Risk Management and Project Prioritization in an Integrated GIS Environment

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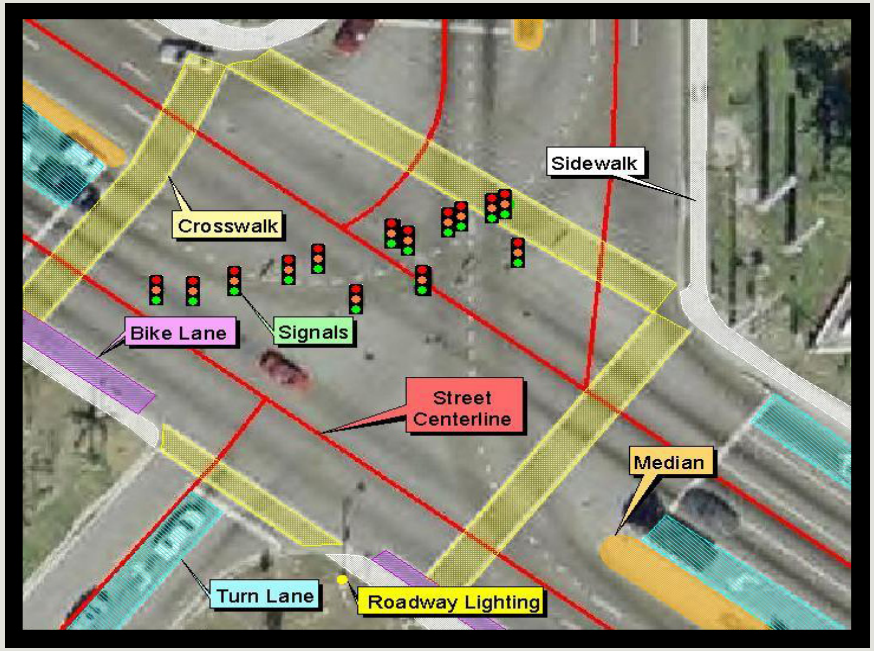
Asset Management

Chances are Asset Management exists in some basic form in every organization. Whether it is organized in a spreadsheet, located in a file cabinet or stored in the maintenance supervisor's head, access to this information is important and could include:

- **Construction Dates**
- **Original Project Costs**
- **Features**
- **Location**
- **Maintenance History**
- **Inspections**



Asset Management Goals

Performance and cost effectiveness

- Deliver policy goals and objectives
- Lower long-term costs for infrastructure preservation
- Improved performance and service to customers
- Improved use of available resources

Communication, accountability, and credibility

- Improved communication within agency and with customers
- Improved credibility and accountability for decisions

Asset Management Goals

- Citizen Response/Customer Satisfaction
- Fiscal Responsibility/Infrastructure Sustainability
- Public Safety
- Federal Requirements

Federal Requirements – Map-21

Performance Based Asset Management Plan:

- Asset management objectives pursuant to achieving a long-term state of good repair over the life of its assets at a minimum cost
- Defined **Measures and Targets** designed to achieve and sustain a desired state of good repair over the lifecycle of the assets at minimum practical cost
- Results from a **Performance Gap Analysis**
- Results from the **Life-Cycle Cost Analysis**
- Results from the **Risk Assessment Analysis**
- Discussion of short and long term **Investment Strategies**

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Significance of Federal Requirements?

- The elements for a National/State/Local geospatial base for linear/point asset management is beginning to form.
- Coordination between Local and State Governments is highly encouraged from the Federal Level
- Compliance with Map-21 will affect Federal Funding at the State/Local level.
- **FHWA Recognizes that GIS is critical Tool for Managing Assets**

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Performance-Based Asset Management

Request Management

- Document & track requests for action
- External or internal

Citizen Request Portal

Service Requests

Reporting

Plan Management

- Forecast capital budget needs
- Create & manage capital projects
- Analyze different tactics using "what-if" scenarios

Forecasts

Work Orders

Projects

Personnel

Work Management

Equipment

Risk

- Track condition, depreciation & value
- Analyze & prioritize consequences of failure

