2014 Water Reuse Conference

Food Process Water Treatment System

Optimization and Capital Improvement Project

City of Pasco, Washington

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Steve Venner – Cascade Earth Sciences

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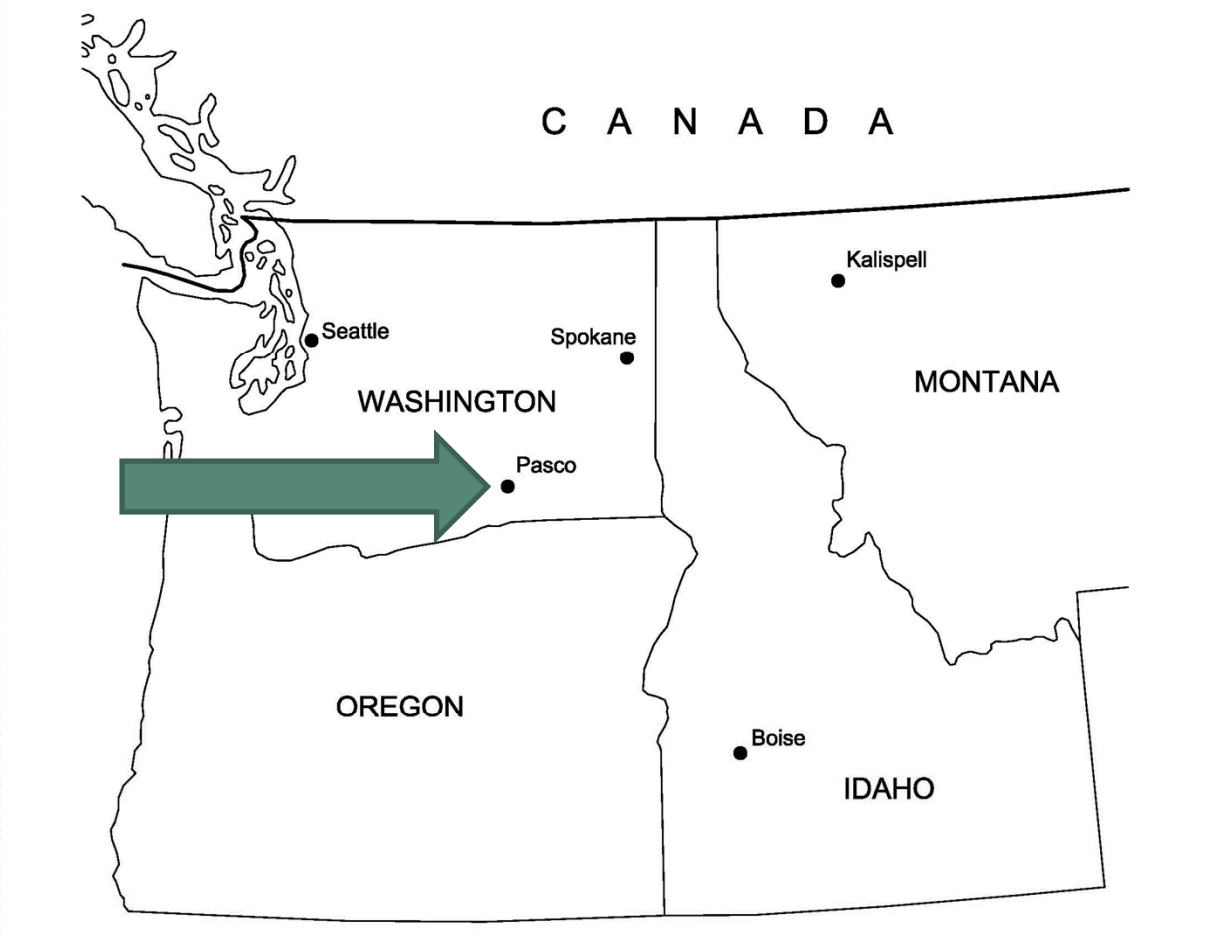
My Journey

Courtesy Ahmad Qayoumi

Project Location



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Vision

- Centralized Treatment
  - Conceptualized 25 years ago
    - One Processor
    - Currently, four processors
- Processor Benefits
  - Produce food, not manage wastewater
  - Minimal pre-treatment requirements
  - Save time and labor
  - Lower cost in combined system
- City Benefits
  - Economic development
    - Attract new processors
  - Tax base and jobs
- Farmer Benefits
  - Free Water ($135/ac)
  - Free Fertilizer ($170/ac)

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Twin City Foods, Inc.

