



City of Dickinson Wastewater Treatment Facility

ND Water Pollution Control Conference
October 12, 2011

Presentation Overview

- **2009 Facility Planning Efforts**
- **Population Projections**
- **Project Need and Siting**
- **Treatment Facility to Meet Future Needs**
- **Estimate of Cost**
- **Schedule**

2009 Facility Planning

Facility Information

- **Pretreatment with screening and grit removal**
- **Two 1 acre aeration ponds**
- **Four stabilization ponds for polishing and storage**
- **Discharge to Heart River**
- **Capacity of 2.23 mgd**



FIGURE 1

EXISTING DICKINSON
WASTEWATER TREATMENT
FACILITY

2009 Facility Planning

- Estimated current population at 18,700
- Used 'population thresholds' of 10%

Year	Increase	Population
2009	-	18,700
	1,870	20,570
	1,870	22,440
	1,870	24,310
	1,870	26,180

2009 Facility Planning

- **20-year Population Estimate of 26,180**
- **Recommended Utilizing Existing Pond System**
- **Most Cost-Effective and Less Labor Needed**
- **Maximum Capacity of Pond System approximately 28,000 people**

2009 Facility Planning Limitations

- **Many Sources Estimate 5-7 year Population Potential of 25,000-28,000 people**
- **Potential to Outgrow Pond System in 5-7 years**
- **Pond System Upgrades (\$12 million) Potentially Obsolete in 5-7 years**
- **Determined Other Treatment Alternatives were Necessary**

Population Projections A Moving Target

Published References

- **Senate Industry Business and Labor Committee House Bill 1206 Testimony**
- **ND Communities Acutely Impacted by Oil and Gas Development**
- **ND Oil and Natural Gas Workforce Needs and Skills Study**
- **Continental Resources – Our Incredible Opportunity in the Bakken**
- **Upper Great Plains Transportation Institute**
- **Williston Comprehensive Plan**

Other Reference Points

- **Annual Building Permits**
- **City Water Usage**
- **City Wastewater Flow**
- **Job Openings**
- **Oil Company Job Forecasts**

Published References

- **Senate Industry Business and Labor Committee House Bill 1206 Testimony**
 - Projects Oil Activity in Williston Area, Alexander Area, Ray-Tioga Area, Watford City-Keene Area, Killdeer Area, Parshall Area, Belfield-Dickinson Area
 - Projects Oil Field Needs
 - Projects Wells per Year, Frac Water Needed, Jobs