Valuation

Inventory

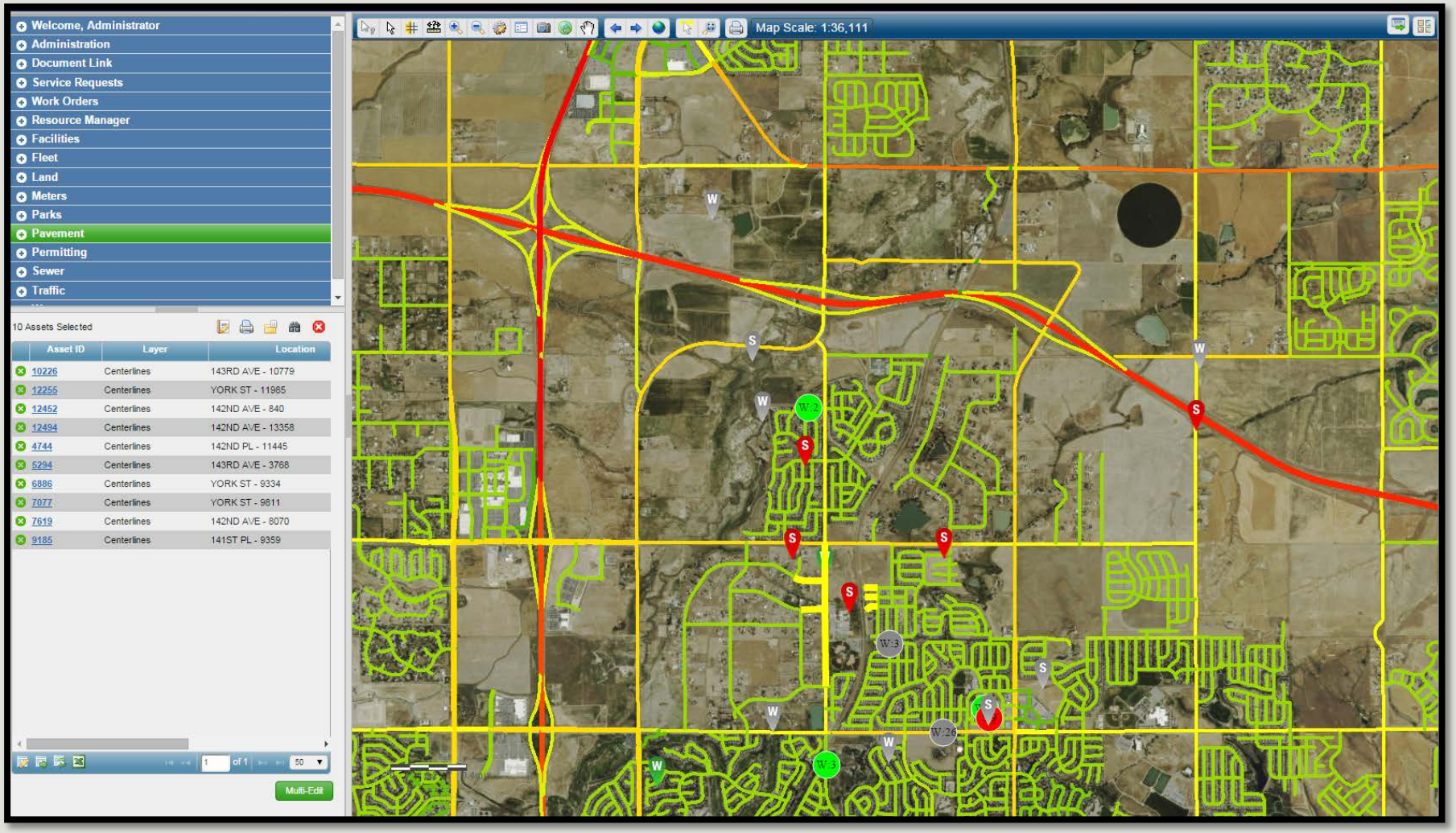
- Create & track work orders
- Manage time & expenses for labor & equipment
- Manage quantity, expenses & location for inventory