CRF FROZEN FOODS, LLC

BYBEE FOODS

PASCO PROCESSING LLC

RESER'S FINE FOODS

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Processor Costs and City Revenue

Average (2011-2012)	Pasco Processing	Twin City Foods	CFR / Bybee	Reser's Foods
Annual Cost	$788,000	$335,000	$324,000	$297,000
Flow (million gallons)	286	148	134	89
Cost per 100 gallons	$0.28	$0.23	$0.25	$0.34

Cost per 100 gallons is higher for Pasco Processing and Reser's Foods because of using Winter Storage

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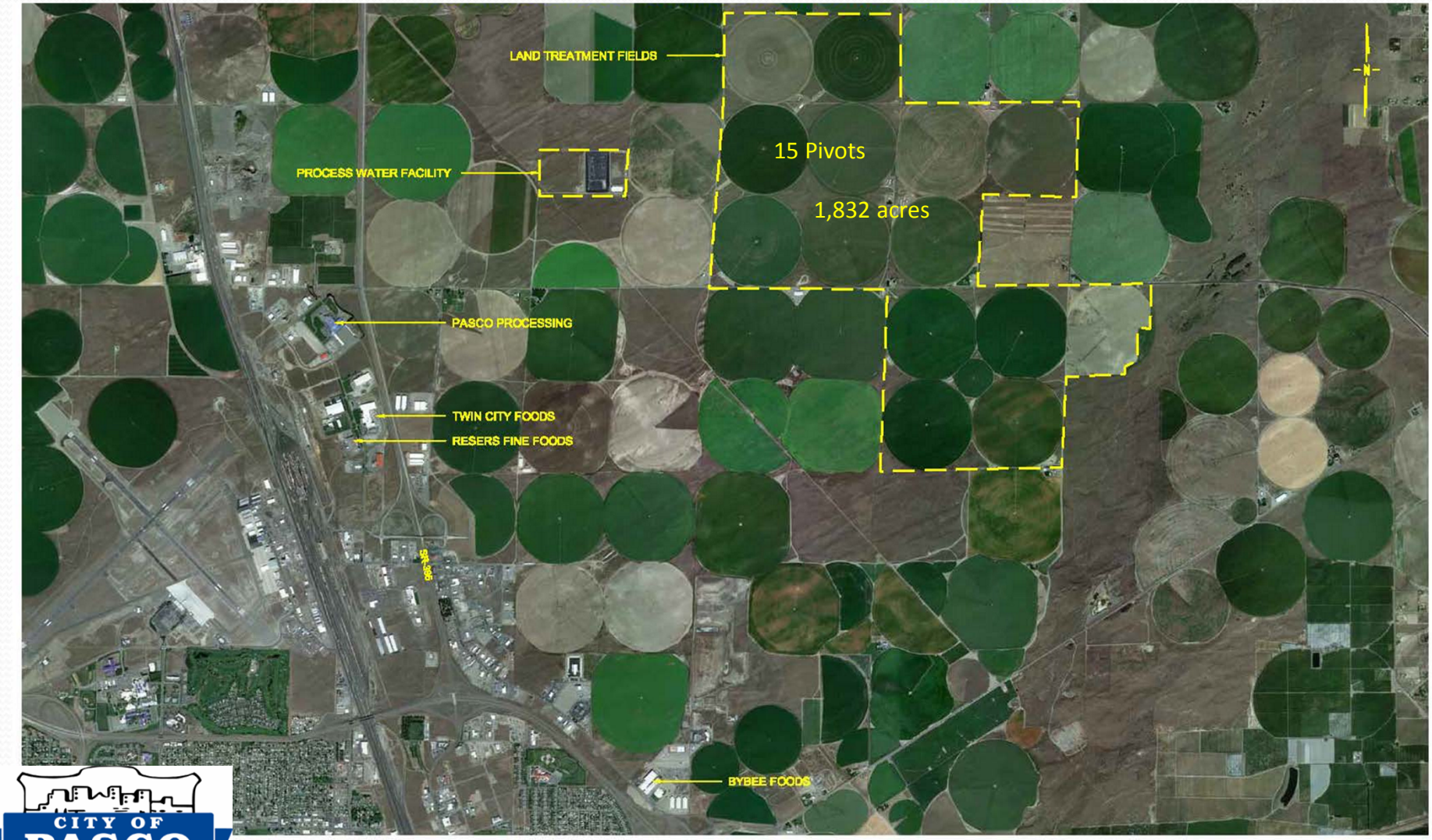
City of Pasco Process Water Reuse Facility



