Pima County Regional Wastewater Reclamation Department

ROMP and Water Quality Improvements

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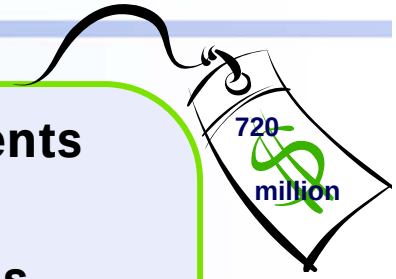
Compliance & Regulatory Affairs

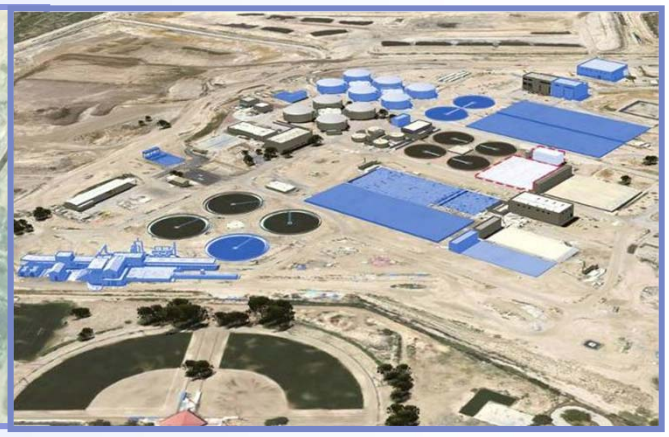
September 18, 2012

ROMP* Program Elements

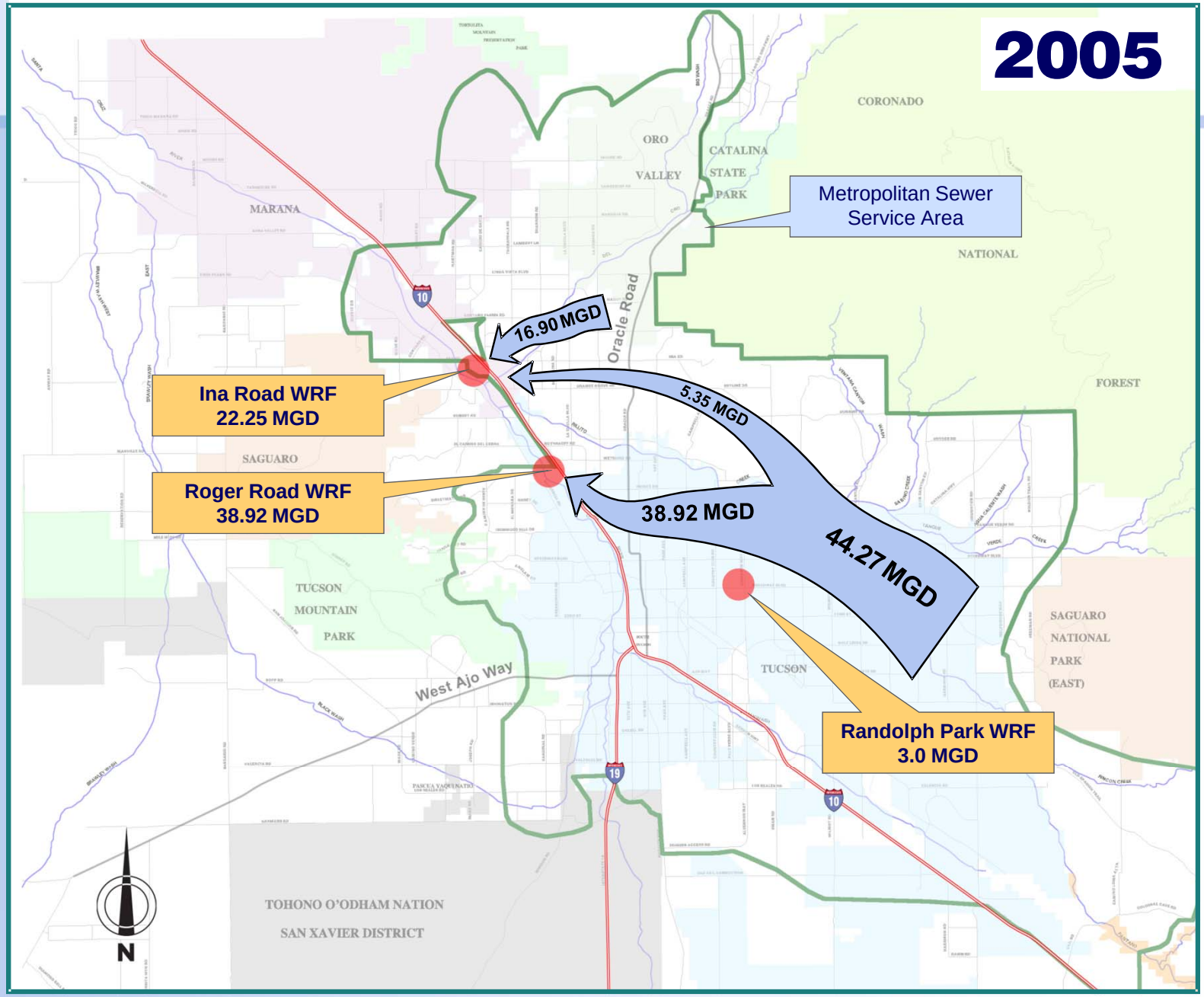
*Regional Optimization Master Plan

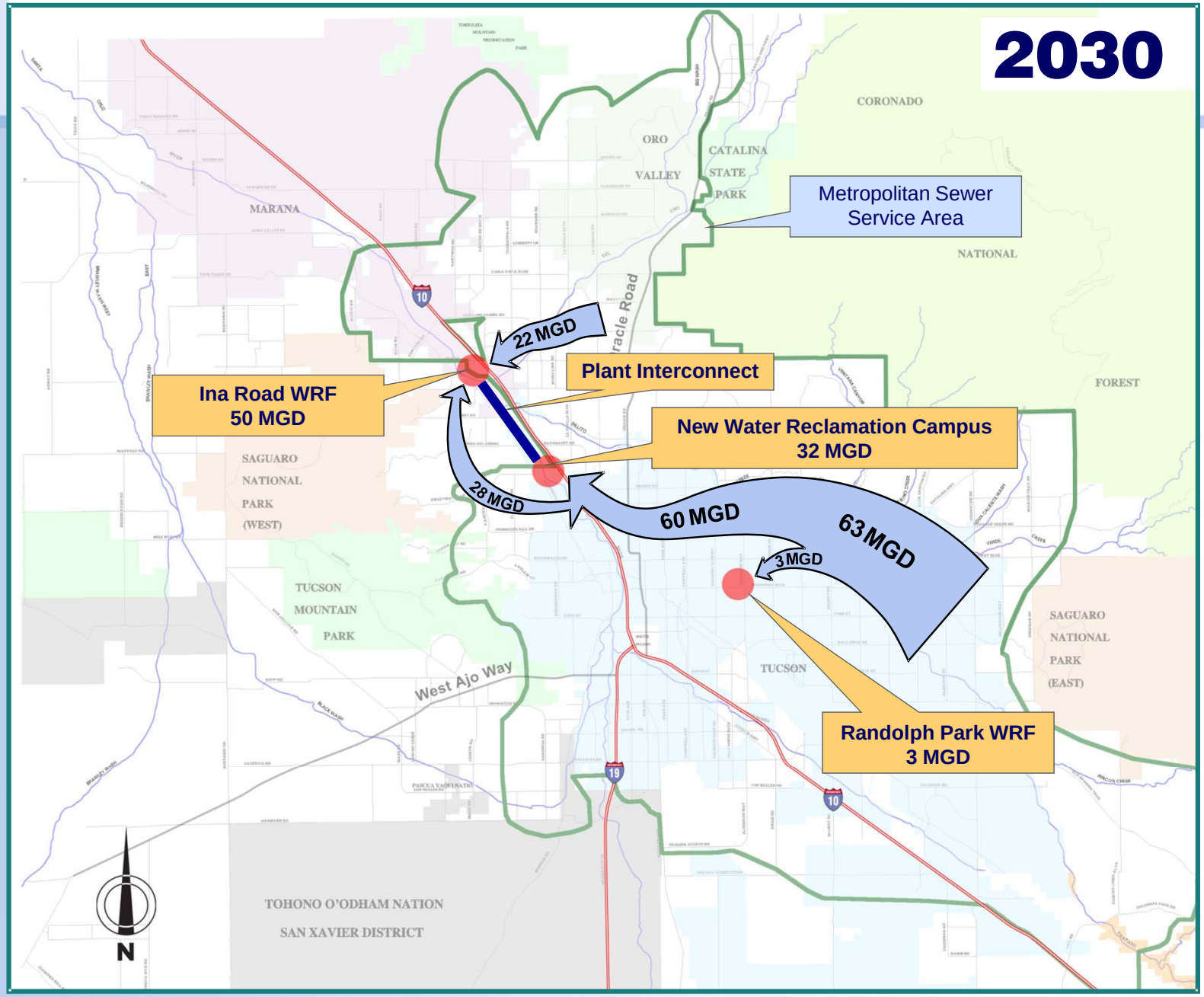


- ✓ Meet ADEQ BADCT & AZPDES discharge requirements
- ✓ Expand Ina Rd WRF to 50 MGD
- ✓ Construct new 32 MGD Water Reclamation Campus (in vicinity of existing Roger Rd WRF)
- ✓ Plant Interconnect
- ✓ Good neighbor facilities
- ✓ Decommission existing 41 MGD Roger Road WRF
- ✓ Meet growth needs to year 2030



Proposed Water Reclamation Campus (left) and Ina Road WRF Expansion and Upgrade


2005
Metropolitan Sewer Service Area
16.90 MGD
5.35 MGD
38.92 MGD
44.27 MGD
Ina Road WRF
22.25 MGD
Roger Road WRF
38.92 MGD