Condition

Risk-Based Asset Management

Handling the life-cycle of assets

Map-Centric Asset and Risk Inventory



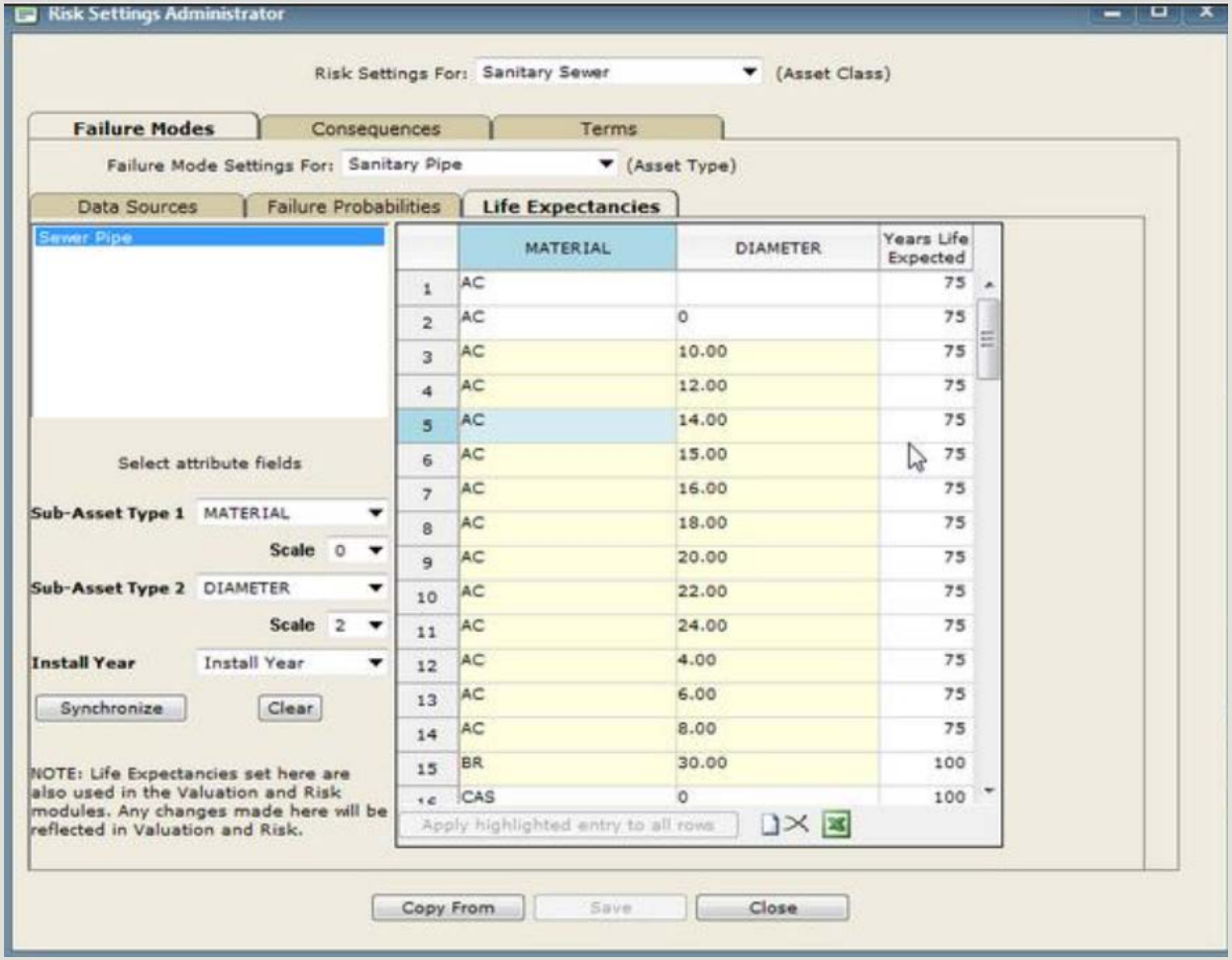
Risk Analysis and Matricies

- Risk can be defined as the Likelihood (Probability) of Asset Failure and the Consequences of Failure to system operation or Customer Safety
- Failure Modes and Probabilities aid in development of a Risk Matrix
- Risk Matrix supports the prioritization of assets actions; maintenance, repair, rehabilitation or replacement
