Presented for
PNWS-AWWA
Bellevue, WA
May 1, 2015

A Tale of Two Treatment Plants:
The similarities and differences between the Lake Oswego-Tigard and Green River Facilities

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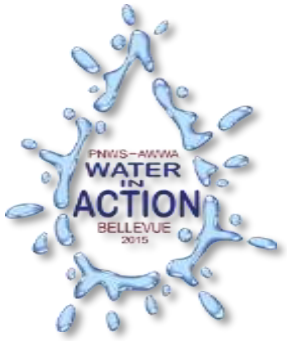

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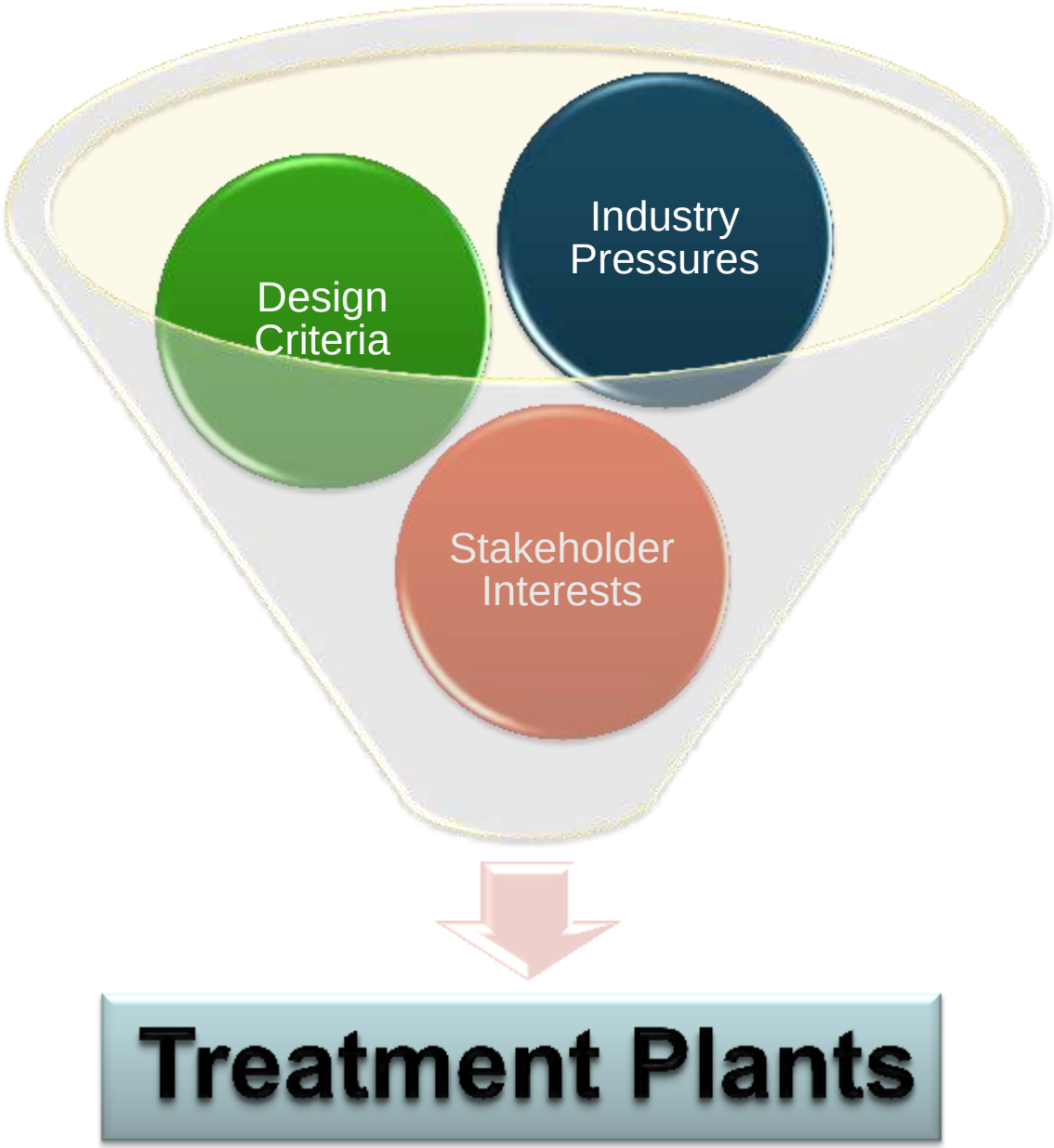
BUILDING A BETTER WORLD