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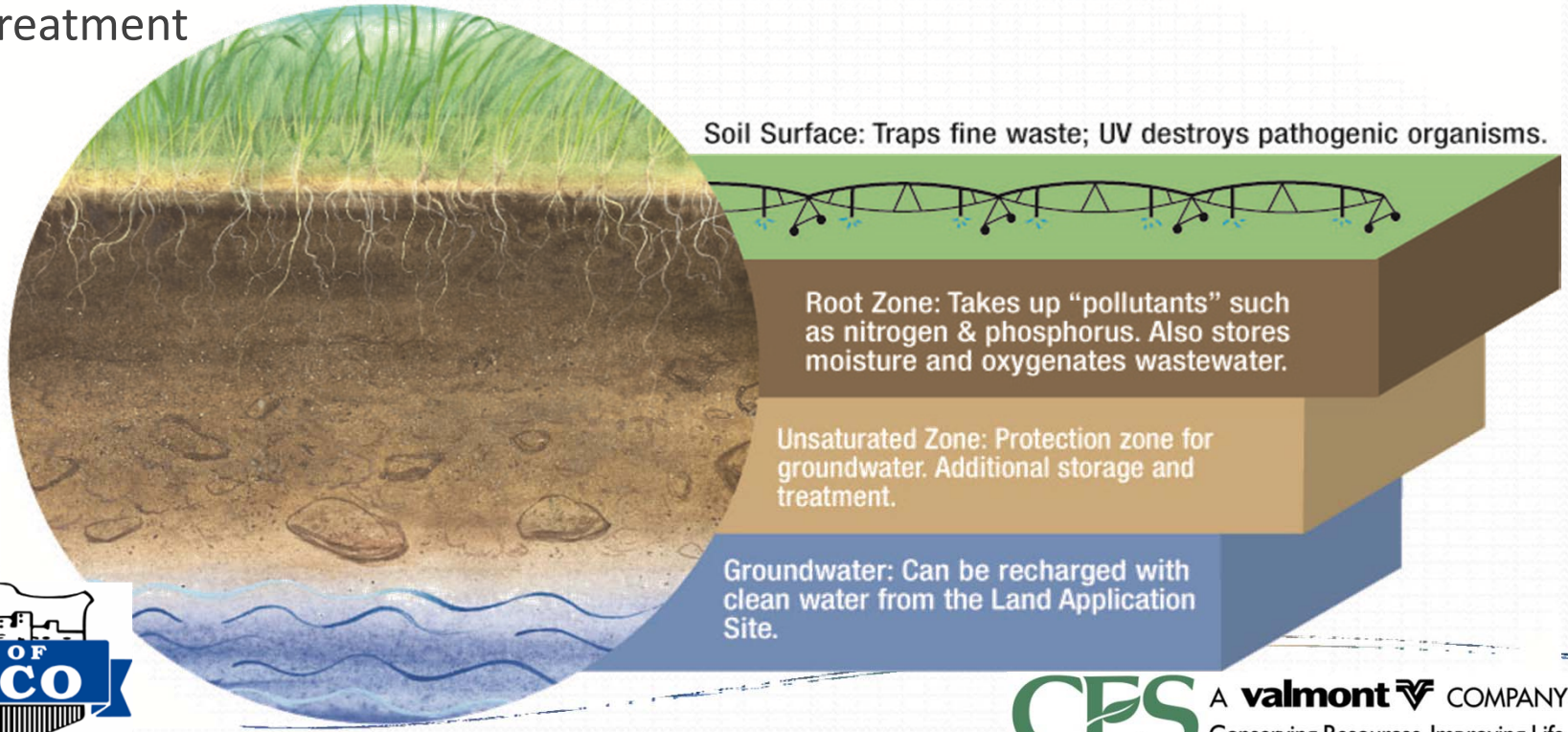
Land Treatment