Published References

- **Western North Dakota**

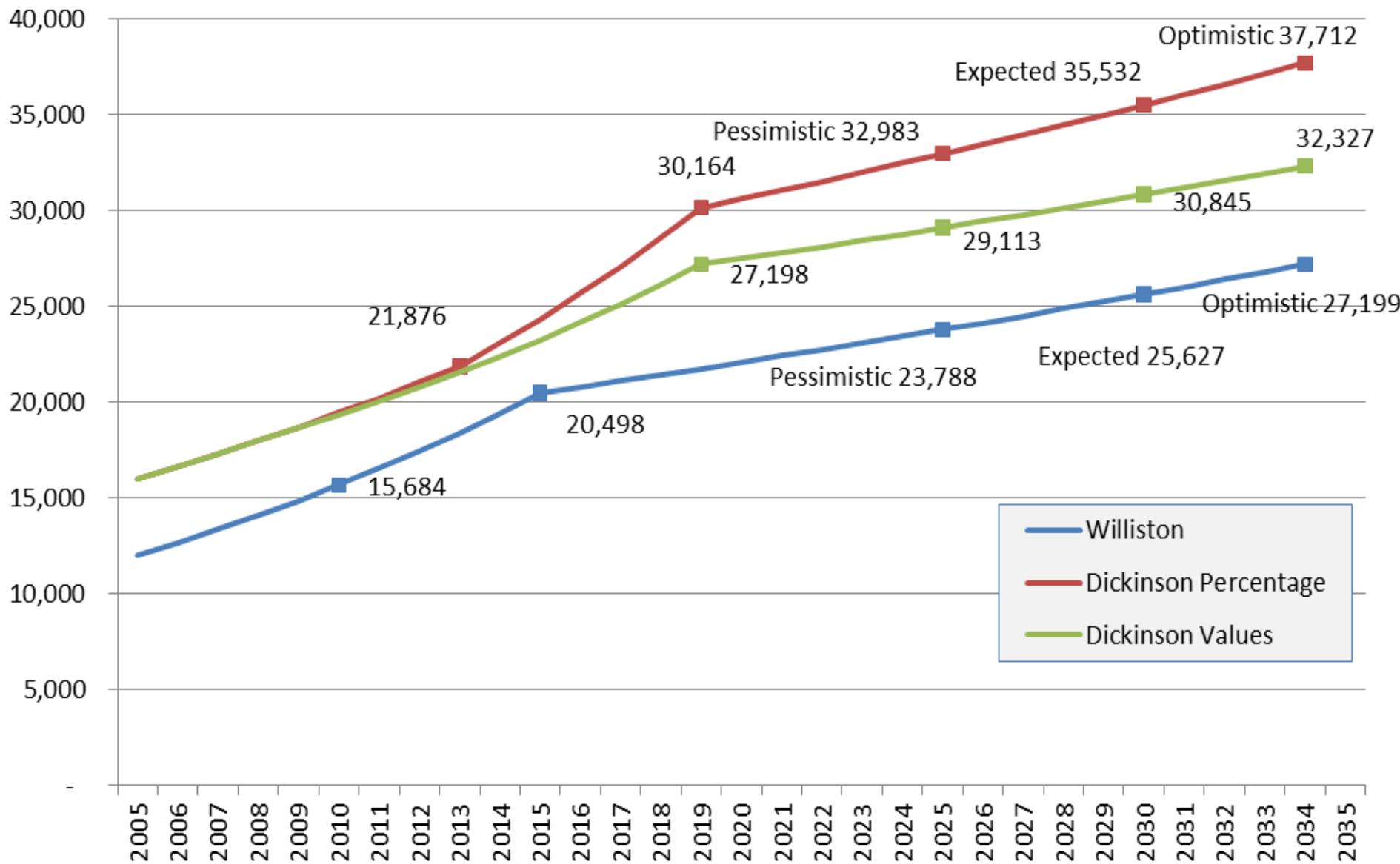
- 1100-2700 wells/year
- 100-225 rigs = 12,000-27,000 jobs
- Lasting 10-20 years

- **Dickinson/Belfield**

- 100-200 wells/year
- 5-10 rigs = 600-1200 jobs
- Lasting 7-10 years

Published References

- **ND Communities Acutely Impacted by Oil and Gas Development**
 - Population Projections for Parshall, Stanley, New Town, Tioga, Williston, Watford City
 - Three Oil Development Phases – Securing Leases, Pattern Drilling and Production
 - Projected Permanent and Transient Growth
 - Presented Expected, Optimistic and Pessimistic Growth



