Brackish Water Desalination in El Paso

Nine Years In and Planning for the Future

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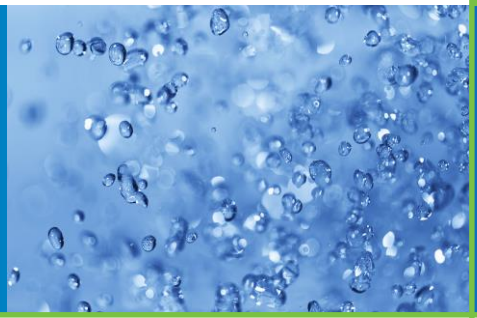


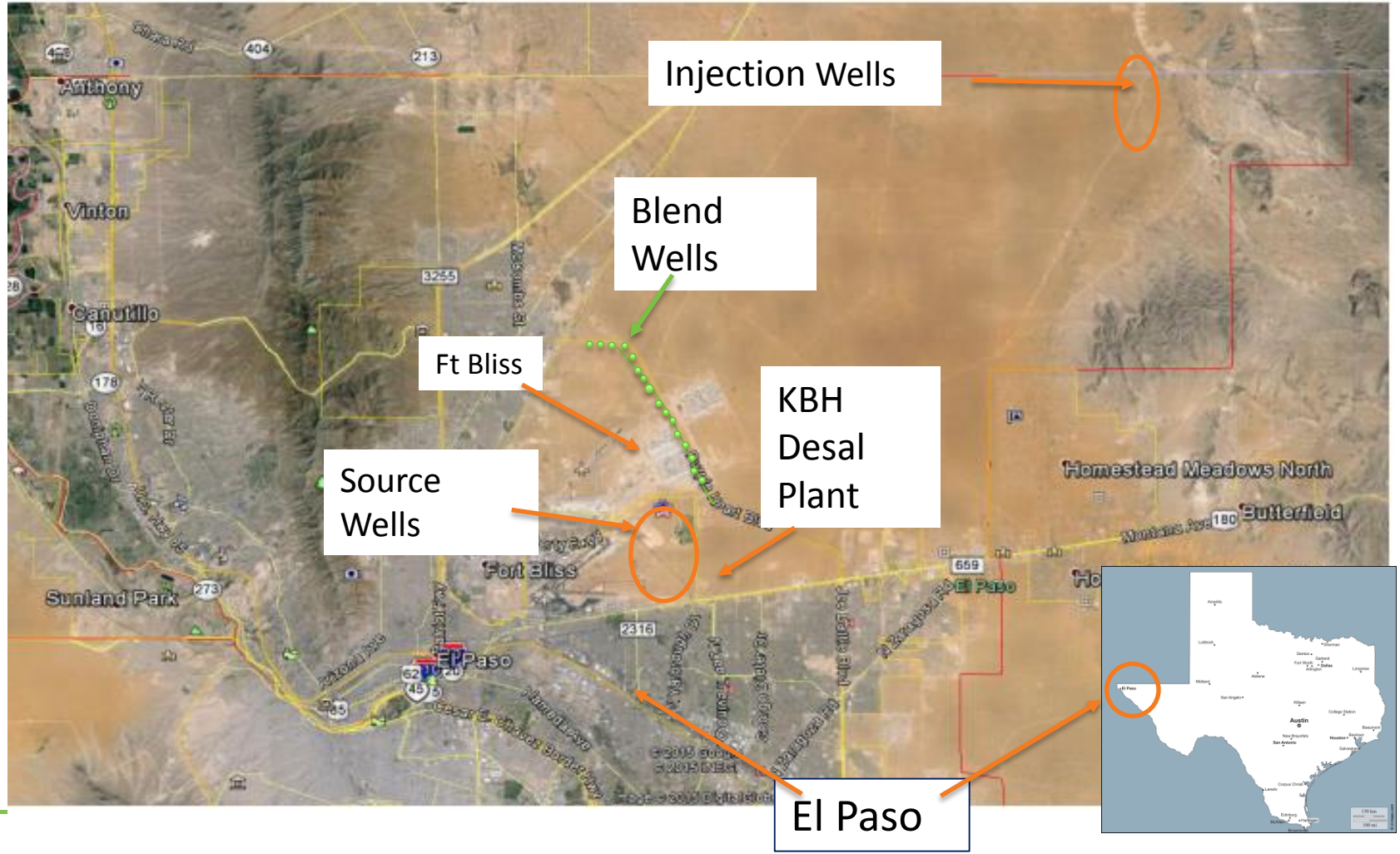
CDM Smith

WATER + ENVIRONMENT + TRANSPORTATION + ENERGY + FACILITIES

el paso WATER

Kay Bailey Hutchison Desalination Facility

- El Paso Water Utilities
- 27.5 mgd delivered capacity
  - 15mgd RO permeate
  - 12.5mgd blend well water
- Startup in 2007
- Used as “reserve capacity” plant when other sources are limited
