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Los Angeles County Sanitation Districts
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LA DWP Los Angeles Department of Water & Power

We will begin our presentation in a few minutes…

Leadership and Excellence in Environmental Engineering and Science

OCTOBER 29 2025 | 1:00 PM EST

From Flood Zone to Future-Proof: California's First MBR-IPR Mainline Facility

ERICK BEVINGTON, P.E., DBIA

KAITIE ZUSY, P.E.

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Agenda

01 Project Drivers

02 The Final Product

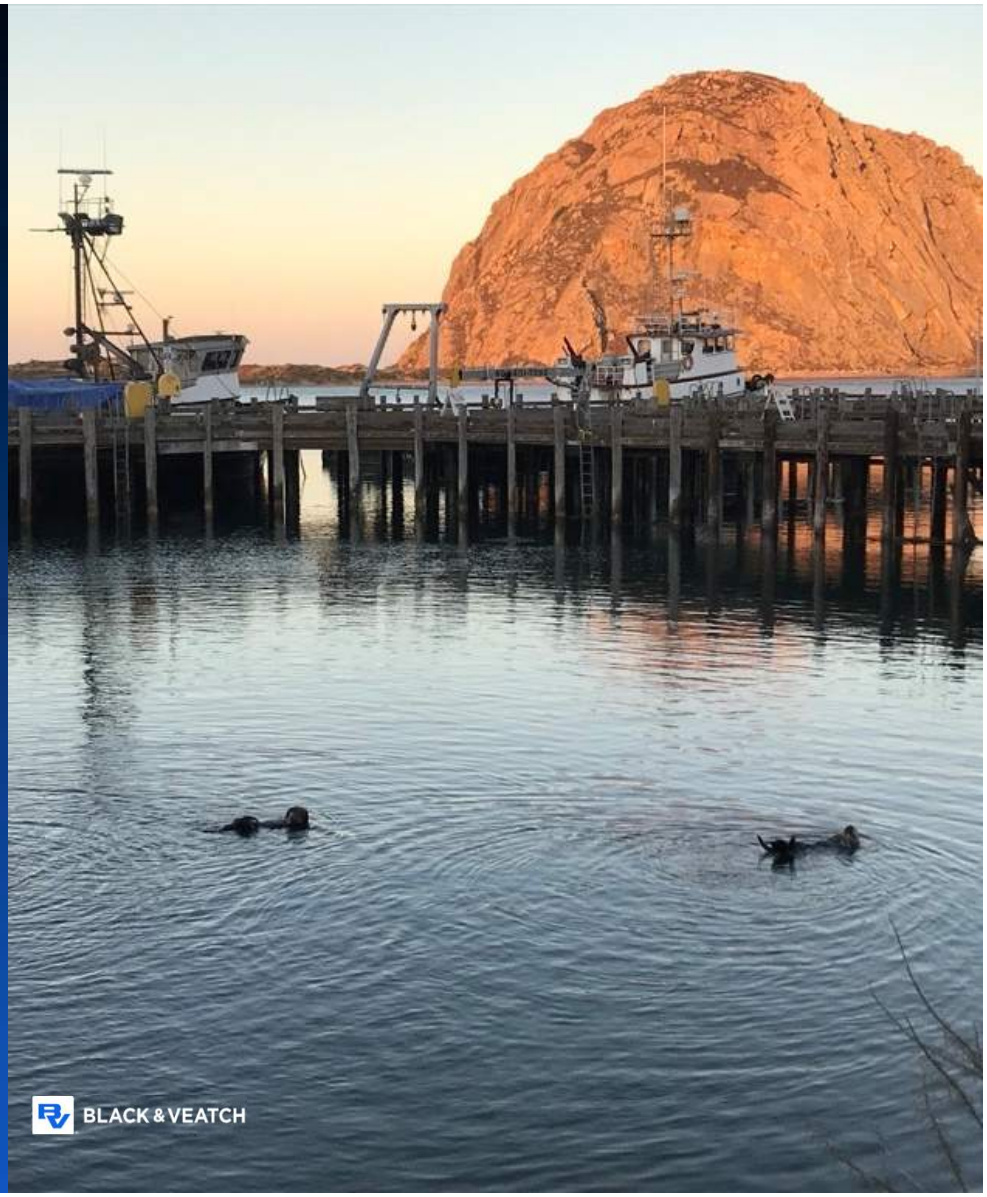
03 Design Features

04 Fixed Price Design-Build Delivery

05 Operation

Erick Bevington, P.E., DBIA
Director of Design-Build Engineering
Black & Veatch
925-949-5918
bevingtonev@bv.com

Kaitie Zusy, P.E., Assoc. DBIA
Project Manager
Black & Veatch
925-949-5903
zusyke@bv.com

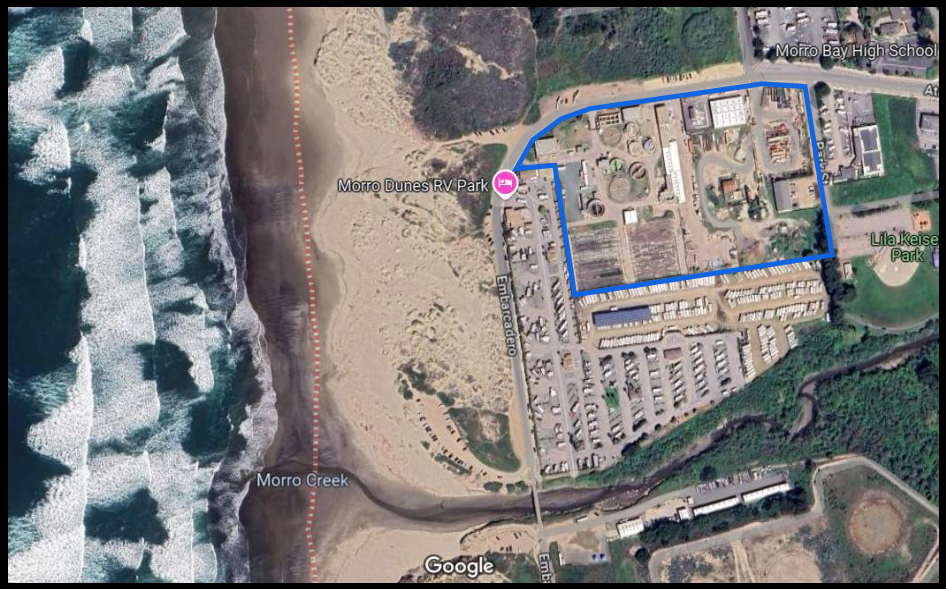


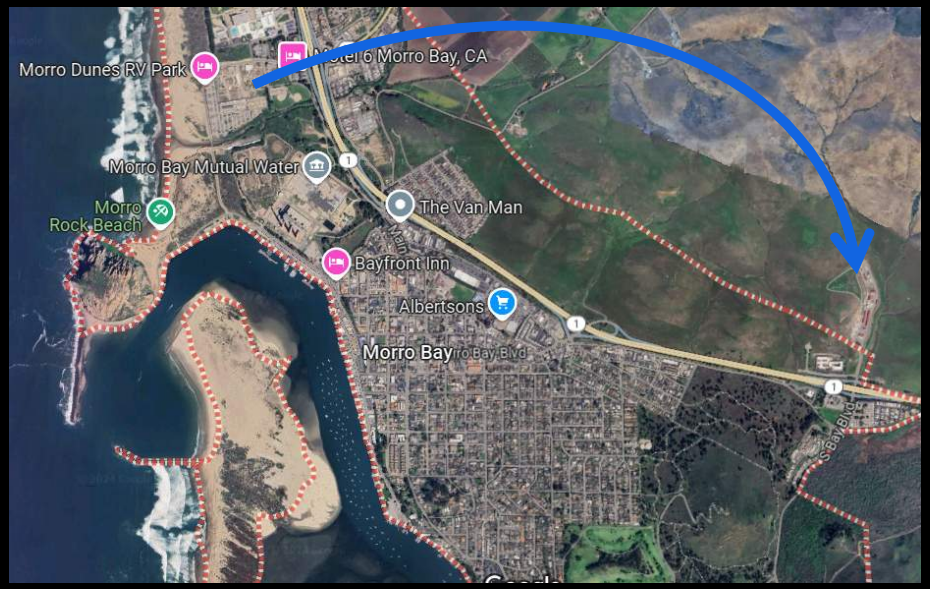
2: Project Drivers

- Protect plant from flooding.
  - Protect water quality of Morro Bay and ocean.
  - Protect Morro Bay's economy.
- Replace aging 70 year old WWTP.
- Create a locally sustainable potable water resource.

1: Moving to High Ground

MOVE 70 YEAR OLD WWTP OFF COAST





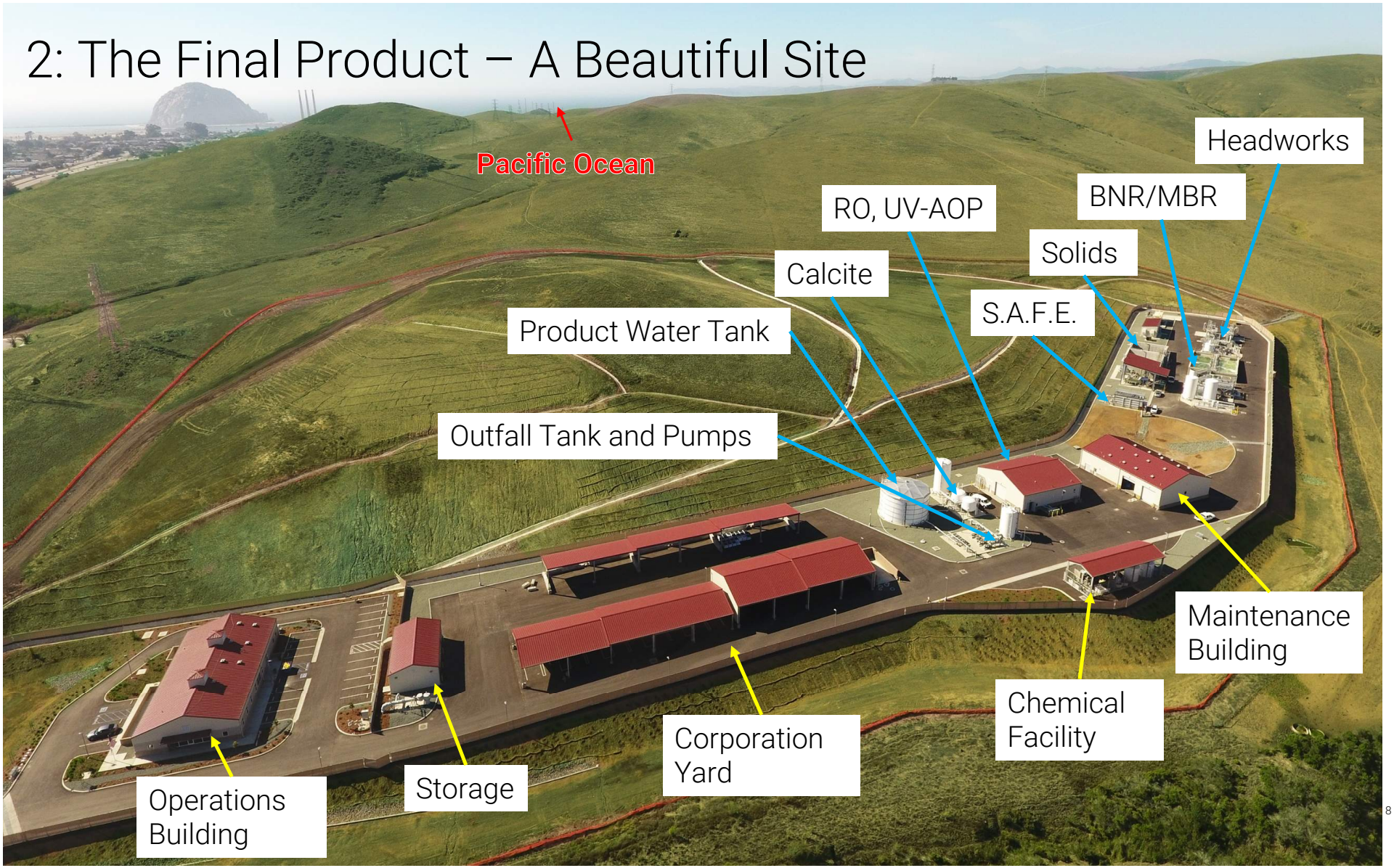
2: Morro Bay Our Water Program Elements

- Lift stations and influent pipeline
- Water Resources Center (Fixed Price Design-Build)
  - 8.14 mgd peak
  - 2.74 mgd max day
  - 1.16 mgd max month
  - 0.97 mgd annual average
  - 0.97 mgd IPR Facility
- Ocean outfall connection pipeline
- IPR product water pipeline
- IPR injection wellfield

