





## McKinleyville Community Services District



Wastewater Facilities Plan  
Administrative Draft

Presented By:  
Lisa Stromme, P.E.  
October 19, 2011



## Presentation Overview

The goal of this presentation is to:

- Provide an overview of the 20-Year Wastewater Facilities Plan developed for the MCS D Wastewater Management Facility (WWMF).

The objective of this presentation is to:

- Outline the various elements of the 20-Year Wastewater Facilities Plan and present the recommendations for system upgrades.

Board approval of the recommended alternative is needed to move forward with system upgrades.



## Introduction

Brief History of the Facilities Planning Process:

- Project started in 2008, initiated by MCS D staff
- Conducted system assessments in 2009
- Completed feasibility study in 2010
- Developed the Facilities Plan in 2011

Major Milestones Throughout the Process:

- Public Scoping Session – April 2010
- Technical Review Session – June 2010
- Selection of Alternatives – July 2010
- Completed Reclamation Study – February 2011
- Completed NPDES Permit Renewal – April 2011
- Peer Review Facilities Plan – August 2011



## Wastewater Facilities Plan Overview

Facilities Plan Goals:

Develop sustainable wastewater solutions for the MCS D wastewater collection, treatment and disposal systems.

Provide a detailed plan outlining a recommended alternative for Regional Board and funding agency consideration.

Facilities Plan Outline:

- Part 1 – Background
- Part 2 – Operations Evaluation
- Part 3 – Project Feasibility
- Part 4 – Recommendations



## Part 1 - Background

Introduction

- Facilities Planning Process
- Purpose and Need

Study Area Characteristics

- Study Area
- Physical Environment
- Socio-Economic Environment
- Land Use Regulations



## Part 2 - Operations Evaluation

Wastewater Characterization

- Influent Flow Analysis
- Wastewater Characteristics

Existing Wastewater Facilities

- Wastewater Collection System
- Wastewater Treatment System
- Effluent Disposal System
- Land Reclamation System



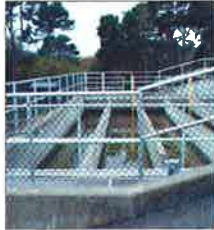
### Part 3 – Project Feasibility

#### Basis For Planning

- Regulatory Requirements
- Basis of Design
- Basis for Cost Estimates

#### Collection System Analysis

- Model Description
- Model Simulations
- Results



### Part 3 – Project Feasibility, continued

#### Treatment Alternatives

- Upgrade/Expand Existing Facultative System
- Extended Aeration System Processes (2)
- Activated Sludge System
- Membrane Bioreactors
- Comparison of Secondary Treatment Options
- New Headworks and Biosolids Management



### Part 3 – Project Feasibility, continued

#### Disposal and Reclamation Alternatives

- New Reclamation Practices
- Existing Outfall to Mad River
- Municipal Reuse
- Ocean Outfall



### Part 4 – Recommendations

#### Recommended Plan

- Collection System Improvements
- Treatment System Improvements
- Disposal and Reclamation System Improvements
- Project Cost Summary



### Facilities Plan Objective

Provide a clear, feasible, and appropriate “road map” to capital improvements, upgrades, and maintenance of the District’s wastewater collection, treatment, and disposal facilities.

The plan is designed to be used in the development of a wastewater management system that:

1. addresses immediate permit requirements,
2. anticipates future permit and regulatory requirements, and
3. accommodates anticipated growth and community needs.



### Current Regulatory Issues

The current area of concern for the existing WWMF is the presence of high ammonia concentrations in treated effluent.

High nutrient loading is impacting the ability of the WWMF to consistently comply with current disposal and reclamation system requirements.



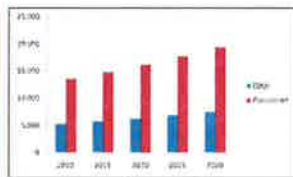
Although the current permit does not directly limit ammonia in effluent discharges, the District anticipates ammonia limits will be established in the next permit cycle.



### Population Growth Forecasts

McKinleyville is the most populated unincorporated area in Humboldt County and is one of the fastest growing communities in the county.