- 3 mgd (1 skid) continuous permeate production

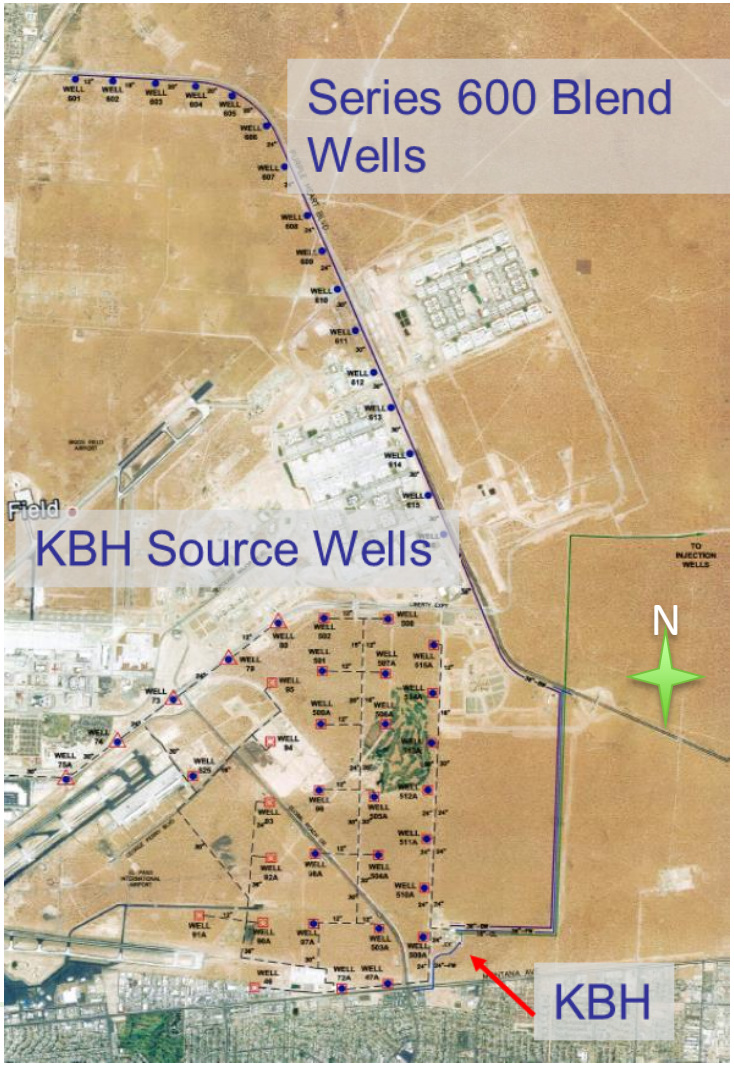

Injection Wells
Blend Wells
Ft Bliss
KBH Desal Plant
Source Wells
El Paso
Anthony
Vinton
Canutillo
Sunland Park
Fort Bliss
El Paso
Homestead Meadows North
Butterfield
Austin

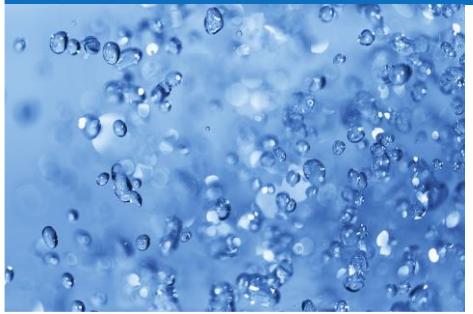
Water Supply

Brackish and Fresh Wells in the Hueco Bolson

- 15 Source Wells
  - For RO Feed
  - Production and Water Quality Declining

- 16 “Blend” Wells
  - Each produce 700-1000 gpm
  - Subject to Ft. Bliss Royalty Fee:
    - $35/AF or $100/AF
  - Water Quality Declining