- Risk determines **WHEN and WHERE** to spend limited maintenance and Capital Improvement dollars

Probability of Failure: Examples

- Age of asset (e.g. % life left)
- Condition of asset
- Capacity of asset
- Performance of asset (e.g. efficiency)

Configure Life Expectancies



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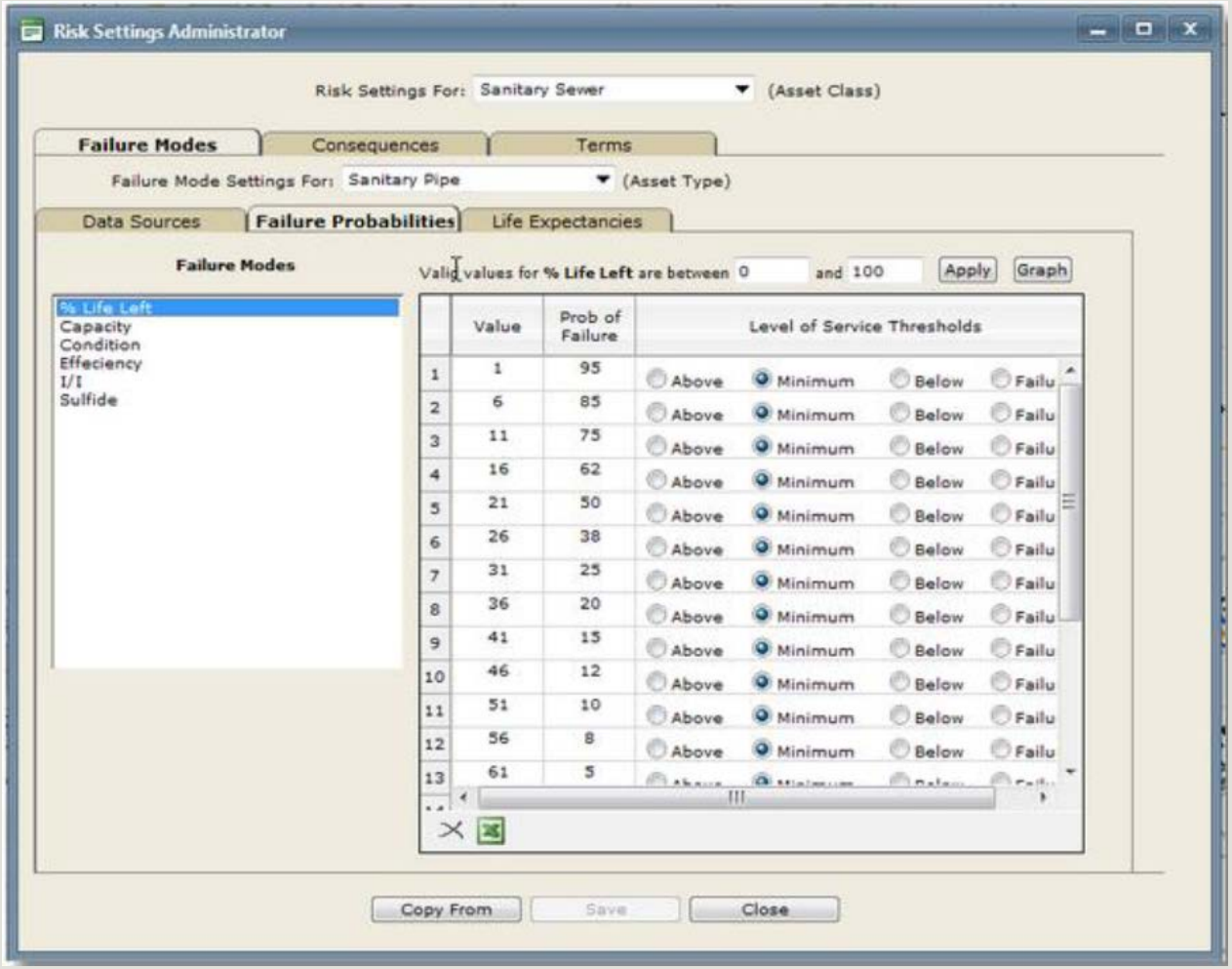
Configure Failure Probabilities