2: The End Product

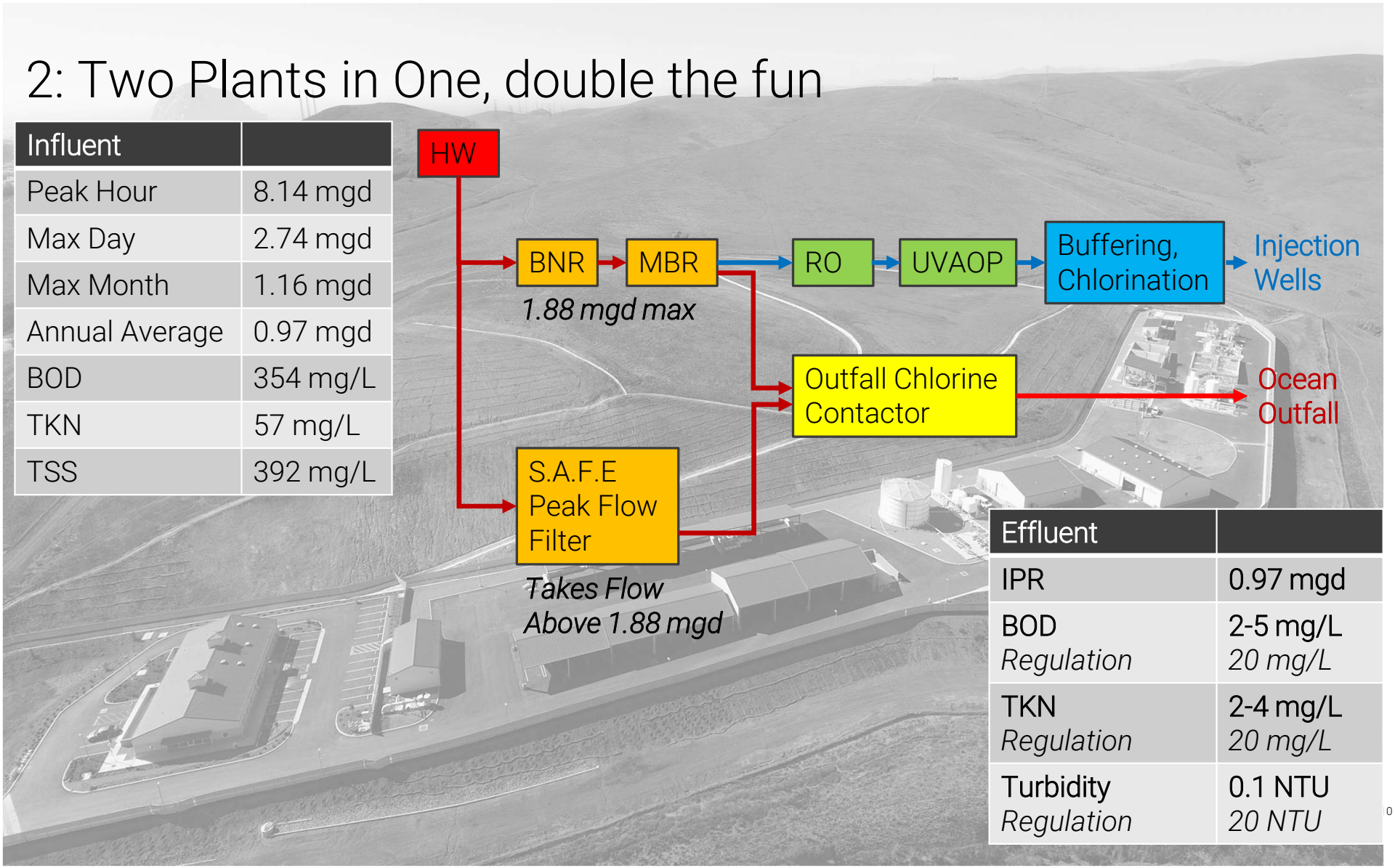
- A beautiful site.
- Two plants in one, double the fun.
- Process flow diagrams can be mooving.

2: The Final Product – A Beautiful Site



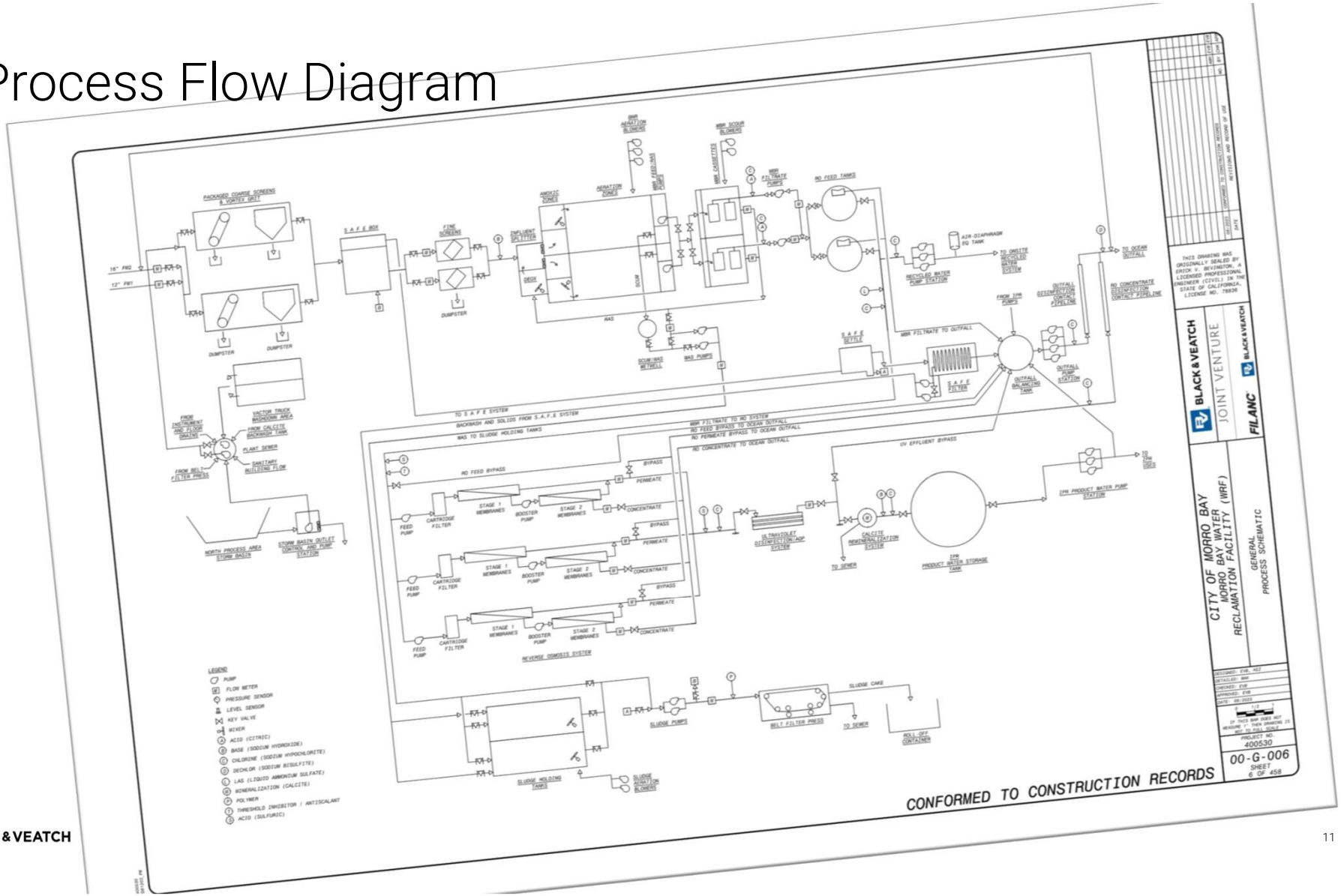
2: Two Plants in One, double the fun

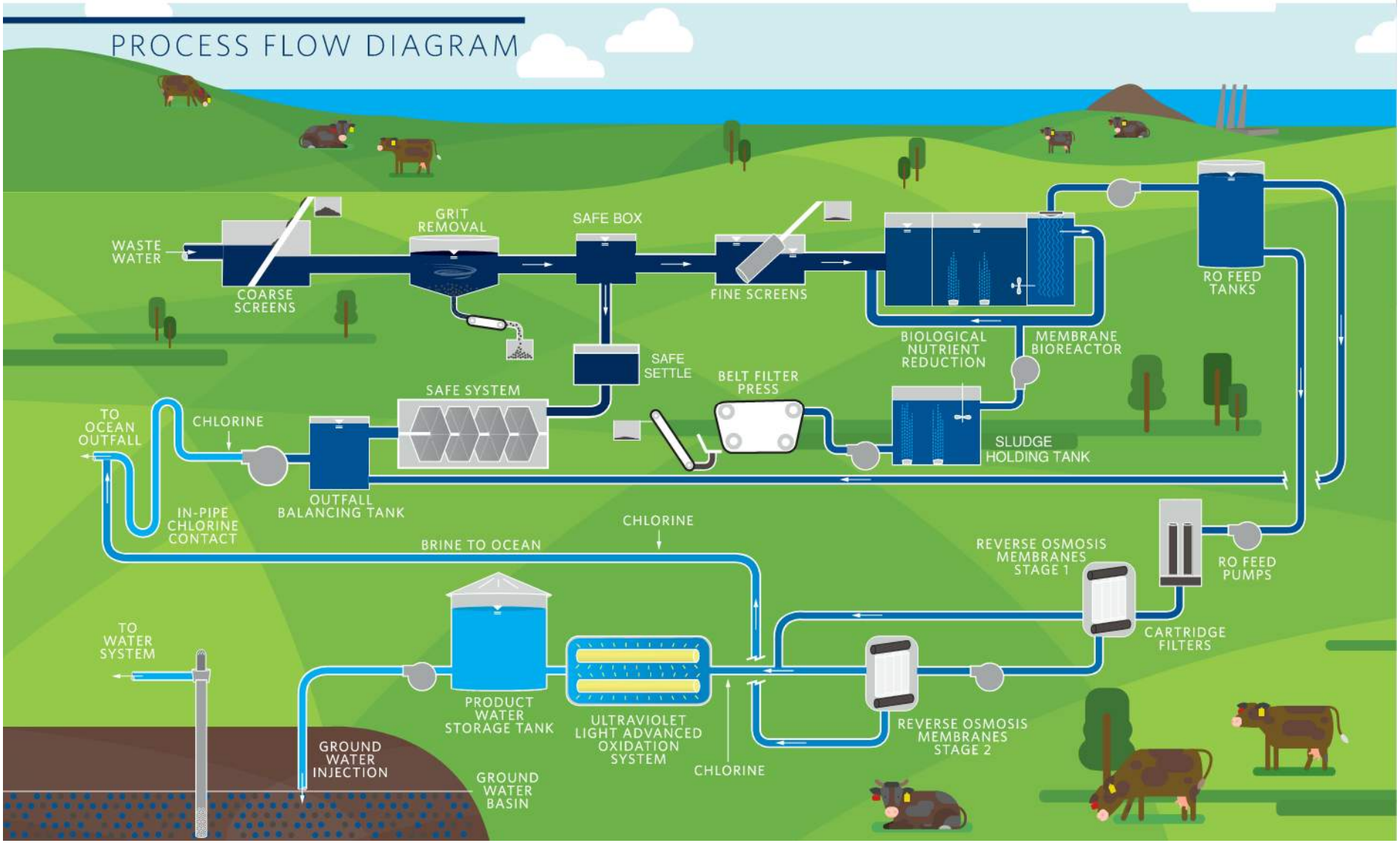
Influent	
Peak Hour	8.14 mgd
Max Day	2.74 mgd
Max Month	1.16 mgd
Annual Average	0.97 mgd
BOD	354 mg/L
TKN	57 mg/L
TSS	392 mg/L

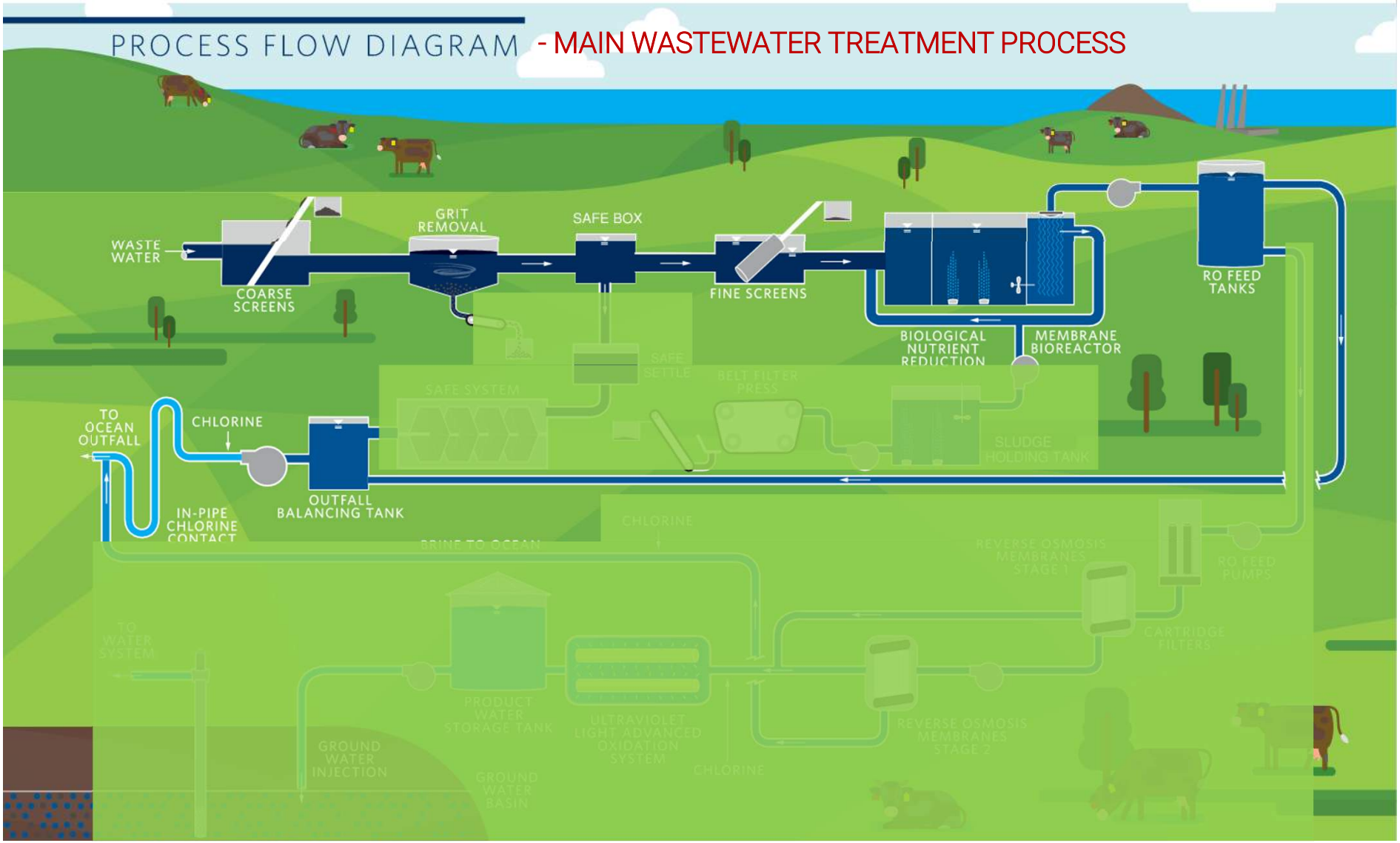


Effluent	
IPR	0.97 mgd
BOD *Regulation*	2-5 mg/L *20 mg/L*
TKN *Regulation*	2-4 mg/L *20 mg/L*
Turbidity *Regulation*	0.1 NTU *20 NTU*

