Maui County Water Use & Development Plan

Status Report

Presentation to the Water Resources Committee of the Maui County Council

March 3, 2009
WUDP Process Status Report

- Overview of Each District Process Status
- Final Candidate Strategy Reports
  - Central District
  - Upcountry District
- Next Steps
Figure 2-2
ELEMENTS OF AN IRP PROCESS

Planning Objectives

Evaluation Criteria

Define Future Uncertainties and Potential Outcomes

Demand Forecast

Characterize Resource Options

Resource Assessment
- Supply-side
- Demand-side

Form Potential Resource Sequences

Narrow

Test Sequences Against Evaluation Criteria

Narrow

Form Resource Strategies

Evaluate Resource Strategies

Narrow

Institutional Feasibility

Final Recommendations

Probabilities of Outcomes
<table>
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<tr>
<th>District</th>
<th>Demand Forecasts</th>
<th>Objectives</th>
<th>Resource Options</th>
<th>Candidate Strategies</th>
<th>Final Strategies</th>
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Lana’i District Status

- Draft Plan Under Review by Lana’i Water Advisory Committee
- Final Draft Being Completed
- Outstanding Issues Being Discussed by Water Advisory Committee
Central District Status

• Draft Final Candidate Strategies Report
  Draft Complete for Public Review
  – Range of Energy Cost Scenarios Considered
  – Analysis of Additional Options / Strategies
  – Verifying Project Feasibility, Costs & Dates
  – Refinements, Perspectives, Sensitivity Testing
  – Includes Consultant’s Recommendations

• Next Process Steps Under Consideration
  – Next WAC Meeting To Be In March 2009
Upcountry District Status

• Draft Final Candidate Strategies Report Being Drafted
  – Range of Energy Cost Scenarios Considered
  – Analysis of Additional Options / Strategies
  – Verifying Project Feasibility, Costs & Dates
  – Refinements, Perspectives, Sensitivity Testing
  – Includes Consultant’s Recommendations

• Draft Report To DWS for Review In March 2009
West Maui District Status

- Water Advisory Committee Reconvened
- Three WAC Meetings
  - Introduction to the WUDP Process
  - Discussion of Planning Objectives and Issues
  - Historical Water Use
  - Demand Projections
  - Potential Resource Options
- System Economic Model Being Developed
Moloka’i District Status

• Water Advisory Committee Assembled
• Six WAC Meetings
  – Introduction to the WUDP Process
  – Discussion of Planning Objectives and Issues
  – Historical Water Use for All Systems
  – Demand Projections for All Systems
  – Potential Resource Options
  – Wellhead Protection and Water Quality
• Next WAC Meeting - March 12
East Maui District Status

- Introductory WAC Meetings in Keanae and Hana (December 2008)
  - Introduction to the WUDP Process
  - Discussion of Planning Objectives and Issues
  - Pre-existing Conflicts / Contested Issues
    - Diversion of Stream Water
    - Impacts of New Wells
  - Acute Water Shortage Conditions
    - Private System Sources Dry
Central District
Final Candidate Strategies

• A. Na Wai Eha Surface Water Treatment
• B. Northward Basal Groundwater
• C. Eastward Basal Groundwater
• D. Desalination
• E. Extensive Conservation and Wastewater Recycling
Elements Included in Final Candidate Strategies

• Committed Options
• Near Term Options
• Long Term Options
  – Groundwater
  – Surface Water
  – Recycled Water
• General Options
Options Included in All Strategies

• Committed Options
  – Kupaa Well
  – Iao Tank Site Well
  – Waikapu Tank Well
  – Maui Lani Wells

• Near Term Options
  – Waikapu South Wells
  – Shaft 33 Replacement Wells
General Options

- Conservation – Demand Side Management
- Supply Side Leak Reduction Measures
- Production Energy Efficiency Measures
- Energy Production Options
- Water Rate Design and Pricing Policies
- Stream Restoration Measures
- Watershed Protection and Restoration
- Well Development Policies and Regulation
- Wellhead Protection Ordinance
- Conservation Ordinance
Integration Analysis Model