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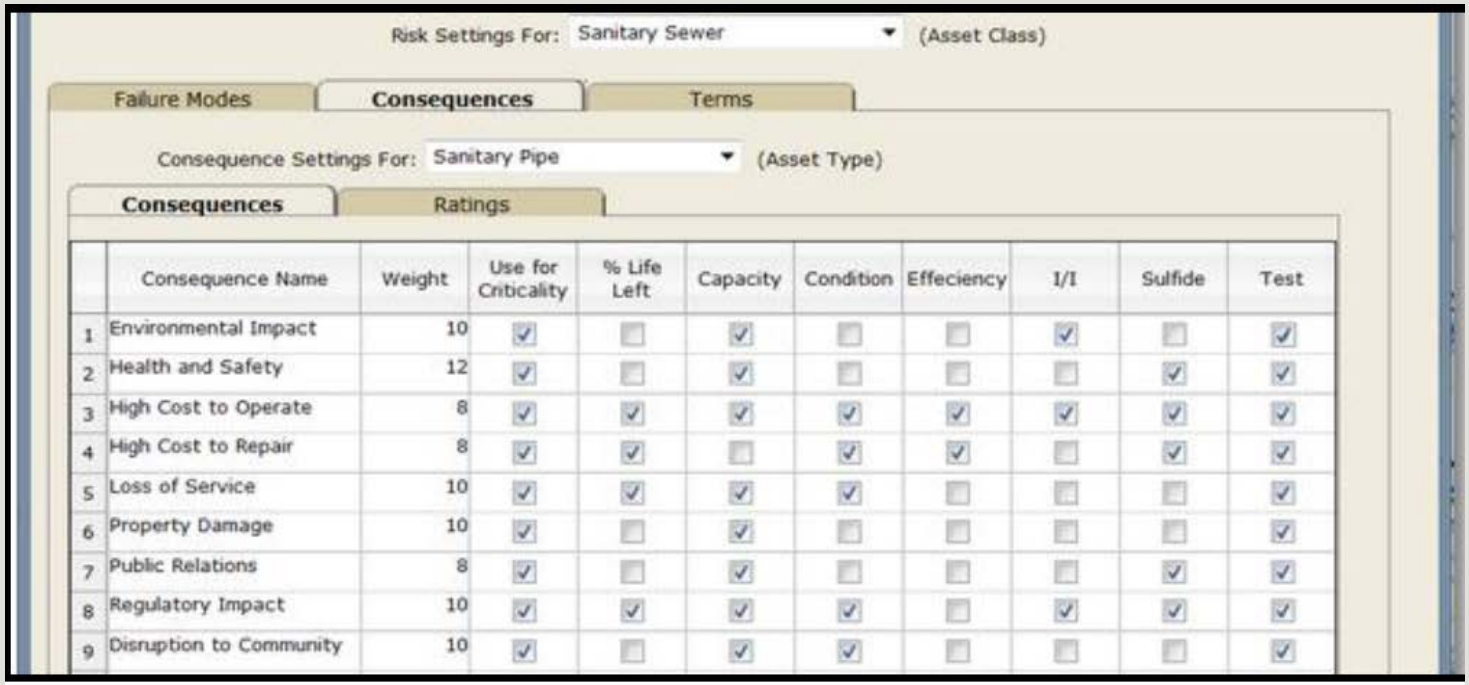
Consequences of Failure: Examples

- High cost to repair
- Loss of service
- Loss of life or injury
- Adverse health impact
- Property damage
- Loss of revenue
- Environmental damage
- Regulatory impact
- Disruption to community

Configure Consequences



	Consequence Name	Weight	Use for Criticality	% Life Left	Capacity	Condition	Effeciency	I/I	Sulfide	Test
1	Environmental Impact	10	☑	☐	☑	☐	☐	☑	☐	☑
2	Health and Safety	12	☑	☐	☑	☐	☐	☐	☑	☑
3	High Cost to Operate	8	☑	☑	☑	☑	☑	☑	☑	☑
4	High Cost to Repair	8	☑	☑	☐	☑	☑	☐	☑	☑
5	Loss of Service	10	☑	☑	☑	☑	☐	☐	☐	☑
6	Property Damage	10	☑	☐	☑	☐	☐	☐	☐	☑
7	Public Relations	8	☑	☐	☑	☐	☐	☐	☑	☑
8	Regulatory Impact	10	☑	☑	☑	☑	☐	☑	☑	☑
9	Disruption to Community	10	☑	☐	☑	☑	☐	☐	☐	☑