- Reuses wastewater by applying it to land to grow crops
- The soil-plant-water interactions provide the treatment
  - Equal to treatment plant if properly sized and managed
  - Low capital, energy, and maintenance, while producing revenue from crops
- Eastern Washington State has >18 companies with >30,000 acres of land treatment



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Process Wastewater Facility

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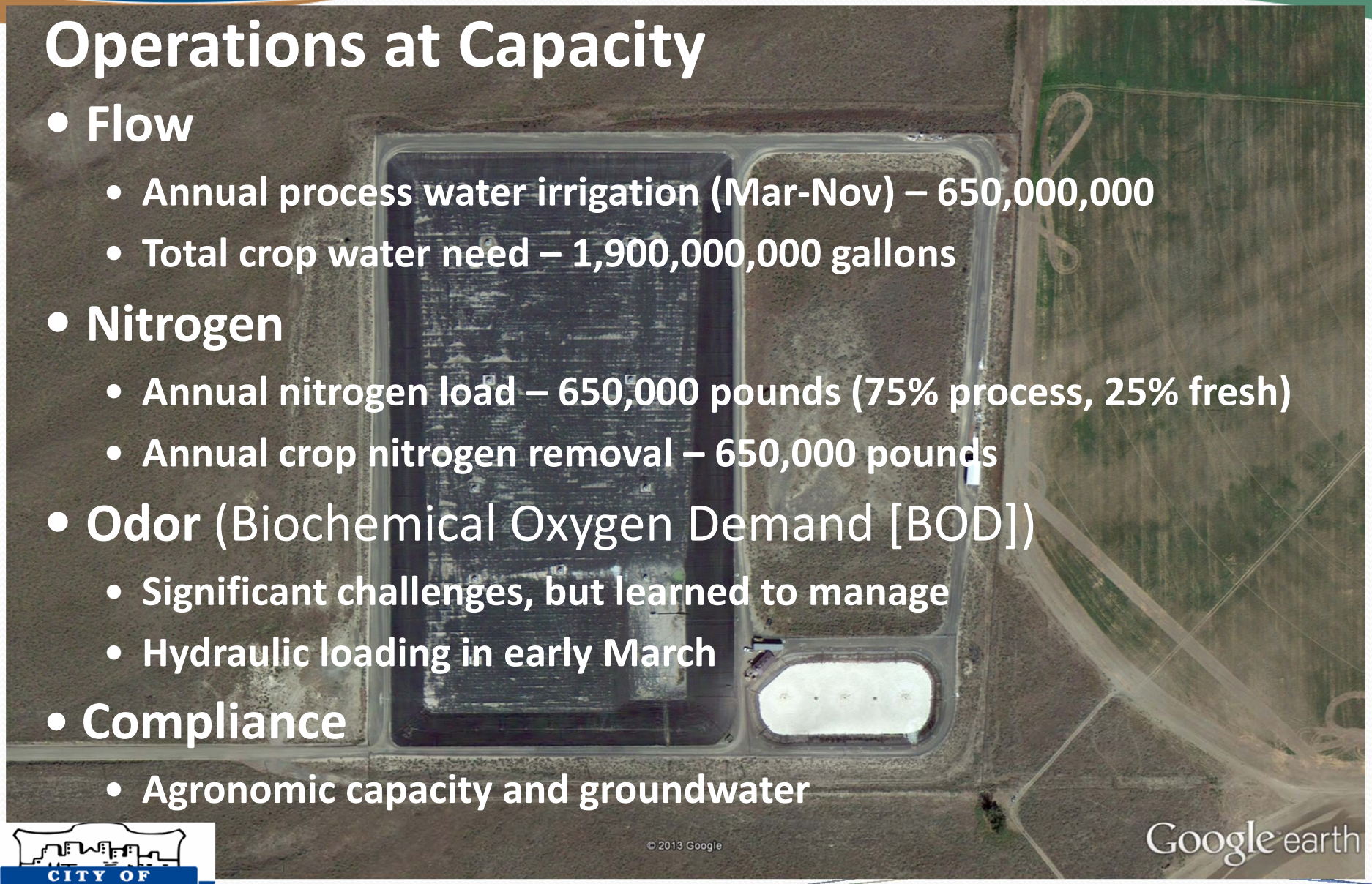
Operations at Capacity