Randolph Park WRF
3.0 MGD
CORONADO
NATIONAL
FOREST
ORO
VALLEY
CATALINA
STATE
PARK
MARANA
SAGUARO
TUCSON
MOUNTAIN
PARK
TUCSON
SAGUARO
NATIONAL
PARK
(EAST)
Oracle Road
West Ajo Way
TOHONO O'ODHAM NATION
SAN XAVIER DISTRICT
N


2030
Metropolitan Sewer Service Area
Ina Road WRF
50 MGD
Plant Interconnect
New Water Reclamation Campus
32 MGD
Randolph Park WRF
3 MGD
22 MGD
28 MGD
60 MGD
63 MGD
3 MGD
CORONADO
NATIONAL
FOREST
ORO
VALLEY
CATALINA
STATE
PARK
MARANA
SAGUARO
NATIONAL
PARK
(WEST)
TUCSON
MOUNTAIN
PARK
TUCSON
SAGUARO
NATIONAL
PARK
(EAST)
West Ajo Way
TOHONO O'ODHAM NATION
SAN XAVIER DISTRICT
N

Upgrade/Expand
Ina Road Wastewater Reclamation Facility

- Expand treatment capacity to 50 MGD
  - Convert/replace existing processes
  - Additional 12.5 MGD expansion
- Centralized biosolids processing and handling
  - Reduce overall cost
  - Provide for co-generation bio-gas utilization at one location
- Replace existing power plant

