



EarthRes
ENGINEERING AND SCIENCE

***Wastewater Surcharge Reduction
for Manufacturing Processes***

***LVPIX Wastewater Conference
November 2016***

Wastewater Surcharge Reduction

OBJECTIVE

- To reduce water and wastewater-related fees and surcharges

SEWER FEES

- Connection
- Rental
- Surcharge
- Penalties



Wastewater Surcharge Reduction

WASTEWATER SURCHARGE FEES

- Surcharges are intended to cover additional operating expenses over normal levels due to higher wastewater flow and/or stronger wastewater characteristics

TYPICAL WASTEWATER SURCHARGE FEE COMPONENTS

- Flow
- BOD5
- TSS
- Nutrients
- Chlorine Demand



Wastewater Surcharge Reduction

WASTEWATER SURCHARGE FEE FORMULA

FEE = UNIT COST x FLOW x CONCENTRATION (over limit) x CONVERSION FACTOR

FEE = Surcharge Cost x Q x C x 8.34

WHERE

UNIT COST = Surcharge fee, in dollars per billing cycle per pound of pollutant

Q = Flow, in million gallons per day

C = CONCENTRATION, measured concentration of limited parameter in mg/l over the designated limit

CONVERSION FACTOR = 8.34

Wastewater Surcharge Reduction

WASTEWATER SURCHARGE FEE EXAMPLE

Parameter	Limit	Value	Quantity	Rate	Cost
Water Purchased	N/A	0.1 MGD	0.1 MGD	\$3/1000 gal	\$300/day
Sewer Flow Charge	N/A	90% of water use	0.09 MGD	\$2.7/1000 gal	\$270/day
BOD5	300 mg/l	500 mg/l	167 lbs/d	\$0.25/lb	\$41.70/day
TSS	350 mg/l	700 mg/l	292 lbs/d	\$0.2/lb	\$58.40/day

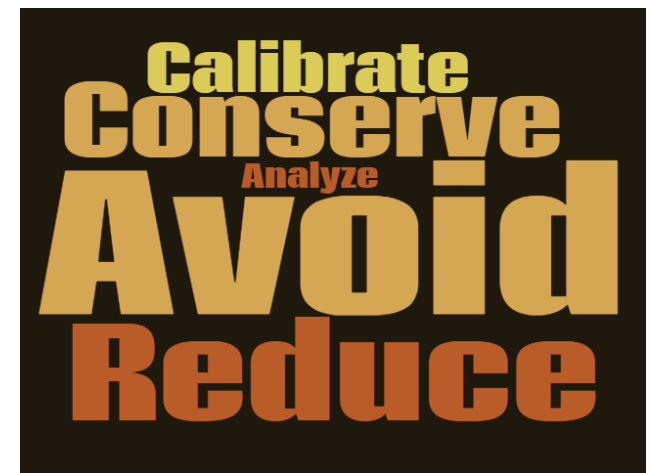
Sample: BOD5 Quantity = (0.1 MGD) x (500-300 mg/l) x 8.34 = 167 lbs/day

BOD5 Surcharge = 167 lbs/day x \$0.25/lbs = \$41.70/day

Wastewater Surcharge Reduction

ATTACK THE EASY STUFF

- Flow
 - Calibrate water meter (routine interval & document)
 - Use commonsense conservation measures
 - Look for ways to reduce the amount of water used
 - Review all water and sewer bills
- Wastewater Characteristics
 - Avoid product and/or waste disposal down drain
 - Collect representative samples
 - Review all results for outliers
 - Retest if needed



Wastewater Surcharge Reduction

NEXT LEVEL OF EVALUATION

- Flow
 - Discharge flow measurement
 - Flow reduction/water reuse
- Wastewater Characteristics
 - Pretreatment
- Examples