Once upon a time…

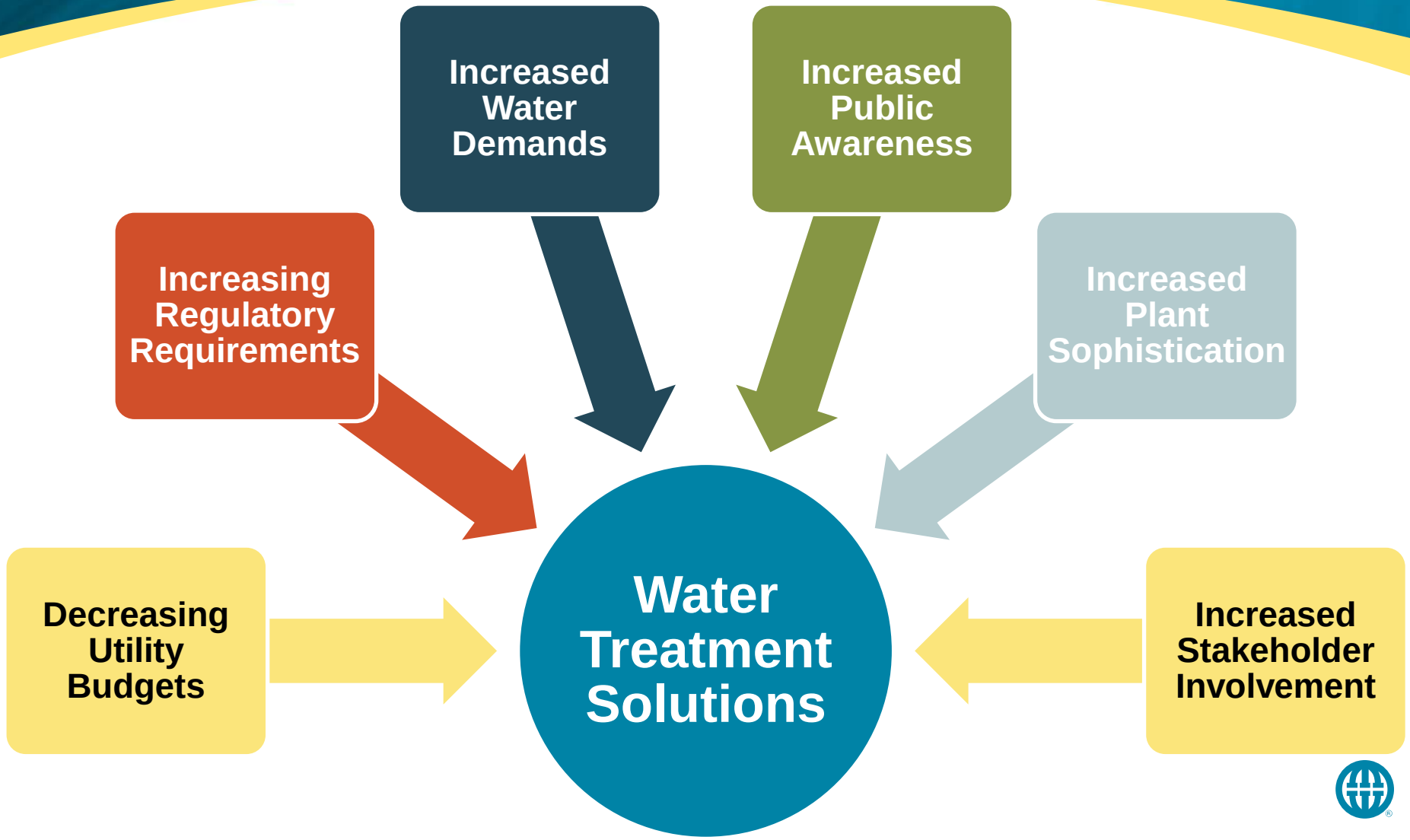
- Where do Water Treatment Plants Come From?
- Water Treatment Plant Incubation
- Background of the Two Plants
- Key Drivers of Project Decisions
- GRFF & LO-T WTP As Decision Making Case Studies
- Lessons Learned

Where do Water Treatment Plants Come From?

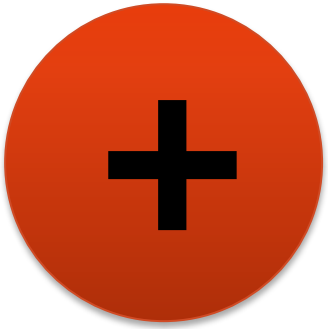
Where Do Treatment Plants Come From?