Current Ina Road WRF Expansion Construction

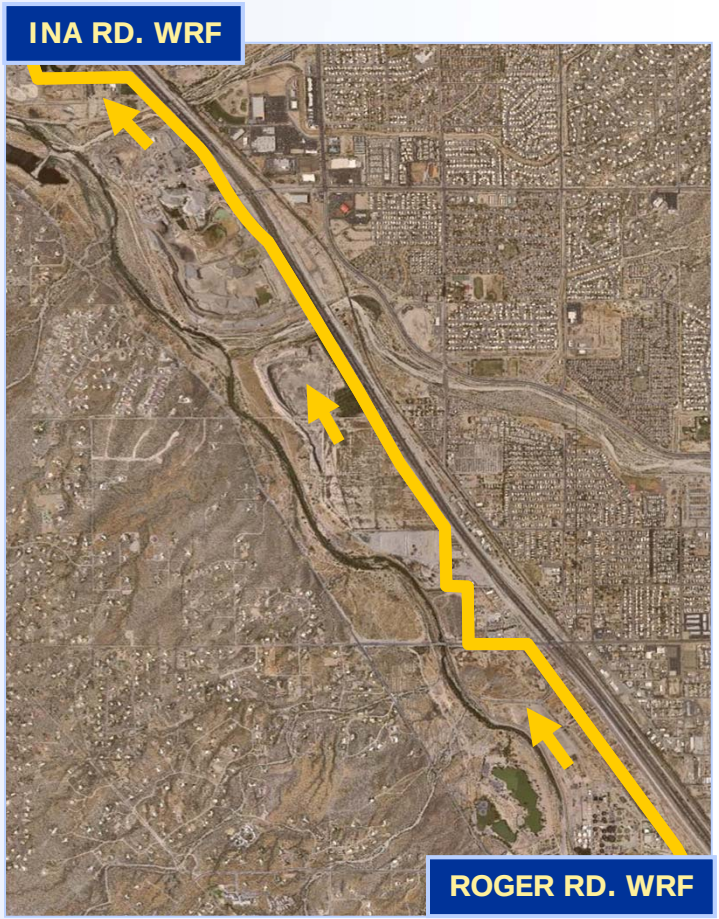
32 MGD Water Reclamation Campus

- Develop project in campus-type setting
- 32 MGD Bardenpho treatment train
- Central Compliance Laboratory
- Compliance and Regulatory Affairs Office (CRAO)
- Showcase for cultural and biological resources
- Environmental enhancements: adjacent parks, natural areas, and economic development centers
- Solar energy project

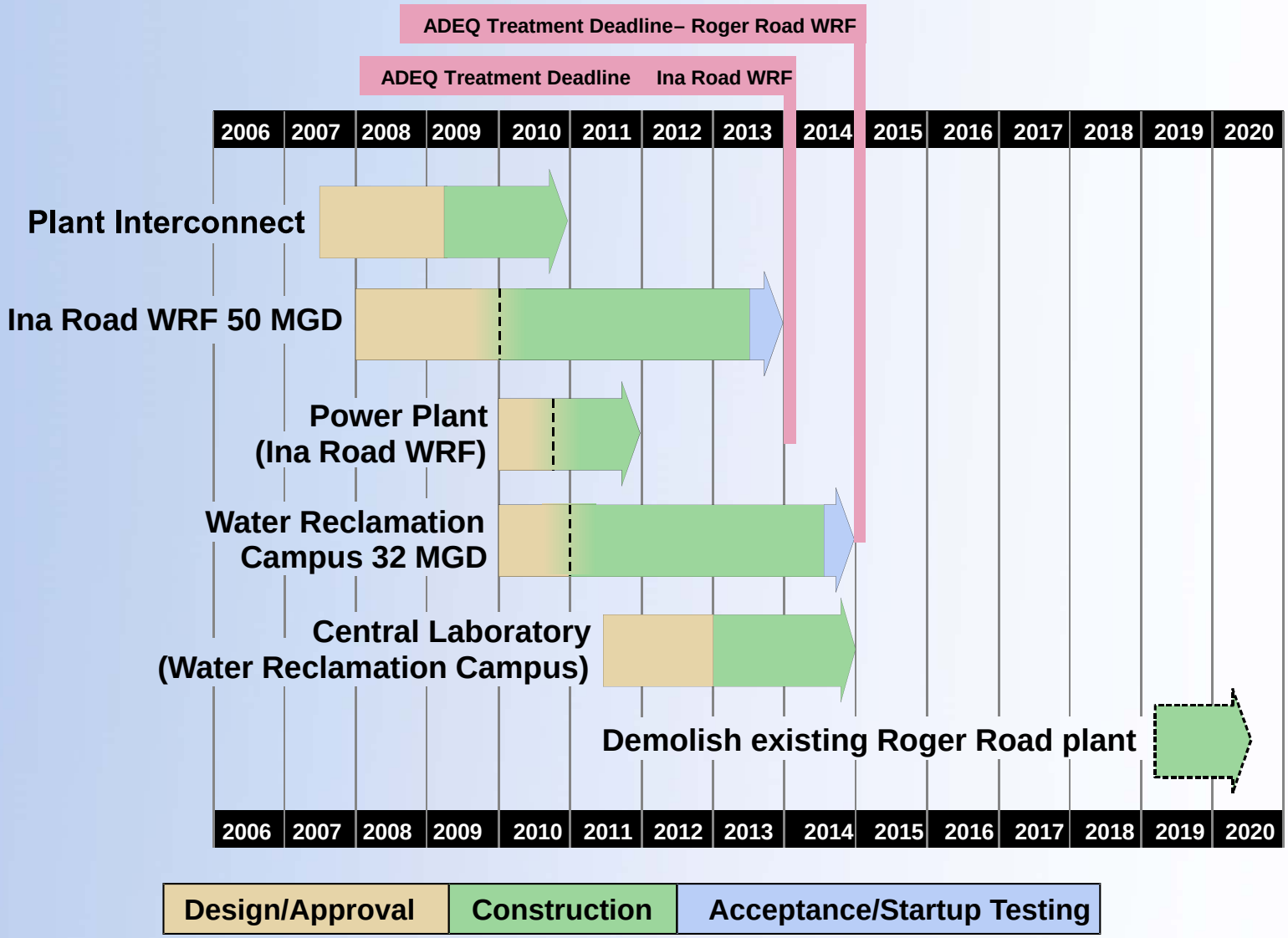
Current Water Reclamation Campus Construction

ROMP Plant Interconnect

- Five miles of 60” to 72” line connecting two metropolitan treatment plants
- Flow management and capacity management between the treatment plants
  - 36 MGD average, 81 MGD peak flow
- Stimulus Assistance:
  - Grants: $2,000,000
  - WIFA Loan: $8,000,000
- Completed December 22, 2010
  - Operational April 11, 2011



