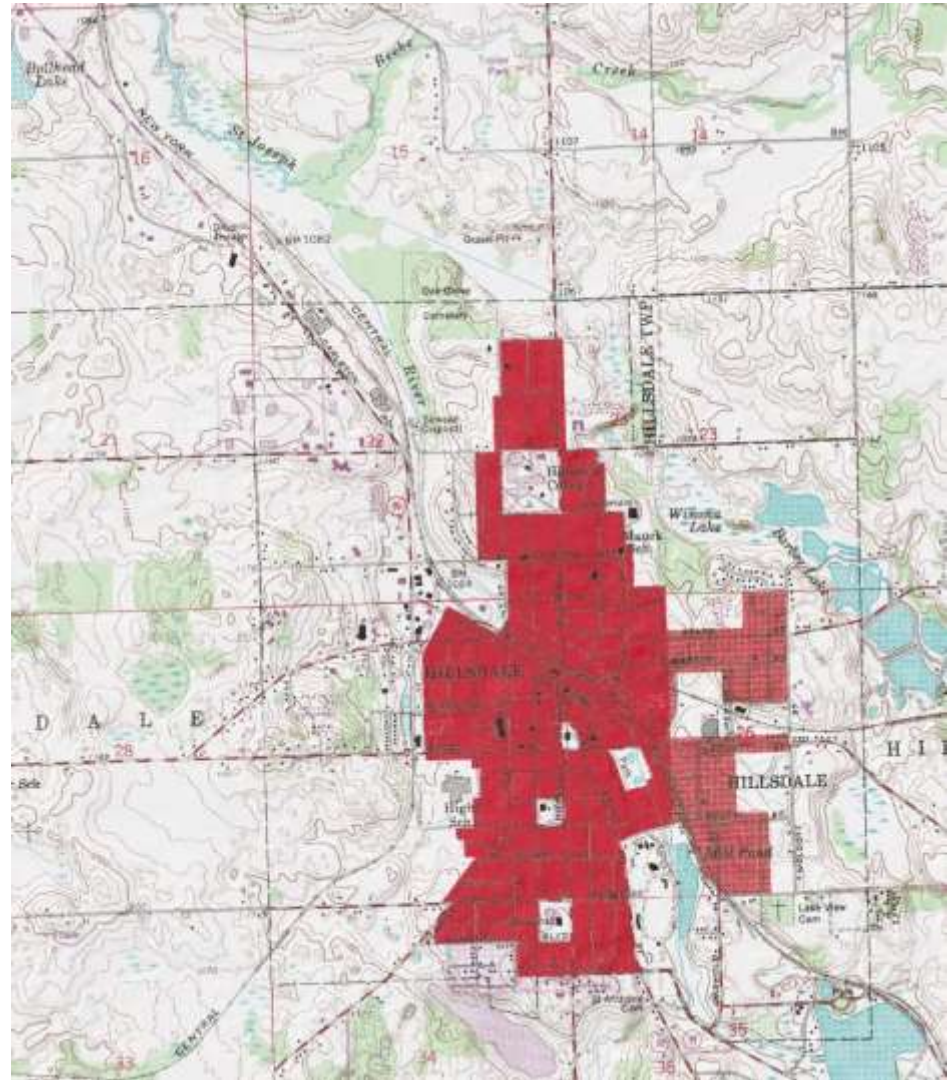
- Review the Project Plan
 - Summary of Needs & Alternatives
 - Project Impact on the Environment
 - Discussion of Benefits & Costs