Water Treatment Industry Pressures



New Infrastructure Design Criteria



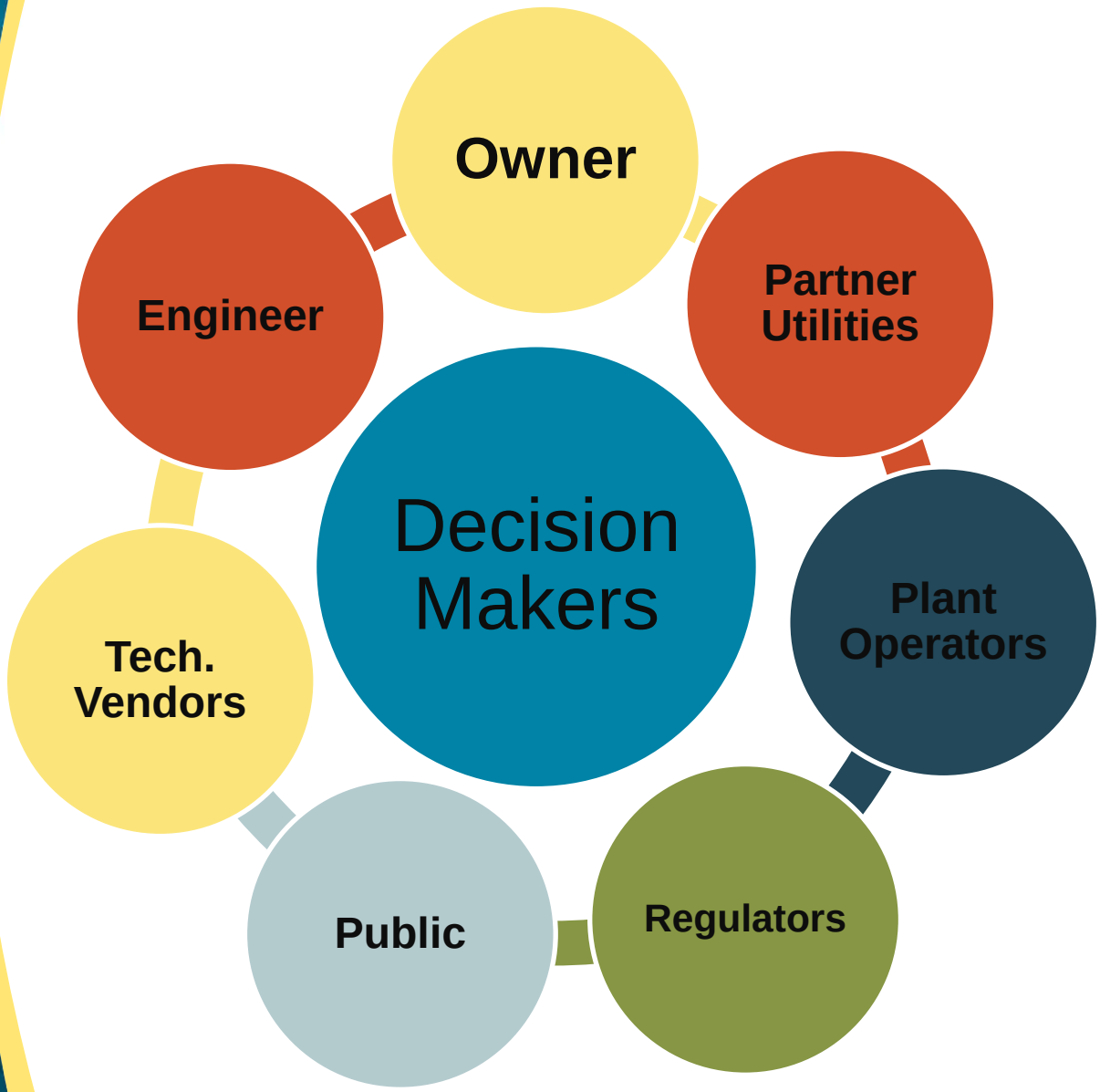
Elements to Maximize

- Value
- Plant Production
- Public Acceptance
- Reliability
- Process Efficiency

Elements to Minimize

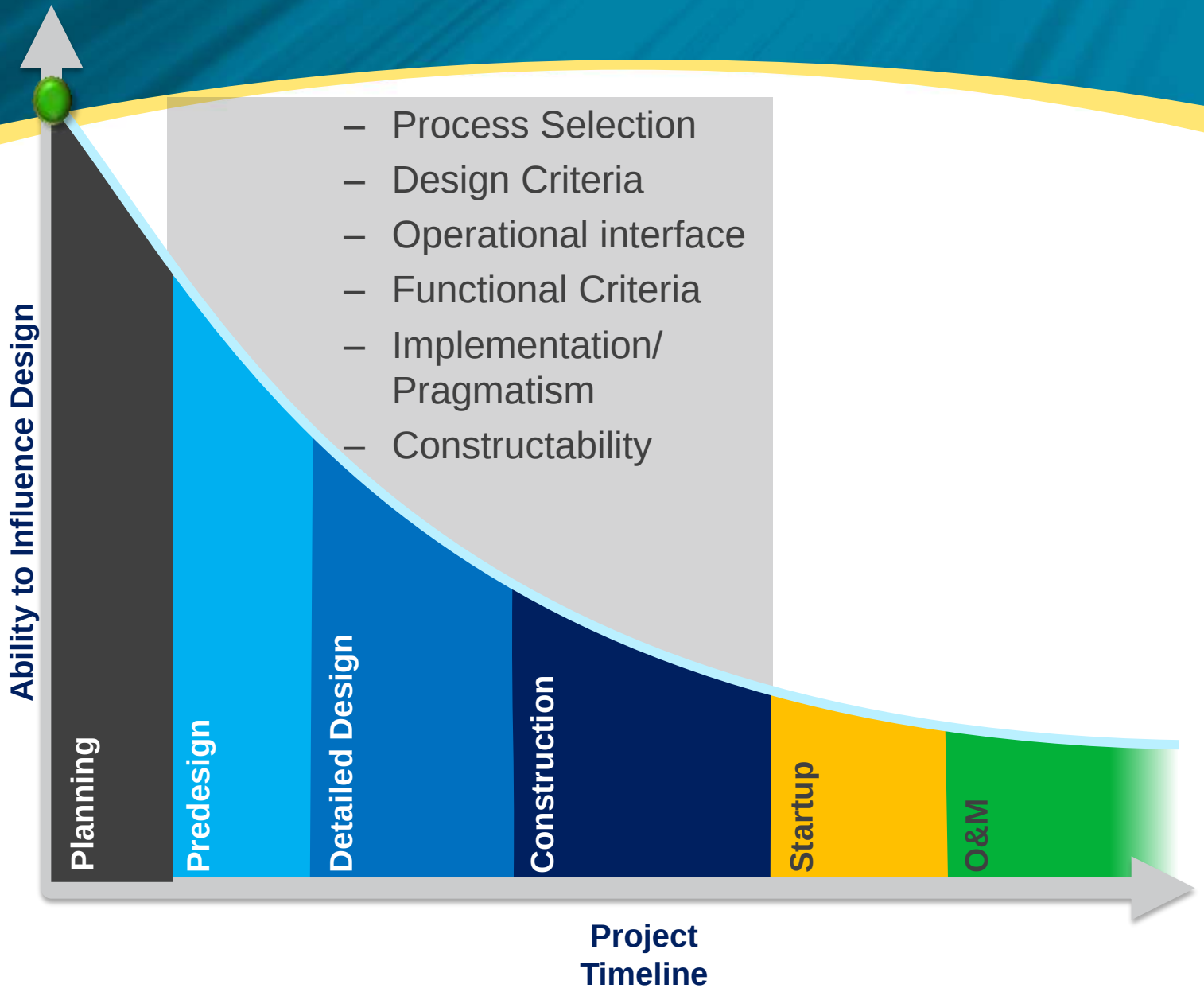
- Cost
- Contaminants
- Land Use Impact
- Risk