For purposes of the facilities plan, the average growth rate used to develop 20-year flow projections was based on an alternative growth rate presented by the County that projects a 1.8% annual increase in population in McKinleyville.



### Existing and Projected WWMF Flows

#### Existing Flows

The average dry weather flow is approximately 0.9 MGD. The average wet weather flow is approximately 1.1 MGD. The peak day flow is approximately 2.0 MGD.

#### Projected Flows (Year 2030)

The projected average dry weather flow is 1.4 MGD. The projected average wet weather flow is 1.7 MGD. The projected peak day flow is 3.1 MGD.

Projected 20-year flows for year 2030 were developed based on a 1.8% annual increase in population. MCSD staff have noted that the 1.8% growth rate is the annual average increase observed over the last 10 years.



### Existing Wastewater Treatment System

The MCSD WWMF consists of a collection system, wastewater treatment facility, and effluent disposal and land reclamation system. The existing treatment system is a secondary treatment process that consists of three aerated ponds and one stabilization pond followed by a two-stage treatment wetland.



The average dry weather design flow of the treatment facility is 1.6 MGD and the wet weather design flow is 3.3 MGD.



### Existing Disposal and Reclamation System



#### Monitoring Locations:

- M-001: WWMF/CC Chamber
- M-002: Mad River at Hammond
- M-003: Percolation Ponds
- M-004: Lower Fisher Ranch
- M-005: Upper Fisher Ranch
- M-006: Hiller Wetlands Inflow
- M-007: Padorsi Ranch
- M-008: Hiller Wetlands Outflow



### Existing Disposal and Reclamation System

#### Discharge Period - October 1 through May 14

Treated wastewater effluent is discharged to the Mad River, or, if the flow in the river is less than 200 cubic feet per second effluent is discharged to the percolation ponds adjacent to the river and/or to land for reclamation.

#### Discharge Prohibition Period - May 15 through September 30

Treated wastewater effluent is discharged to the percolation ponds and/or to land for reclamation.



### Disposal and Reclamation System Limitations

Under current conditions wastewater reuse on the existing wastewater reclamation areas does not conform to the current waste discharge requirements for reclamation activities.

The Upper Fisher Ranch is not currently operated for reclamation; wastewater effluent is applied by overland flow irrigation methods in quantities that exceed agronomic rates.

Opportunities to increase irrigation on the lower pastures may balance these effects; however, based on current nitrogen loading rates, the existing available reclamation area is not sufficient to reclaim wastewater.



### Disposal and Reclamation System Limitations, cont.

In order to accommodate the land application of effluent, modifications to the existing practices will need to include:

1. a reduction in total nitrogen in the plant effluent, and
2. an increase of the crop cover's ability to use the available nitrogen being applied through land application.

The District also needs an alternative to the continued use of the existing percolation ponds for effluent disposal during the summer discharge prohibition period.



### Collection System Improvements

The central crossing (Line 5) and the southern crossing (Line 3) have been identified as the critical areas in the collection system that will require upgrades under projected flow conditions.

Recommended improvements to the collection system network include installing parallel pipe networks adjacent to each main line in these areas.



Additional improvements are recommended at the system lift stations.

Total costs for the proposed collection system upgrades were estimated to be \$3.4M.



### Treatment System Improvements

Secondary treatment alternatives were evaluated with regard to:

- treatment,
- cost,
- implementability,
- public acceptance, and
- regulatory issues.

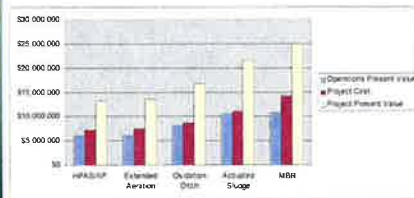
Nitrogen removal, in addition to secondary treatment, was considered a priority.



### Treatment System Improvements, cont.

Secondary treatment alternatives reviewed in detail included:

1. a high performance aeration system with a nitrifying filter;
2. an in-basin extended aeration system;
3. an oxidation ditch;
4. an activated sludge system; and
5. a membrane treatment system.