- Address Public Comments/Questions

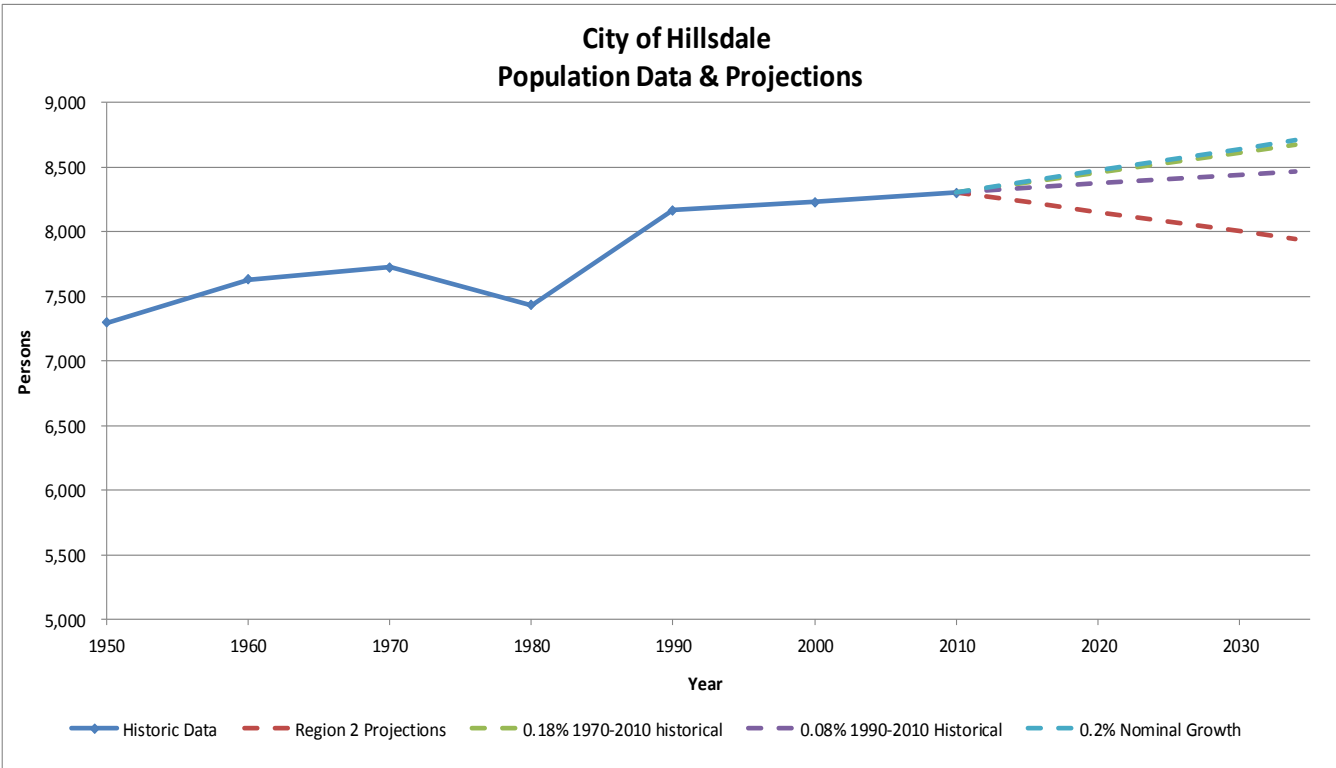
Project Background

- Study Area
 - City of Hillsdale including Hillsdale College
 - Small portions of Hillsdale Twp and Cambria Twp
- Land Use includes residential, business, industrial, Downtown, College, and recreational areas.
- The St. Joseph River runs through the City center.

Service Area



Population Data & Projections



The Region 2 Planning Commission is anticipating a slight decrease in population through 2040; -0.18% annually.

The BPU believes it is prudent to plan for a nominal increase in wastewater flow; a 0.2% annual increase was selected for planning.

*Historic population data from US Census Bureau
Declining projections from Region 2 Planning Commission

Current & Projected Wastewater Flows

- Residential & Commercial/Industrial Flows
 - Current Sewer Customers: 3,702
 - Est. Equivalent Service Population: 13,722
 - Current Avg. Flow: 1.25 mgd

- Projected Service Population: 14,111
- Corresponding 20-yr Design Avg. Flow: 1.38 mgd

- Current WWTP Capacity: 2.0 mgd



WWTP Site

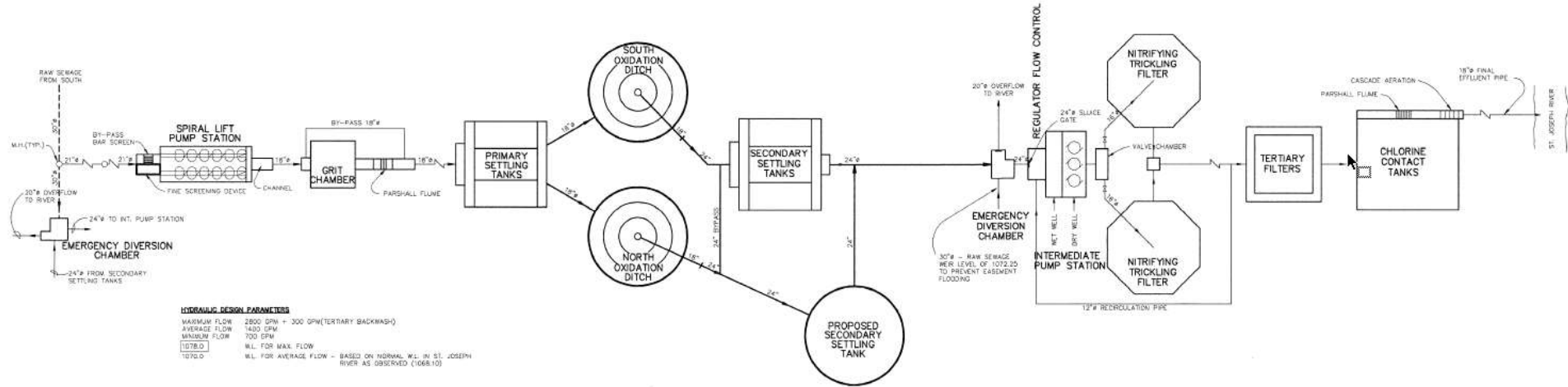
- North side of the City
- Between the St. Joe River & the railroad