- **Flow**
  - Annual process water irrigation (Mar-Nov) – 650,000,000
  - Total crop water need – 1,900,000,000 gallons
- **Nitrogen**
  - Annual nitrogen load – 650,000 pounds (75% process, 25% fresh)
  - Annual crop nitrogen removal – 650,000 pounds
- **Odor** (Biochemical Oxygen Demand [BOD])
  - Significant challenges, but learned to manage
  - Hydraulic loading in early March
- **Compliance**
  - Agronomic capacity and groundwater



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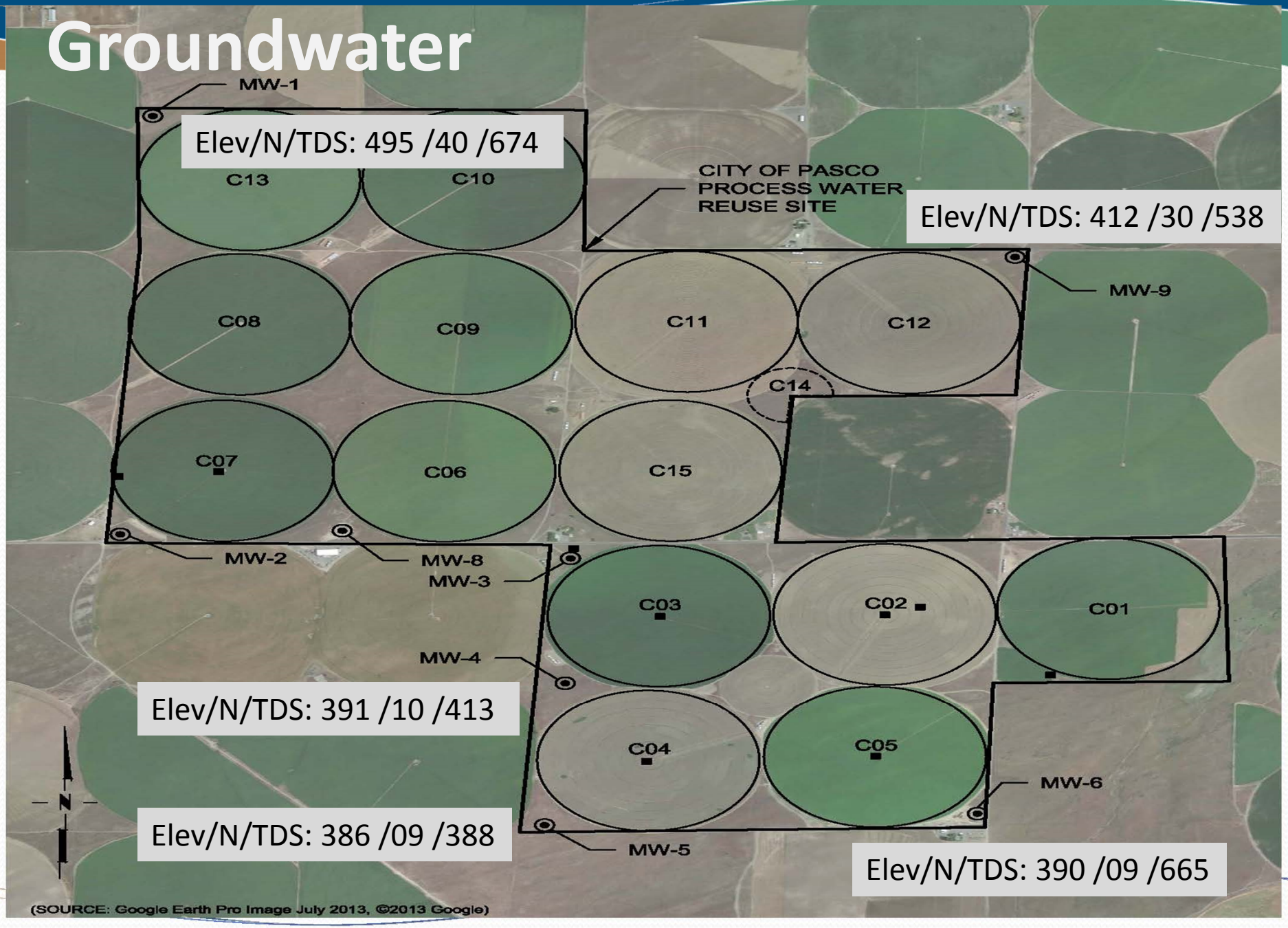
Groundwater