ROMP Implementation Schedule

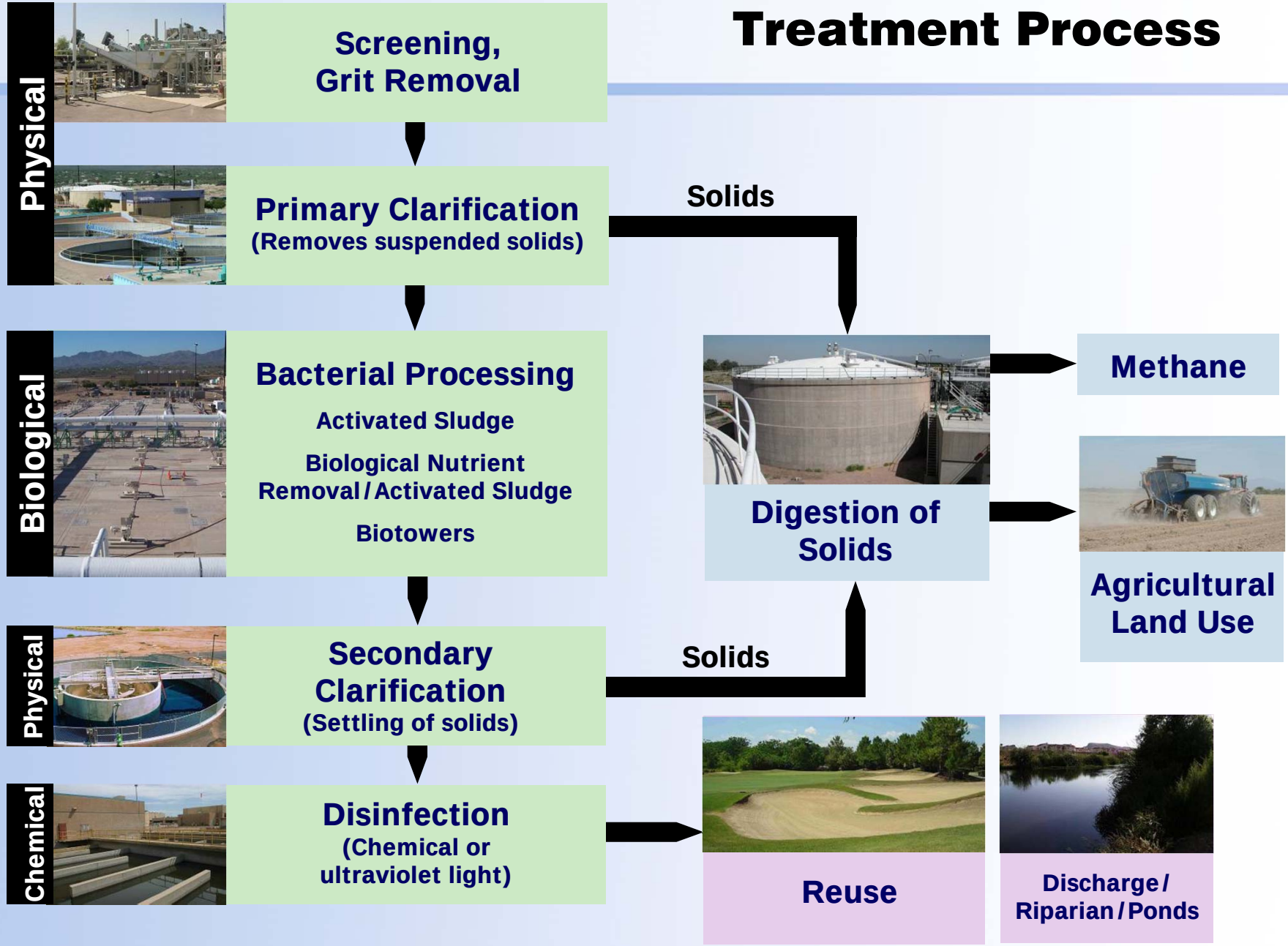


ROMP Budget vs. Projected Final Costs

	ROMP BUDGET	PROJECTED FINAL COSTS
Ina Road WRF	$301,290,000	$311,717,581
Plant Interconnect	41,190,000	33,415,907
Water Reclamation Campus	275,100,000	182,466,445
Central Laboratory Complex	28,870,000	28,870,000(5)
Biosolids / Biogas Master Plan	21,810,000	25,810,000(2)
SCADA	13,460,000	13,593,000
Roger Road WRF Decommissioning / Deconstruction	38,290,000	41,107,736(3)
TOTALS	$720,010,000(1)	$636,980,669(4)

1) The original ROMP Budget of $720,000,000 has been reduced to $660,000,000 due primarily to the budget savings in the award of the Water Campus Treatment Facility DBO Project.
2) Significant savings in capital costs may be realized if the ultimate master plan results in a Public Private Partnership with private sectors ownership such as in a DBFOO procurement.
3) The capital cost for the deconstruction of the Roger Road WRF property may be significantly reduced in the event of the sale or lease of the property.
4) Additional reductions in the ROMP Budget below current ROMP Budget of $660,000,000 is anticipated when the project procurement methods for the Biosolids / Biogas Master Plan and deconstruction of the Roger Road WRF Property are decided.
5) The projected costs for the Central Laboratory Complex includes costs for an expansion to the Laboratory for future RWRD needs and an interim lease agreement with the University of Arizona.

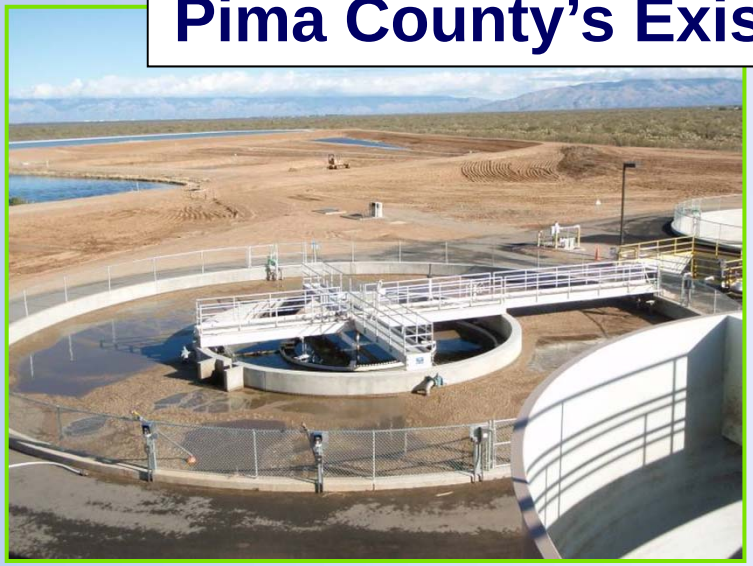
Typical Treatment Process



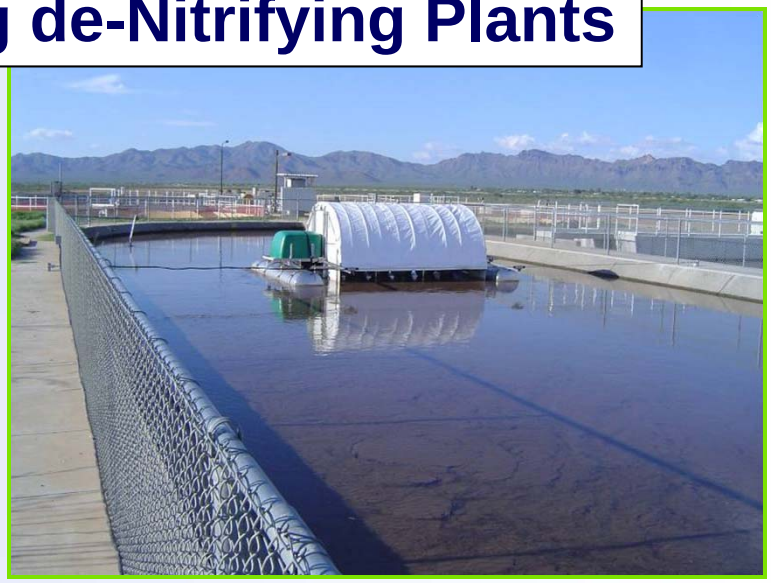
Pima County's Existing de-Nitrifying Plants