### Treatment System Improvements, cont.

The in-basin extended aeration system provides a high quality effluent that would reliably meet anticipated permit requirements for land application and discharge to Mad River.

Of the high reliability alternatives considered, the in-basin extended aeration system had the lowest capital and operational costs.

Costs for the in-basin extended aeration system were estimated to be \$7.4M.

Additional costs for a new headworks were estimated to be \$1.1M.



### Disposal and Reclamation System Improvements

To increase reclamation capabilities at the land reclamation sites, installation of a poplar forest is proposed.

The proposed poplar forest disposal plan includes the planting of approximately 45 acres of the Lower Fisher Ranch with poplars in 4- to 5-acre plots.



If poplars replaced the current grass crop mixture on the Lower Fisher Ranch, total acreage efficiency could be increased by 130%.

Total costs for the proposed disposal and reclamation system upgrades were estimated to be \$1.9M.





## Total Anticipated Project Cost

Component	Description	Total Cost
Collection System	Gravity Mains/ Lift Stations	\$3.4M
Pre-treatment	Headworks	\$1.1M
Secondary Treatment	In-Basin Extended Aeration	\$7.4M
Disposal/Reclamation	Poplar Forest/ Pond Removal	\$1.9M
<b>Total Project Cost</b>		<b>\$13.8M</b>

The opinion of probable cost to complete the recommended WWMF collection, treatment and disposal/reclamation system improvements is approximately \$13.8M.



## Conclusions

The Facilities plan provides a clear, feasible, and appropriate "road map" to capital improvements, upgrades, and maintenance of the District's wastewater collection, treatment, and disposal facilities.

Of the alternatives reviewed, the in-basin extended aeration system provides a high quality effluent that would reliably meet anticipated permit requirements for land application and discharge to Mad River.

This secondary treatment system upgrade, coupled with improvements to the existing land reclamation practices, should enable the WWMF to consistently meet or exceed regulatory requirements over the 20-year planning horizon.



## Next Steps...

The Administrative Draft of the Facilities Plan is being submitted for MCSD Board review and approval.

Following MCSD Board approval, the plan will be submitted to the Regional Board.

In addition to review by the MCSD Board, we have made the Facilities Plan available to the general public on the MCSD website for review and comment.

The public comment period will start on October 19, 2011 and end on December 14, 2011.

A presentation is scheduled for November 7<sup>th</sup> at the McKinleyville Library to provide an overview of the plan for the general public.



## Next Steps, continued...

A Final Facilities Plan will be submitted to the Regional Board for review and comment.

Following Regional Board approval, the District will need to initiate the planning, design, and permitting phases of the Preferred Project.

This work will include completing the following:

1. Design Team Review and Selection (2012)
2. Preliminary Engineering Design (2013)
3. CEQA Review (2013)
4. Final Design (2014)
5. Project Permitting (2014)
6. Construction (2015)
7. NPDES Permit Renewal (2016)



## Thank You!

Are there any questions?



## McKinleyville Community Services District



Wastewater Facilities Plan  
Administrative Draft - Public Presentation

Presented By:  
Lisa Stromme, P.E.  
November 7, 2011



## Introduction

SHN presented the Administrative Draft of the Facilities Plan for the MCSD Wastewater Management Facility (WWMF) to the MCSD Board on October 19, 2011.

The Facilities Plan identifies a recommended alternative for upgrading the existing system to meet current regulatory requirements as well as address projected growth needs in the community.

Board approval of the recommended alternative is needed to move forward with system upgrades.

The public is encouraged to send comments on the plan to MCSD for consideration during the public review and comment period.



## Public Review and Comment Period

### Facilities Plan Review

- The public is encouraged to review the Administrative Draft of the Facilities Plan.
- The document is available for review at the MCSD office and on the MCSD website:

<http://mckinleyvillecsd.com/document-library>

### Facilities Plan Comments

- Comment period started on October 19, 2011.
- Comment period ends at 5 pm on December 14, 2011.
- The public should address comments on the plan to Norman Shopay, the MCSD General Manager.

McKinleyville Community Services District  
P.O. Box 2037  
McKinleyville, CA 95519



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The goal of this presentation is to:

- Provide an overview of the 20-Year Wastewater Facilities Plan developed for the MCSD WWMF.