History

- **1947 Construction**
Primary Treatment, Trickling Filters, Final Clarifiers, Digesters, Sludge Drying Beds
- **1980 Improvements**
Added Disinfection, Chemical Feed, Nitrification Towers, Tertiary Filters, add'l Digester
- **1992 Improvements**
Converted Trickling Filters to Oxidation Ditches, added Circular Secondary Clarifier, Sludge Thickening, Tertiary Pumping System



Existing Process Flow Diagram



SCHMATIC FLOW DIAGRAM

SCALE: NONE

Need for the Project

- Aging Infrastructure
 - Several concrete tanks are 67 years old
 - Newer concrete tanks are 22-34 years old
 - Mechanical & electrical equipment beyond its useful life
- Inconsistent Compliance
 - Challenges with MLSS control
 - Permit violations for ammonia, TSS, BOD
 - Violation notice letters from the DEQ; on EPA's watchlist



Aging Infrastructure

Need for the Project

- Hydraulic Issues
 - Influent pumps not efficient; pumping capacity reduced
 - Tertiary Filters hydraulic capacity reduced
- Inefficient/Outdated Infrastructure
 - Anaerobic digestion system
 - Building roofs and walls
 - SCADA

Areas In Need of Improvement

- Headworks – Influent pumps & grit system
- Primary Clarifiers
- Secondary Clarifier & RAS/WAS handling
- Tertiary Filters
- Anaerobic Digesters
- Buildings – roofs, exterior brick, insulation
- SCADA – instrumentation & controls

Effluent Violations

- Exceeded Limits in 2012 & 2013
 - D.O. & ammonia in June 2012
 - D.O. & total residual chlorine May/June 2013
 - Ammonia violations regular from July 2013 through October 2013
 - cBOD exceeded in August, September, and November 2013



Parameter	Effluent Limit, Monthly Avg.	Effluent Limit, Daily	7-day, Daily
Biochemical Oxygen Demand			
May 1 – Nov 30	4 mg/L	10 mg/L (daily)	
Dec 1 – Mar 31	15 mg/L	23 mg/L (daily)	
Apr 1 – Apr 30	18 mg/L	27 mg/L (daily)	
Total Suspended Solids			
May 1 – Nov 30	20 mg/L	30 mg/L (7-day)	
Dec 1 – Apr 30	30 mg/L	45 mg/L (7-day)	
Total Phosphorus			
	1.0 mg/L		
Ammonia Nitrogen			
May 1 – Nov 30	0.5 mg/L	2 mg/L (daily)	
Dec 1 – Mar 31	8.6 mg/L	10 mg/L (daily)	
Apr 1 – Apr 30	9.1 mg/L	10 mg/L (daily)	
Fecal Coliform			
	200 cts/100 mL	400 cts/100 mL (7-day)	
Total Residual Chlorine			
		0.038 mg/L (daily)	
Total Selenium			
Until Jan. 31, 2015	Report		
Beginning Feb 1, 2015	5 µg/L		
Available Cyanide			
Until Jan. 31, 2015	Report		
Beginning Feb 1, 2015	6 µg/L		
Chronic Toxicity			
	1.1 TU _c		
Total Mercury			
	2 ng/L (rolling avg)		
TSS removal			
	85%, Min		
pH			
		6.5 - 9.0	
Dissolved Oxygen			
Apr 1 - Apr 30		6.0 mg/L, Min	
May 1 – Mar 31		7.0 mg/L, Min.	

Objectives for SRF Project

- Ensure reliable wastewater service to the customers.
- Bring existing processes into conformance with current design standards.
- Incorporate renewable energy concepts with environmentally innovative processes and equipment.
- Minimize financial burden to the sewer system users, creating a sustainable utility.
- Minimize environmental impact during construction of the improvements project.
- Minimize future environmental impact of WWTP operations, effluent discharges and residuals disposal.