Green Valley WRF – BNROD with Chlorination

Randolph Park – Membrane Bioreactor



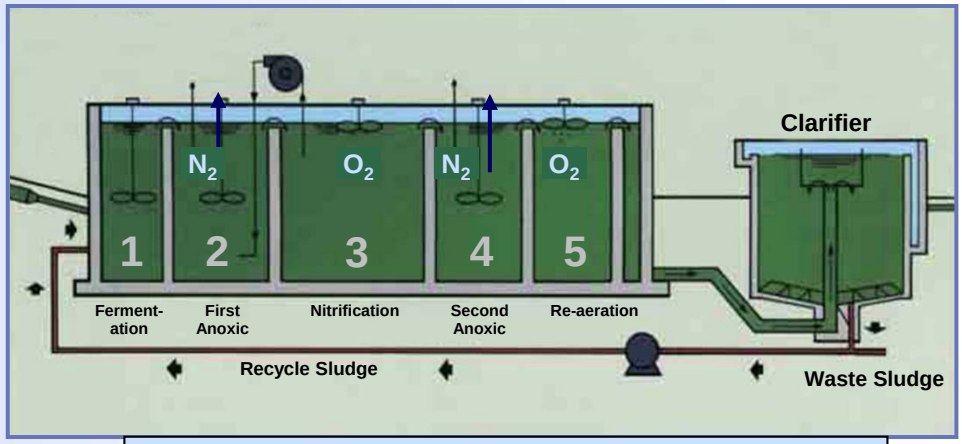
Corona de Tucson WRF – Closed Loop Reactor



Avra Valley WRF – BNROD with UV Disinfection

Ina Road WRF Capacity and Upgrade Project Overview

- Expansion of preliminary and primary treatment facilities
- HPO replacement with 25 MGD Bardenpho
- 12.5 MGD Bardenpho east side expansion
- BNRAS modification to 12.5 MGD Bardenpho process
- Biosolids facilities improvements
- New digester complex
- Disinfection upgrades
- Comprehensive odor control facilities



5-stage Bardenpho process

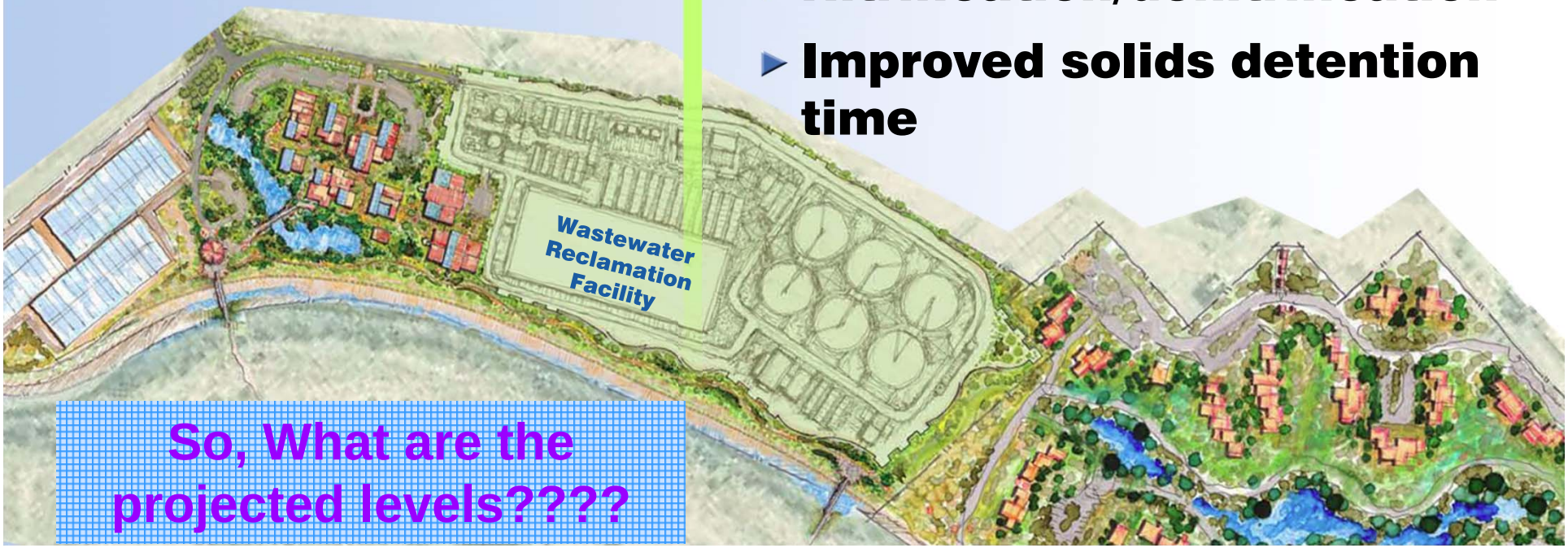
(Source: EIMCO Water Technologies)

Regional Optimization Master Plan

Addressing Water Quality with State-of-the-art Treatment

Bardenpho Treatment

- Lower BOD
- Nitrification/denitrification
- Improved solids detention time



So, What are the projected levels????