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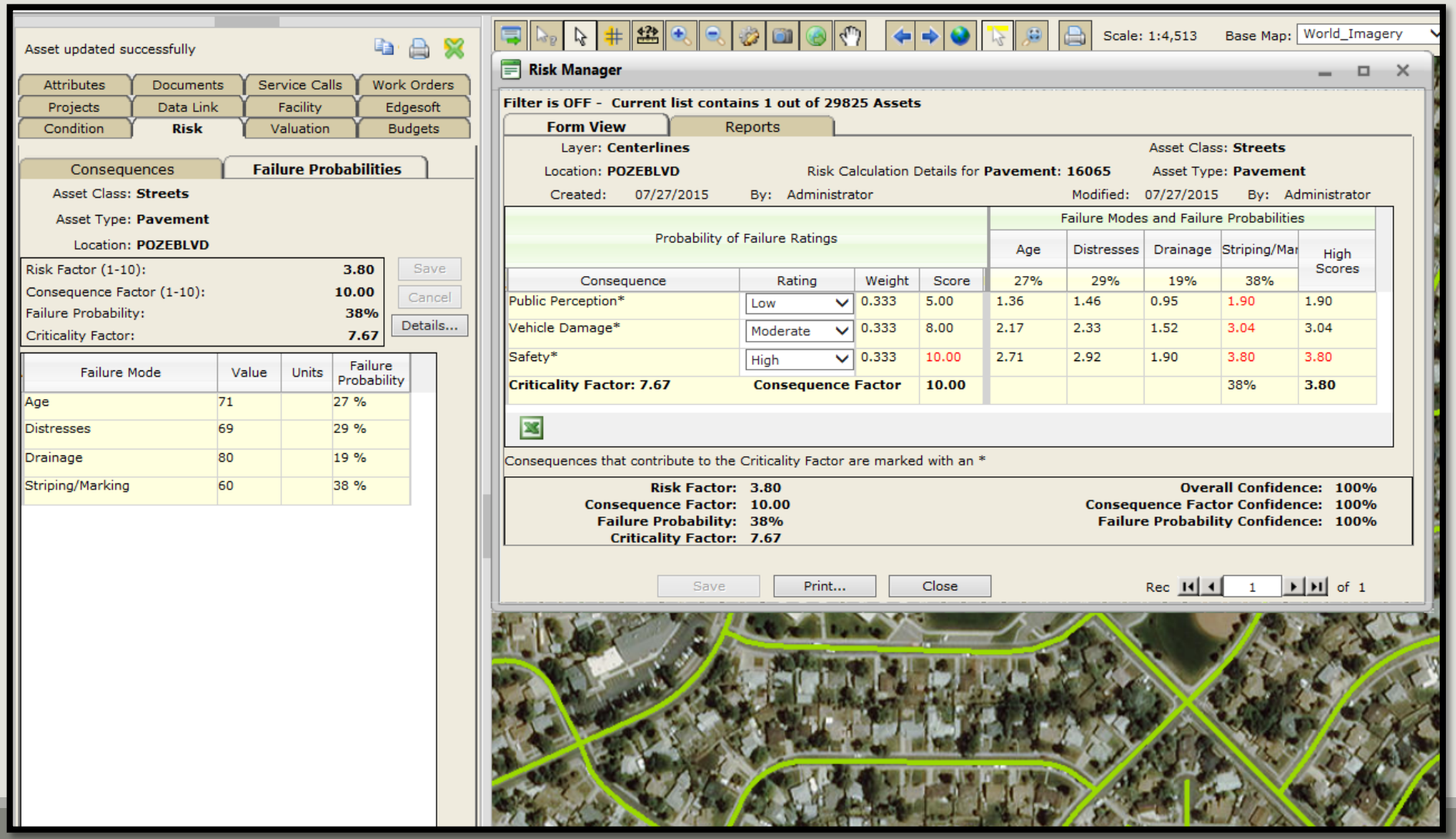
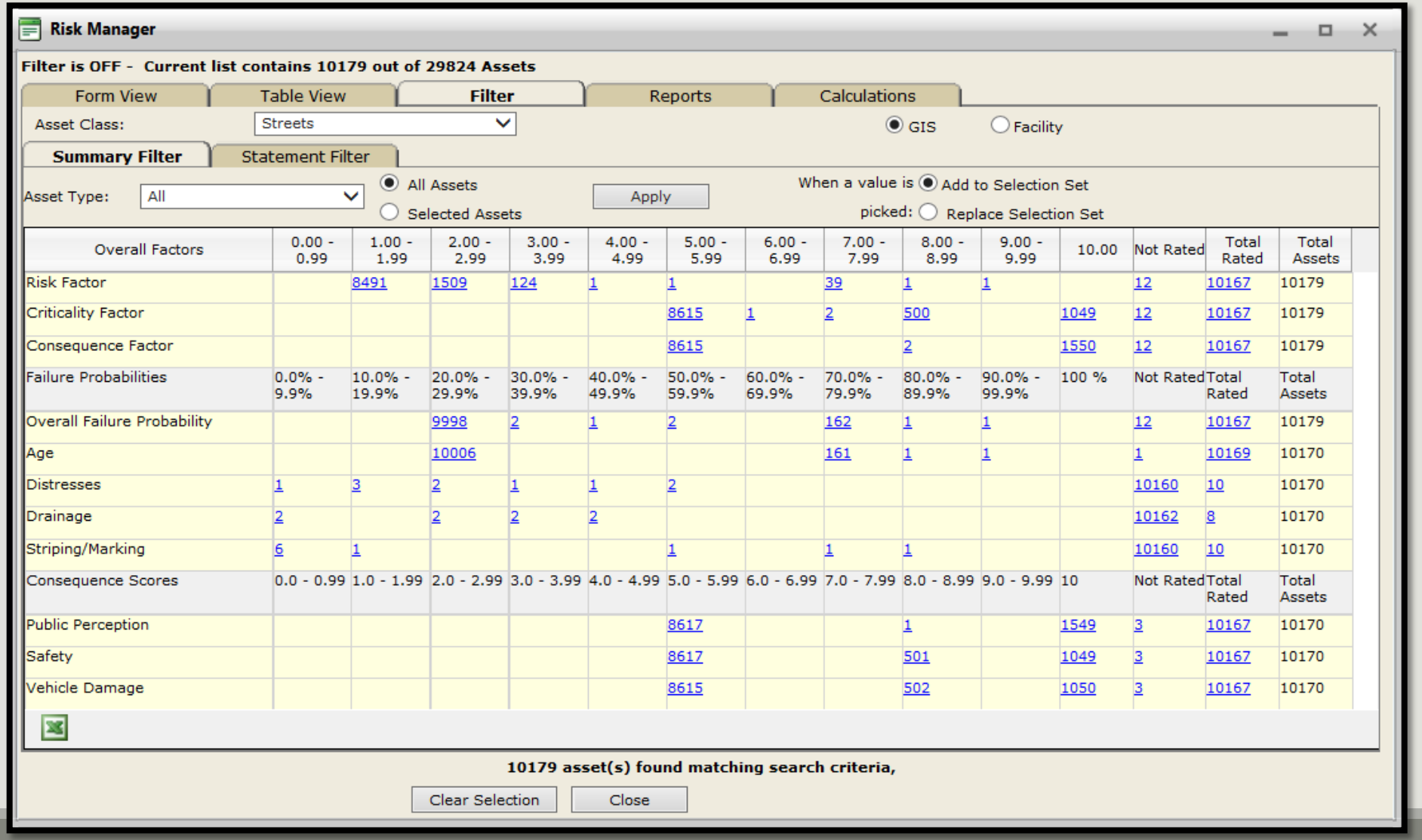
Risk Assessment