Multiple Unique Interests to Balance



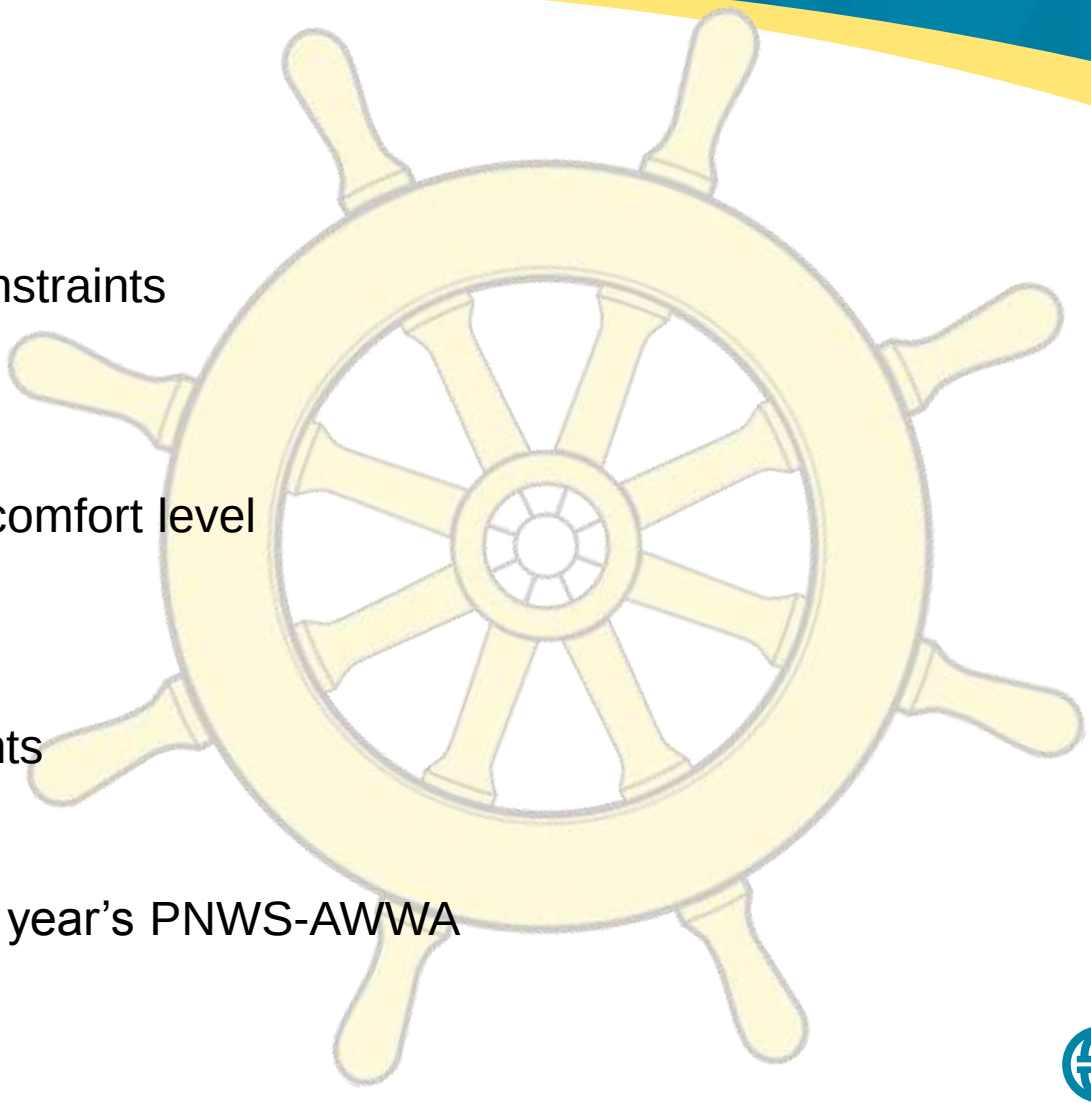
Water Treatment Plant Incubation

The Project Arc



Workshops: Early Stakeholder Collaboration

Typical Drivers for Design Decisions



What Drives Engineers

- Owner's & Operators
- Plant location & site constraints
- New Technology

What Drives Operators

- Previous experiences/comfort level
- Coffee

What Drives Owners

- Regulatory Requirements
- Cost
- Public Perception
- What they heard at last year's PNWS-AWWA

Drivers for Design Uniformity

What Drives Engineers

- Plant location & site constraints
- Owner's & Operators
- Technical Criteria

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Drivers for Design Diversity

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The Wildcard

“Never underestimate the power of a small group of committed people to change the world. In fact, it is the only thing that ever has.”