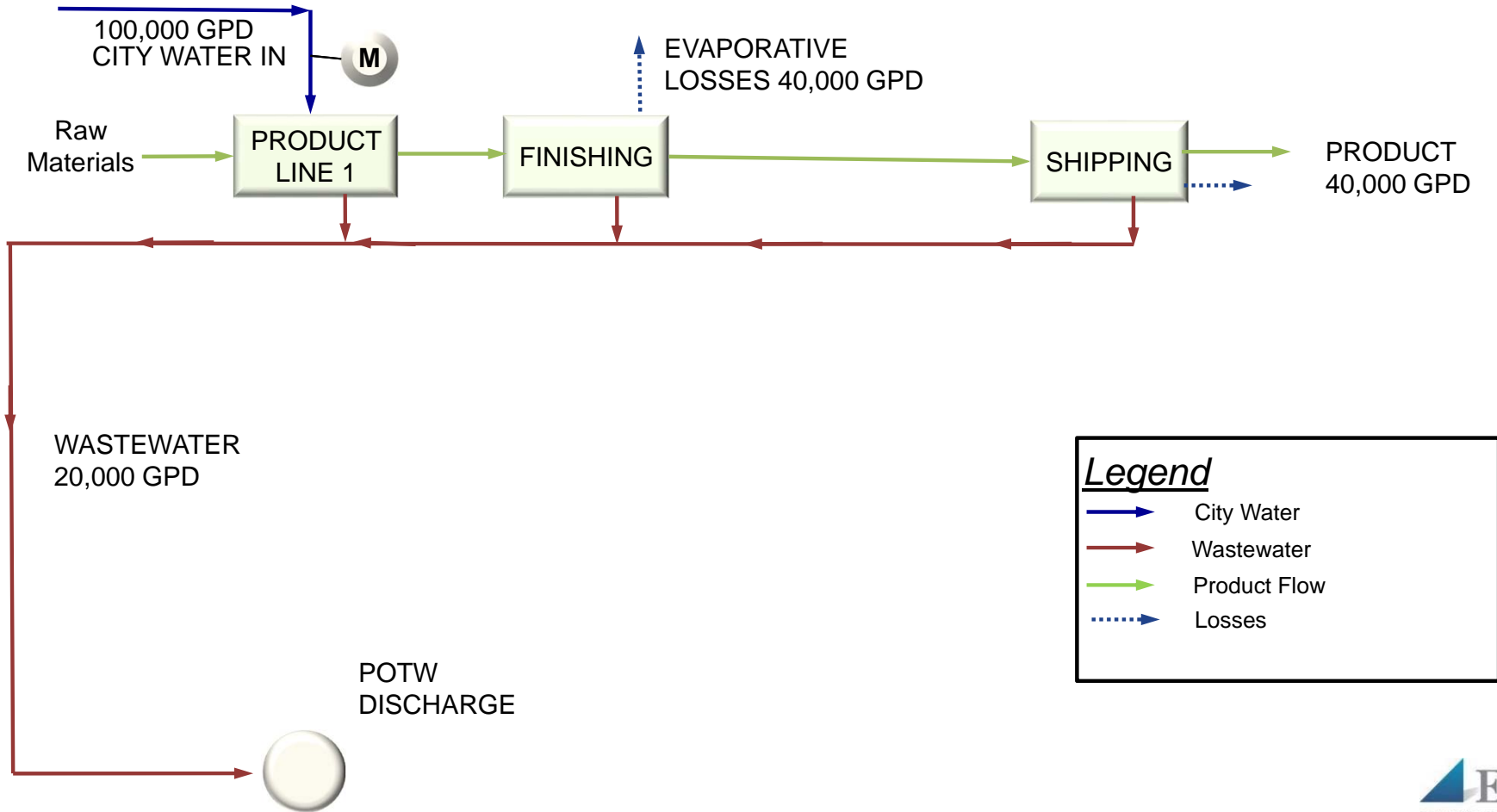
Example #1

Food Preparation Plant

- Uses 100,000 gallons per day of water
- Loses estimated 80,000 gpd of water in process and product
- Currently paying for 100,000 gpd of water use and 100,000 gpd of sewer use