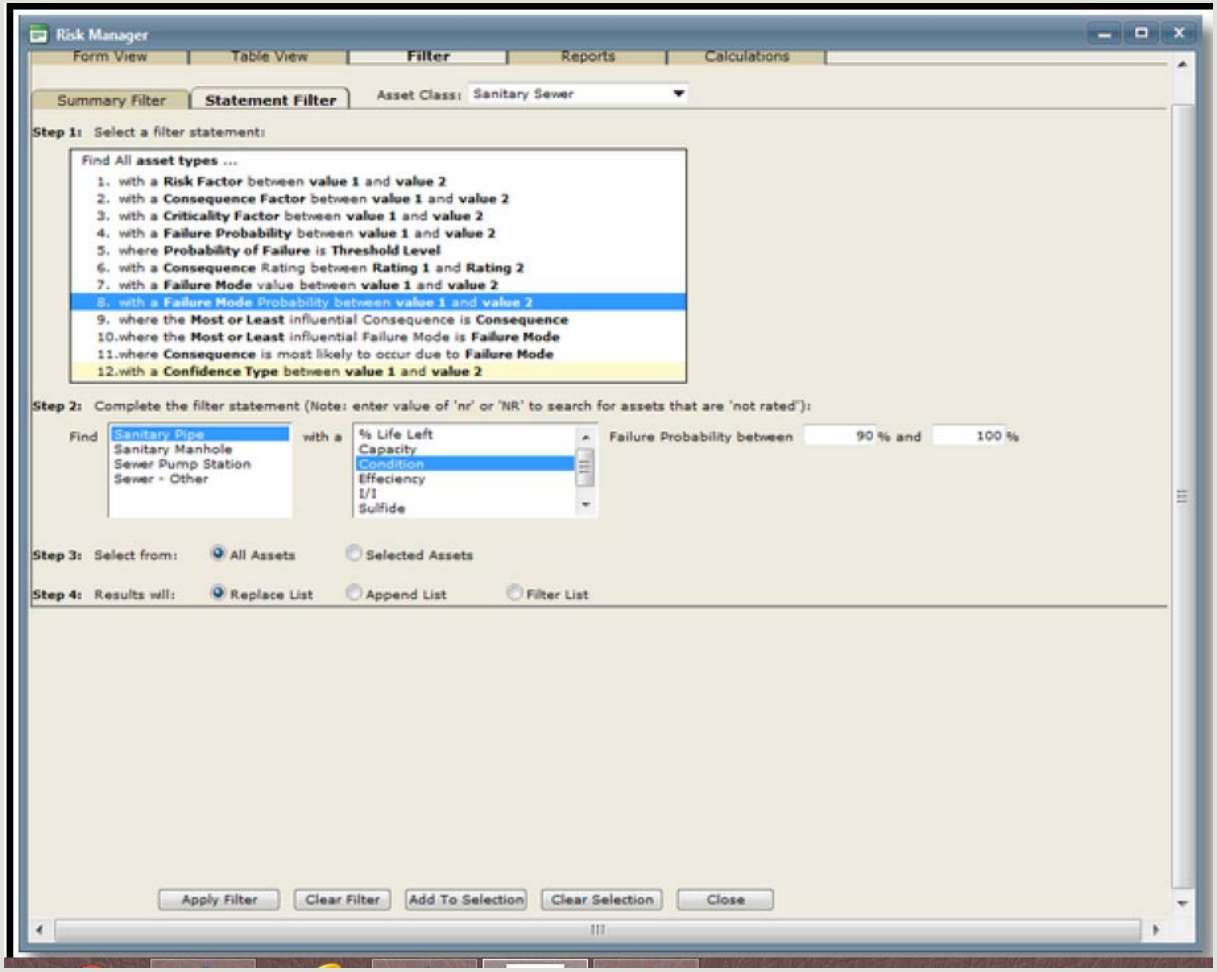


Risk Assessment



Overall Factors	0.00 - 0.99	1.00 - 1.99	2.00 - 2.99	3.00 - 3.99	4.00 - 4.99	5.00 - 5.99	6.00 - 6.99	7.00 - 7.99	8.00 - 8.99	9.00 - 9.99	10.00	Not Rated	Total Rated	Total Assets
Risk Factor		8491	1509	124	1	1		39	1	1		12	10167	10179
Criticality Factor						8615	1	2	500		1049	12	10167	10179
Consequence Factor						8615			2		1550	12	10167	10179
Failure Probabilities	0.0% - 9.9%	10.0% - 19.9%	20.0% - 29.9%	30.0% - 39.9%	40.0% - 49.9%	50.0% - 59.9%	60.0% - 69.9%	70.0% - 79.9%	80.0% - 89.9%	90.0% - 99.9%	100 %	Not Rated	Total Rated	Total Assets
Overall Failure Probability			9998	2	1	2		162	1	1		12	10167	10179
Age			10006					161	1	1		1	10169	10170
Distresses	1	3	2	1	1	2						10160	10	10170
Drainage	2		2	2	2							10162	8	10170
Striping/Marking	6	1				1		1	1			10160	10	10170
Consequence Scores	0.0 - 0.99	1.0 - 1.99	2.0 - 2.99	3.0 - 3.99	4.0 - 4.99	5.0 - 5.99	6.0 - 6.99	7.0 - 7.99	8.0 - 8.99	9.0 - 9.99	10	Not Rated	Total Rated	Total Assets
Public Perception						8617			1		1549	3	10167	10170
Safety						8617			501		1049	3	10167	10170
Vehicle Damage						8615			502		1050	3	10167	10170