2: Process Flow Diagram




PROCESS FLOW DIAGRAM
WASTE WATER
COARSE SCREENS
GRIT REMOVAL
SAFE BOX
FINE SCREENS
RO FEED TANKS
BIOLOGICAL NUTRIENT REDUCTION
MEMBRANE BIOREACTOR
SAFE SETTLE
BELT FILTER PRESS
SAFE SYSTEM
TO OCEAN OUTFALL
CHLORINE
SLUDGE HOLDING TANK
OUTFALL BALANCING TANK
IN-PIPE CHLORINE CONTACT
CHLORINE
BRINE TO OCEAN
REVERSE OSMOSIS MEMBRANES STAGE 1
RO FEED PUMPS
CARTRIDGE FILTERS
TO WATER SYSTEM
PRODUCT WATER STORAGE TANK
ULTRAVIOLET LIGHT ADVANCED OXIDATION SYSTEM
REVERSE OSMOSIS MEMBRANES STAGE 2
CHLORINE
GROUND WATER INJECTION
GROUND WATER BASIN


PROCESS FLOW DIAGRAM - MAIN WASTEWATER TREATMENT PROCESS
WASTE WATER
COARSE SCREENS
GRIT REMOVAL
SAFE BOX
FINE SCREENS
BIOLOGICAL NUTRIENT REDUCTION
MEMBRANE BIOREACTOR
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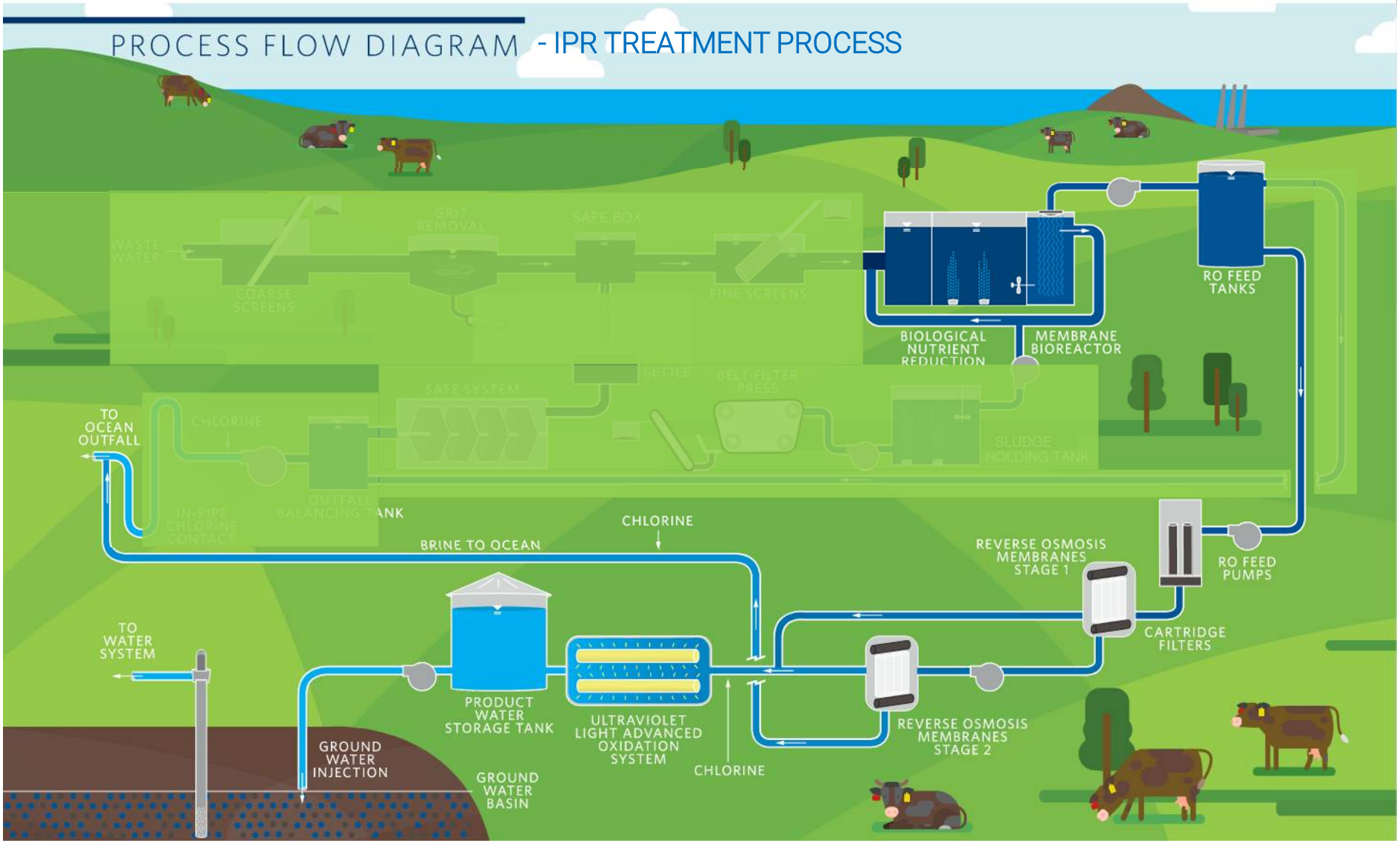
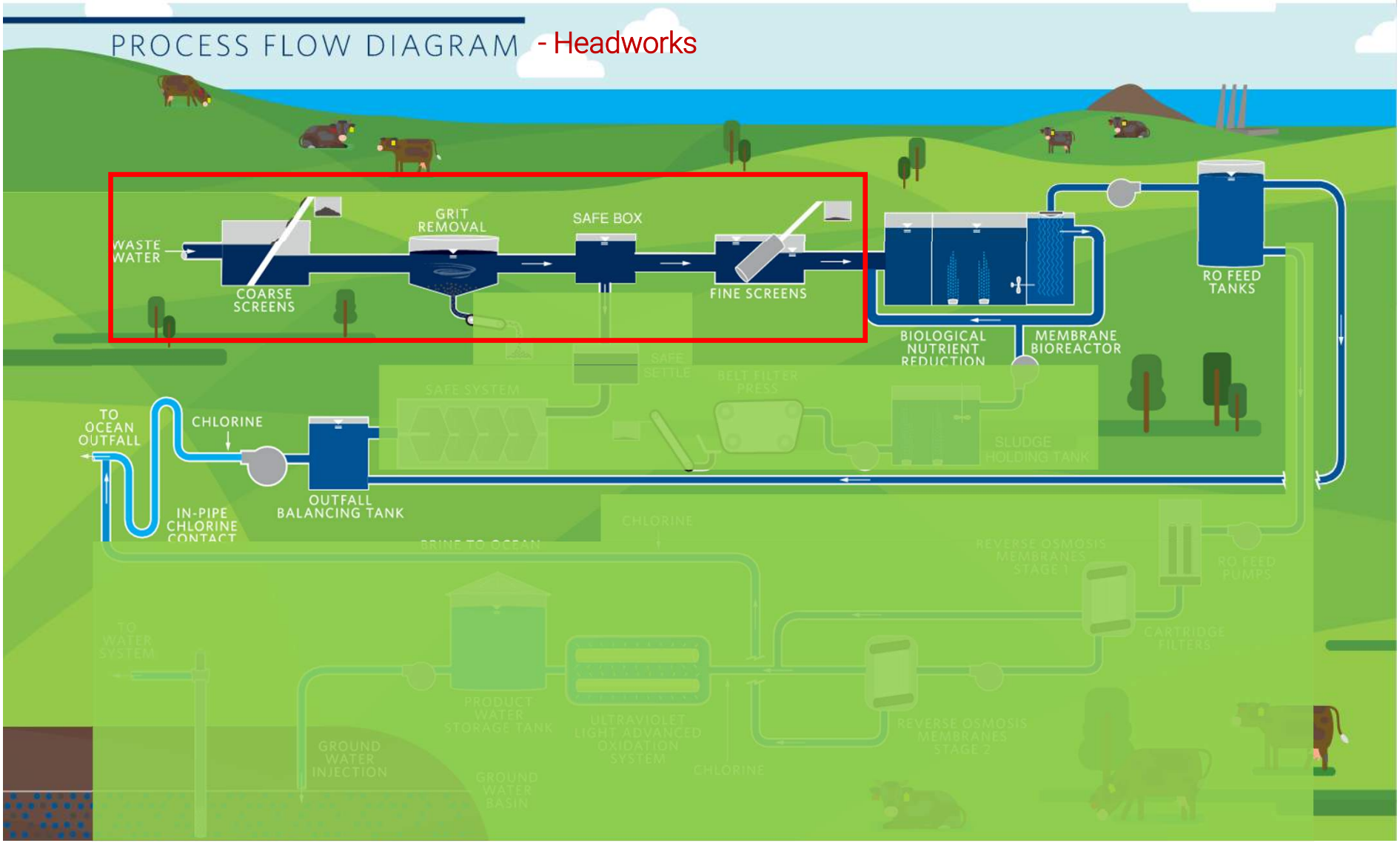
GROUND WATER INJECTION
GROUND WATER BASIN

PROCESS FLOW DIAGRAM - IPR TREATMENT PROCESS



3: Design Features

- Headworks
- BNR/MBR
- SAFE System
- Ocean Outfall
- Solids Handling
- RO
- UV-AOP
- IPR Buffering and Chlorination


PROCESS FLOW DIAGRAM - Headworks
WASTE WATER
COARSE SCREENS
GRIT REMOVAL
SAFE BOX
FINE SCREENS
BIOLOGICAL NUTRIENT REDUCTION
MEMBRANE BIOREACTOR
RO FEED TANKS
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CHLORINE
IN-PIPE CHLORINE CONTACT
OUTFALL BALANCING TANK
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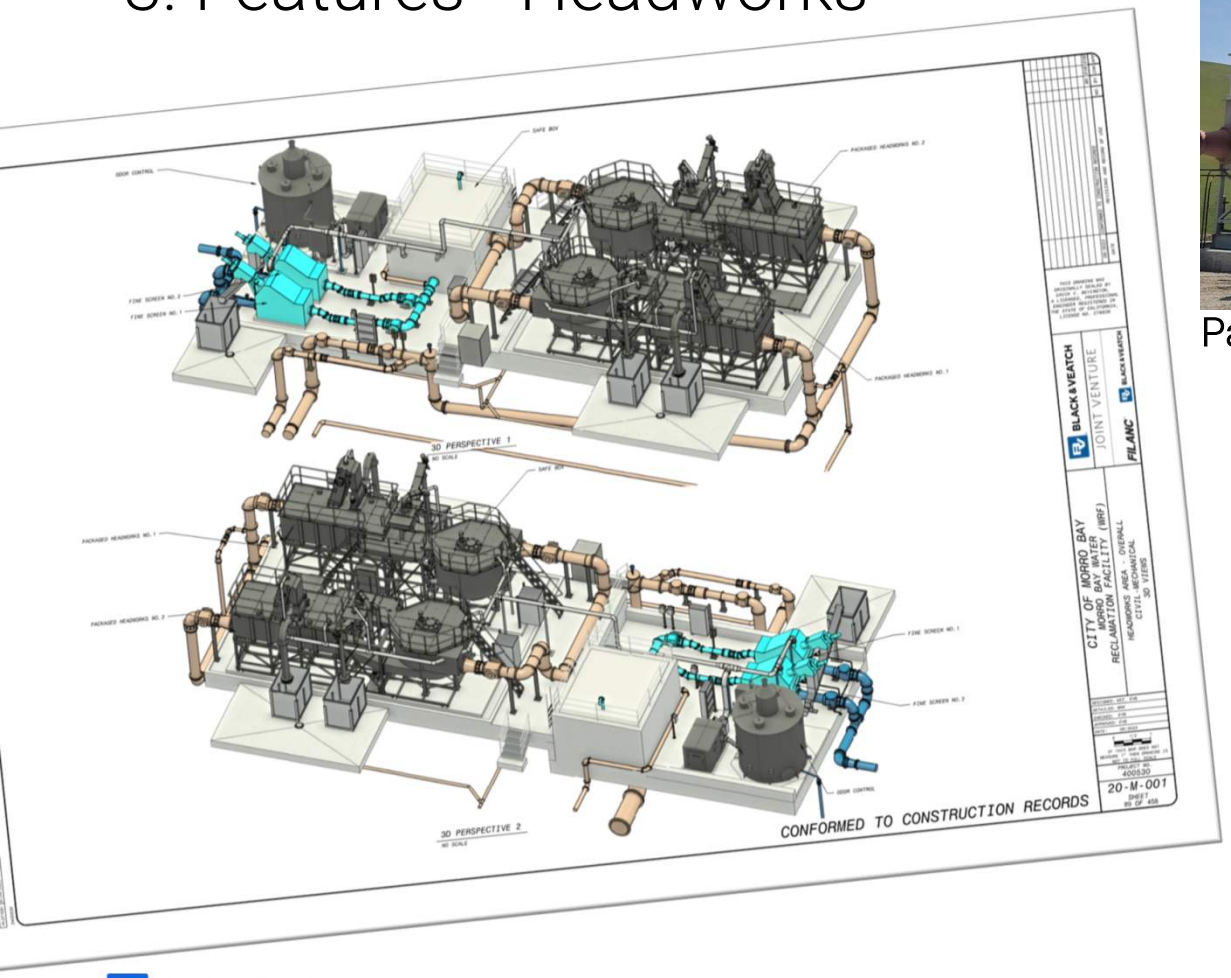
REVERSE OSMOSIS MEMBRANES STAGE 2
GROUND WATER INJECTION
GROUND WATER BASIN
CHLORINE