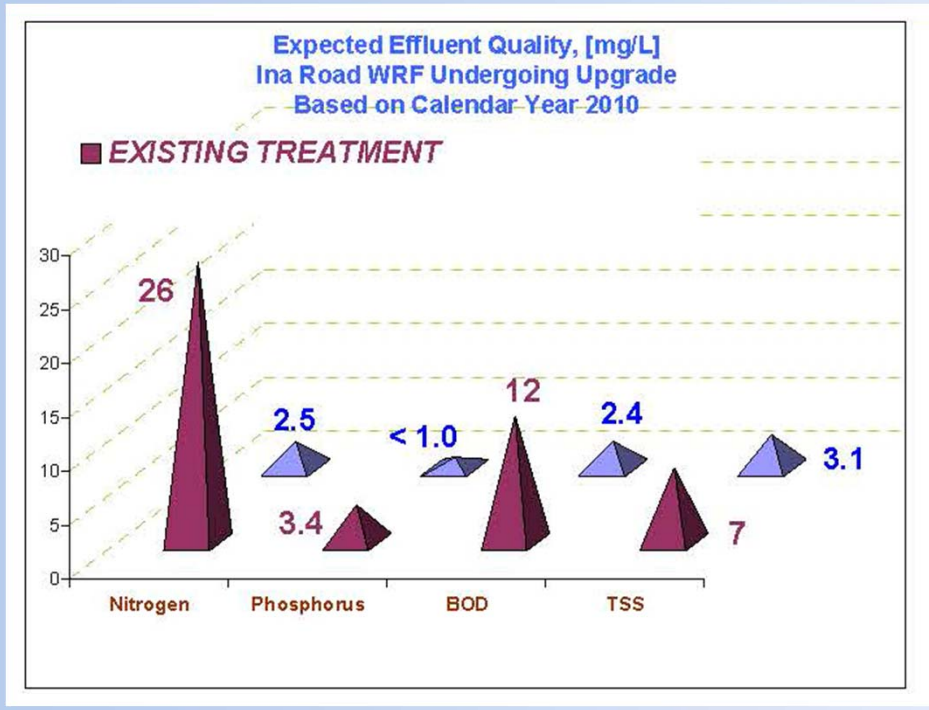
Pollutant Removal Efficiency, Percent

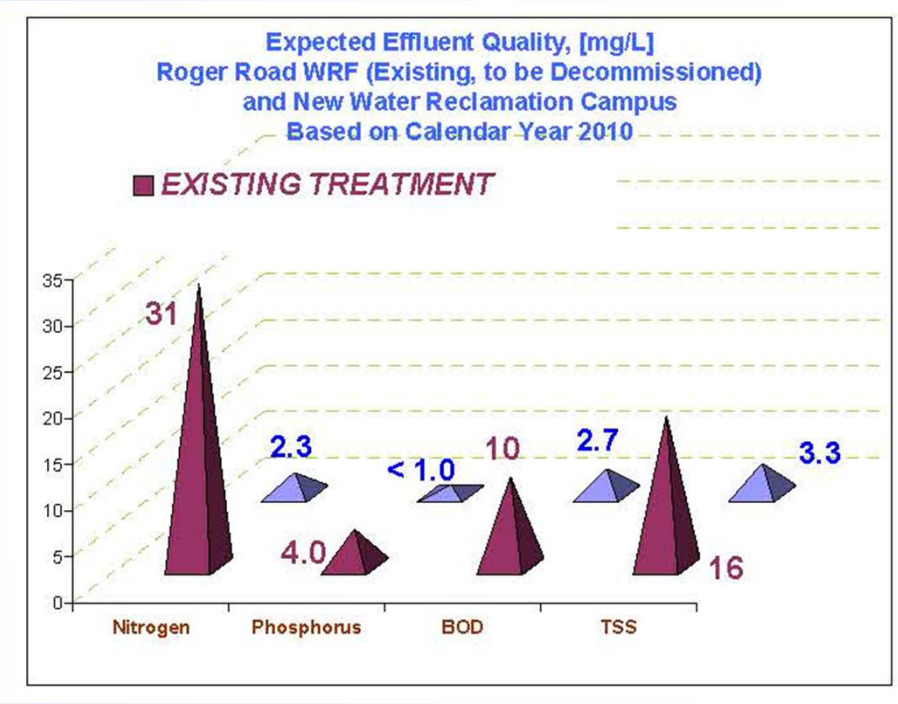
EXISTING WASTEWATER RECLAMATION FACILITIES
AVERAGE BASED ON 2010 PERFORMANCE DATA

	INA ROAD WRF	ROGER ROAD WRF	AVRA VALLEY WRF	MARANA PARK WRF
Nitrogen	48%	34%	97%	93%
Phosphorus	52%	42%	73%	67%
BOD	93%	98%	> 99%	> 99%
TSS	96%	96%	> 99%	> 99%

Nitrogen (Total), Phosphorus (Total), BOD and TSS Effluent Quality Characterization and Improved Removal

Roger Road WRF and Ina Road WRF





Average Pollutant Concentration, (mg/L)