The objective of this presentation is to:

- Outline the various elements of the 20-Year Wastewater Facilities Plan and present the recommendations for system upgrades.



## Facilities Planning Process

### Brief History of the Facilities Planning Process:

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- Peer Review Facilities Plan - August 2011



## Overview of the Public Scoping Session (April 2010)

The workshop presented an opportunity for the public to provide input on alternatives to be included in the Facilities Plan.

The outcome included a list of ideas and treatment system goals that the public would like MCSD to consider.

### Treatment system:

- Promote energy efficiency
- Increase passive/wetland system use
- Provide recreational benefits
- Incremental build-out of upgrades
- Reduce influent flow/gray water

### Biosolids production and reuse:

- Methane capture system
- Composting for reuse

### Disposal/reclamation/reuse:

- Use existing discharge for ocean outfall
- Challenge summer discharge prohibition
- Treat portion for reuse and then dispose
- Extract as much benefit before discharging





## Wastewater Facilities Plan Overview

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Provide a detailed plan outlining a recommended alternative for Regional Board and funding agency consideration.

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## Part 1 - Background

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### Study Area Characteristics

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### Wastewater Characterization

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### Recommended Plan

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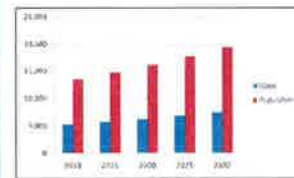
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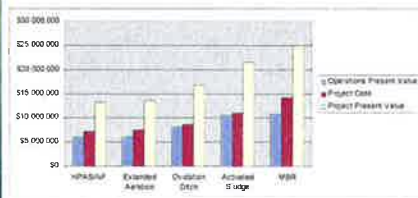
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Additional costs for a new headworks were estimated to be \$1.1M.



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Total Project Cost		\$13.8M

The opinion of probable cost to complete the recommended WWMF collection, treatment and disposal/reclamation system improvements is approximately \$13.8M.

### Conclusions

The Facilities plan provides a clear, feasible, and appropriate "road map" to capital improvements, upgrades, and maintenance of the District's wastewater collection, treatment, and disposal facilities.

Of the alternatives reviewed, the in-basin extended aeration system provides a high quality effluent that would reliably meet anticipated permit requirements for land application and discharge to Mad River.

This secondary treatment system upgrade, coupled with improvements to the existing land reclamation practices, should enable the WWMF to consistently meet or exceed regulatory requirements over the 20-year planning horizon.

### Next Steps...

The Administrative Draft of the Facilities Plan was presented to the MCSD Board on October 19, 2011.

The plan will be submitted for MCSD Board approval in January 2012, pending no significant changes.

Following MCSD Board approval, the plan will be submitted to the Regional Board.

In addition to review by the MCSD Board, the Facilities Plan is available to the general public on the MCSD website for review and comment.

The public comment period started on October 19, 2011 and will end on December 14, 2011.

The public is encouraged to provide comments to MCSD for consideration during the review and comment period.

### Next Steps, continued...

A Final Facilities Plan will be submitted to the Regional Board for review and comment.

Following Regional Board approval, the District will need to initiate the planning, design, and permitting phases of the Preferred Project.

This work will include completing the following:

1. Design Team Review and Selection (2012)
2. Preliminary Engineering Design (2013)
3. CEQA Review (2013)
4. Final Design (2014)
5. Project Permitting (2014)
6. Construction (2015)
7. NPDES Permit Renewal (2016)



### Overview of General Comments to Date

The following general comments on the plan were noted during the MCSD Board meeting:

1. Incorporation of Public Input from 2010
  - Wetlands Treatment
  - Municipal Reuse
  - Ocean Outfall
  - Modular System
2. Selection of Designated Growth Rate
3. Pilot Project Results for Poplar Study
4. Odor Concerns for Selected Alternative



### Incorporation of Public Input from 2010

1. Wetlands Treatment
  - Addressed in Section 7.2
2. Municipal Reuse
  - Addressed in Section 8.3
3. Ocean Outfall
  - Addressed in Section 8.4
4. Modular System
  - Regulatory Requirements vs. Capacity-Driven Upgrades



Thank You!