3: Features - Headworks



Package Headworks – 8.14 mgd

- 1 duty / 1 standby
- ¼" bar screen
- Vortex grit removal

Fine Screens – 1.88 mgd

- 1 duty / 1 standby
- 1 mm openings

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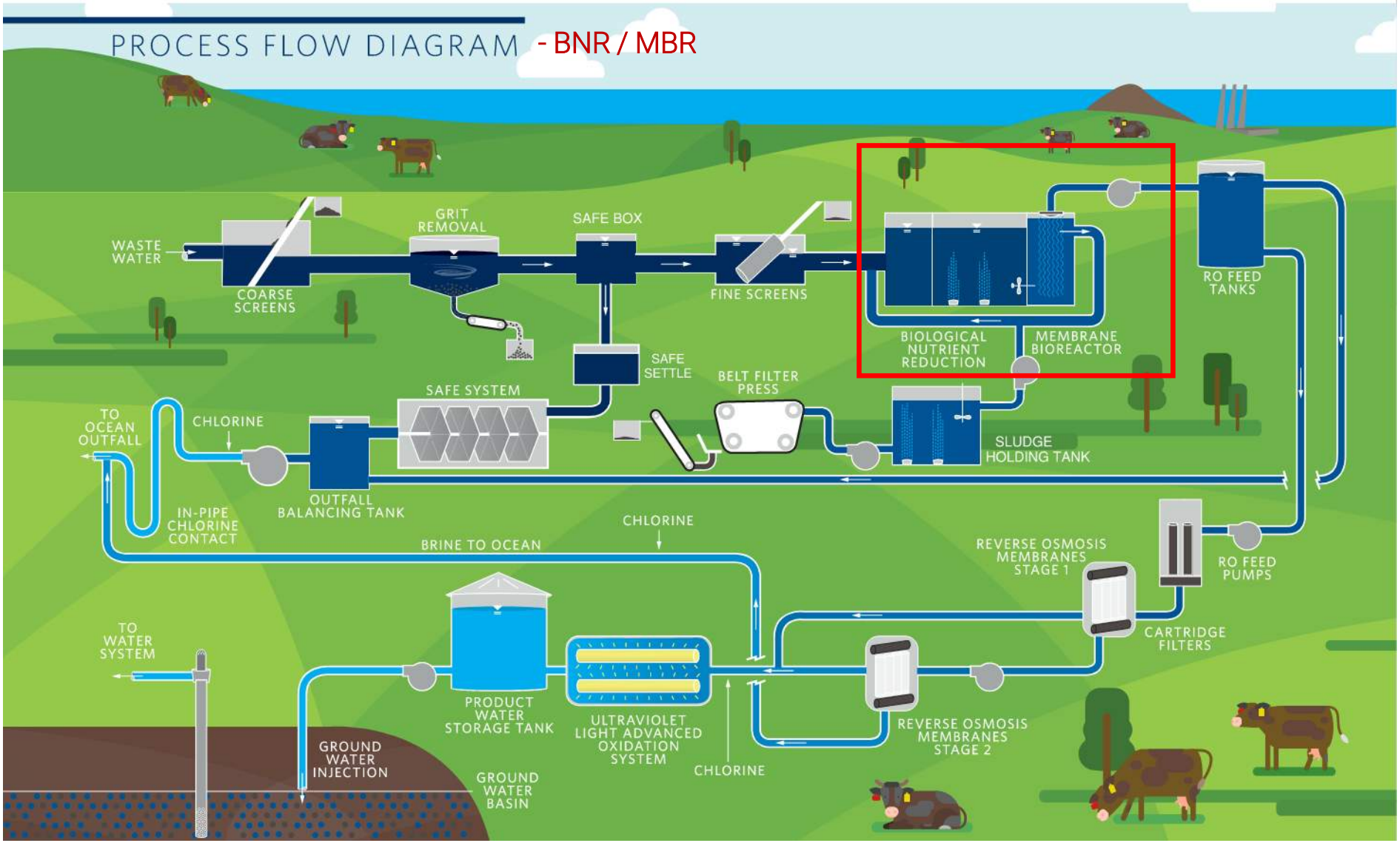
PROCESS FLOW DIAGRAM - BNR / MBR
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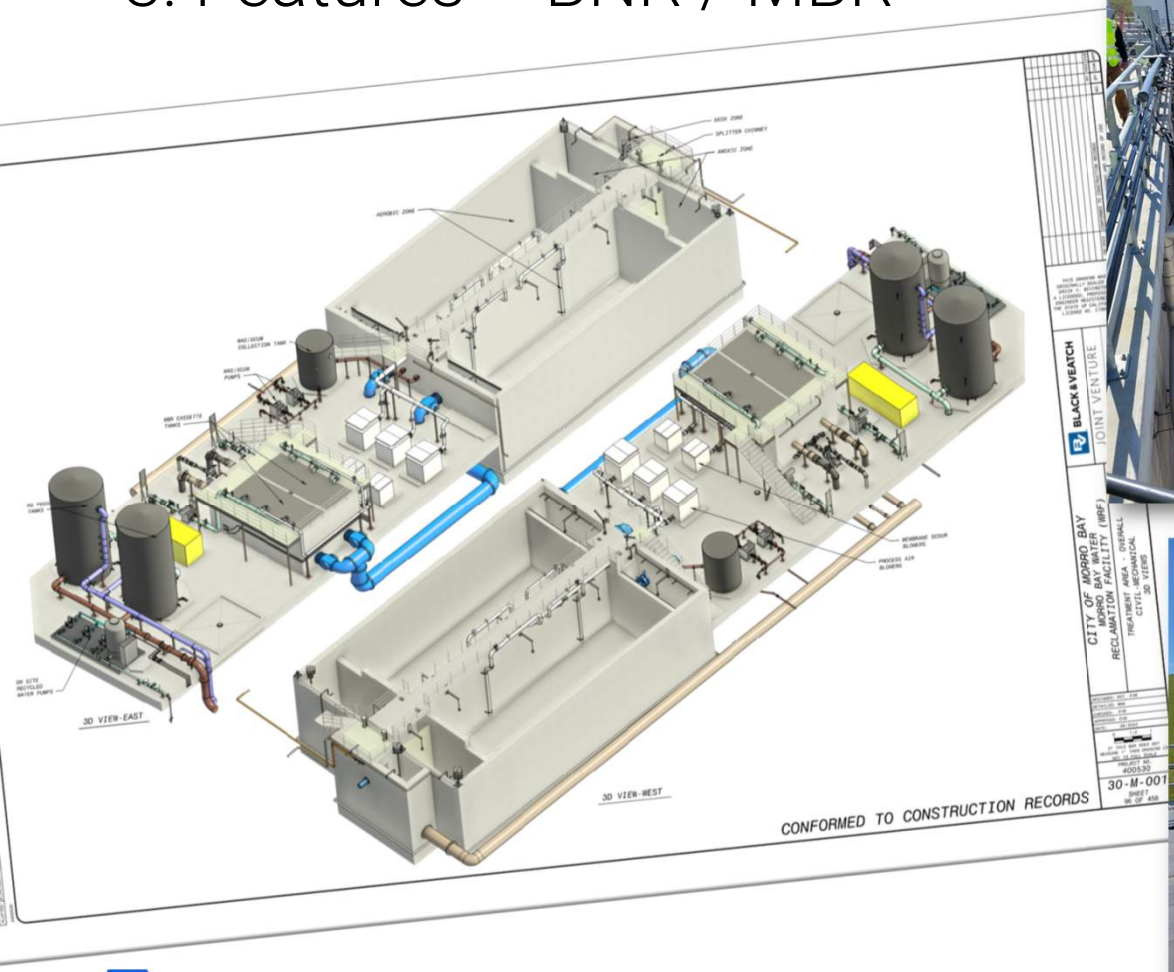
CHLORINE
REVERSE OSMOSIS MEMBRANES STAGE 2
GROUND WATER INJECTION
GROUND WATER BASIN

3: Features – BNR / MBR



BNR Basins – 1.88 mgd

- 2 trains 0.94 mgd AA each
- 1 train MM redundancy
- DO controlled aeration
- 36,000 EQ volume in freeboard

MBR Trains – 1.88 mgd

- 2 trains 0.94 mgd AA each
- 1 train MM redundancy
- Pump to MBR, gravity RAS back to BNR
- Replaces function of MF for IPR production

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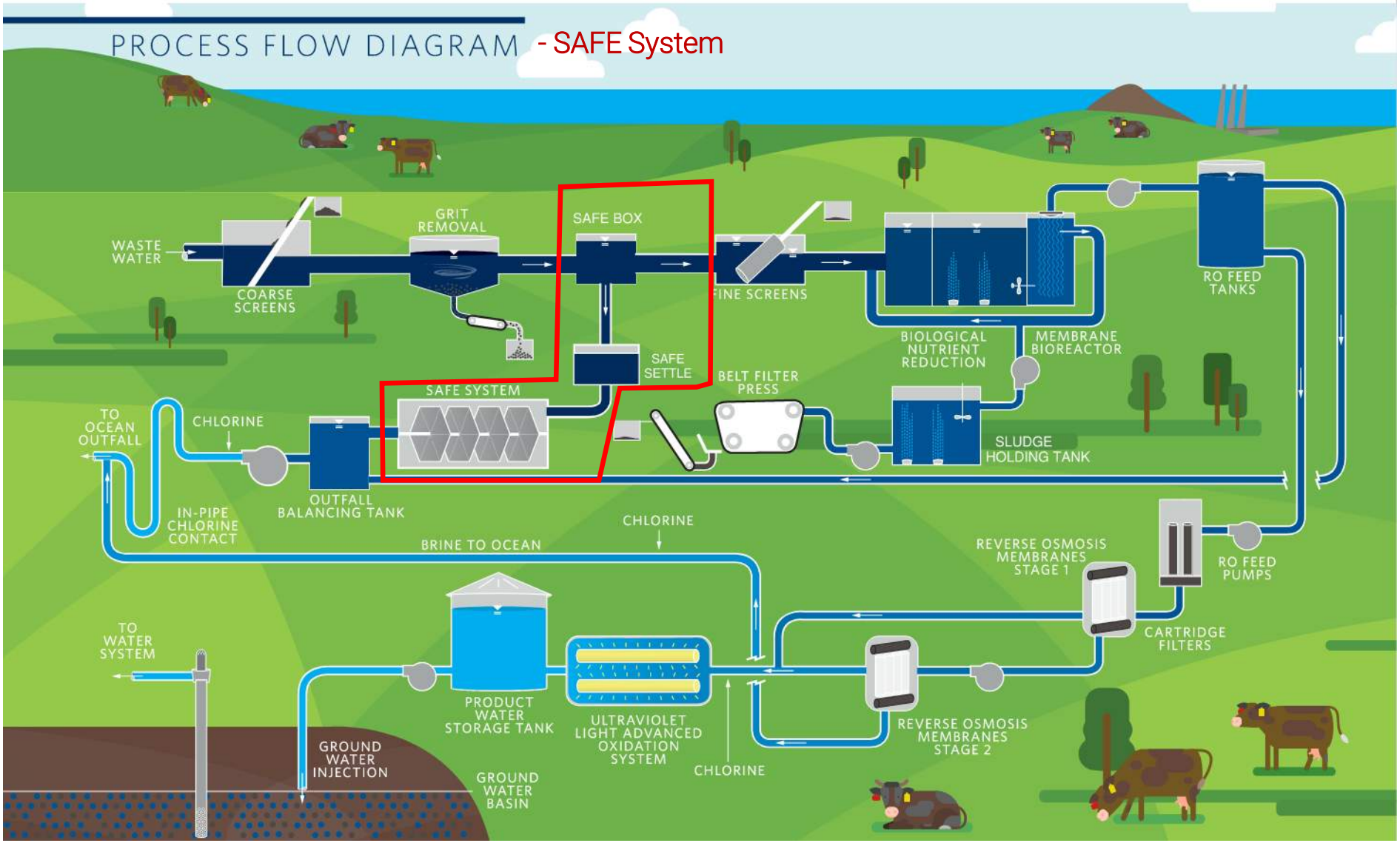
PROCESS FLOW DIAGRAM - SAFE System
WASTE WATER
COARSE SCREENS
GRIT REMOVAL
SAFE BOX
FINE SCREENS
RO FEED TANKS
BIOLOGICAL NUTRIENT REDUCTION
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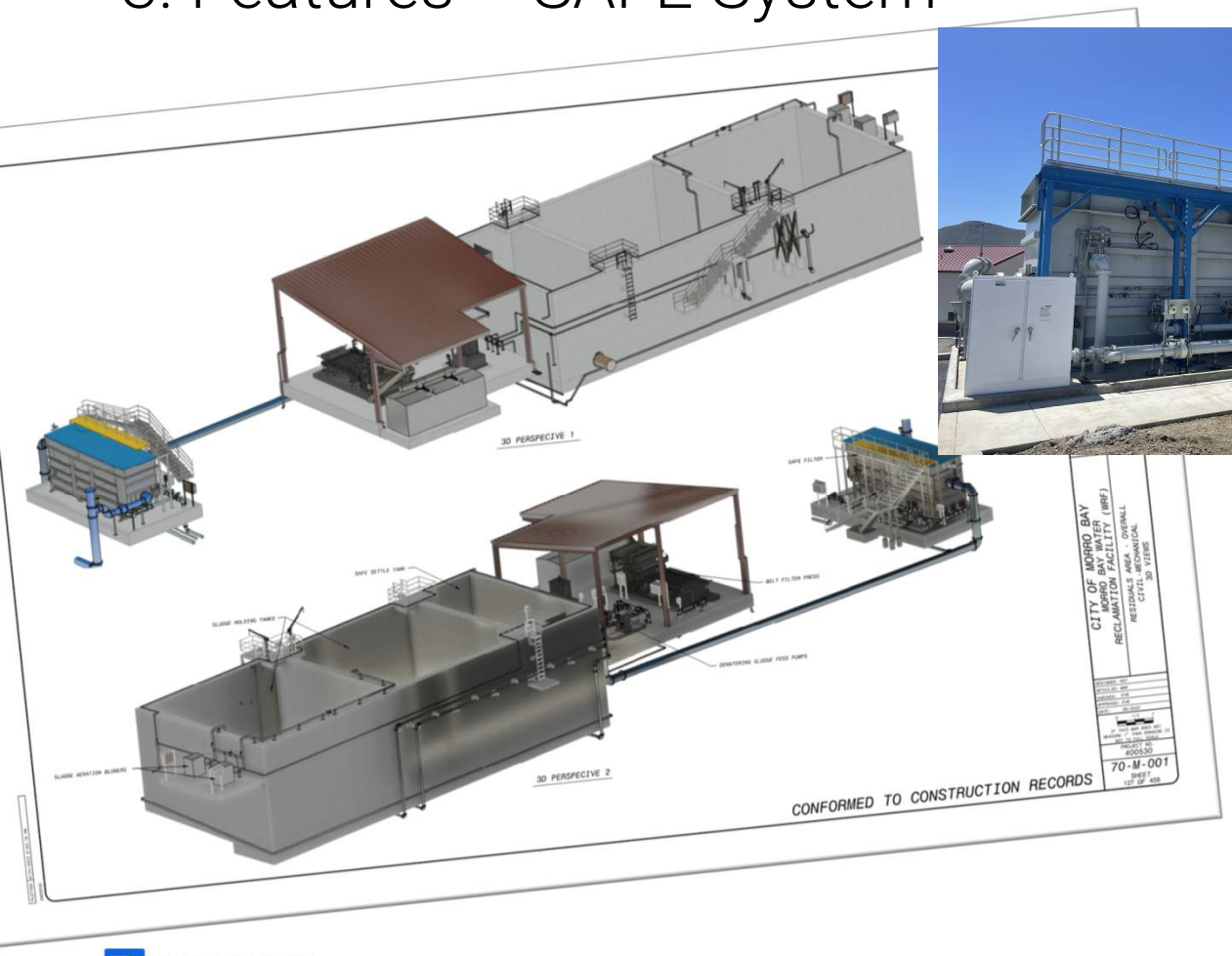
GROUND WATER BASIN