• Integration analysis model developed for each DWS water system
  – Capacity Expansion Requirements Analysis
  – Production Cost Analysis
  – Integration of Supply and DSM Resources
  – Determination of System Costs and Impacts
    • Capital and Fixed & Variable O&M Costs
    • Costs by “Perspective” (Utility, TRC, Participant)
    • Rate Impact Analysis
Demand Side Management Program Analysis

• What programs can the County implement to encourage customers to use energy efficiently?
• How effective will the programs be as a “resource” to meet future water needs?
• Are the programs cost effective?
Demand Side Management Program Analysis

• Analysis of End Uses of Water
  – How much water is used for various end uses?

• Assessment of DSM Technical Potential
  – How much water could be saved with efficient fixtures and practices?

• Assessment of DSM Economic Potential
  – How much water could be saved with different levels of expenditure on measures and program administration?
Demand Side Management
Economic Potential

• Several Possible DSM Programs Characterized
  – Targeting Indoor and Outdoor End Uses
  – Implemented Various Conserving Measures
  – Using Alternate Delivery Mechanisms
• Costs of Attaining Progressive Levels of Technical Potential Estimated
• Cost EffectivenessEvaluated in Integration Model
Cost of System Demand Growth

• Conservation Programs Cost Less Than New Supply Resources
  – $4.3 Million (NPV) Conservation Programs Reduce System Capital and Operating Costs by $9.4 Million
    • Capital Requirements Reduced $ 4.2 Million
    • Operating Costs Reduced $5.2 Million  
      (Assuming Low Energy Price Scenario)
Options Included in All Strategies

• Demand Side Management Portfolio
  – Basic Programs Included in All Strategies
    • Indoor Fixture Retrofit Program
    • Outdoor Landscape Irrigation Efficiency Program
  – More Aggressive Programs Evaluated Separately

• DPW Water Recycling Projects
  – NOT Included in All Strategies
  – Evaluated as Separate Strategy
A. Na Wai Eha Surface Water Treatment

One or more water treatment plants using water from the Na Wai Eha Streams
A. Na Wai Eha Surface Water Options

- Base Flow Options:
  - Waialae Water Treatment Plant
  - Waihee Water Treatment Plant

- Storage Reservoir Options:
  - Design for Using Primarily Diversions During High Water Flows
Diversion Volume Fraction vs Diversion Capacity

Iao Stream Diversion Modeled in Reservoir Mass Flow Analysis

Hypothetical Allocation of IFS, Agricultural and Municipal Uses
Reservoir Mass Flow Analysis
Iao Stream

Instream Flow Base 10MGD
20 MGD Agricultural Diversion Capacity After IFS
40 MGD Diversion to Reservoir After IFS and Ag. Diversion

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B. Northward Basal Groundwater Development

New basal wells, transmission and storage northward in Waihee and Kahakuloa aquifers
C. Eastward Basal Groundwater Development

New Basal Wells in the Haiku and/or Honopou Aquifers w/ Transmission to the Central District
C. Eastward Basal Groundwater Variations

- Haiku Wellfield at 1500 ft. Elevation
- Haiku Wellfield at 1000 ft. Elevation
- Waikamoi Aquifer Wellfield
- Waikamoi Aquifer Wellfield with Ditch Transmission and WTP
D. Brackish Water Desalination

Desalination Plant Using Central Brackish Groundwater
E. Large Scale Water Recycling and Conservation

Meeting New Water Needs by Maximizing Recycled Water Use and Conservation Measures
Central District
Final Candidate Strategies

• A. Na Wai Eha Surface Water Treatment
• B. Northward Basal Groundwater
• C. Eastward Basal Groundwater
• D. Desalination
• E. Extensive Conservation and Wastewater Recycling
Total 50 Yr. Study Period System Costs
Difference From Reference Strategy