## McKinleyville Community Services District



### Wastewater Facilities Plan Treatment System Improvements Recommended Alternative Review

Presented By:  
Lisa Stromme, P.E.  
November 16, 2011



## Introduction

SHN presented the Administrative Draft of the Facilities Plan for the MCSD Wastewater Management Facility (WWMF) to the MCSD Board on October 19, 2011 and held a public workshop on November 7, 2011 for the public to ask questions and provide comments.

The Facilities Plan identifies a recommended alternative for upgrading the existing treatment system to meet current regulatory requirements as well as address projected growth needs in the community.

Board approval of the recommended alternative is needed to move forward with system upgrades.



## Presentation Overview

The goal of tonight's presentation is to:

- Provide an overview of the recommended alternative as set forth in the Facilities Plan developed for the MCSD WWMF.

The objective of tonight's presentation is to:

- Review the various elements of an in-basin extended aeration system and present the benefits of the recommended alternative.



## Facilities Plan Objective

Provide a clear, feasible, and appropriate "road map" to capital improvements, upgrades, and maintenance of the District's wastewater collection, treatment, and disposal facilities.

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## Treatment System Improvements

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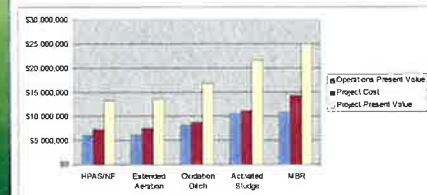
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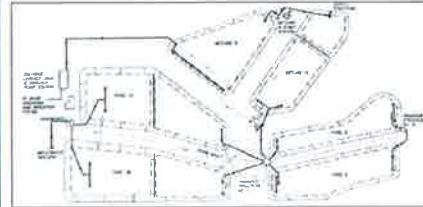
Additional costs for a new headworks were estimated to be \$1.1M.



### Existing Treatment System

Existing treatment system components:

- oxidation/stabilization ponds
- treatment wetlands
- chlorine disinfection



### Proposed Treatment System

Proposed treatment system components:

- new headworks/blower building
- aeration basins (2)
- clarifiers (4)



### In-Basin Extended Aeration Systems

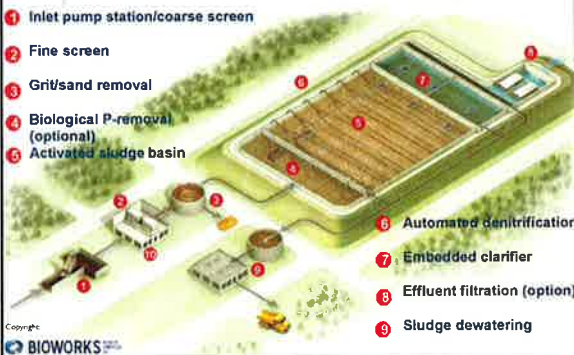
There are two leading manufacturers of in-basin extended aeration systems in the United States:

BioWorks® - Bioworks North America  
 Biolac® - Parkson Corporation

The information presented on the following slides was provided by BioWorks® and is being used with permission in accordance with applicable copyright laws.



### In-Basin Extended Aeration - Typical Design



### In-Basin Extended Aeration - Basic Concepts

An "Extended Aeration System" speeds up Mother Nature's normal way of eliminating biological waste.

This is done by helping the already-present microorganisms to consume the waste (the waste is their food).

Those microorganisms are "aerobic" (they breathe air - oxygen).

Following preliminary treatment, the wastewater is contained in a large basin full of the wastewater and microorganisms.

High volumes of air are added to allow the microorganisms to breath and flourish.

The biological waste is consumed as their food.



### In-Basin Extended Aeration – Diffuser System

Aeration is typically responsible for 2/3 of the total electric costs in the operation of wastewater treatment plants.

The in-basin extended aeration system uses fine-bubble diffused aeration. The fine-bubble diffuser process is energy-efficient:

- it minimizes energy usage,
- provides the right amount of air, and
- keeps the basins well mixed.