3: Features – SAFE System



Primary Filtration – 6.26 mgd

- 1 train.
- Treats settled primary effluent above 1.88 mgd.
- Produces higher quality effluent than primary clarifiers
- Filtered effluent blends with MBR effluent to meet Ocean discharge regs.

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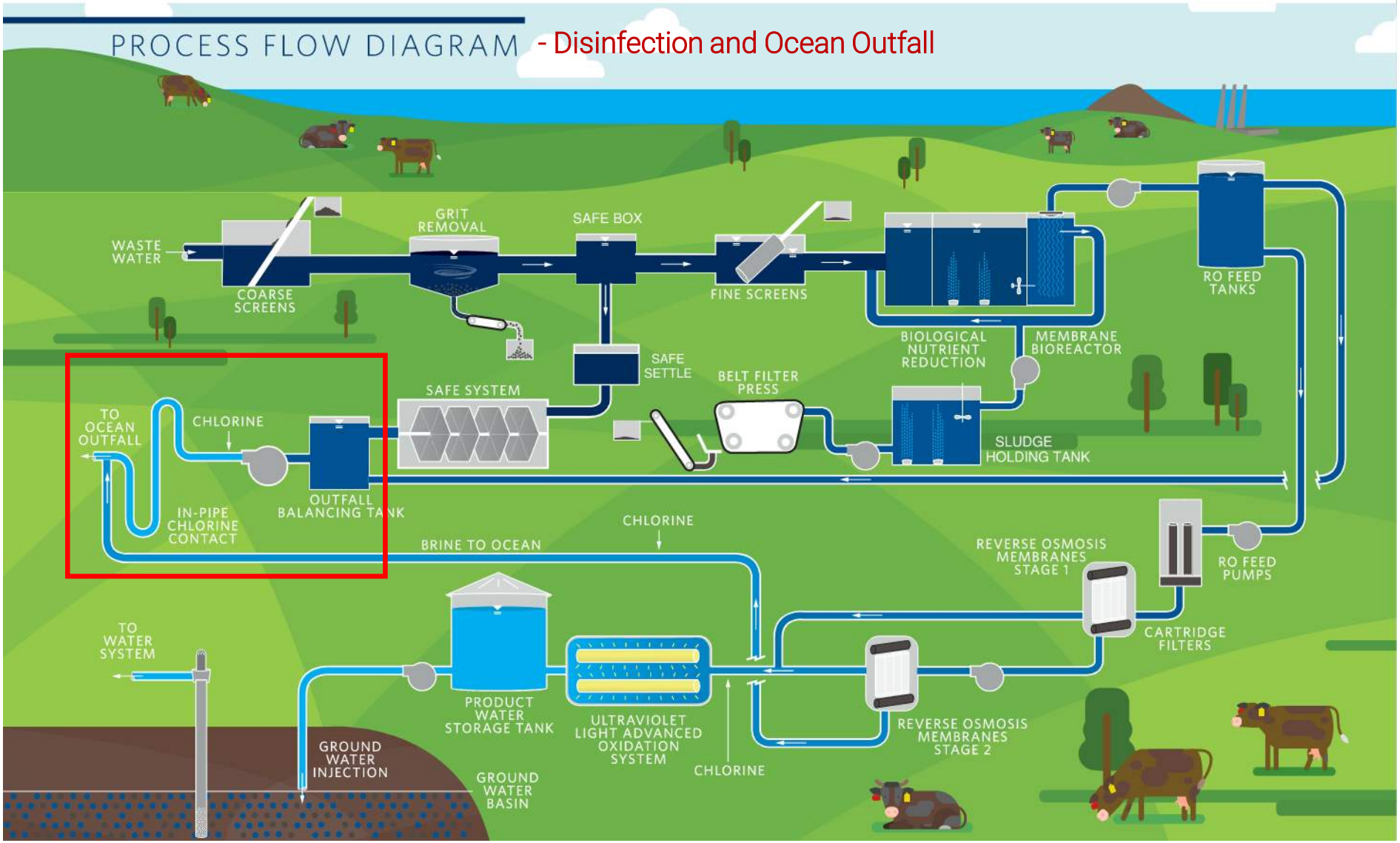
PROCESS FLOW DIAGRAM - Disinfection and Ocean Outfall
WASTE WATER
COARSE SCREENS
GRIT REMOVAL
SAFE BOX
FINE SCREENS
RO FEED TANKS
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CHLORINE
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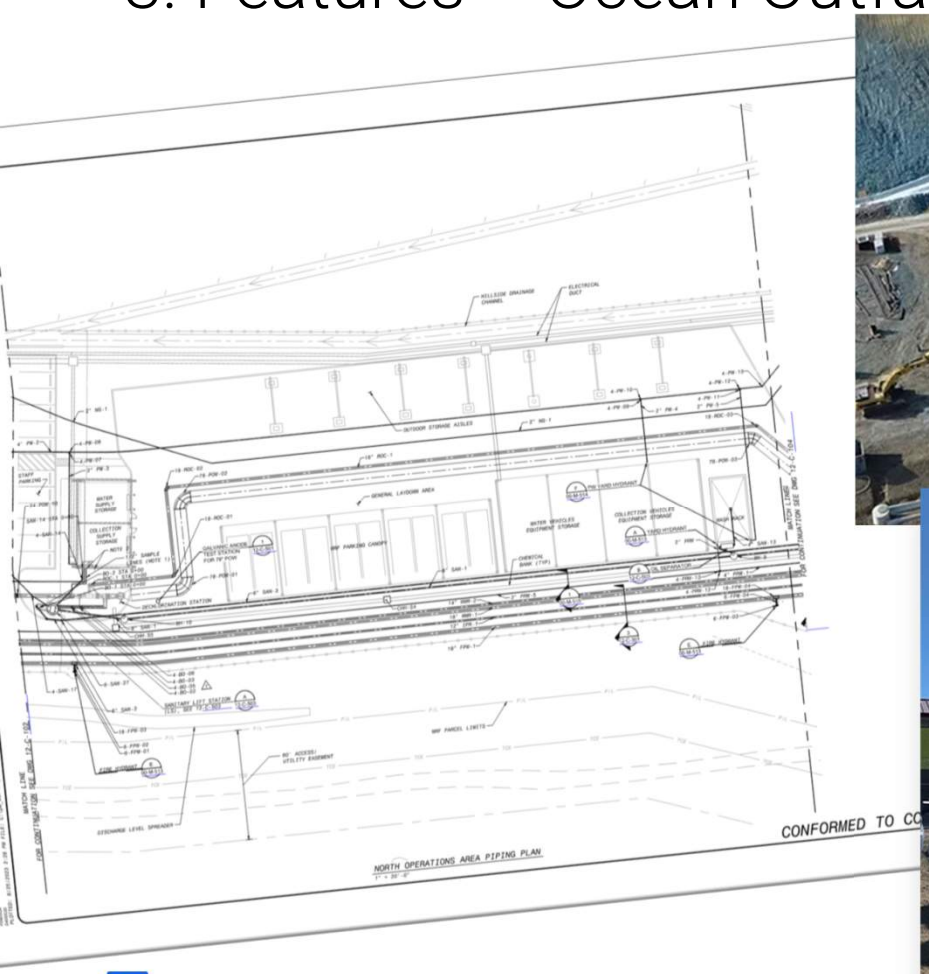
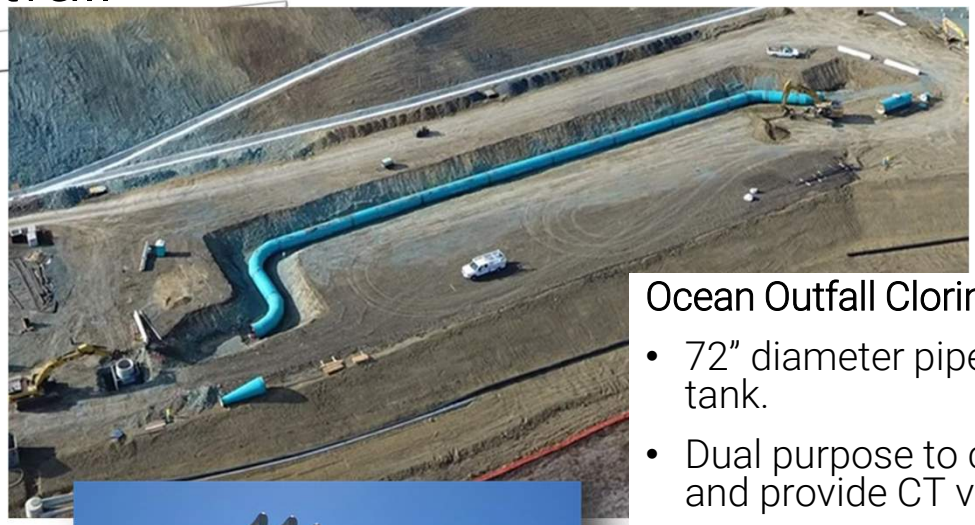
GROUND WATER INJECTION
GROUND WATER BASIN

3: Features – Ocean Outfall





Ocean Outfall Clorine Contactor

- 72” diameter pipe instead of tank.
- Dual purpose to convey water and provide CT volume

Outfall Balancing Tank and Pump Station – 8.14 mgd

- Equalizes and pumps all flow sent to the Ocean Outfall.
- Takes MBR effluent not used by IPR System.
- Takes SAFE effluent during peak flows.
- Takes IPR bypasses.