Energy Costs @ $125 per barrel

Reference Strategy
Northward Reconfigured
Haiku Wellfield (8) 1000'
Brackish Desal 4T
300MG Resv + WTP(6 MGDA)
Recyc 1 MGD DSM 45%TP

All of the Plans Are EXPENSIVE!
Cost of System Demand Growth

• New Growth In System Demand Requires Capital Expenditures
  – Central System
    • Approx. $10 / GPD of New Demand
    • Approx. $6,000 per New 600 GPD Service
  – Upcountry System
    • Approx. $14 to $19 per GPD (varies by system)
    • Approx. $9,000 to $11,000 per New Service

• Current System Development Fee includes $2,000 for New Sources
Central District
Final Candidate Strategies

• A. Na Wai Eha Surface Water Treatment
• B. Northward Basal Groundwater
• C. Eastward Basal Groundwater
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• E. Extensive Conservation and Wastewater Recycling
# WUDP Planning Objectives

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<td>Minimize Adverse Environmental Impacts</td>
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<td>Establish Viable Plans</td>
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## Planning Objectives

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### Components in All Strategies
- Committed Resource Options
- Near Term Resource Options
- Demand Side Management Programs

### Independent Strategy Components
- Supply Side Leak Reduction
- Energy Production and Efficiency Measures
- Stream Restoration Measures
- Watershed Protection and Restoration
- Well Development Policies and Regulations
- Wellhead Protection Ordinance
- Landscape Ordinance
- Drought Water Use Restrictions
- Water Rate Design and Pricing Policies
Central District Recommendations

- Short Term Resources
- Long Term Resource Acquisition
- Regulatory Mechanisms
- Resource Protection and Restoration
- Energy Efficiency and Production
- Water Allocation Policies
Central District Recommendations

• Short Term Resources
  – Diligently Acquire Committed and Near Term Supply Resources Planned and Underway
  – Optimize Production from Existing Resources
  – Accelerate Leak Detection and Repair
  – Explore Demand Response Options
Central District Recommendations

• Long Term Resource Acquisition
  – Monitor Na Wai Eha Proceedings
    • CWRM Interim Instream Flow Standards
    • CWRM Surface Water Management Designation
    • PUC Contested Case on WWC Rates
  – Defer But Prepare to Restart Waiale WTP Contract Negotiations
  – Commission Study of Alternative Na Wai Eha WTP Site “Upstream” of Urbanized Areas
Central District Recommendations

- Long Term Resource Acquisition
  - Implement Substantial Conservation Programs
  - Verify Feasibility of Expanding Use of Kihei WWTP Recycled Wastewater
  - Monitor Ongoing Feasibility and Preserve Options for Other Long Term Options
    - Northward Basal Groundwater Wells
    - Haiku Basal Groundwater Wells
Central District Recommendations

- Regulatory Mechanisms
  - Maintain or Extend Inverted Block Rates
  - Review System Expansion Financing Policies
    - Establish Sufficient System Development Funding
  - Establish Water Source Development Contract Standards
  - Establish Clear Criteria for Determining Water Availability and Need for New Water Resources
Central District Recommendations

• Resource Protection and Restoration
  – Watershed Protection and Restoration
  – Wellhead Protection
  – Stream Restoration
    • Support CWRM IIFS Amendments
    • Support Stream Restoration Measures and Programs
  – Protection of Cultural Resources
Central District Recommendations

• Energy Efficiency and Production
  – Establish Full Time DWS Energy Resource Coordinator Position
  – Identify and Implement Opportunities For:
    • Energy Efficiency
    • Load Management
  – Identify and Implement Energy Generation Opportunities
Central District Recommendations

• Establish Water Allocation Policies
  – Determine Venues and Purposes for Allocations
  – Consider Alternative Allocation Approaches:
    • Hierarchy of Priorities
    • Set-Asides
    • Allocations of Specific Sources to Land Uses
    • General Statements of Allocation Policies
Upcountry District
Final Candidate Strategies