Development of Alternatives

- Alternatives developed in the Project Plan to address urgent needs and satisfy project goals & objectives.
- The alternatives include the SRF Program required No Action and Regional Alternative.
- Alternatives:
 - Alternative No. 1 – No Action
 - Alternative No. 2 – Regional Alternative
 - Alternative No. 3 – Optimize Existing Facilities
 - Alternative No. 4 – Optimize Existing w/ CHP
 - Alternative No. 5 – Build a New Treatment Plant

Analysis of Alternatives

- Alternative No. 1 – No Action
 - No construction project
 - Effluent violations will continue – DEQ will escalate enforcement
 - Aging infrastructure will continue to deteriorate
 - Does not meet Project Objectives
- Alternative No. 2 – Regional Alternative
 - Decommission Hillsdale WWTP and pump wastewater to nearby facility
 - Nearest treatment facility is 5.4 miles away in Jonesville
 - Additional pumping and expansion of host facilities required
 - Does not meet project objectives

Regional Treatment Facility	Distance (miles)	Estimate Forcemain Cost	Friction head (ft)	Estimated Annual Pumping Cost
Jonesville	5.4	\$3,136,000	120	\$55,143
Coldwater	26	\$15,100,800	575	\$264,229
Hudson	18	\$10,454,400	400	\$183,812
Quincy	15	\$8,712,000	330	\$151,645
Litchfield	12	\$6,969,600	270	\$124,073

Analysis of Principal Alternatives

- Headworks – Influent pumps & grit system
- Primary Clarifiers and Pump House
- Secondary Clarifier & RAS/WAS handling
- Tertiary Filters
- Anaerobic Digesters
- Buildings – roofs, exterior brick, insulation
- SCADA – instrumentation & controls

Alternative No. 3 – Optimize Existing Facilities

- Addresses urgent/important issues, specifically:
 - Headworks improvements – demo screw pump, install new influent pumps, rehab grit system, building roof & wall insulation
 - Demolish primary clarifiers and pump house
 - Add VFDs to oxidation ditch aerators, paint metals, heat trace chem lines
 - Replace existing rectangular south secondary clarifiers with new circular clarifier, update RAS/WAS systems to improve control
 - Replace existing sand filters with disc filter system, tertiary pump station building roof & wall insulation
 - Rehab ferrous chloride feed system
 - Paint metals at sludge thickener, install sludge flow meter
 - Anaerobic Digester improvements – construct solids capture tank, rehab Digester #3, new mixing & heating systems, dual fuel boiler, rehab hydronic system, replace gas equipment
 - SCADA & alarm improvements

Alternative No. 3 – Areas of Improvement



Alternative No. 3 – Areas of Improvement



Alternative No. 3 – Areas of Improvement



Alternative No. 3 – Optimize Existing Facilities

- Est. Project Cost: \$6,193,000
- Anticipated OM&R savings with project: \$-66,400/yr
 - Natural gas savings – use biogas to fuel digester boiler
 - Sludge disposal savings – better digestion with project
 - Maintenance savings – less emergency type repairs with rehabilitated and newer facilities
- Salvage Value: \$1,176,800
- Total Net Present Worth: \$18,490,000

Alternative No. 4 – Optimize Ex. Facilities w CHP

- Alternative No. 3 *plus* additional Energy Efficiency:
 - Install Combined Heat & Power (CHP) generator
 - Produce electricity for use onsite
 - Waste heat from CHP generator to heat digester and BPU buildings



Alternative No. 4 – Optimize Ex. Facilities w CHP

- Est. Project Cost: \$6,924,000
- Anticipated OM&R savings with project: \$-122,000/yr
 - Natural gas savings – utilize waste heat from engine for digester/buildings
 - Electricity savings – use electricity to reduce onsite power use
 - Sludge disposal savings – better digestion with project
 - Maintenance savings – less emergency type repairs with rehabilitated and newer facilities
- Salvage Value: \$1,176,800
- Total Net Present Worth: \$18,490,000

Alternative No. 5 – Build a new Treatment Plant

- Meets 20-year wastewater needs by:
 - Constructing a new WWTP designed for 2.0 mgd
 - Located on the other side of the St. Joseph River from the existing facility
 - New influent pump station
 - New Headworks building with fine screen & vortex grit removal
 - Organic solids recovery tank
 - Moving Bed Biofilm Reactor (MBBR)
 - Secondary clarificiation
 - Disc filter tertiary filtration
 - Chlorination/dechlorination
 - Cascade re-aeration
 - Anaerobic digestion