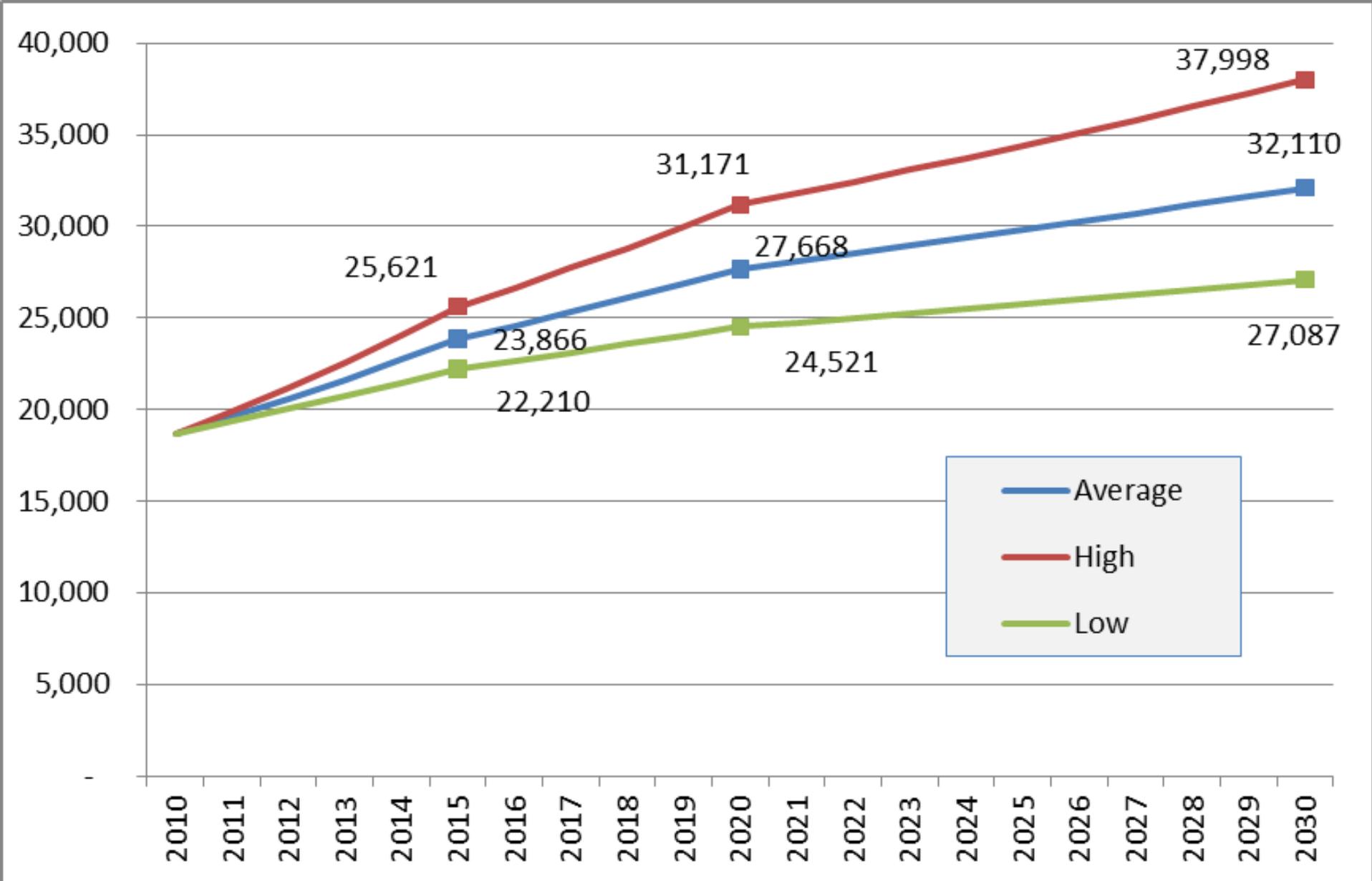
Published References

- **Continental Resources – Our Incredible Opportunity in the Bakken**
 - Independent Analysis of Oil Potential in ND
 - Continental Resources Believes Much Higher Oil Potential Than State Estimates
 - 1050-2700 wells per year over the next 20 years
 - 48,000 wells – 90% yet to be drilled
 - Predicted 1 million barrels/day and 90,000-100,000 jobs by 2020