~ Margaret Mead

Passionate advocates dedicated to driving ideas through

Two Water Treatment Plants are Born

Overview: Green River Filtration Facility

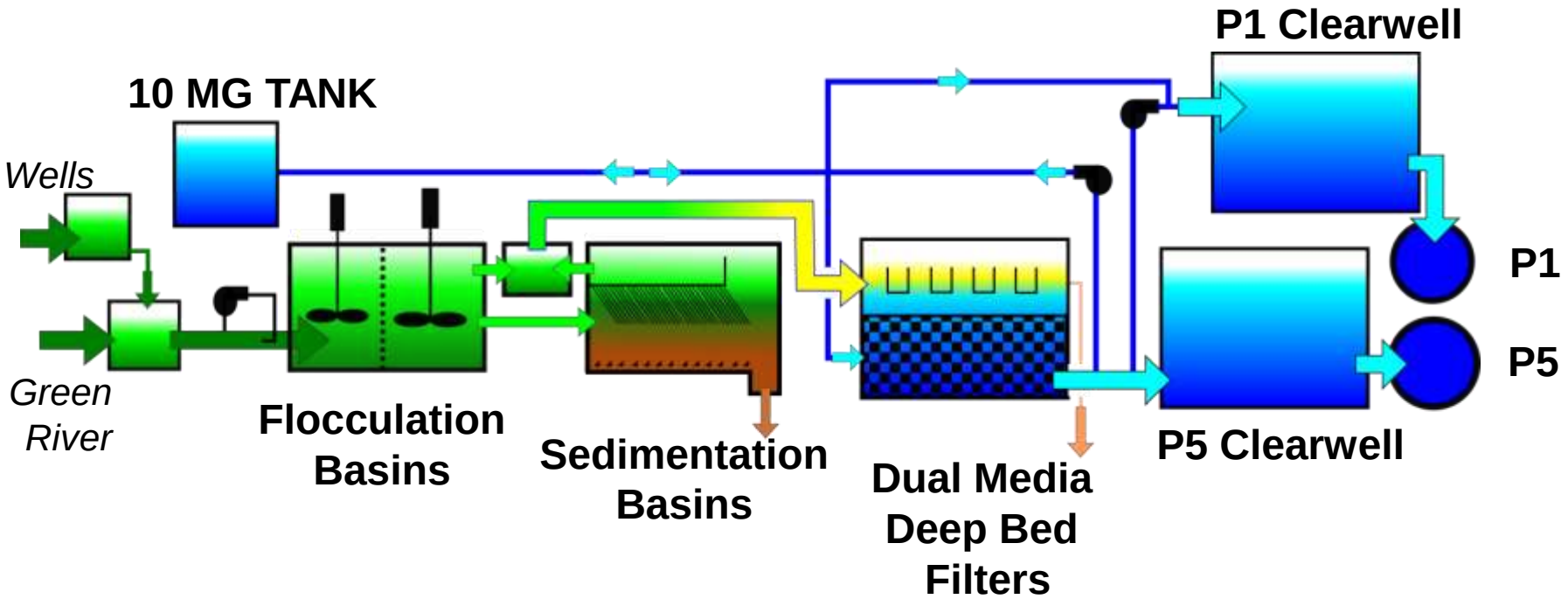
Existing Facilities

- Unfiltered water
- Pipelines with chemical addition and ozone reactors
- A well system and storage reservoir

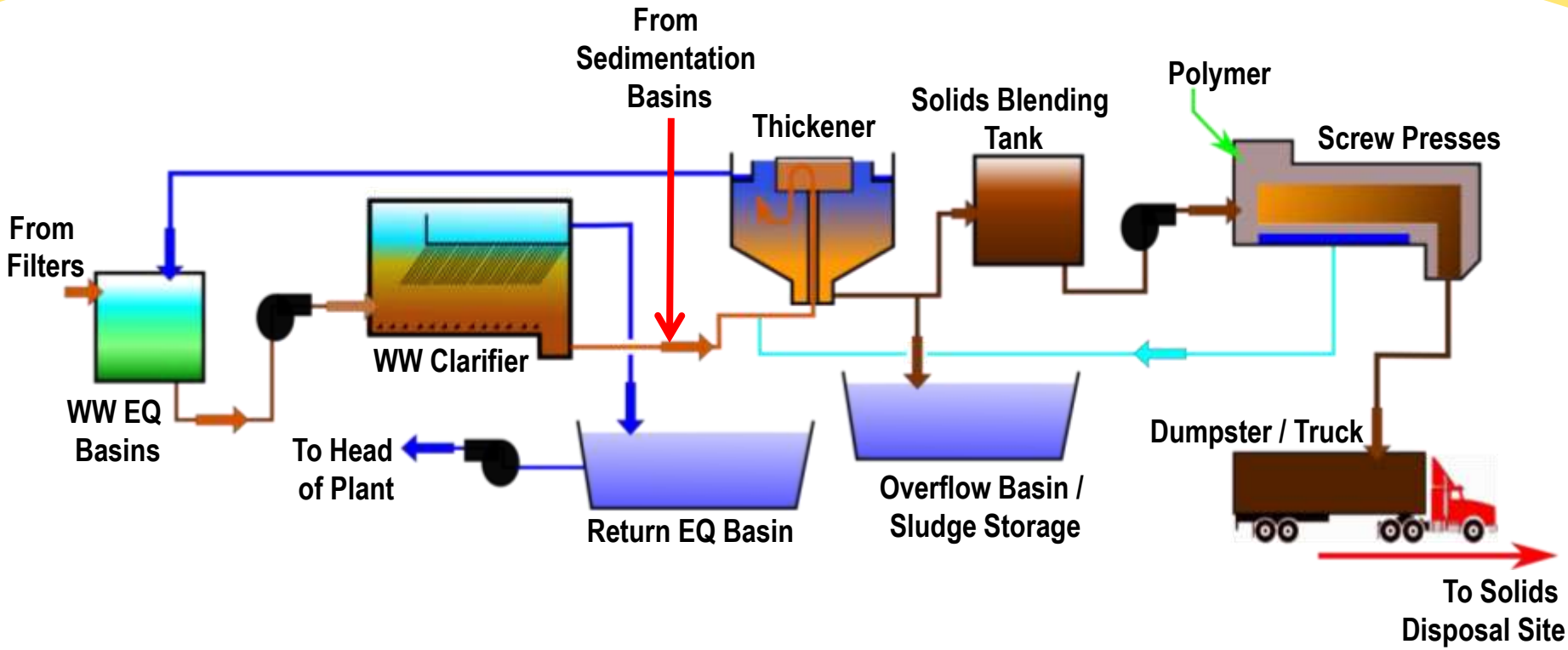
New Plant

- 168 MGD
- Hybrid Conventional/Direct Filtration
- Pretreatment: Flocculation & High Rate Plate Settlers
- Mechanical Dewatering: Screw Presses