Expected Effluent Quality vs. Existing Effluent Quality

EXISTING TREATMENT

Based on Actual Treatment Quality, 2010

	Ina Road WRF	Roger Road WRF
Nitrogen	26	31
Phosphorus	3.4	4.0
BOD	12	10
TSS	7	16

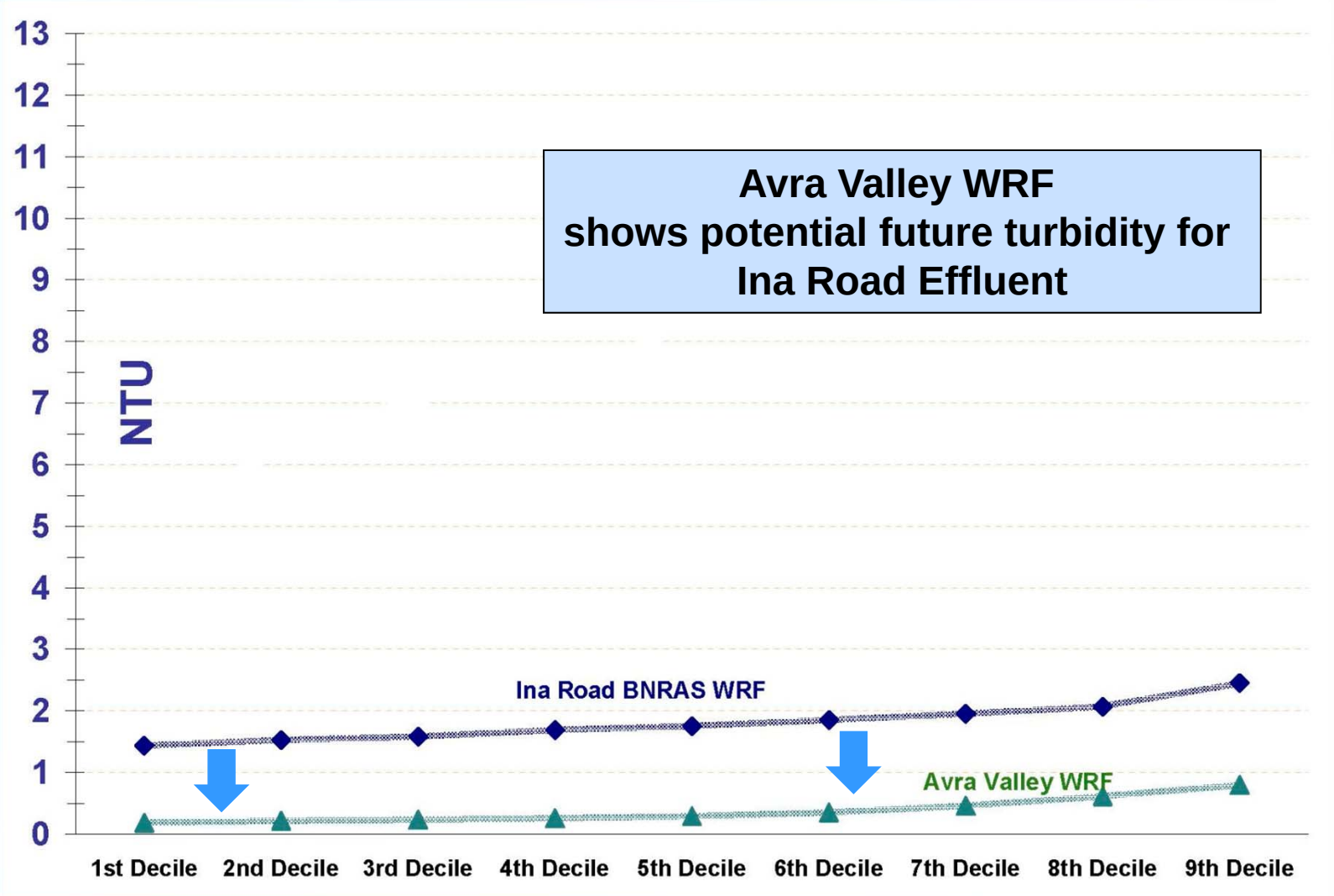
UPGRADED TREATMENT

Estimate Using Actual Percent Removal by Existing BNR Facilities and Actual Influent Data, 2010

Ina Road WRF	Water Reclamation Campus
2.5	2.3
< 1.0*	< 1.0*
2.4	2.7
3.1	3.3

*** From Basis for Design – Effluent Quality Requirements Ina Road WRF Capacity and Effluent Quality Upgrade; Ina Road WRF Capacity and Effluent Quality Upgrade Final Design Report, January 2011**

Mean Daily Turbidity, Decile Distribution: 2010



Other Constituents?

- **Metals**

Exceedances besides ammonia noted in ADEQ 305b report:

- Copper (ADEQ variance at Ina)
- Lead
- Zinc
- Mercury

...most of these linked to stormwater

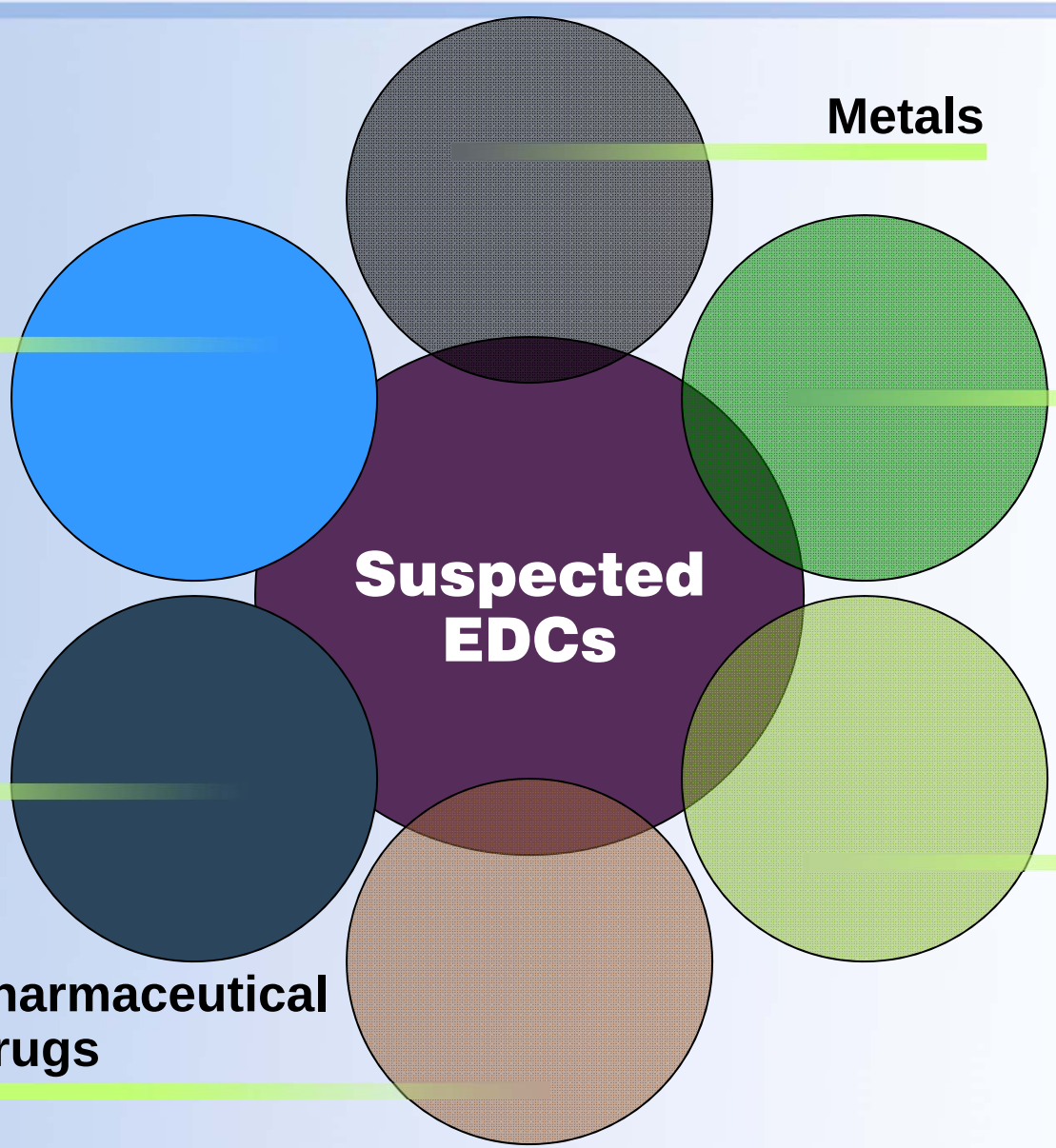
- **TDS, alkalinity**

...little change anticipated?