The Challenge

Source Water Quality and Quantity

- Declining Water Quality→ Higher RO Operation
  - Re-drilled, deeper wells=higher TDS
  - Design: 1200-1500 mg/L
  - Current: Average 2660 mg/L
- Production Rate Declining in Source Wells
  - Water level dropping, minimum feed pressure to RO plant
  - More wells required for same production

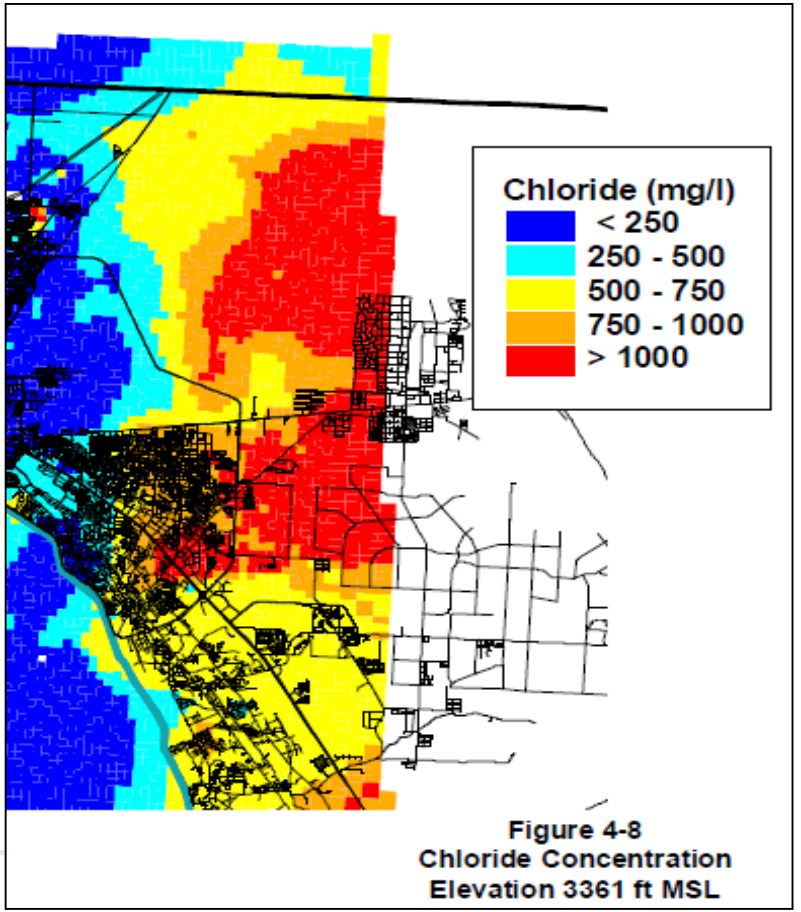
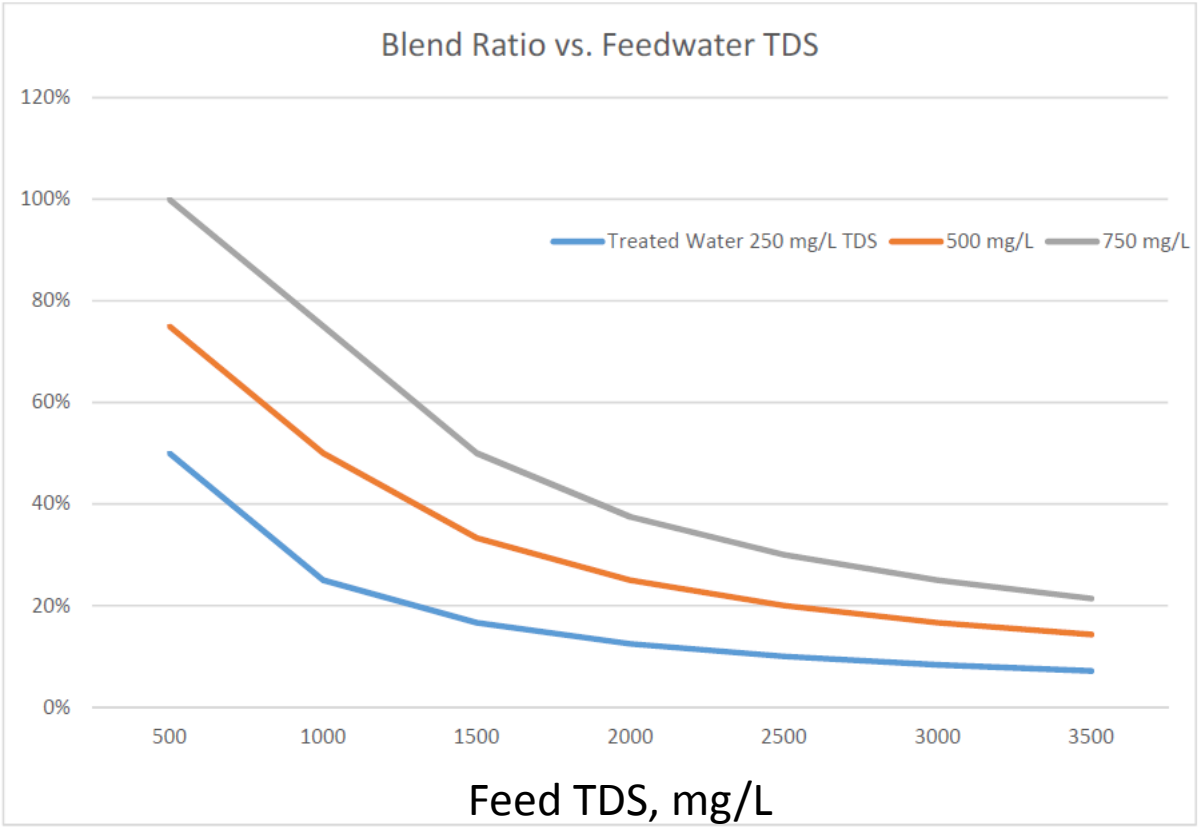