Published References

▪ **Williston Comprehensive Plan**

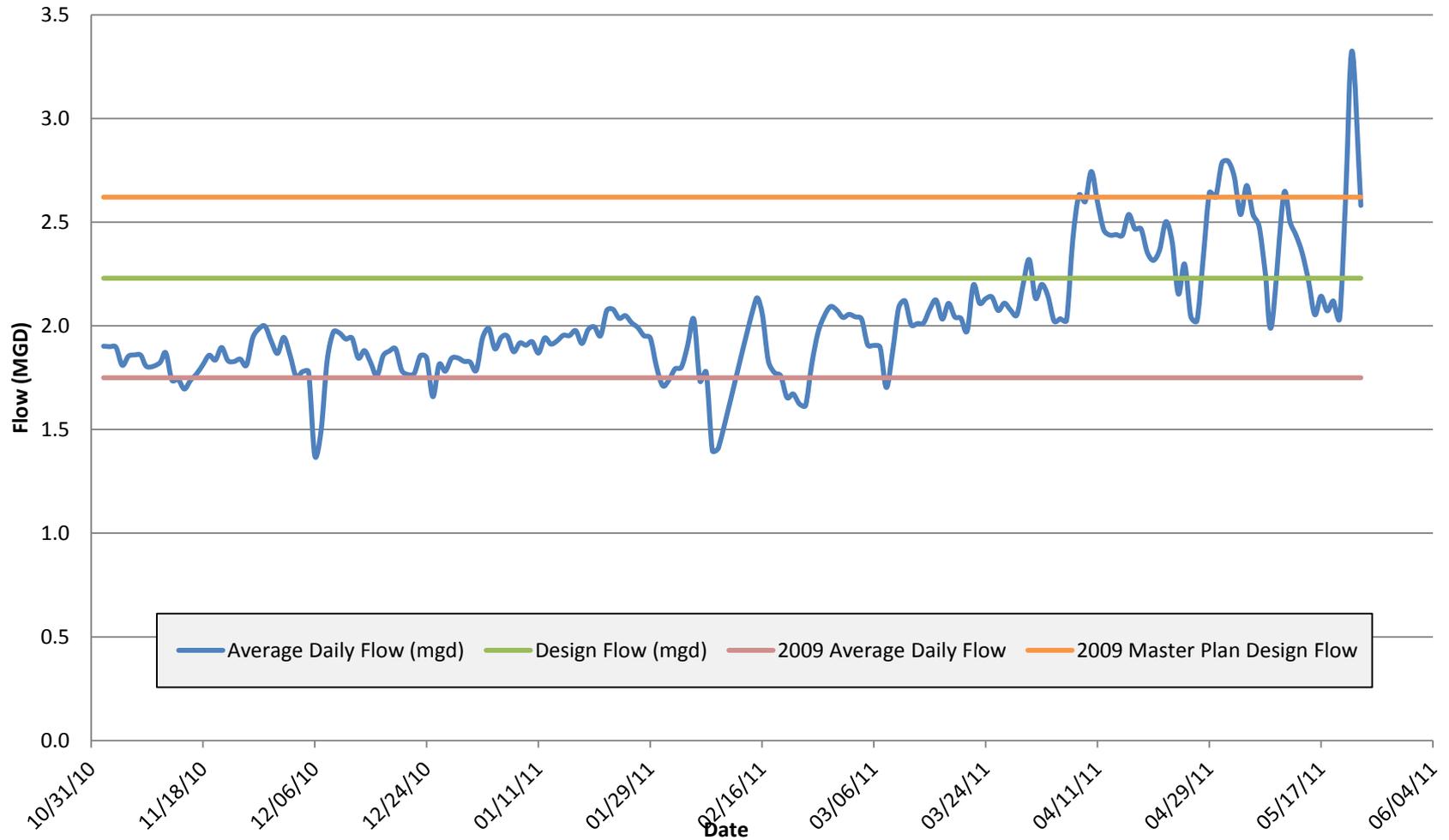
- High growth rate to 2015, dropping off through 2030
- 3 Scenarios: High, Average, Low
- Apply Williston Growth Rates to Dickinson
 - 5% to 2015; 3% to 2020; 1.5% to 2030
 - 6.5% to 2015; 4% to 2020; 2% to 2030
 - 3.5% to 2015; 2% to 2020; 1% to 2030



Population Projections from City Data

- **Wastewater Flow Records**
- **Building Permits**

Existing Flow Conditions



Wastewater Flow Records

■ Wastewater Flow Records

- Flow record trending showed an increase of 66,000 gallons per day each year since 2002
- 63% increase in wastewater flows since 2002
- Projecting similar growth trend for 20 years = additional 13,200 people
- Total population in 2030 = 31,900

City Building Permits

- **City projects 300-350 building permits per year to continue**
- **Equates to approximately 660 people per year**
- **5 to 7 year population of 25,000-27,000**
- **20-year population of 33,200**

Population Projections

- **Reference Reports**

- Predict Fast Growth Rate for 5-7 years followed by Slower Growth Rate
- Possibility of 25,000 to 28,000 in 5-7 years
- 20 year Estimates of 28,000-37,000 people

- **Wastewater Flow Record Trend Shows 30,000-32,000 people in 20 years**

- **Current Home Construction Rate Supports 25,000 to 27,000 people in 5-7 years; 33,000 people in 20 years**

Population Projections

- **Uncertainty about oil industry**
- **Pond facility cannot address the growing population dynamic**
- **Any facility must be easily expanded**
- **Build for a population of 31,000 – plan for more (and less!)**

Project Need and Siting

Project Need

- **Future Growth Expected to 31,000 People or More**
- **Existing Facility is at Capacity Serving 20,000 people**



2011 Facility Conditions

Parameter	Existing Facility Design	2010 Conditions	Jan-Jun 2011
Flow	2.23 mgd	1.80 mgd	2.15 mgd
BOD	3,665 lb/d	3,753 lb/d	4,274 lb/d
TSS	3,665 lb/d*	3,780 lb/d	4,440 lb/d
Ammonia	175 lb/d	445 lb/d	513 lb/d

* Existing Facility Design TSS estimated based on typical design parameters.