The diffuser assemblies are suspended from floating air lines.

The Aeration Basin is then followed by a settling tank (clarifier) where the heavy solids fall to the bottom and the clean water flows over a weir.



### In-Basin Extended Aeration – Diffuser System



- 1 Floating air header
- 2 Downcomer hose
- 3 Air manifold with ballast weights
- 4 Single diffuser tubes with silicone membranes

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### In-Basin Extended Aeration – Nitrogen Removal

Nitrogen is removed in the treatment system by turning the incoming ammonia to nitrates (through aeration), then getting the nitrates out by "anoxic" action. This is done by alternating aerated (oxic) and non-aerated (anoxic) zones.



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### In-Basin Extended Aeration – Effluent Water Quality

The extended aeration system can produce excellent effluent water quality:

- BOD below 10 mg/L  
(below 5 mg/L w/ filter)
- TSS below 15 mg/L  
(below 5 mg/L w/ filter)
- Ammonia below 1 mg/L
- Nitrogen/phosphorous removal where needed



### In-Basin Extended Aeration - Benefits

#### Cost Advantages

- Construction cost is lower than other alternatives
  - The main (aeration) basin is lined earthen basin (not expensive concrete)
  - Simple design
- Operating costs are also lower
  - Energy-efficient
  - Easy to operate & maintain

#### Overall Benefits

- Cost-Effective Construction
- Easy & Stable Operation
- High-efficiency fine-bubble aeration
- Excellent Effluent Water Quality
- Nitrogen Removal
- Simple & Easy Maintenance
- Low Operating Costs



### BioWorks® Facility



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**SAV**

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**SAV**

**Discussion Points Raised by the Public  
at the November 7<sup>th</sup> Workshop**

- Why not deep well injection for disposal?
- What are the results of the SAV study?
- What would comprise a minimum project?
- Are the community growth rate projections verifiable?
- What irrigation methods are being considered?
- What are the O&M costs?
- Are energy conservation measures being considered?
- Is a decentralized system acceptable by code?
- How will biosolids be handled?
- Are the impacts of future regulatory requirements addressed?
- Are different disinfection methods being considered?

**Thank You!**



**SAV**

## McKinleyville Community Services District



### Wastewater Facilities Plan Response to Comments

Presented By:  
Lisa Stromme, P.E. and  
Mike Veach, P.E.  
January 4, 2012



## Introduction

The 20-Year Facilities Plan for the MCSD Wastewater Management Facility (WWMF) identifies recommended alternatives for upgrading the existing collection, treatment, reclamation, and disposal systems to meet current and future regulatory requirements as well as address projected growth needs in the community.

Board acceptance of the Facilities Plan is needed prior to submission of the plan to the Regional Board.

Tonight we are presenting the response to comments received on the Administrative Draft of the 20-Year Facilities Plan.



## Presentation Overview

The goal of tonight's presentation is to:

- Review the comments received and considered during the public comment period.

The objective of tonight's presentation is to:

- Present the response to comments on the Administrative Draft of the 20-year Facilities Plan.



## Presentation Outline

1. Facilities Plan Review Process
2. Facilities Plan Objective
3. Facilities Plan Conclusions
4. Overview of the Recommended Alternatives
5. General Comments from October Presentation
6. Discussion Points from November Workshop
7. Review and Consideration of Additional Comments
8. Overview of Additional Key Issues
9. General Response to Comments



## Facilities Plan Review Process

The Administrative Draft of the Facilities Plan for the MCSD WWMF was presented to the MCSD Board on October 19, 2011.

The document was made available for public review during the public comment period from October 19, 2011 through December 14, 2011.

A public workshop was also held on November 7, 2011 for the public to ask questions and provide comments.



## Facilities Plan Review Process, cont.

On November 16, 2011 an update on the Facilities Plan was presented to the Board.

The presentation included a detailed review of the recommended alternative (an in-basin extended aeration system) for the treatment system upgrade.

On December 14, 2011 a tour of the City of Willits in-basin extended aeration facility was hosted for MCSD staff and Board members, and interested community members.