Example 1 - Current Process Flow

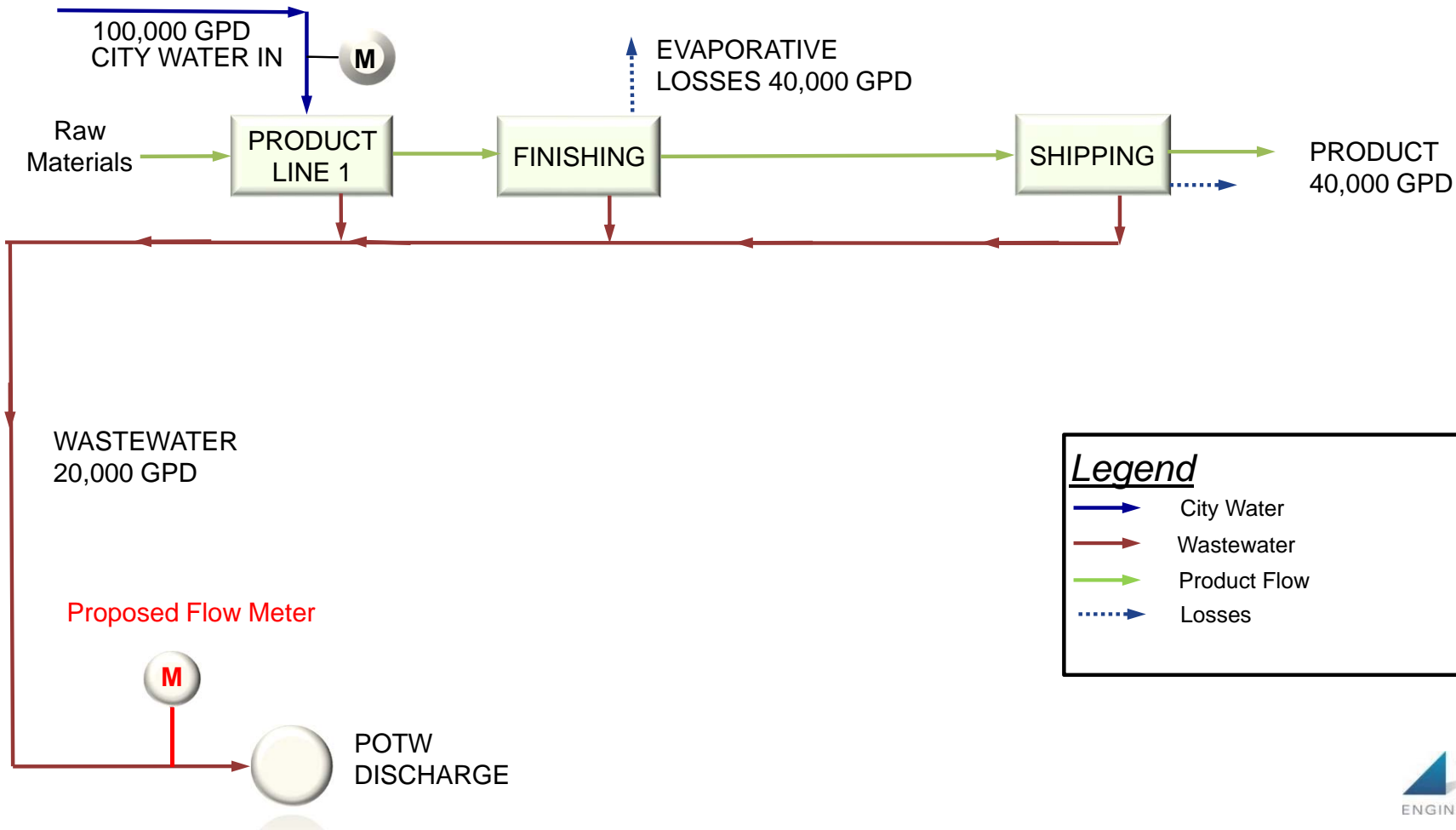


Example #1

Food Preparation Plant

What can be done to reduce current payment?

Example #1 – Recommended Flow Schematic



Flow Meter



Example #1 – Recommended Flow Cost Savings

COST EVALUATION

Location	Flow (gpd)	Current Cost (\$/day)	Future Cost (\$/day)	Savings (\$)	
Water Purchase	100,000	\$300	\$300	-	-
Process Loss	80,000	-	-	-	-
Sewer Discharge	20,000	\$270	\$54	-	-
Totals	-	\$570	\$354	\$216/day	\$78,840/yr

Example #1 – Recommended Flow Install/Operation Cost

COST EVALUATION (continued)

Flow Meter Pit Design and Installation	\$50,000
Annual O&M	\$5,000
Potential Savings	\$78,840

Do you proceed?