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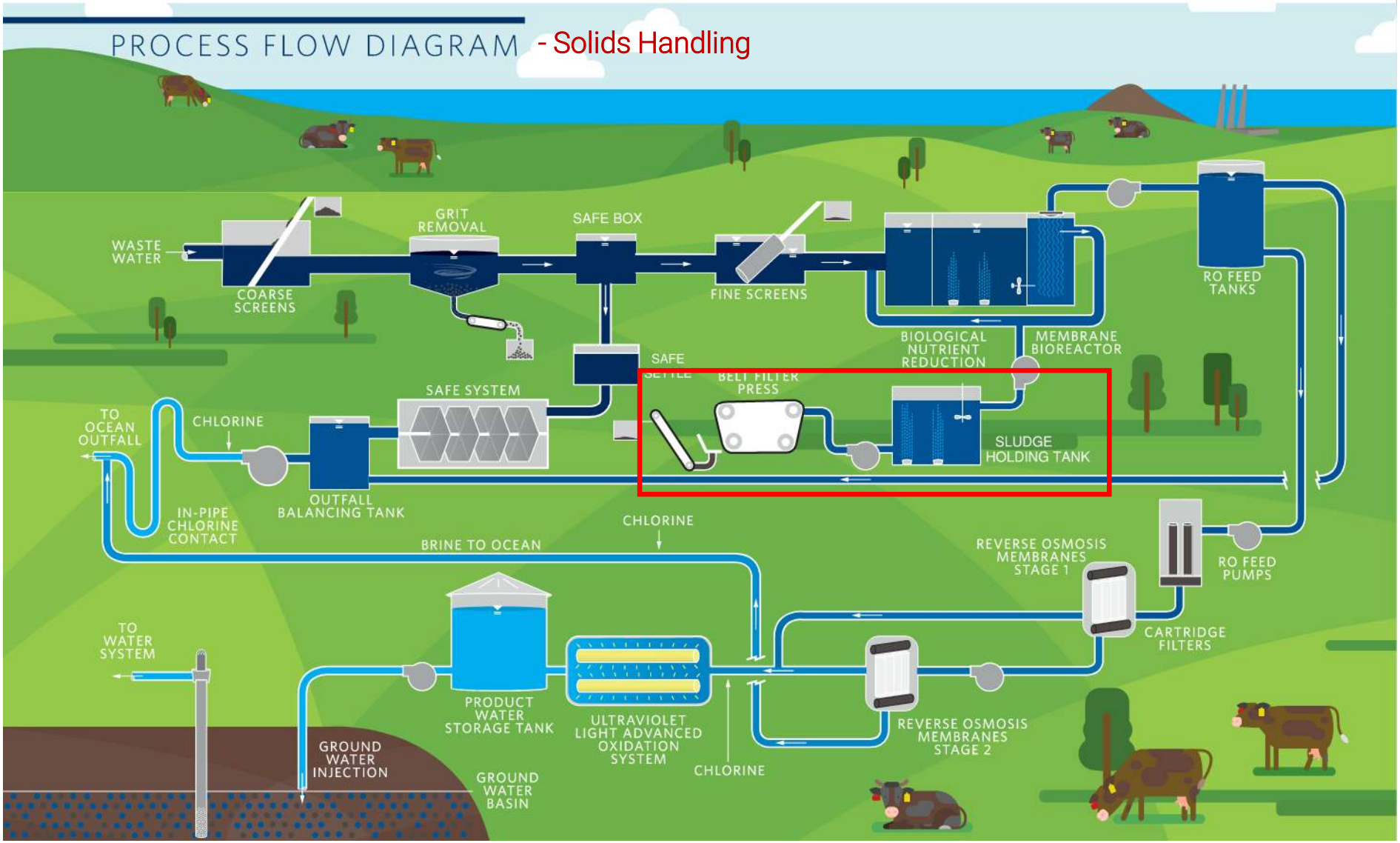
PROCESS FLOW DIAGRAM - Solids Handling
WASTE WATER
COARSE SCREENS
GRIT REMOVAL
SAFE BOX
FINE SCREENS
RO FEED TANKS
BIOLOGICAL NUTRIENT REDUCTION
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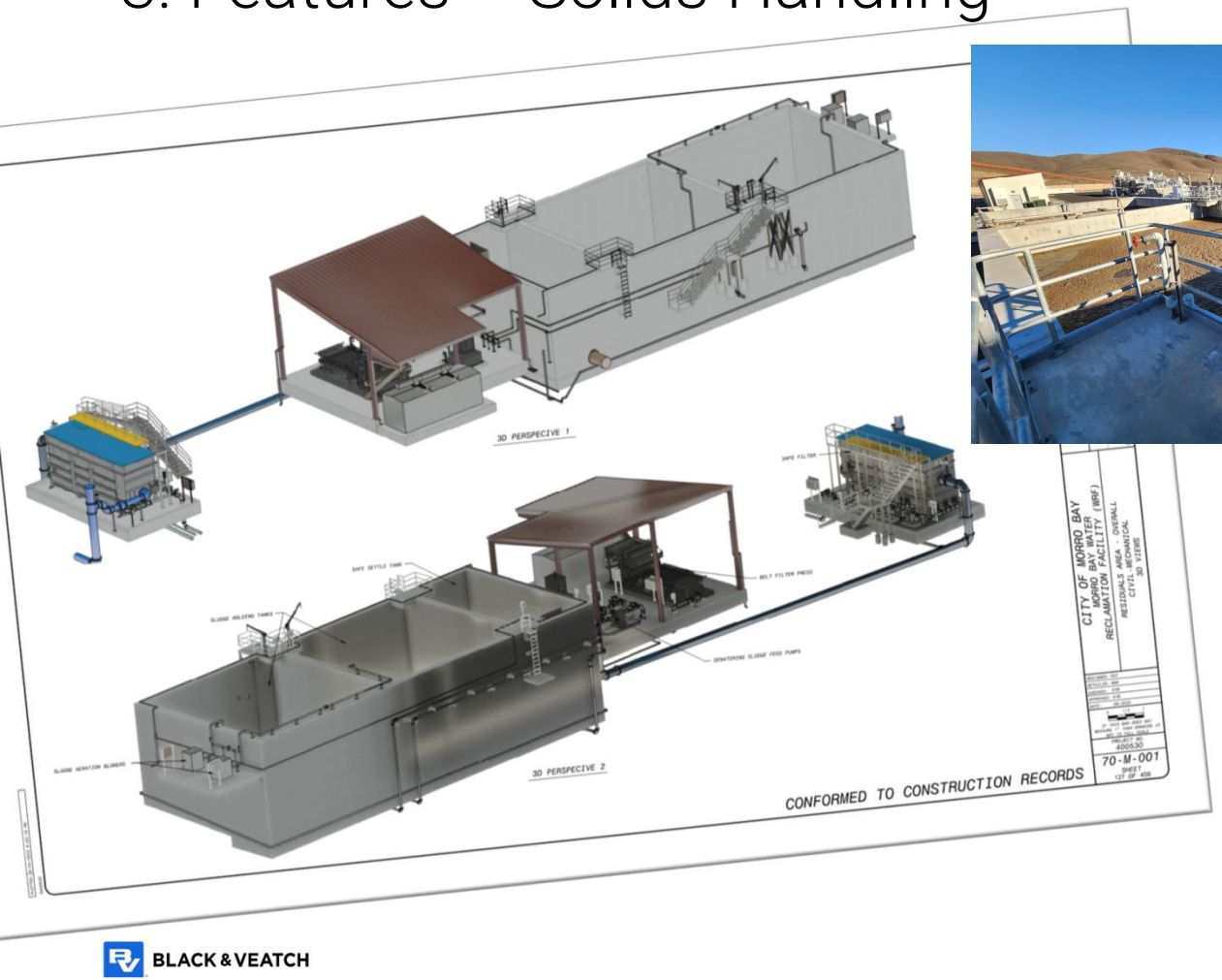
3: Features – Solids Handling



Solids Handling

- 1 belt filter press and polymer system.
- 2 aerate sludge holding tanks
- Dewatered solids at 18% solids content are hauled to landfill.

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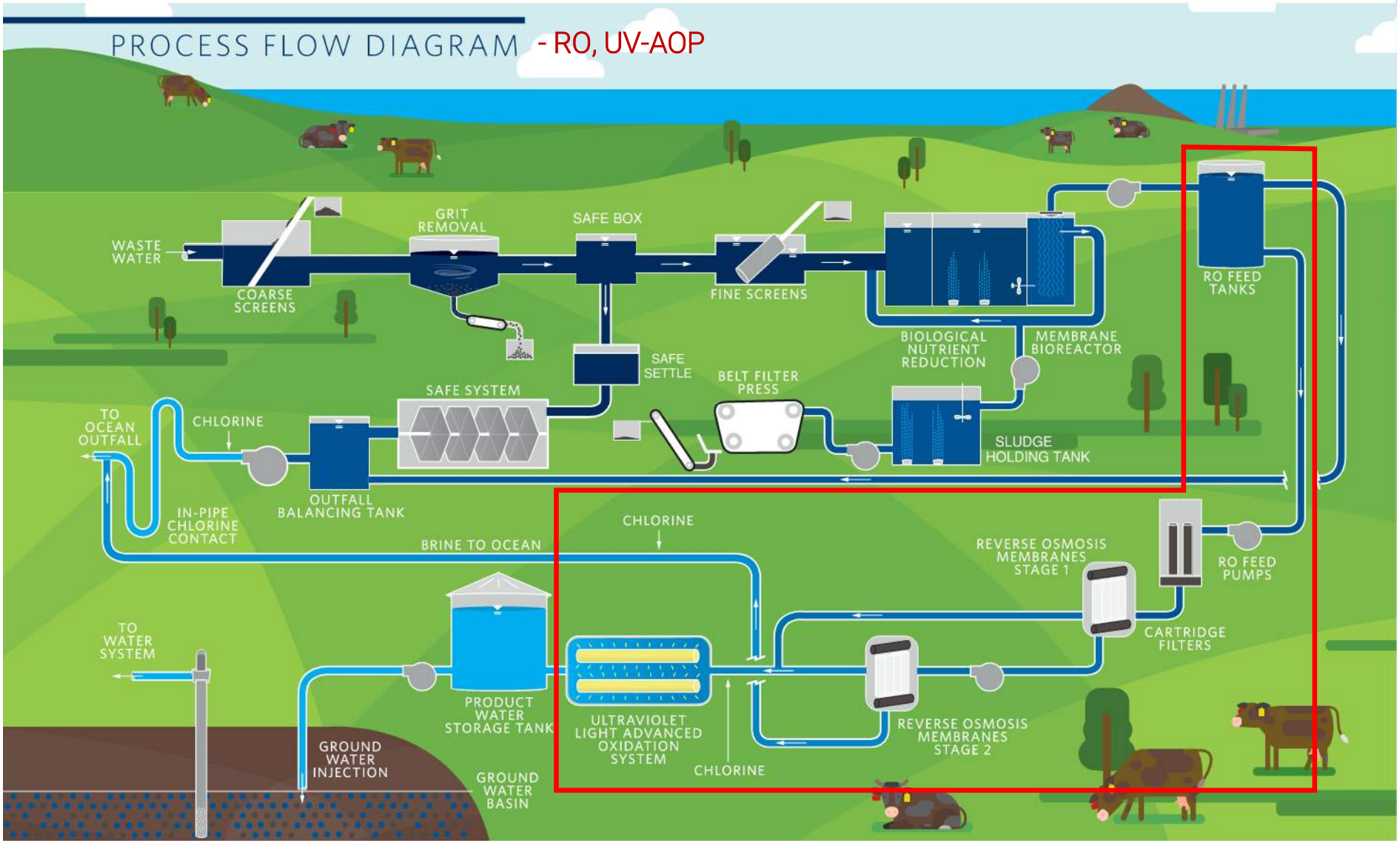
PROCESS FLOW DIAGRAM - RO, UV-AOP
WASTE WATER
COARSE SCREENS
GRIT REMOVAL
SAFE BOX
FINE SCREENS
BIOLOGICAL NUTRIENT REDUCTION
MEMBRANE BIOREACTOR
RO FEED TANKS
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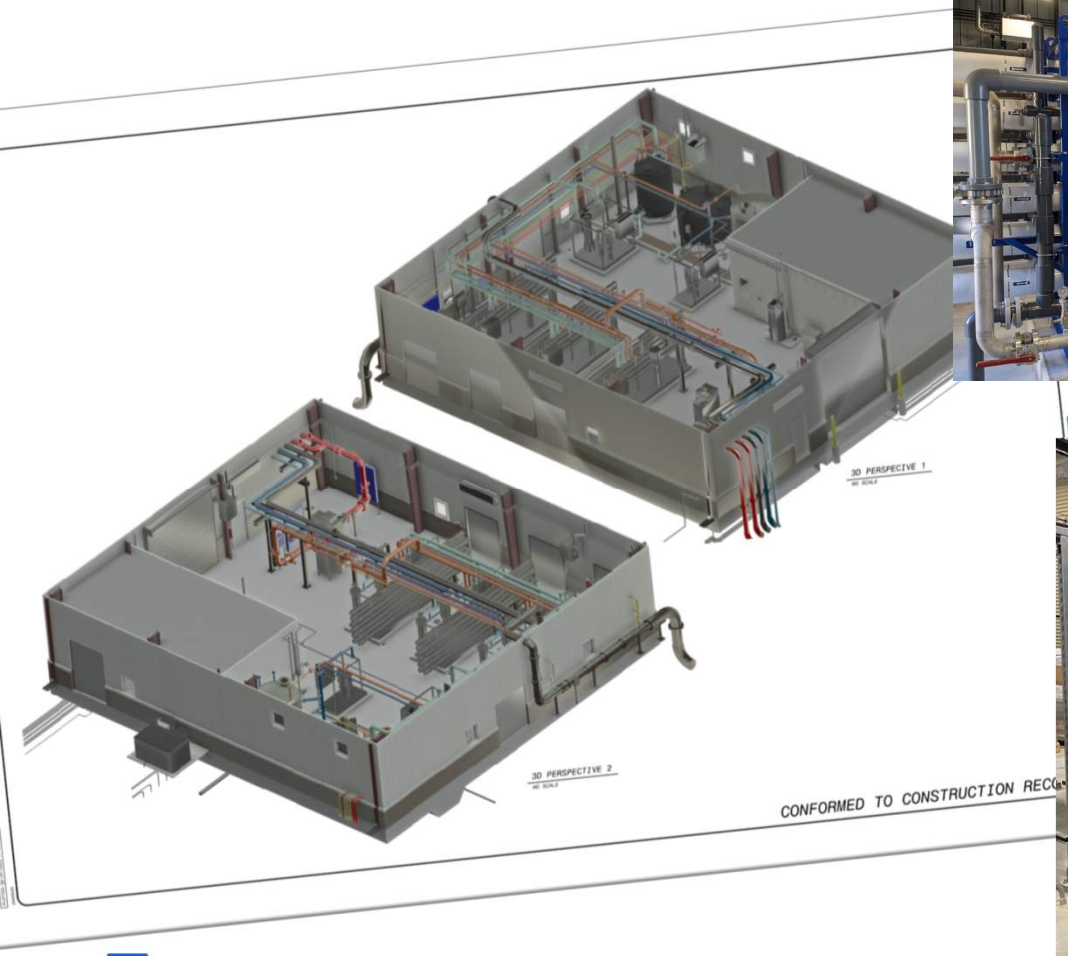
CHLORINE
GROUND WATER INJECTION
GROUND WATER BASIN

3: Features – RO / UV-AOP



RO Trains – 0.97 mgd

- 3 trains 0.33 mgd each.
- 2 stage RO.
- Gravity flow to RO High Pressure Pumps.
- Cartridge filter on high pressure side.
- Interstage booster pump.