Screening?

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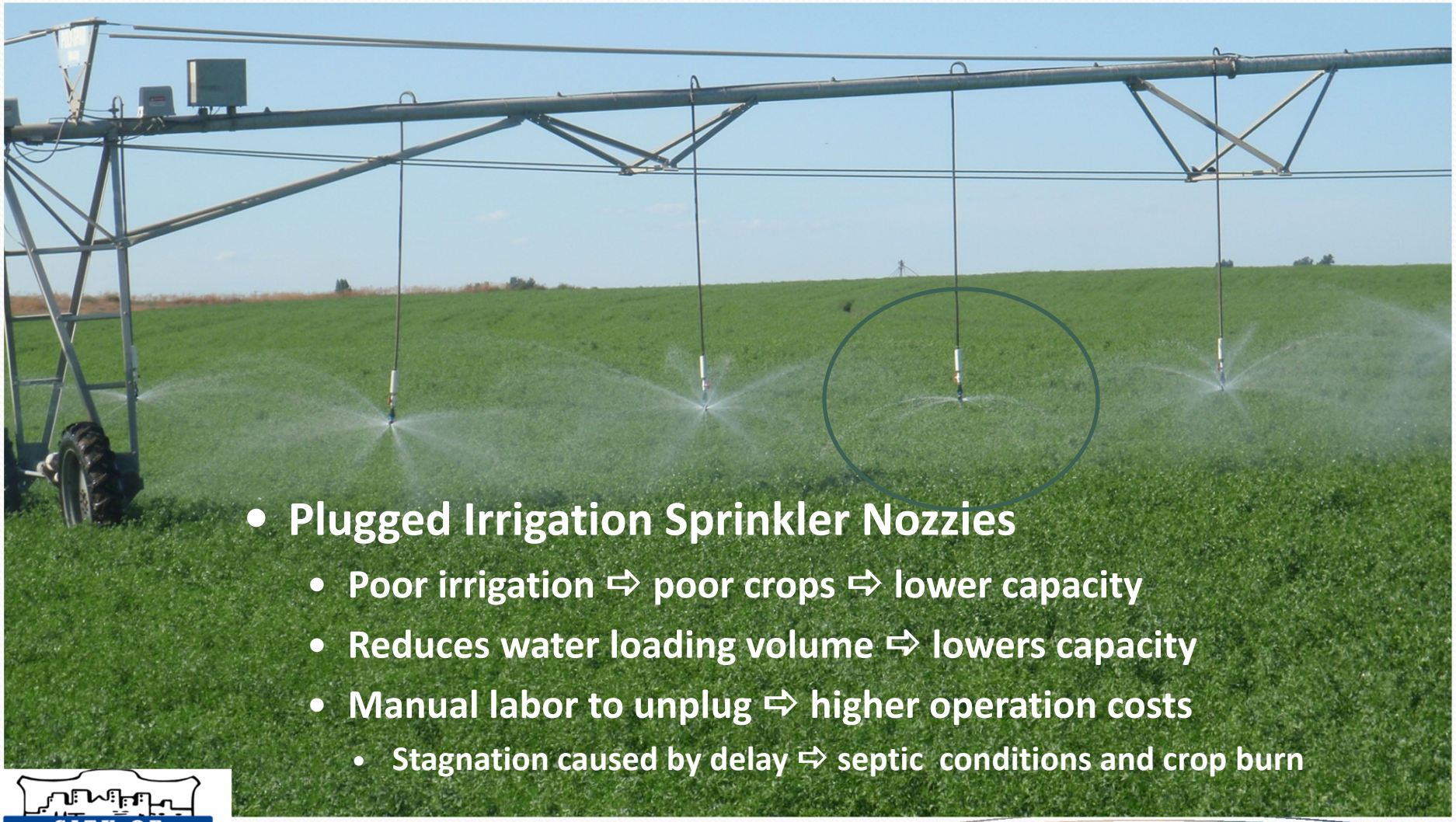
Excess Solids