GRFF: Main Treatment Process



GRFF: Solids Handling Process



Overview: LO-T WTP Expansion

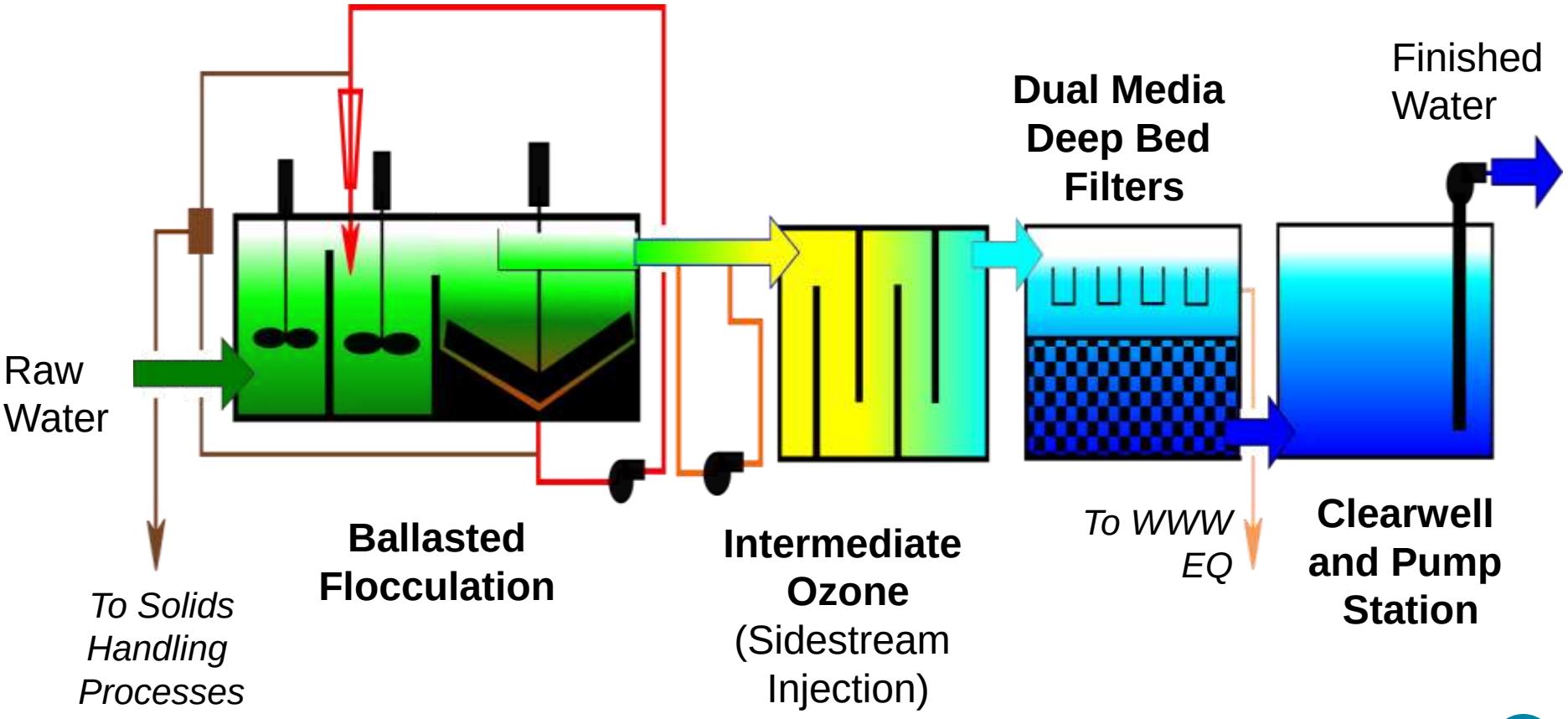
Current Plant

- 16 MGD Capacity
- Direct Filtration
- Solids Dewatering Lagoons
- 5.44 acre site