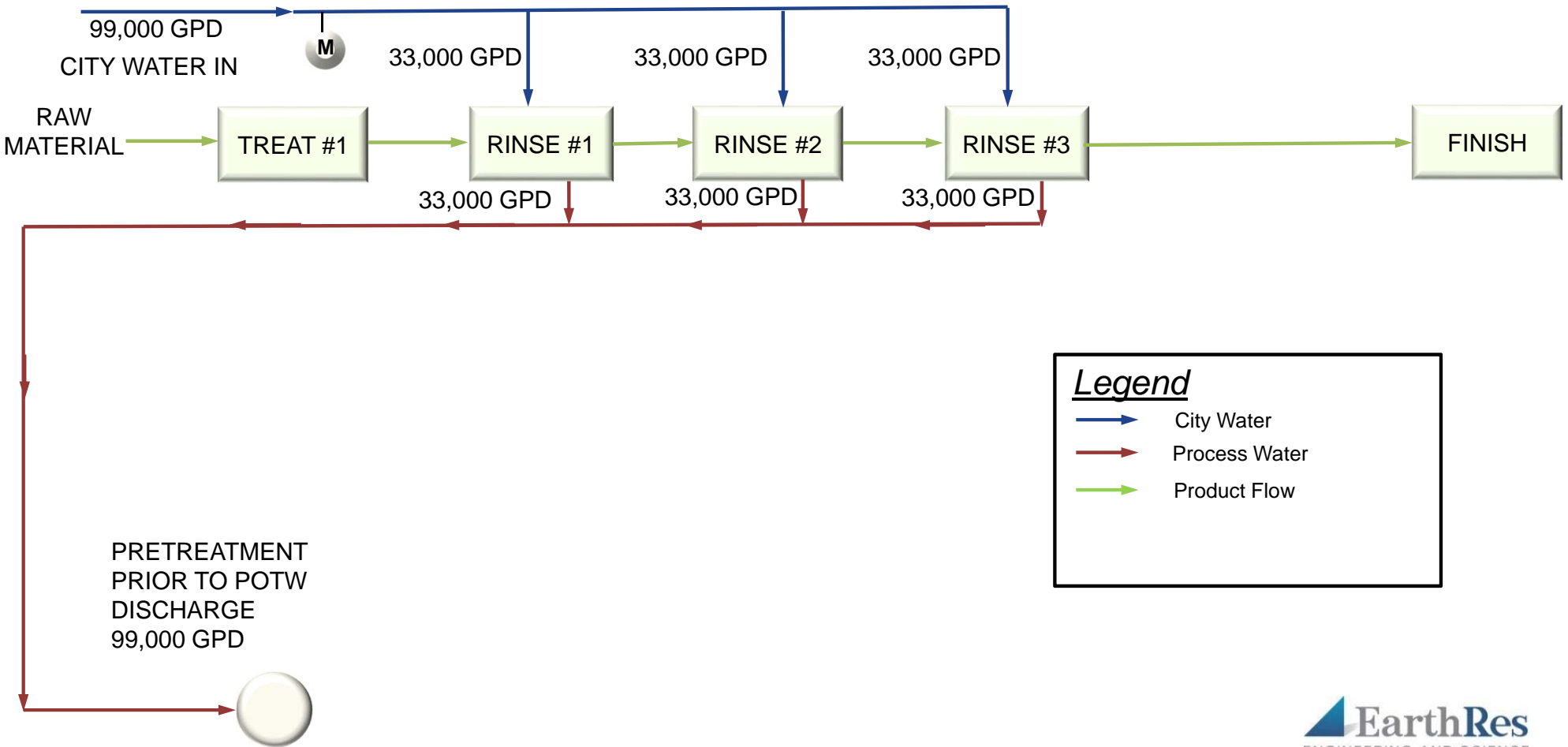
Example #2

Finishing Plant

- Currently uses 99,000 gpd in processes
- Uses water for direct rinse after process steps
- Currently pays for 99,000 gpd of water and 99,000 gpd of wastewater use