Figure 4-8
Chloride Concentration
Elevation 3361 ft MSL

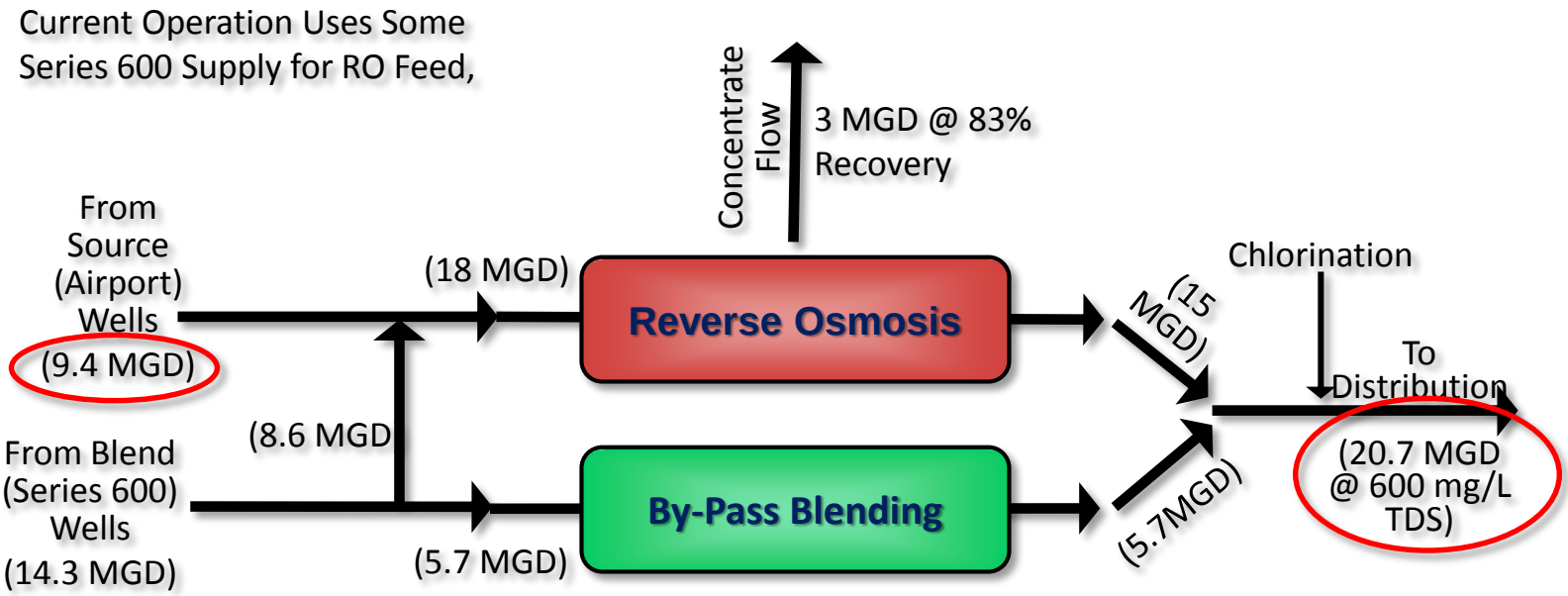
Increase in Feed TDS → Decrease in Blend Ratio