Alternative No. 5 – Build a new Treatment Plant

- Est. Project Cost: \$24,326,000
- Anticipated OM&R savings with project: \$-99,200/yr
 - Natural gas savings – use biogas to fuel digester boiler
 - Sludge disposal savings – better digestion with project
 - Maintenance savings – less emergency type repairs with completely new facilities
 - Labor savings – MBBR process & all new facilities would require less supervision
- Salvage Value: \$5,742,200
- Total Net Present Worth: \$31,630,000

Net Present Worth - Principal Alternatives

	Alternative 3 – Optimize Existing Facilities	Alternative 4 – Optimize Existing Facilities with CHP	Alternative 5 – Build a new Treatment Plant
Capital Cost	\$6,193,000	\$6,924,000	\$24,326,000
Annual O&M Cost	\$1,024,700	\$969,100	\$991,900
Net Present Value of O&M Cost	\$13,474,800	\$12,743,600	\$13,043,500
Total Present Worth (1)	\$19,667,800	\$19,667,600	\$37,369,500
Salvage Value	\$1,176,800	\$1,176,800	\$5,742,200
Net Present Worth	\$18,490,000	\$18,490,000	\$31,630,000

(1) Discount Rate

4.375% required by the SRF Program for FY 2015

Recommend Alternative No. 4 – Optimize Existing Facilities with CHP

Same NPW as Alternative No. 3, but greater *energy* benefits

Environmental Review

Environmental Feature	Alternative 3	Alternative 4	Alternative 5
Agricultural and Open Space Lands	NSI	NSI	L
Air Quality	T	T	T
Archeological Historic Sites	NSI	NSI	NSI
Drinking Water Supply Source	NA	NA	NA
Endangered or Threatened Species	NSI	NSI	L
Energy Resources	SB	GB	SB
Fauna and Flora Communities/ Habitat	NSI	NSI	L
Floodplains	NSI	NSI	L
Great Lakes Shoreline	NSI	NSI	NSI
Lakes and Streams	NSI	NSI	NSI
Parks and Recreational Facilities	NSI	NSI	NSI
Unique Features	NA	NA	NA
Wetlands	NSI	NSI	NSI
Wild & Scenic Rivers	NSI	NSI	NSI

Explanation of Abbreviations:

NSI: No Significant Impact

L: Low, But Measurable Impact

T: Temporary Impact

GB: Great Benefit

NA: Not Applicable

SI: Significant Impact

SB: Slight Benefit

Environmental Mitigation

Temporary construction impacts include noise & temporary air impacts (dust, exhaust)

- Mitigation includes:
 - City approved work hours for construction
 - Traffic flow provided to all residences and businesses
 - Dust control
 - Soil erosion and sediment measures
 - All work performed in accordance with necessary permits: Part 41 construction, SESC, Stormwater, Floodplain, Wetlands etc.

User Charge Summary

BPU funds sewer & wastewater treatment through user fees:

- Monthly Readiness to Serve Charge
 - Based on water meter size
 - Covers debt service and fixed replacement costs
- Commodity Charge
 - Based on usage
 - Covers variable OM&R related expenses

Alt 4 would increase monthly residential bills by about \$2.50

Current Resident Bill (4,500 gal/month)	Est. Bill with Project (4,500 gal/month)
\$22.43	\$24.80

User charge rates estimated based on 2.5% interest, 20-year loan
Assumes no Green Project Reserve Principal Forgiveness

Green Project Reserve

- GPR provides Principal Forgiveness for components of SRF Projects that meet eligibility criteria
- Several components are expected to qualify for GPR:
 - Anaerobic Digester
 - Combined Heat & Power
 - Building & Roof Insulation
 - Disc Filter
 - Oxidation Ditch VFD
- User Charge increase would be reduced in proportion to the awarded GPR Principal Forgiveness

Anticipated Planning/Design Schedule

Task Description	Milestone Deadline (no later than)
Draft MAHL & WWTP Capacity Evaluation for DEQ review	June 20, 2014
Submit SRF Project Plan to DEQ	July 1, 2014
Receive DEQ comments on MAHL Report	August 15, 2014
Begin Preliminary Design on WWTP Improvements Project	October 27, 2014
Submit final MAHL, incorporating DEQ comments	October 30, 2014
Revise Local Limits & issue revised industrial discharge permits	December 30, 2014
Draft Plans & Specs due to DEQ	March 13, 2015
Final Plans & Specs due to DEQ	May 15, 2015
Bid advertisement published	June 12, 2015
Bid Opening	July 15, 2015
Loan Closing	September 16, 2015
Construction Begins	November 13, 2015
Substantial Completion	March 24, 2017
Start Up	April 26, 2017
Final Completion	May 26, 2017

Questions?

- Please state your name for the public record