- Plugged Irrigation Sprinkler Nozzies
  - Poor irrigation ⇨ poor crops ⇨ lower capacity
  - Reduces water loading volume ⇨ lowers capacity
  - Manual labor to unplug ⇨ higher operation costs
    - Stagnation caused by delay ⇨ septic conditions and crop burn

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Sedimentation?

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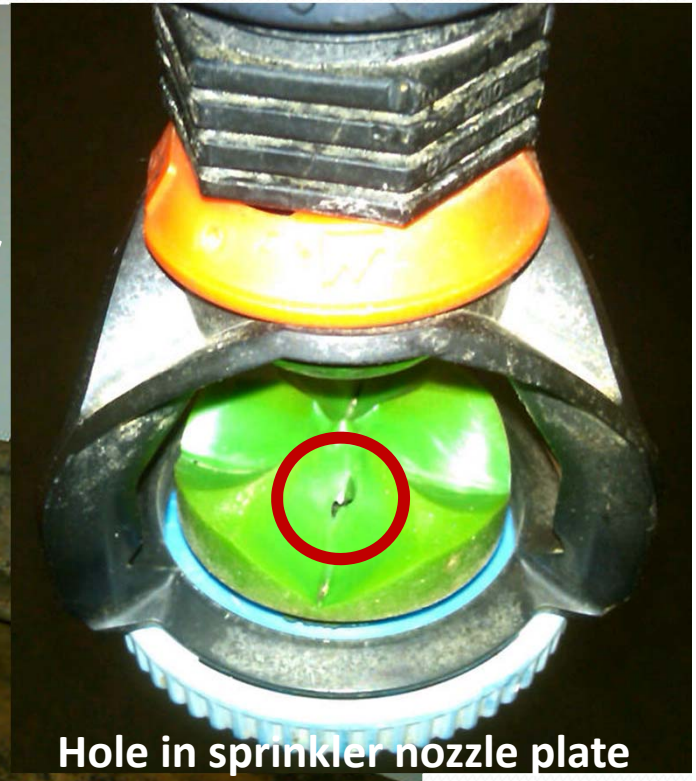
Sediment

- Abrasion of end guns and nozzles
  - Poor irrigation ⇨ poor crops ⇨ lowers capacity
- Abrasion of pumps and pipeline
  - Increases operation costs



Hole in sprinkler nozzle plate

- Settles in ponds
  - consumes storage & increases operation costs
- Plugs irrigation pipe
  - Poor irrigation ⇨ poor crops ⇨ lower capacity
  - Manual labor to unplug ⇨ increases operation costs

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Optimization Plan (Fit for Purpose)

- Fit more wastewater in the capacity and increase capacity
  - Achieve both by pretreatment and improved farm management

- Screening
  - Eliminate irrigation nozzle plugging
- Sedimentation
  - Eliminate abrasion and irrigation pipe plugging
- Odor/BOD reduction + Additional Storage
  - Improve application timing
- Improve Farm (Land Treatment System) Management
  - Data feedback systems , irrigation equipment and design, farm plan, training
- Add acreage
  - non-City owned – pretreated water in demand