UV-AOP – 0.82 mgd

- 1 train
- No redundancy – IPR is non-critical, can bypass to Ocean Outfall
- UV Chlorine

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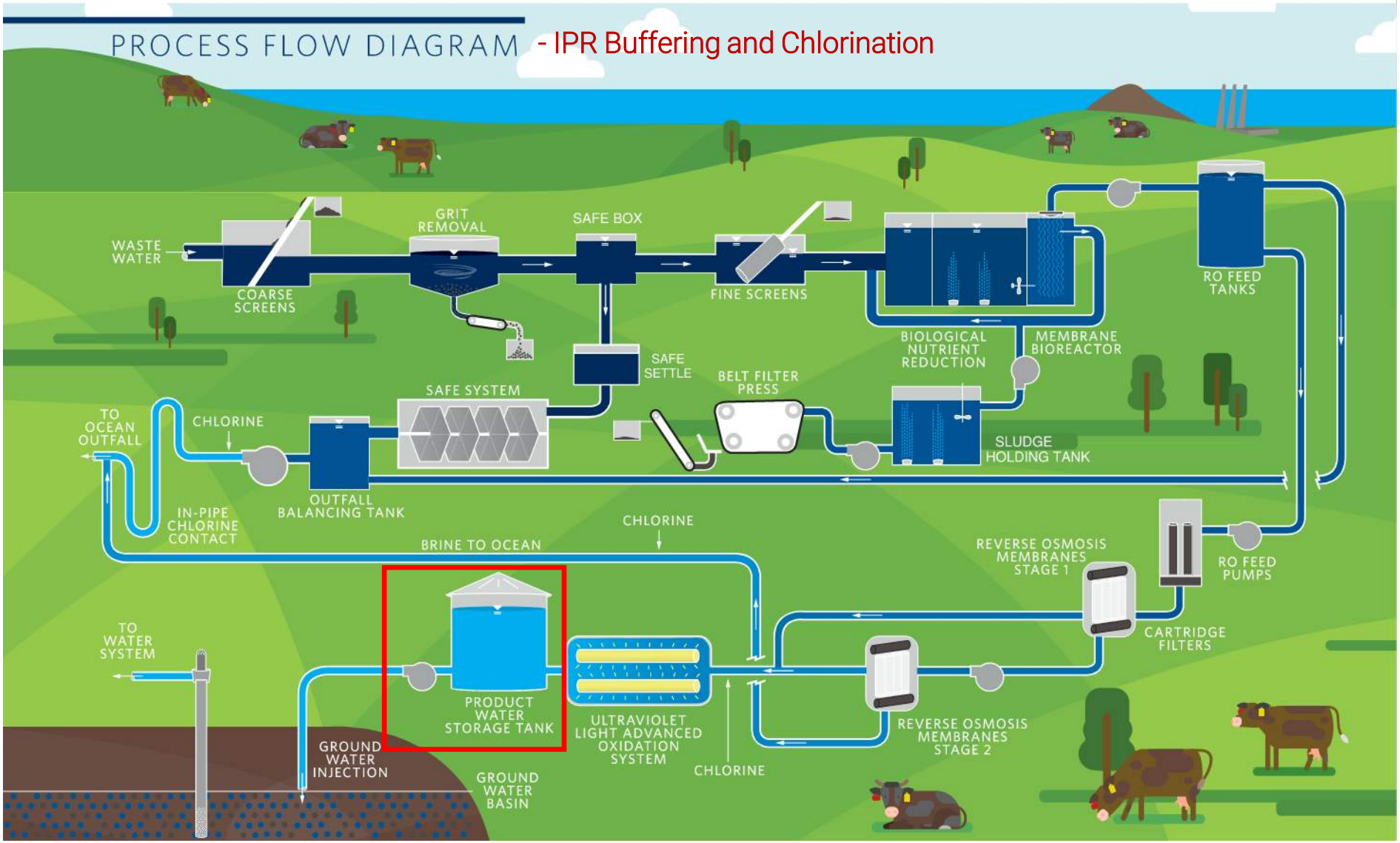
PROCESS FLOW DIAGRAM - IPR Buffering and Chlorination
WASTE WATER
COARSE SCREENS
GRIT REMOVAL
SAFE BOX
FINE SCREENS
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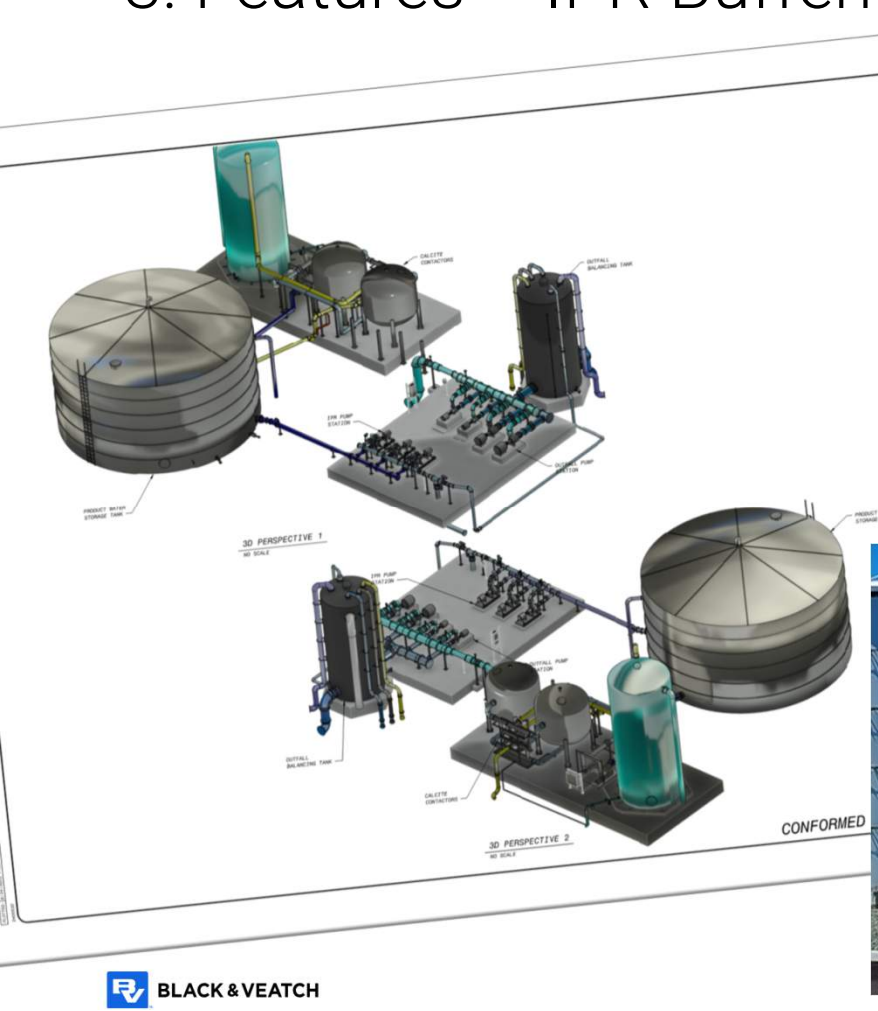
CHLORINE
GROUND WATER BASIN

3: Features – IPR Buffering and Chlorination



Calcite Contactors – 0.82 mgd

- 2 contactor tanks.
- Calcite chips provide buffering.
- 6 month media life.

Product Water Tank – 200,000 gallons

- 1 tank
- Chlorine contact volume
- Operational EQ volume for injection wellfield

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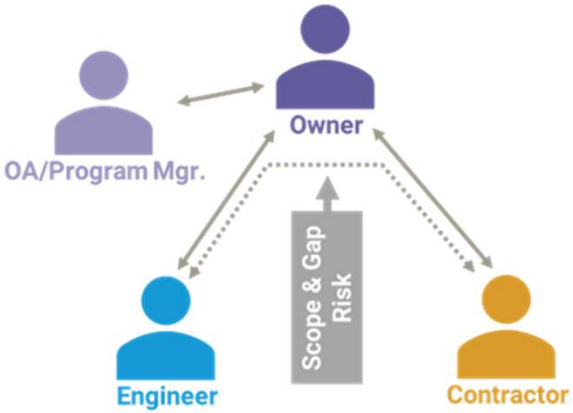
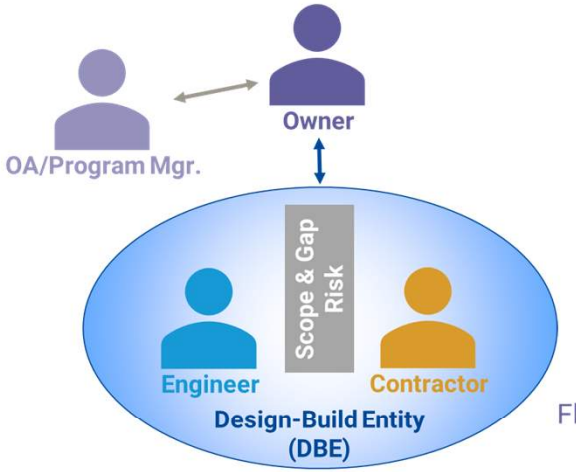
4: Fixed Price Design-Build Delivery

- Fixed Price Design-Build vs. Traditional Design-Bid-Build
- Project Schedule
- Project Schedule vs. DBB Schedule
- Design an $80M plant in 10 weeks…GO!
- Innovation to reach lowest price with expensive MBR
- Collaboration is still possible with Fixed Price Design-Build

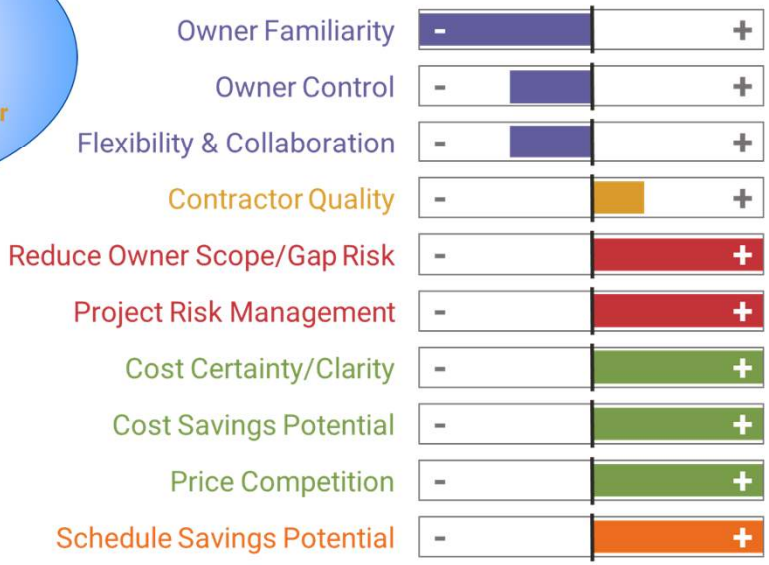
4: Fixed Price Design-Build Delivery Method



- DBB (Design-Bid-Build)
- *CMAR (Construction Manager At-Risk)*
- *CM/GC (Construction Manager General Contractor)*



- DB, FPDB (**Fixed Price Design-Build**)
- PDB (Progressive Design-Build)