Example #2 – Current Process Flow Diagram



Example #2

Finishing Plant

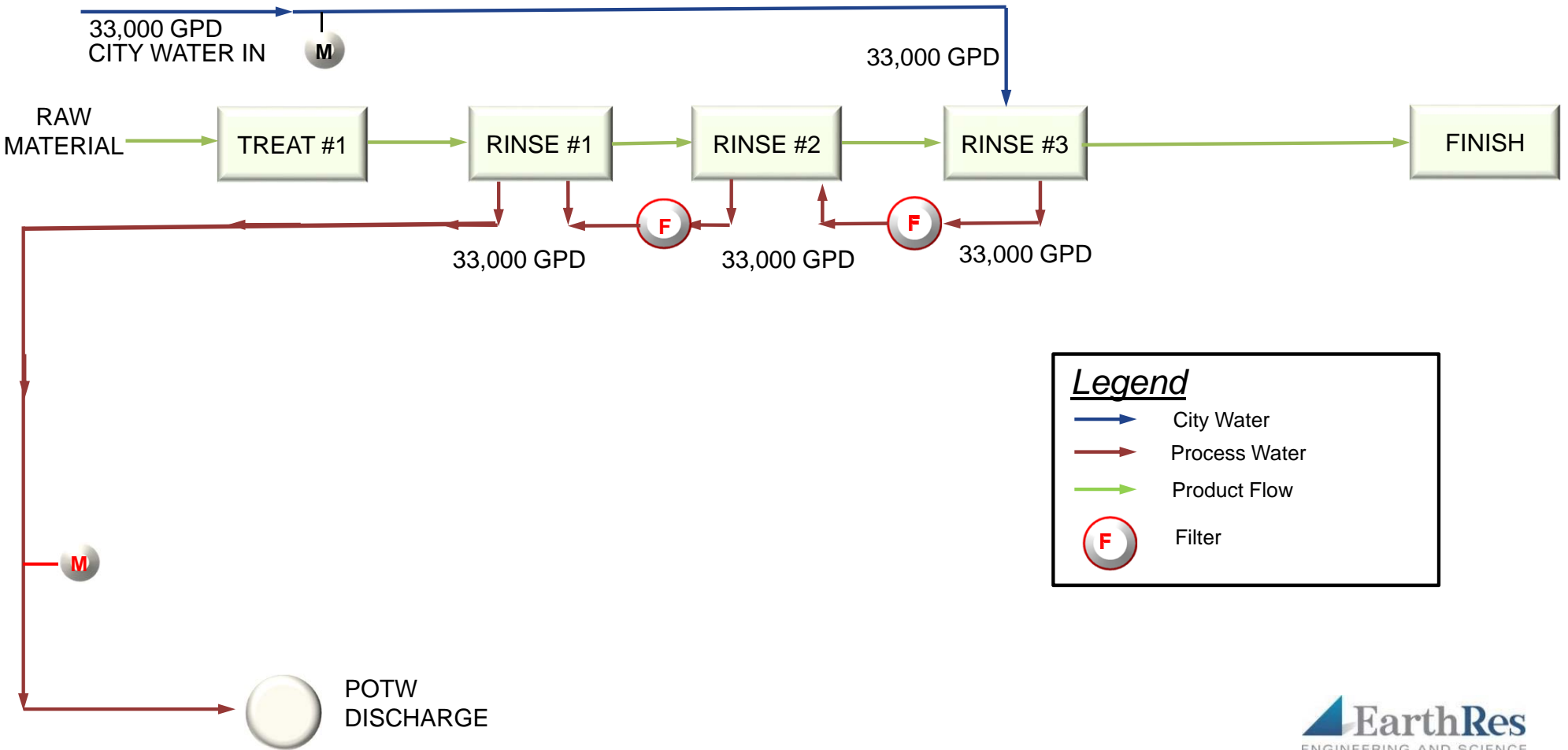
What can be done to reduce water and wastewater usage?

Example #2 – Process Flow Options

FLOW REDUCTION EVALUATION

Option 1: Filter and reuse rinse water in counter flow process

Example #2 – Alternative Flow Option 1



Filtration



Example #2 – Alternative Option #1 Cost Savings

COST EVALUATION – OPTION 1

Location	Flow (gpd)	Current Cost (\$/day)	Future Flow (gpd)	Future Cost (\$/day)	Savings (\$)	
Flow In	100,000	\$300	33,000	\$100	-	-
Process Loss	negligible	-	-	-	-	-
Flow Out	100,000	\$270	33,000	\$90	-	-
Totals	-	\$570	-	\$190	\$380/day	\$138,700/yr

Example #2 – Alternative Option #1 Cost Savings

COST EVALUATION (continued)

OPTION 1 - Filtration and Reuse

Water Filtration Design and Installation	\$150,000
Annual O&M	\$20,000
Potential Savings	\$138,700

Do you proceed?