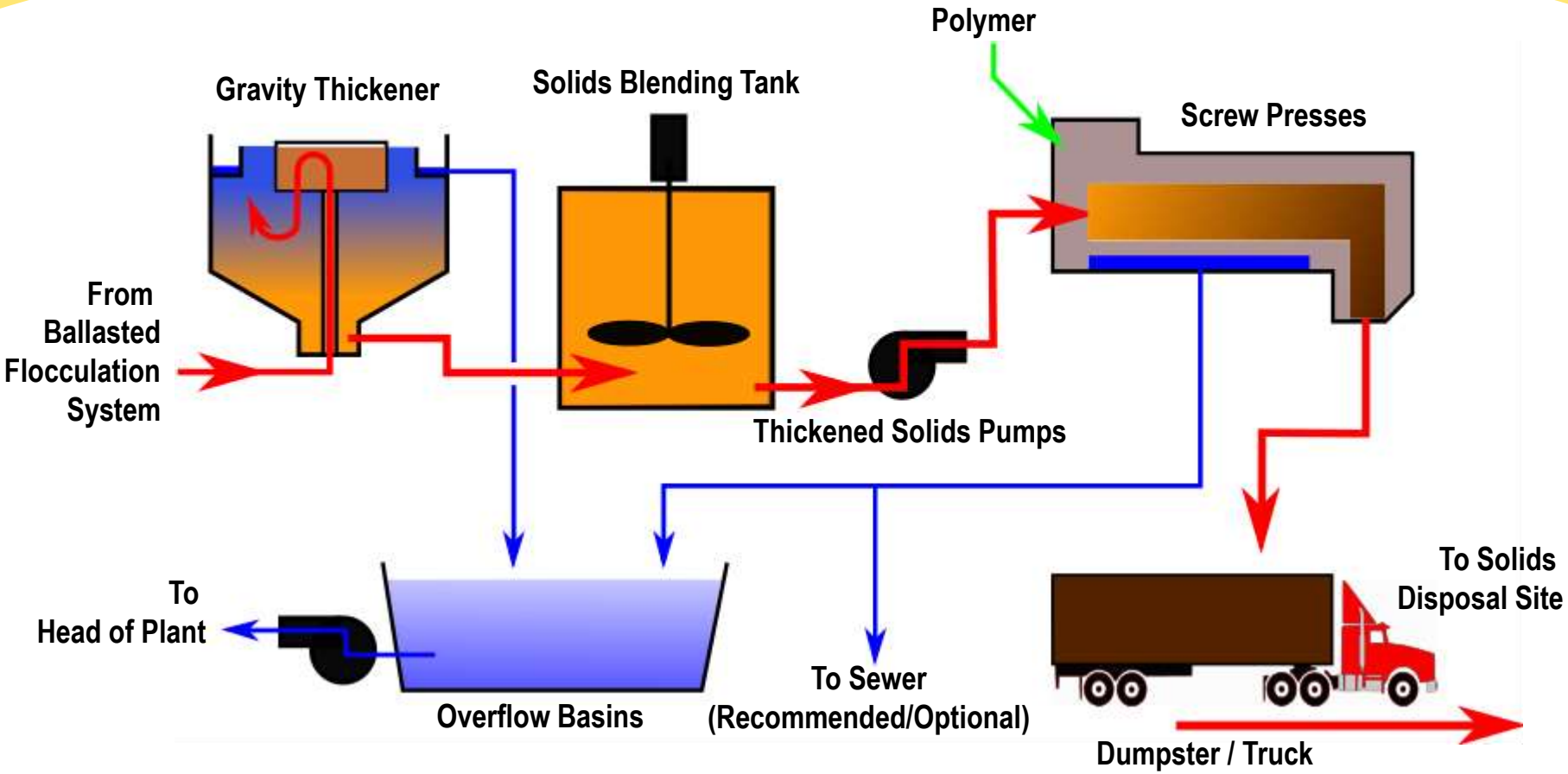
Expanded Plant

- 38 MGD Capacity
- Conventional Treatment
  - High-rate Clarification
  - Intermediate Ozone
  - High-rate GAC Filtration (10 gpm/sf)
  - Mechanical Dewatering
- Expanded 9.24 acre site
  75% increase in overall plant footprint

LO-T WTP: Main Treatment Process



LO-T WTP: Solids Handling Process



GRFF & LO-T WTP Uniformity

- Designed by MWH
  - *Somewhat separate design teams*
- Design Started in 2011
- Surface water treatment from “flashy” river sources
- Conventional treatment with high-rate sedimentation and deep bed, dual media filtration processes
- Mechanical Solids Handling Systems with Gravity Thickener and Screw Press technology

Mechanical Dewatering

Screw Presses

Advantages:

- Big, slow, dumb
- Low maintenance
- Minimal operational oversight
- Strong bench / pilot scale results

Disadvantages:

- Largely unproven in municipal water treatment applications

Chemical Pumps

Previous Experiences

GRFF LO-T

Diaphragm Pumps

- Higher discharge pressures
- More linearity at higher pressures
- Simple to operate and maintain

Peristaltic Pumps

- High turndown capabilities
- No pulsations in flow
- Lots of controls options
- Ability to pull suction

Chemical Pumps: Why?