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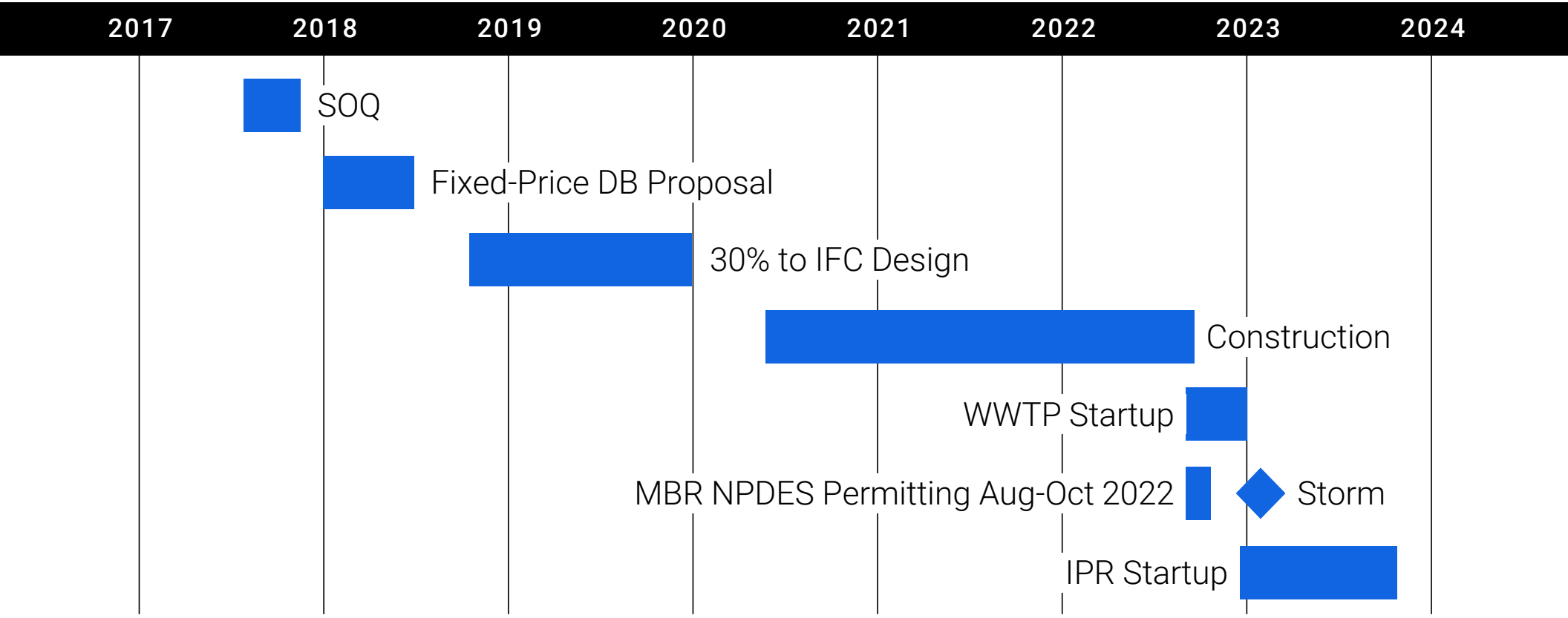
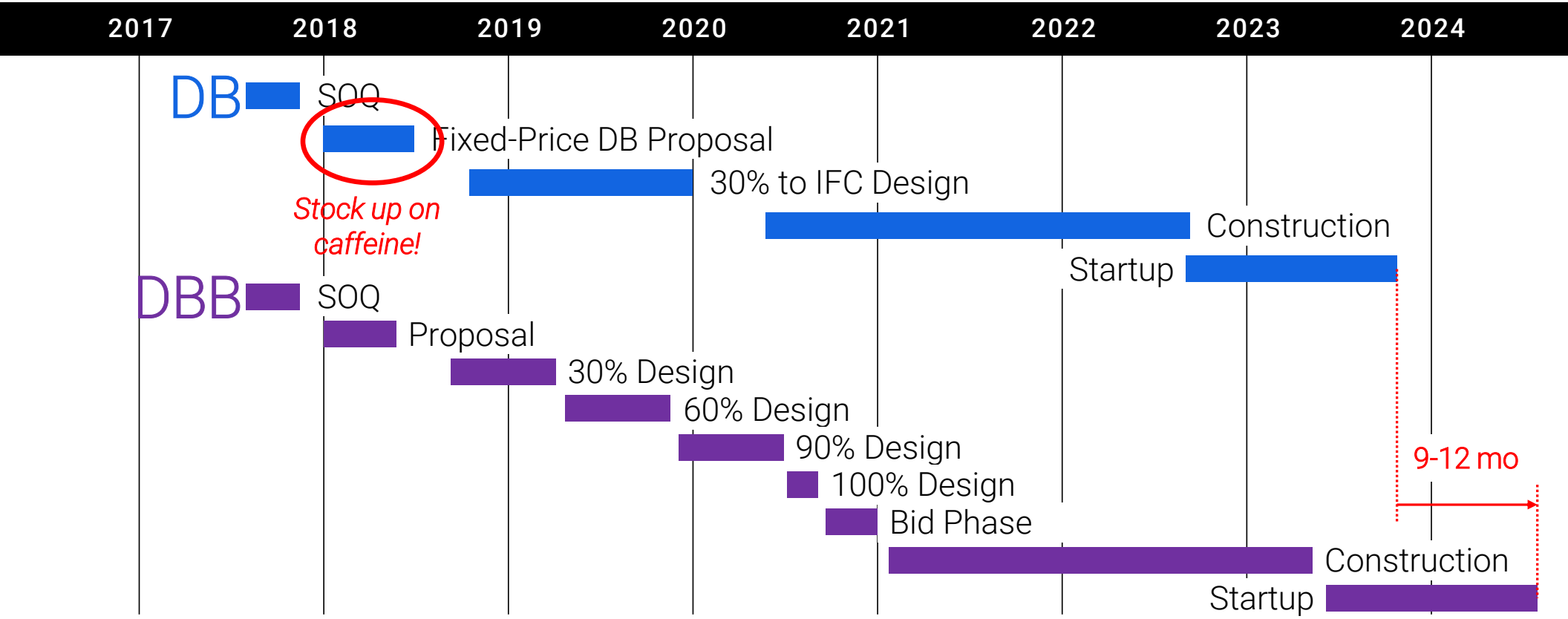
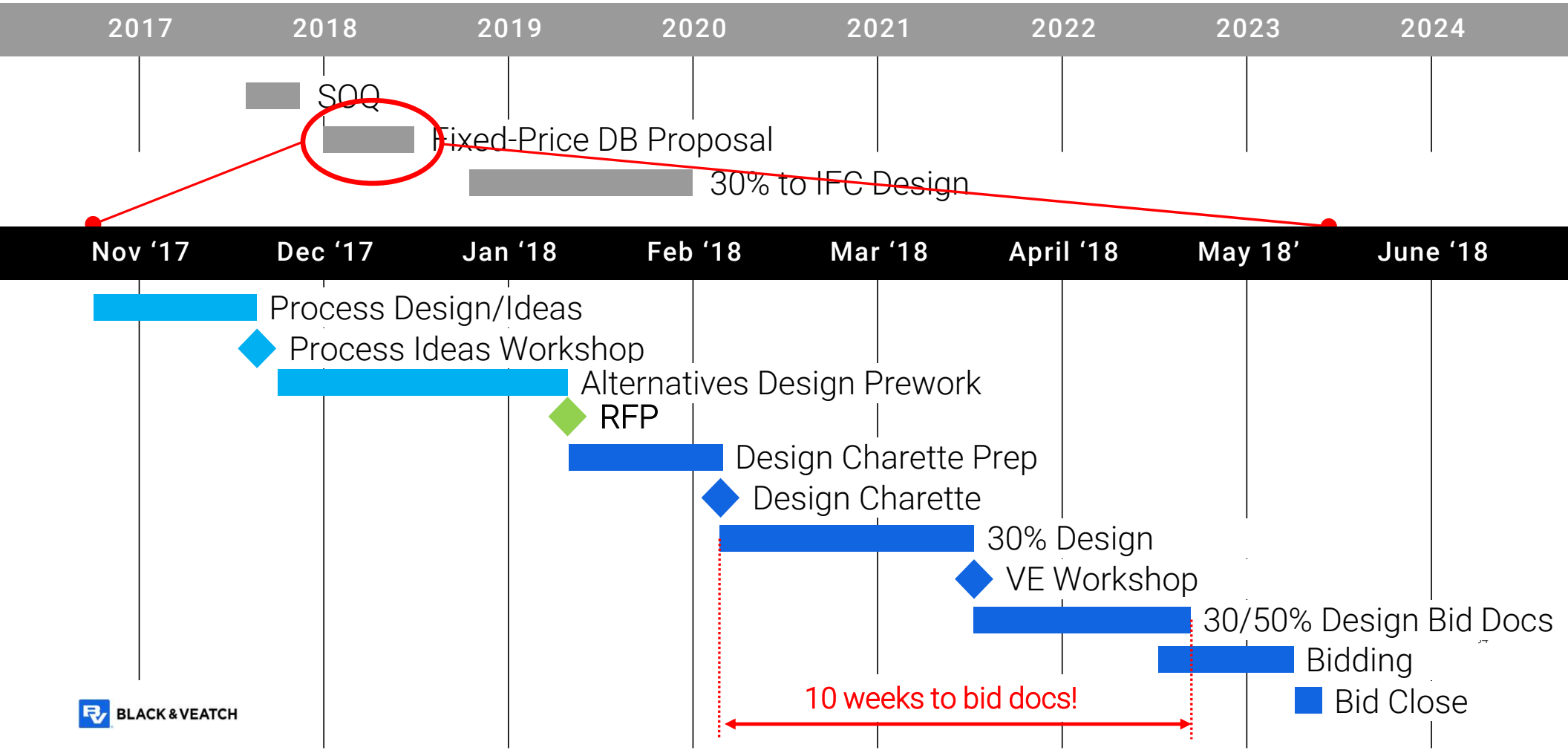
4: WRC Delivery Timeline



4: Developing a Design for Fixed-Price DB Bid



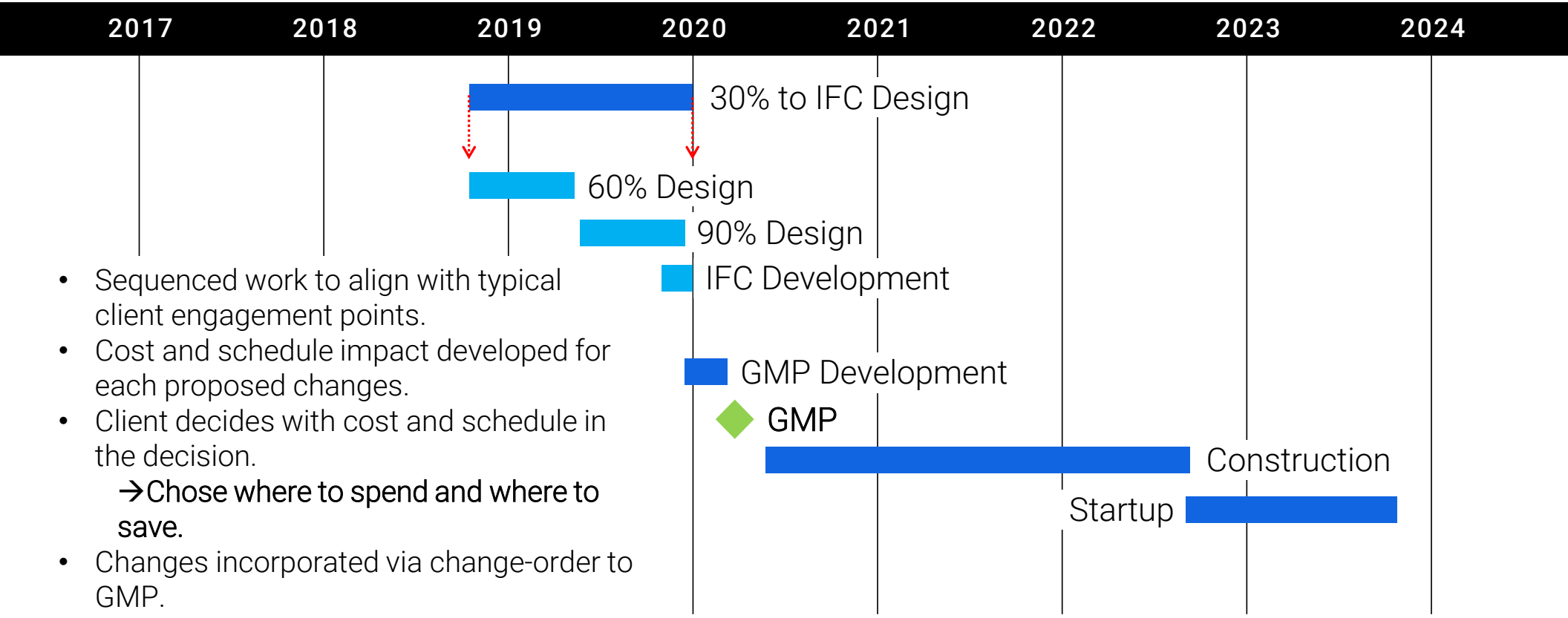
4: Designing an $80M plant in 10 weeks…GO!



4: Innovation to win a low-price bid with expensive MBR

BHAG: MBR for less than SBR Price

4: Collaboration is Possible with Fixed-Price DB Bid



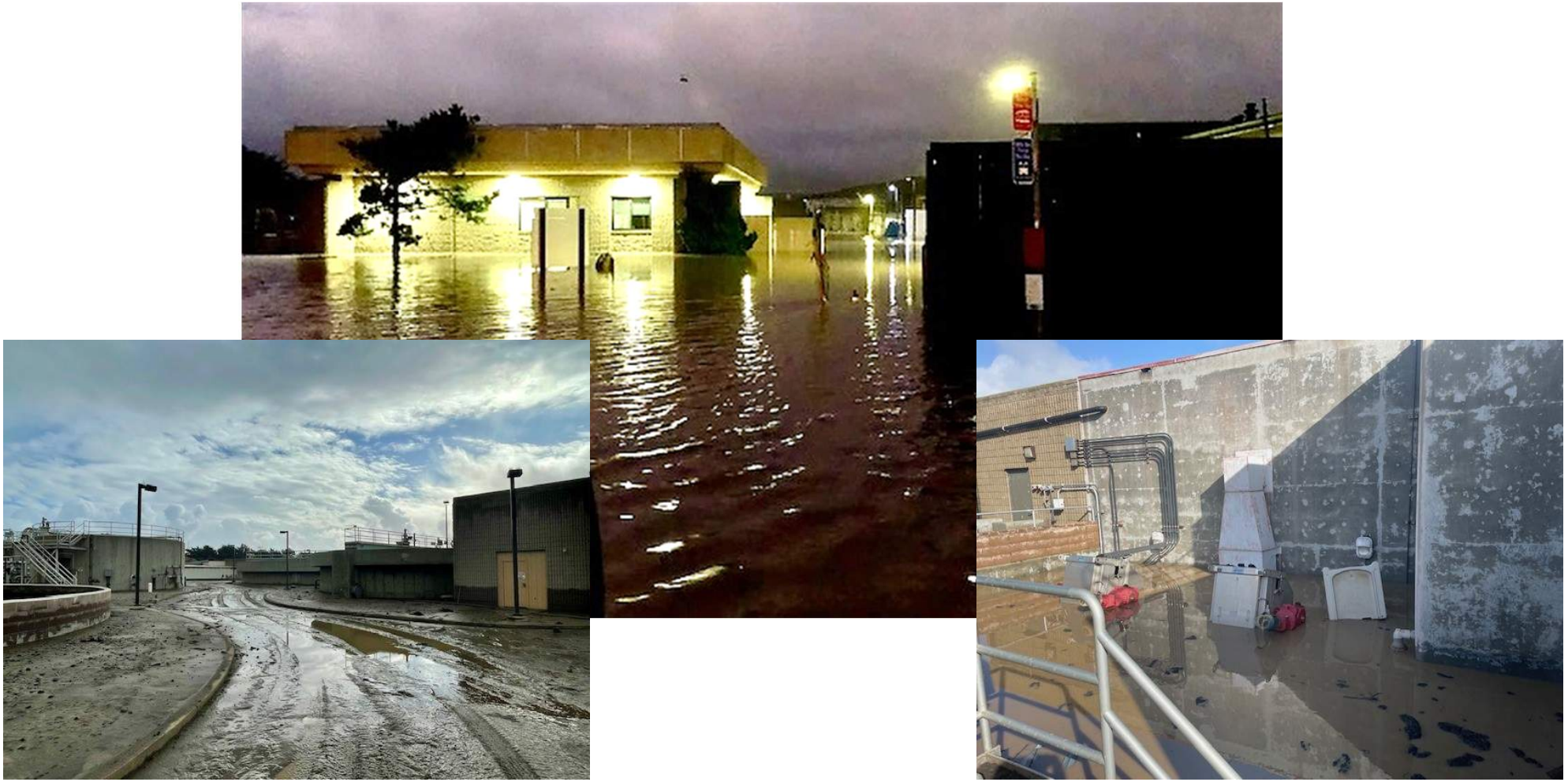
- Sequenced work to align with typical client engagement points.
- Cost and schedule impact developed for each proposed changes.
- Client decides with cost and schedule in the decision.
  →Chose where to spend and where to save.
- Changes incorporated via change-order to GMP.

5: Operations

- BNR-MBR system in full operation for 3 years.
- No discharge violations from the first minute of operation.
- IPR injection wellfield under construction.
  - IPR system operated weekly with discharge to ocean.

	Old Plant	New Plant
Turbidity	20-30 NTU	0.1 NTU
BOD	10-15 mg/L	2-5 mg/L
TKN	15-20 mg/L	2-4 mg/L

5. Sometimes “Someday” becomes “Today”

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Questions?
Email Marisa Waterman at mwaterman@aaees.org with any questions you may have.

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