Project Need

- **Facility is Overtaxed and in Danger of Violating Discharge Limits**
- **Existing Facility is Nearly 30 Years Old and Exceeded its Design Life**



Facility Site and Collection System Needs

- **New Wastewater Treatment Facility Requires Approximately 10 Acres**
- **North Dakota Department of Health Recommends $\frac{1}{4}$ Mile Separation from Residents**

Facility Site and Collection System Needs

- **Recommended Site is 2 ½ Miles from Existing Pretreatment Building**
- **Meets ¼ Mile Separation Recommendation**
- **Requires New Pump Station to Convey Wastewater to Site**

Facility Siting



DICKINSON
WASTEWATER
TREATMENT FACILITY



Apex Engineering Group, Inc.
Bismarck - Fargo, North Dakota
400 South 2nd Street, Suite # 140
Bismarck, North Dakota 58504
Cellular: 701.223.3800
Fax: 701.223.5881
www.apexengr.com



Treatment Facility to Meet Future Needs

Treatment Facility to Meet Future Needs

▪ Discharge Limits

- Increasing Flow Increases Discharge Amount
- Heart River Low Flow Conditions = Less Dilution Water
- Increased Facility Flow and Heart River Conditions = Strict Discharge Limits

Parameter	Current Limits	New Limits
BOD	25 mg/l	10 mg/l
TSS	30 mg/l	10 mg/l
Ammonia	Average 10 mg/l	< 5 mg/l

Proposed Facility

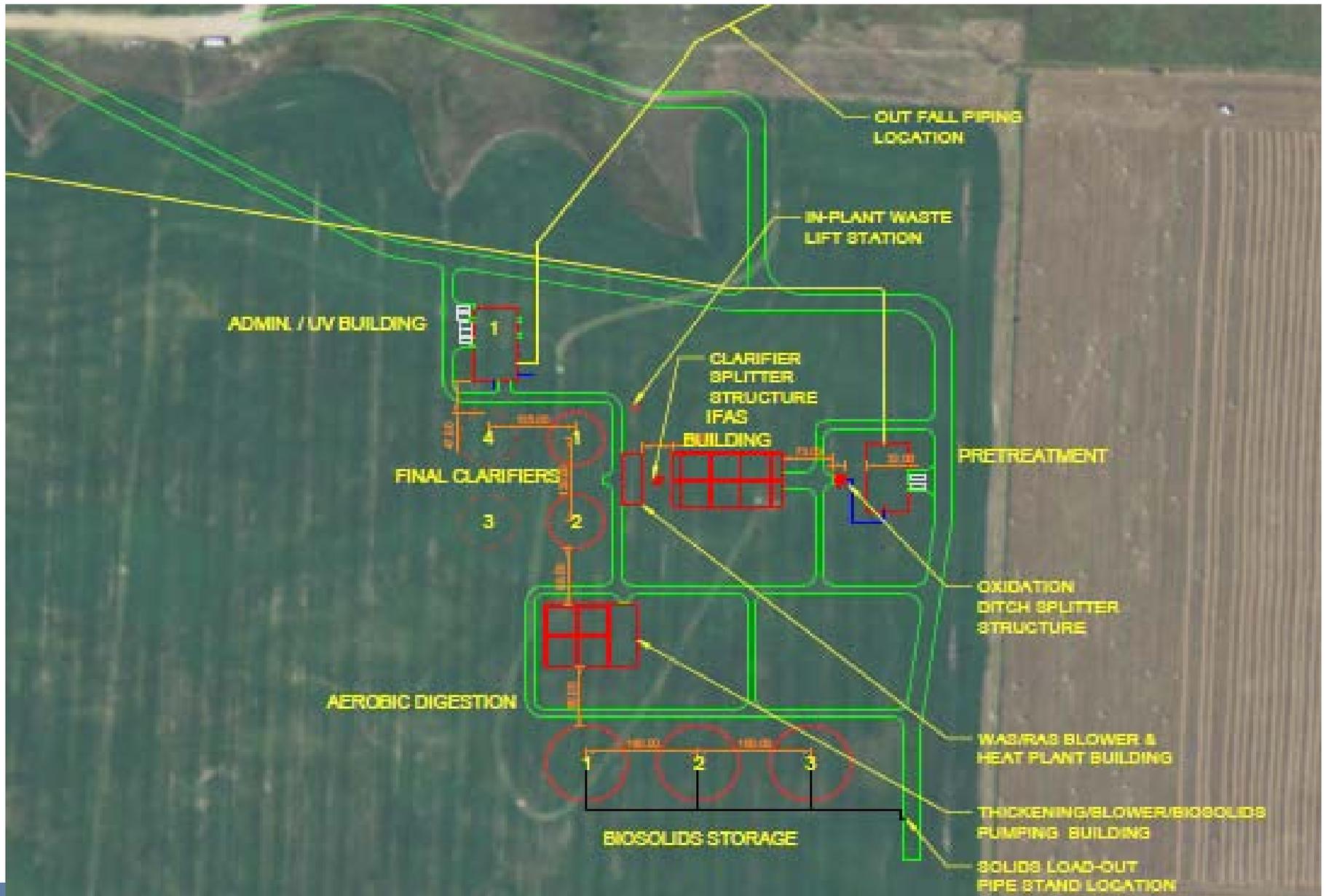
- **Treatment Facility Components – Liquid Train**
 - Pretreatment Building
 - Removes large rags, debris, grit from the wastewater
 - Biological Treatment Process
 - Reduces wastewater strength through biological processes
 - Clarification
 - Settles and separates clear liquid from solids
 - Disinfection
 - Reduces pathogens before discharge to river
 - Reuse for Oil Industry
 - Conserves potable water supply for city residents