### Facilities Plan Objective

Provide a clear, feasible, and appropriate "road map" to capital improvements, upgrades, and maintenance of the District's wastewater collection, treatment, reclamation and disposal facilities.

The plan is designed to be used in the development of a wastewater management system that:

1. addresses immediate permit requirements,
2. anticipates future permit and regulatory requirements,
3. accommodates anticipated growth and community needs, and
4. provides flexibility for future expansion.



### Facilities Plan Conclusions

Of the treatment system alternatives reviewed, the in-basin extended aeration system provides a high quality effluent that would reliably meet anticipated permit requirements for land application and discharge to Mad River.

The treatment system upgrade, coupled with improvements to the existing land reclamation practices, should enable the WWMF to consistently meet or exceed regulatory requirements over the 20-year planning horizon.



### Overview of the Recommended Alternatives

#### Collection System Upgrades (\$3.4M)

- Upgrade collection system network and system lift stations to handle projected flows.

#### Treatment System Upgrades (\$8.5M)

- Install new headworks.
- Convert existing pond process into an in-basin extended aeration system.

#### Reclamation/Disposal System Upgrades (\$1.9M)

- Decommission existing percolation ponds.
- Install poplar forest for reclamation.



### General Comments from October Presentation

The following general comments on the plan were noted during the October presentation to the Board:

1. Incorporation of Public Input from 2010
  - Wetlands Treatment (Addressed in Section 7.2)
  - Municipal Reuse (Addressed in Section 8.3)
  - Ocean Outfall (Addressed in Section 8.4)
  - Modular System (Regulatory vs. Capacity Driven)
2. Selection of Designated Growth Rate
3. Pilot Project Results for Poplar Study
4. Odor Concerns for Selected Alternative



### Discussion Points Raised by the Public at the November 7<sup>th</sup> Workshop

- Why not deep well injection for disposal?
- What are the results of the Submerged Aquatic Vegetation study?
- What would comprise a minimum project?
- Are the community growth rate projections verifiable?
- What irrigation methods are being considered?
- What are the O&M costs?
- Are energy conservation measures being considered?
- Is a decentralized system acceptable by code?
- How will biosolids be handled?
- Are the impacts of future regulatory requirements addressed?
- Are different disinfection methods being considered?



### Review and Consideration of Additional Comments

The facilities plan sets forth recommended alternatives for upgrading the existing WWMF collection, treatment, reclamation and disposal systems.

Based on review and consideration of the comments received to date, the recommended alternatives as set forth in the plan have not been changed.

However key issues were raised during the comment period that warrant further discussion and the Facilities Plan is being updated to address these issues.





## Overview of Additional Key Issues Raised

### Treatment Technology

- Disinfection-by-Products
- Impacts of Low Alkalinity
- Treatment Pond Lining Requirements
- Integral Clarifier RAS Control Issues
- Alternative Treatment Technologies

### Disposal Concepts

- Alternative Disposal Methods
- Poplar Forest Expansion Options
- Percolation Pond Options

### Alternative Energy Sources

### In-basin Extended Aeration Facility Locations



## Disinfection-By-Products

### Chlorine Disinfection-By-Products:

- Chloroform (No Criteria)
- Bromoform (Limit = 4.3 ug/L)
- Chlorodibromomethane (Limit = 0.4 ug/L)
- Bromodichloromethane (Limit = 0.6 ug/L)

### MCSD Effluent Concentrations (2008-2011):

- Chloroform (Max = 3.4 ug/L)
- Bromoform (ND = <0.1 ug/L)
- Chlorodibromomethane (ND = <0.08 ug/L)
- Bromodichloromethane (Max = 0.4 ug/L)



## Impacts of Low Alkalinity

### General Wastewater Characteristics for McKinleyville

- Average Alkalinity = 220 mg/L  $\text{CaCO}_3$
- Nitrification/Denitrification process will alter levels
- Anticipated effluent = 85 to 100 mg/L  $\text{CaCO}_3$
- Considered adequate to maintain required pH levels

### Consideration of Impacts

- Colder weather could drop alkalinity levels below those needed to maintain minimum pH
- Need to provide a means for increasing alkalinity during the design process
- Include caustic soda drip or addition of lime
- Anticipate minimal additional cost