Risk Filtering

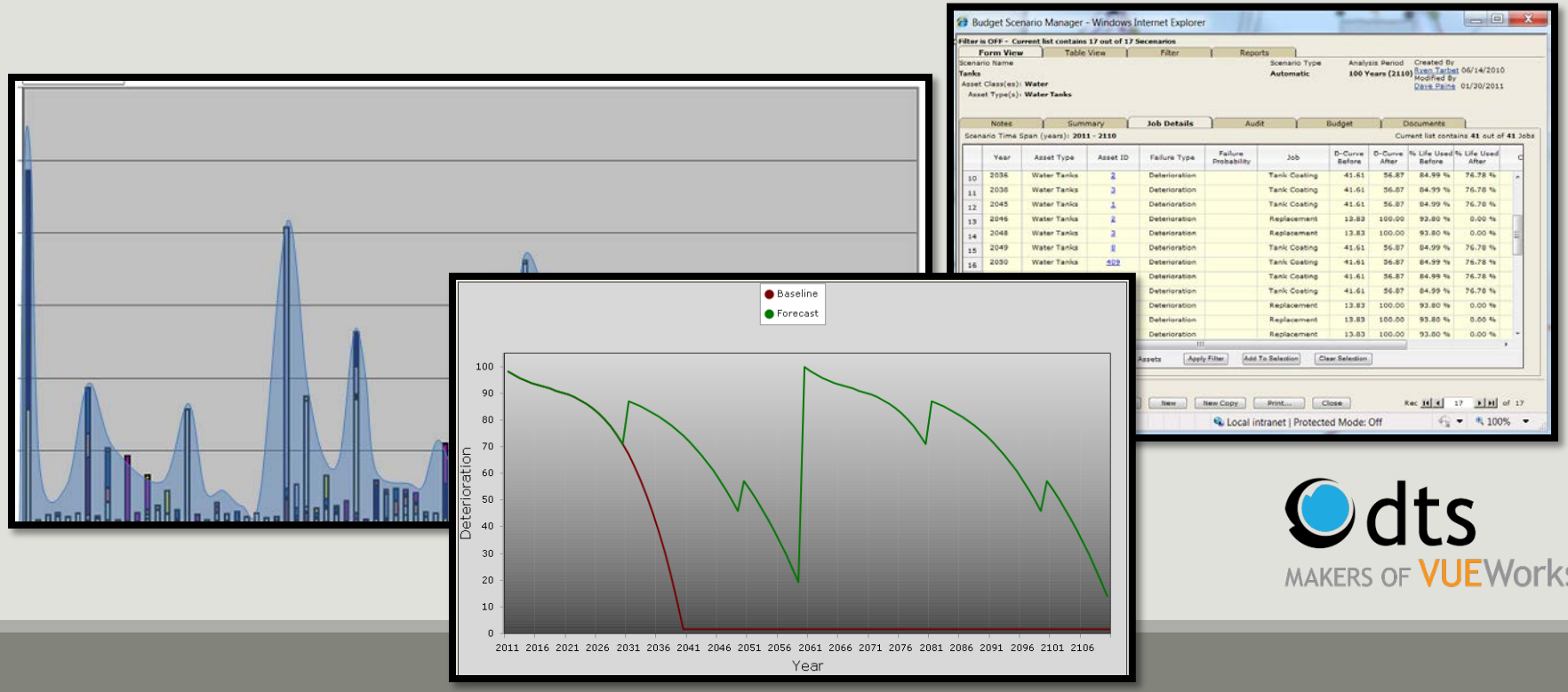


Budget Forecasting / Projects

Risk Utilized to Prioritize Budget Forecasts

Cost effective life-cycle planning

GIS-based strategic asset management tools to prioritize WHERE and WHEN work needs to be programmed and a powerful budget forecasting tool to forecast near and long term budgetary needs using decay curves, risk and condition data. Combined, these tools offer life cycle management capabilities that help agencies provide the consistent level of service that customers expect.



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Budget Forecasting Tools

- Budget Forecasting enables “What-if” scenario analysis
- Determines how assets will perform over time based on “What-if” funding scenarios
- Asset selection is based on Short-Term (**Risk-Based**) or Long-Term (D-Curve) criteria
- Budget Forecasting supports an agency in implementing the most optimal level of funding for Assets

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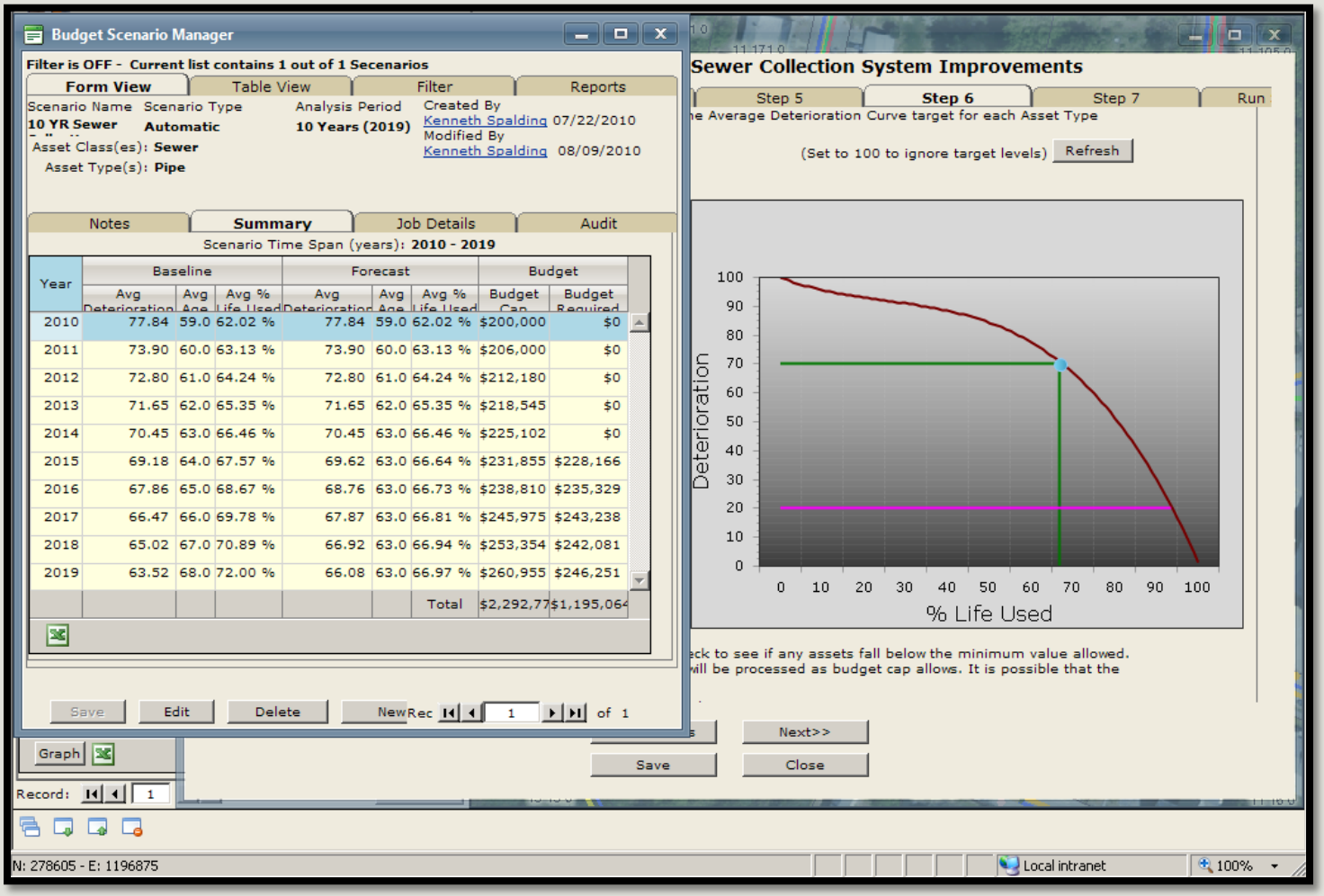
Budget Forecasting



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questions?