Previous Experiences

GRFF

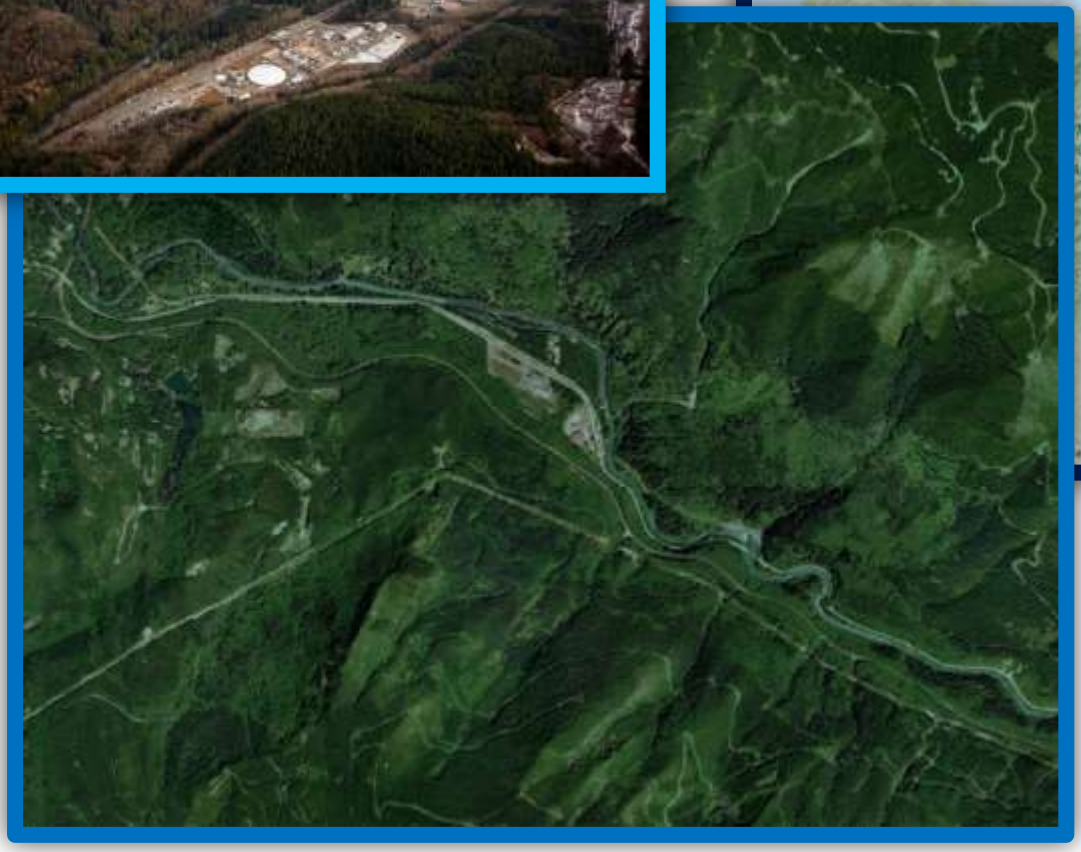
Struggle with carrier water pressure

LO-T

Interested in trying something new

Plant Location: GRFF

Site Constraints



Nearest neighbor:
1 mile

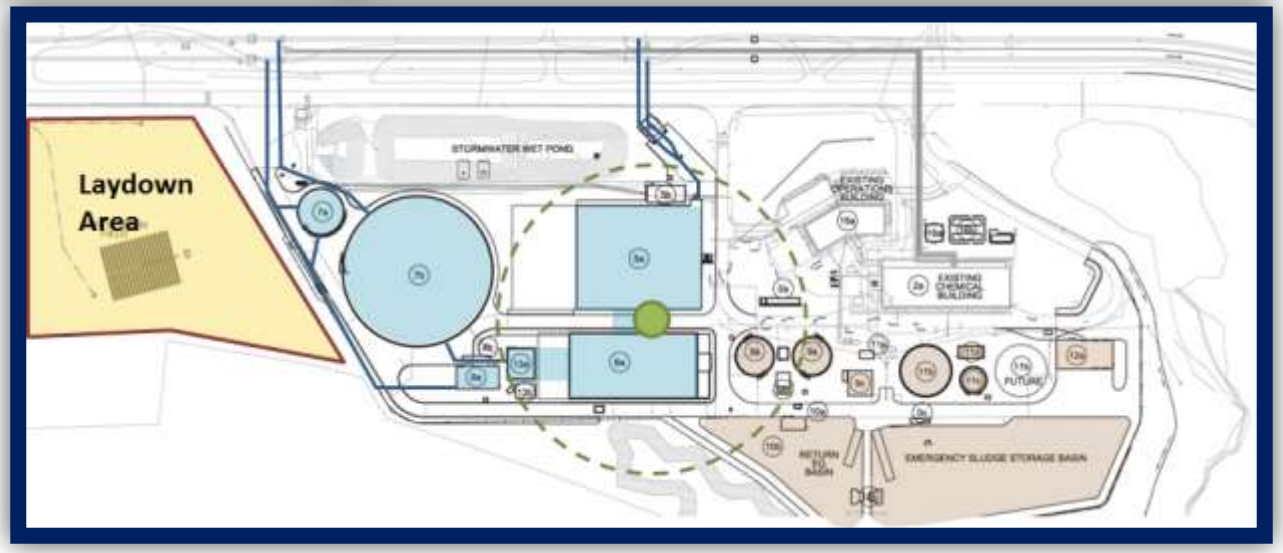
Plant Site: GRFF

Site Constraints

GRFF Neighbors

- Chemical Delivery Considerations
- Power Requirements

Constructability



Plant Location: LO-T WTP

Site Constraints

Treatment plant design affected significantly by small site footprint, land use requirements, and neighborhood concerns

Nearest Neighbor:
150 feet

Plant Site: LO-T WTP

Site Constraints

- Minimize footprint / centralize process buildings
- Enclose all mechanical equipment
- Building height restrictions
- Architectural finishes

Pre-Treatment Technology

Site Constraints

Plate Settlers: High Rate Clarification vs Higher Rate Clarification

GRFF

Traditional stainless steel plates

- Overflow Rate: 0.3 gpm/sf (design) up to 0.56 gpm/sf (max hydraulic capacity)

LO-T

Ballasted Flocculation with Lamella Tubes

- Overflow Rate: 30gpm/sf (normal) up to 45 gpm/sf (emergency)

Other site related differences

Site Constraints

GRFF

- New plant to make use of existing Chemical Building, Ozone System, 10 MG Tank
- Access Limitations → No shutdown of access road
- No sewer → process water is 100% recycled

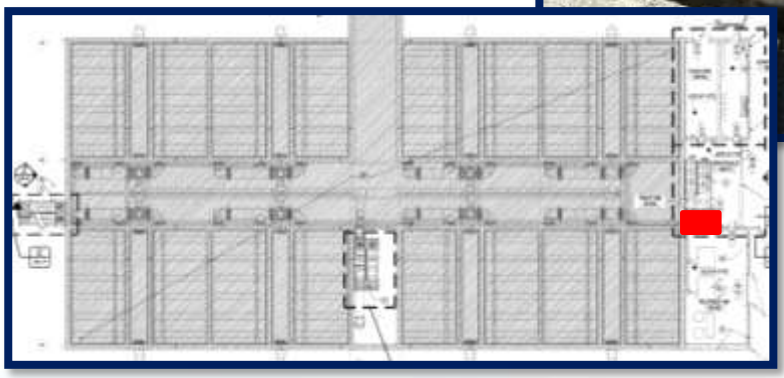
LO-T

- Existing plant must maintain continuous operation → requires multi-phased construction sequence
- Narrow neighborhood roads → reduce excavations to limit truck traffic
- Liquefiable site soils →place augercast piles under critical buildings and pipelines.

Individually GRFF

Individuals

- Hose reels for washdown hoses
- A restroom in the filter facilities
- Double leaf gates in the fence on the backside of the facility
- Multiple water sources for ozone cooling
- Windows that open for the buildings and pump stations



Individually LO-T WTP

Individuals

- Automated valves on chemical tank outlet
- Full width gravity thickener bridge
- Large opening hatches on manholes for easier access
- Simplified piping color scheme
- Remote control of sample pumps
- Catwalk adjacent to chemical tanks for tank washdown from above

Conclusions

- Plant siting can drive the design as much as or more than technology and regulatory requirements
- Involvement of Management and Operations Staff is key to project success – designing in a vacuum is sure to disappoint
- Passionate advocates can uniquely affect design decisions throughout the design and construction process
- Given two plant operators, you are sure to get at least two disparate opinions
- No one size fits all

And they lived happily ever after…

Questions?

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