## Treatment Pond Lining Requirements

### Title 27 Secondary Containment Requirements

- Municipal wastewater is classified as a "designated waste" (Water Code Section 13173/ Title 27 Section 20220)
- Unless exempted, wastewater surface impoundments must be designed in accordance with Title 27 requirements for a Class II waste management unit.
- These requirements include provisions for liners that meet a prescriptive standard or for an engineered alternative that provides equivalent protection.
- Prescriptive standards include double liners and leachate collection and removal systems.
- Engineered alternatives and/or qualifications for exemptions will require detailed analyses of site geology and groundwater quality.



## Integral Clarifier RAS Control Issues

### In-basin Clarifiers vs. Conventional Clarifiers

- RAS = Return Activated Sludge
- Concern over operating problems with integral or in-basin clarifiers.
- Can also modify RAS pumps to eliminate the issues associated with RAS control in integral clarifiers.
- Use external RAS pumps for improved RAS control.
- Recommend modification of pumps or consideration of conventional clarifiers.
- Investigate use of conventional circular clarifiers as a desired upgrade during the final design process.



## Alternative Treatment Technologies

### Suspended Aeration with Clarification

- Include suspended growth or fixed film media in Pond 2, add recycle pumps to return flows.
- Requires screens/media and additional aeration.
- Preliminary review of similar alternative indicated this solution would not be cost effective.

### Microbial Seeding with Algae Control

- Biological nutrient removal through microbial seeding in "nursery tank".
- Interesting alternative, but rather new process.
- Need proposed alternative to be proven and reliable.
- Question whether this technology has the ability to meet this criteria.





### Alternative Disposal Method – Deep Well Injection

#### Two Options for Deep Well Injection:

- Injection into an aquifer (groundwater).
- Injection into a pervious layer isolated from an aquifer.

#### Deep Well Injection Issues:

- Discharge directly to groundwater would require additional treatment.
- Installation and maintenance of injections wells can be problematic in seismically-active areas.
- Suspended solids loading constraints on injection system may require higher level of treatment.
- Well drilling costs may be excessive: exploratory borings, need for redundant wells, etc.



### Poplar Forest Options

#### Poplar Forest Expansion Options

- The facilities plan includes costs for construction of a 45-acre poplar forest at the existing land reclamation sites.
- The minimum required acreage (45-acres) was estimated based on anticipated hydraulic loading rates following decommissioning of the percolation ponds.
- Expansion of the poplar forest beyond the minimum required acreage is another option for consideration at the land reclamation sites.
- The current pilot study will provide the required data for the development of the poplar forest.
- Expansion of additional potential reclamation areas will also be considered during the design process.



### Percolation Pond Options

#### Percolation Pond Options

- The facilities plan includes costs for decommissioning and abandonment of the existing percolation ponds.
- The California Department of Fish and Game has expressed interest in an alternative use for the percolation ponds as potential fish-rearing facilities.
- This alternative use for the percolation ponds should be considered and investigated during the pre-design process.



### Alternative Energy Sources

#### Alternative Energy Sources for Treatment System:

- Solar – installation of a solar array that will provide the energy needed to power the recommended treatment system has an estimated payback period of 40+ years based on current rates.
- Wind – preliminary research indicates the project area does not have consistent wind patterns at speeds sufficient for harvesting.

#### Alternative Energy Production from Sludge Process:

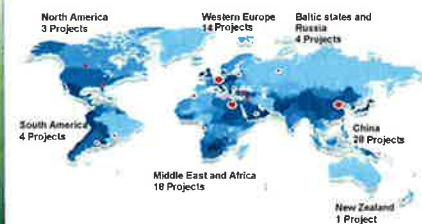
- Methane – installation of a cost effective methane capture and reuse system would require a larger volume of sludge production than MCSD is anticipated to generate.



### In-Basin Extended Aeration Facilities - Parkson Biolac Process Locations



### In-Basin Extended Aeration Facilities - Bioworks Process Locations



**Thank You!****SHN Project Team:**

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