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Construction Begins

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Screening Building

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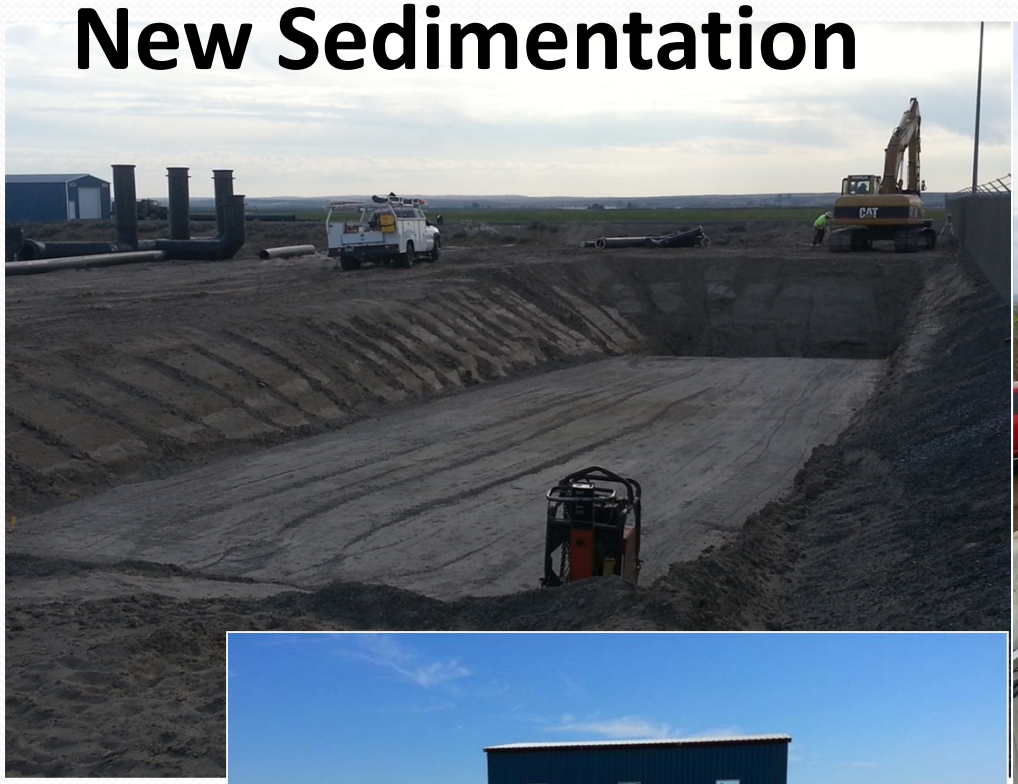
Fine Screen Installation

Fine Screen Influent Piping

Utility Systems

Utility System - Solids

New Sedimentation



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Ponds for Storage and BOD Treatment

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EQ Basin Repair/Repurpose

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Improve Farm Operations

- Install data management system
  - Near real-time nitrogen balance and soil moisture
  - Match load to capacity on each field
  - Increase crop growth and yield – increase capacity
  - Improve communications between farmers and operators
- Update irrigation equipment
  - Maximize uniform irrigation distribution and depth – max capacity
  - Increase crop growth and yield – increase capacity
- Train farmers and operators to maximize system benefits
  - Maximize capacity and increase capacity

Google earth
Imagery Date: 7/4/2013 46°17'17.21" N 119°01'51.43" W elev 509 ft eye alt 18335 ft

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Capacity Improvement

- Additional capacity from screening, sedimentation, and BOD treatment
  - 110,000 pounds additional nitrogen capacity
    - 17% increase from 650,000 pounds
  - 170 MG of additional process water capacity
    - 26% increase from 650 MG
- Additional capacity with each center pivot field added
  - 47,200 pounds of additional nitrogen capacity, and
  - 71 MG of additional process water capacity

Project Cost

- Screening and sedimentation construction
  - $2,200,000
- Additional 40 MG storage construction
  - $425,000
- BOD treatment
  - $1,000,000 (estimate)
- Cost & operations covered by a debt service plan approved by the Food Processors

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Questions

Food Process Water Treatment System

Optimization and Capital Improvement Project

City of Pasco, Washington

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