Proposed Facility

- **Treatment Facility Components – Solids Train**
 - Solids Thickening
 - Solids Digestion
 - Stabilizes solids removed from the liquid train
 - Solids Storage
 - Stores biosolids between land application periods
 - Land Application of Biosolids
 - Utilizes stabilized treatment product for beneficial use
 - Highly regulated by US EPA

Proposed Facility

- **Administration Building**
 - Houses Controls for Facility
 - Monitor processes and equipment
 - Optimize facility operation
 - Laboratory
 - Test for permit compliance
 - Analyze process performance
 - Office
 - Facility records storage
 - Permit reporting



Estimate of Cost

Treatment Facility to Meet Future Needs

Process	Cost
Pretreatment Building	\$2,854,300
Biological Process	\$4,704,750
Clarifiers	\$2,629,050
UV Disinfection	\$595,000
Yard Piping, Control Structures	\$2,173,450
Biosolids Digestion	\$1,953,300
Biosolids Storage	\$2,306,900
Land Application Equipment	\$967,300
Civil/Site Work	\$375,700
Administration/Laboratory/Control Building	\$3,431,450
Subtotal	\$21,991,200
Undeveloped Design Details and Contingencies (15%)	\$3,880,800
Total Opinion of Cost	\$25,872,000

Facility Site and Collection System Needs

Item	Cost
Treatment Facility	\$25,872,000
Collection System Improvements	\$3,822,000
Construction Subtotal	\$29,694,000
City Engineering, Administration and Legal (2%)	\$594,000
Planning, Design and Bidding Engineering (6.5%)	\$1,915,000
Construction Engineering (7.1%)	\$2,117,000
Total Project Cost	\$34,320,000

Potential Revenue Sources

- **Traditional Revenue Sources**
 - User Fees
 - Special Assessments
- **Equitable Revenue Sources from Permanent, New and Temporary Users**
 - Infrastructure Sales Tax
 - Sewer Access Charge (SAC)
- **Exact Funding Strategy Not Yet Determined**

Schedule

Schedule

Item	Week of
Submit Facility Plan to NDDH	August 15, 2011
Begin Preliminary Engineering	August 15, 2011
Public Hearing	September 22, 2011
Begin Environmental Review Process	September 26, 2011
Preliminary Engineering Report Complete	November 2011
Begin Design	November 2011
90% Design Documents	March 2012
100% Design Documents	April 2012
City Approval of Plans & Specs	April 2012
Submit Final Plans & Specs to NDDH	April 2012
Advertise for Bids	April 2012
Open Bids and Award Contract	May 2012
Begin Construction	June 2012
Substantial Completion	June 2014
Final Completion	September 2014

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