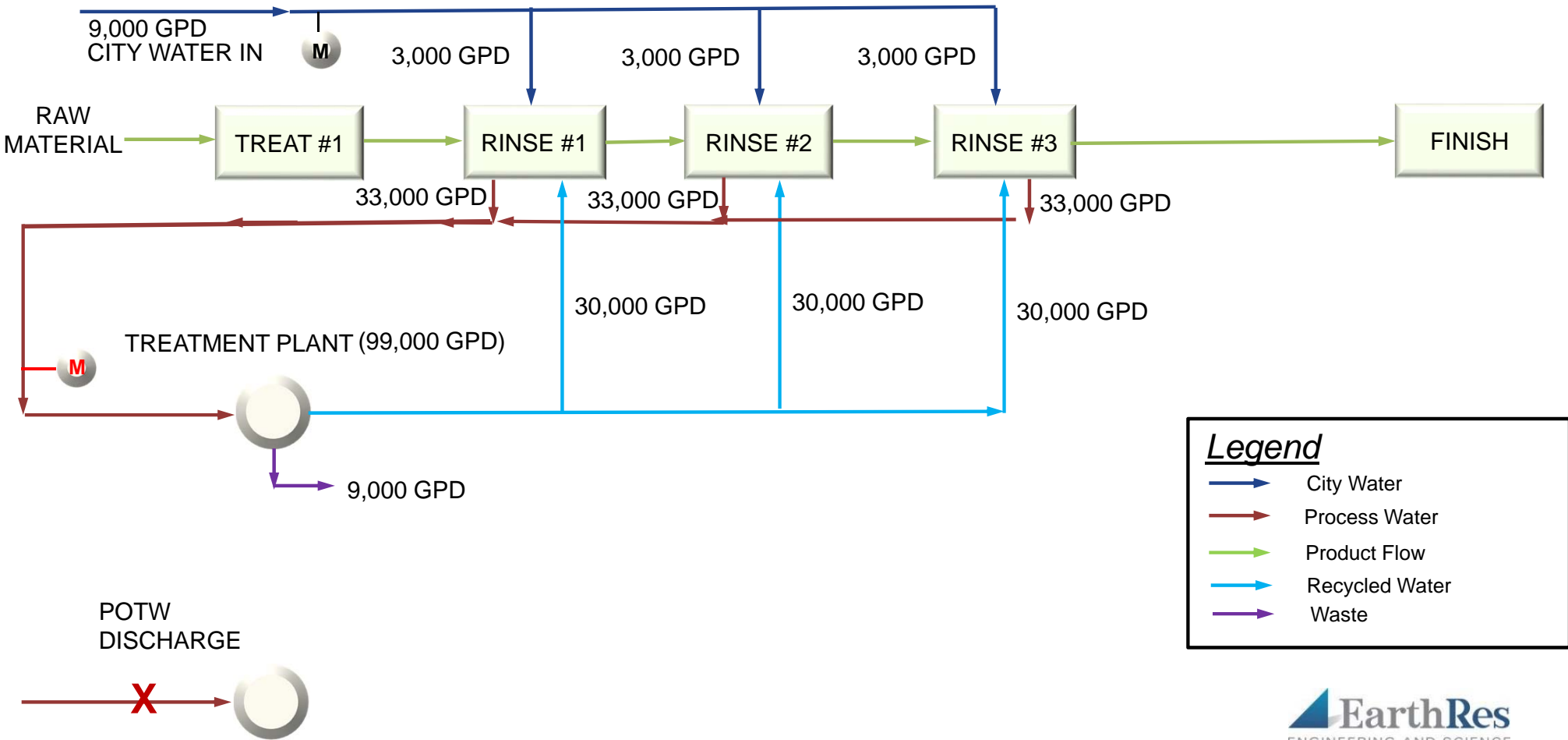
Example #2 – Options

FLOW REDUCTION EVALUATION

Option 2: Install closed-loop system for water reuse



Example #2 – Alternative Flow Option 2



Legend

- City Water
- Process Water
- Product Flow
- Recycled Water
- Waste

Membrane Filtration



Example #2 - Alternative Flow #2 Cost Savings

COST EVALUATION – OPTION 2

Location	Flow (gpd)	Current Cost (\$/day)	Future Flow (gpd)	Future Cost (\$/day)	Savings (\$)	
Water Purchased	100,000	\$300	9,000	\$27	-	-
Process Loss	negligible	-	-	-	-	-
Sewer Discharge	100,000	\$270	0	\$0	-	-
Totals	-	\$570	-	\$27	\$597/day	\$218,000/yr

Example #2 - Alternative Flow #2 Cost Savings

COST EVALUATION (continued)

OPTION 2 – Closed-loop Water Reuse

Water Filtration Design and Installation

\$550,000

Annual O&M

\$150,000

Potential Savings

\$218,000



Do you proceed?

Recommendations

- Review your process objectively
- Evaluate overall impact on process and product quality
- Discuss with your water and/or sewer authority beforehand
- Collect good data
- Enlist help from qualified professionals and experienced equipment vendors





Thank You