• A. Expansion of Raw Water Storage
• B. Full Basal Groundwater Backup
• C. Limited Growth with Extensive Conservation Measures
• D. Expanded Kamole Water Treatment Plant Capacity and Volume
• E. “Drill, Pump and Boost” Basal Water
Options Included in All Strategies

• Committed / Near Term Options
  – Pookela Well
  – Olinda WTP Upgrade
  – Piiholo Well
  – Kamole WTP Upgrade

• Phase 6 and Phase 10 Booster Upgrades
Options Considered for Each Strategy

• Demand Side Management Portfolio
  – Included in All Strategies

• Standard for Maintaining Drought Period Service Reliability
  – Development of Upcountry District Capacity Expansion Reliability Criteria
  – Alternate Standards Explored to Determine Cost of Reliability Improvements
Independent Components

- Supply Side Leak Reduction Measures
- Production Energy Efficiency Measures
- Energy Production Options
- Stream Restoration Measures
- Watershed Protection and Restoration
- Well Development Policies and Regulation
Independent Components

- Wellhead Protection Ordinance
- Landscape Ordinance
- Drought Period Water Use Restrictions
- Water Rate Design and Pricing Policies
  - Altitude Based Tariff
  - Summer / Winter Rates
  - Drought Period Surcharge
A. Expansion of Raw Water Storage

Addition of substantial additional raw water storage for the Upper Kula, Lower Kula and/or Makawao systems.
B. Full Basal Groundwater Well Backup

Development of sufficient new basal wells to provide reliable water capacity in “worst case” drought conditions.
C. Limited Growth with Extensive Conservation Measures

Restrictions on growth on Upper Kula system and targeted conservation to keep water demands within surface water system capacity
D. Expanded Kamole WTP Capacity and Volume

Improvements to storage, pretreatment and/or filter capacity to maximize Kamole WTP drought period capacity
Upcountry District
Final Candidate Strategies

• A. Expansion of Raw Water Storage
• B. Full Basal Groundwater Backup
• C. Limited Growth with Extensive Conservation Measures
• D. Expanded Kamole Water Treatment Plant Capacity and Volume
• E. “Drill, Pump and Boost” Basal Water
Total Planning Period System Costs
Difference From Reference Strategy

Cost of Adding 200,000 GPD to Each Subsystem

Capital Cost
$14/GPD to $19/GPD

Total System Costs

Ref Strat Basal Wells
+200k Sheridan Dmd. L.Kula
+200k Sheridan Dmd. Makawao
+200k Sheridan Dmd. Haiku

Thousands of Dollars (NPV $2006)
Cost of Adding 200,000 GPD to Each Subsystem

Capital Cost
About $9000 per 600GPD Dwelling

Total Planning Period System Costs
Difference From Reference Strategy

DWS Wind Generation Analysis
Conclusions

• Kamole WTP is good potential site for wind generation with substantial displaceable electrical loads and good wind regime
  – Land purchase or easements would be required
  – Environmental studies would be required
• 100 kW Wind Generation (Net Energy Metered) should be a good first step.
• Private partnering options should be considered to optimize cost and risks.
Maui County WUDP Next Steps

- Public Review of Central District Final Candidate Strategies Report
- Completion Upcountry District Report
- Proceed with West Maui, Moloka’i and East Maui District Analysis and Process
- Council Review of WUDP Drafts After Budget Cycle
Documents Available at: mauliwater.org/planning.html

• Draft WUDP Chapters
  – Water Use and Demand
  – DWS Finance and System Economics
  – Resource Options
  – Central Candidate Strategies
  – Upcountry Candidate Strategies

• Advisory Group Agendas, Minutes, Handouts, Work Materials

• Working Group Reports
Comments are Welcome

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- Write by mail to:
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  Department of Water Supply
  59 Kanoa Street
  Wailuku, HI 96793