- **Chlorine residual**

...lower dosing possible

Emerging Contaminant & Endocrine Disruptor (EDC) Concerns



Metals

Personal Care Products

Industrial Chemicals

Pesticides
Herbicides
Fungicides

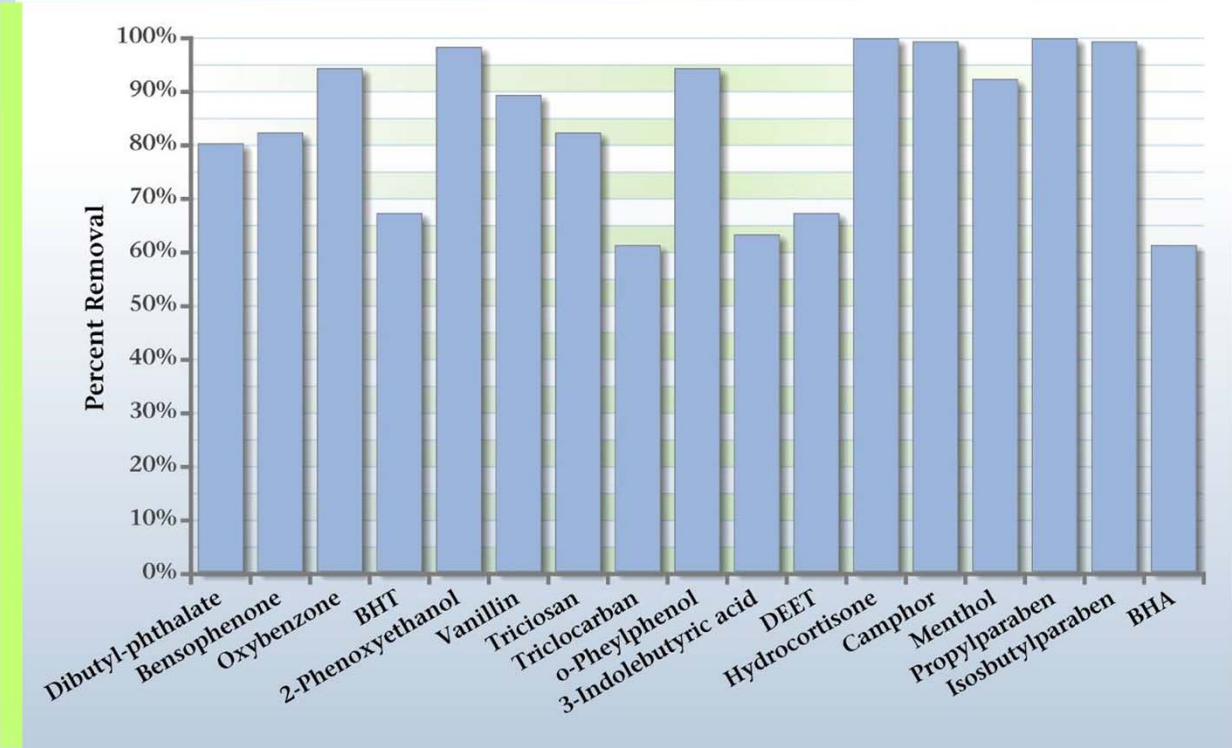
Synthetic and Naturally Occurring Hormones

Pharmaceutical Drugs

Wastewater Treatment and Removal of EDCs

Conventional wastewater treatment is generally efficient at removing chemicals responsible for estrogenic activity

…But some potentially important trace organics are not effectively removed



Wastewater Treatment and Removal of EDCs

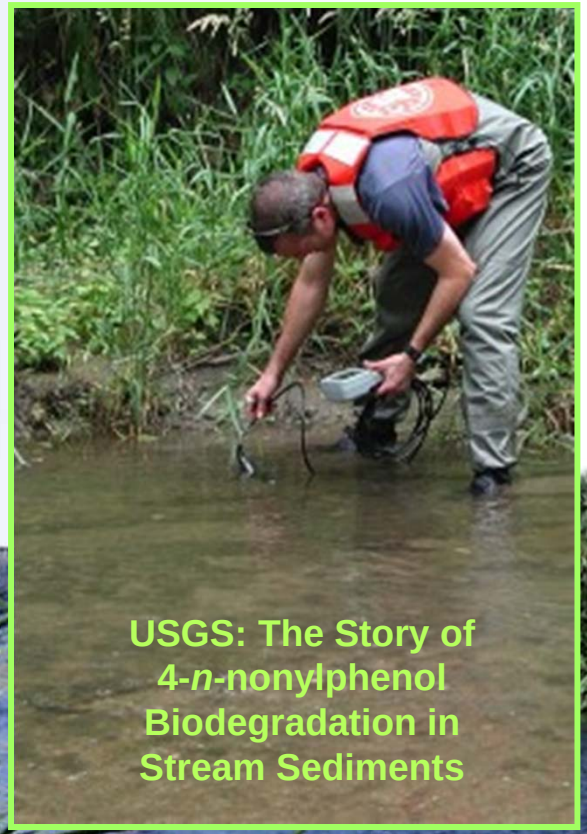
Total Estrogenic Activity	
Arizona Facility	**% Removal**
Avra Valley	99.8
Roger Road	33
Ina Road	88
Randolph Park	>99
Wildcat (Flagstaff)	96
Rio de Flag (Flagstaff)	>99.6

Note: RWRD's Roger Road and Ina Road WWTPs did not have nitrification-denitrification at the time of this study. All others were tertiary plants with nitrification-denitrification. *Black and Veatch, 2004*

Wastewater Treatment and Removal of Emerging Contaminants

Effects of trace organics in effluent discharged into surface water or through groundwater infiltration have not been well studied.

There is some evidence of biodegradation of some trace organic compounds in the stream environment.



ROMP Effects Beyond Water Quality

- In Channel Recharge / Infiltration Rates
- Water Taken Off-Channel
  - A+ Reclaimed Water
  - Constructed Recharge for 100% Credit
- Improved Odor
- Adjacent Land Use

ROMP Lays the Groundwork for Expanded Effluent Utilization

Discharge / Recharge

Ecosystem Restoration

Urban Uses