- RO permeate quality & production not significantly impacted
- RO feed pumps currently running at ~100%

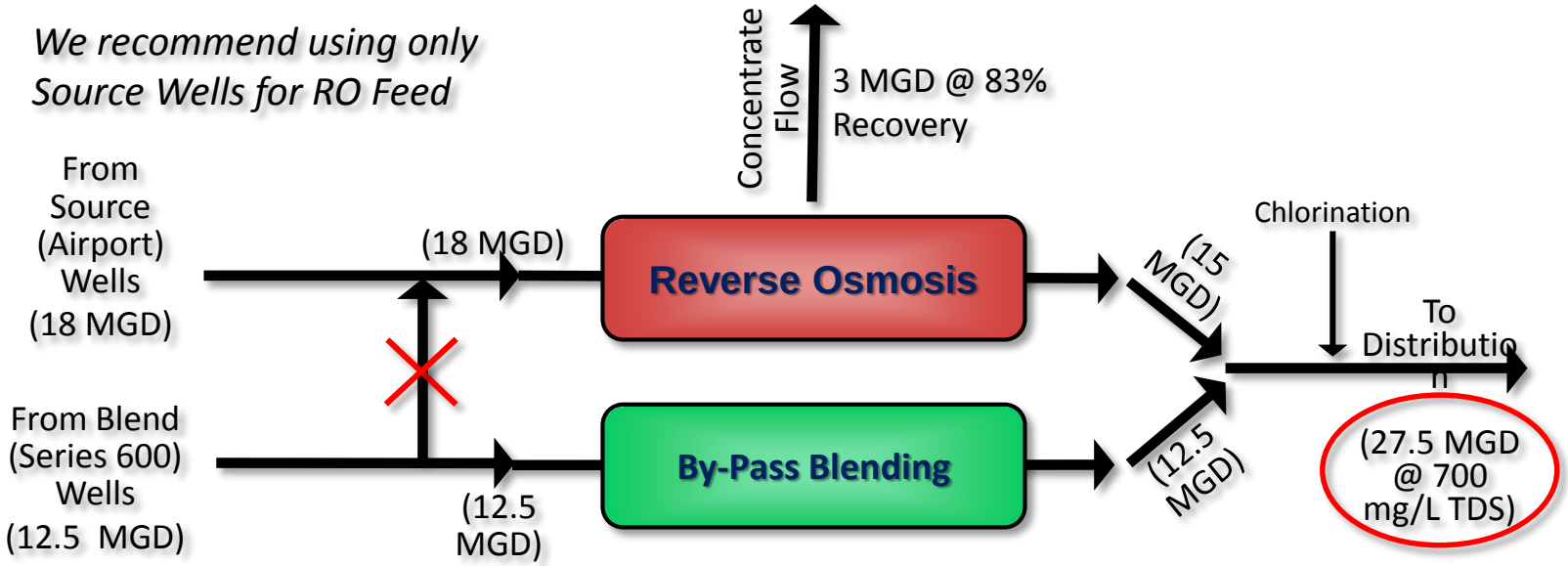


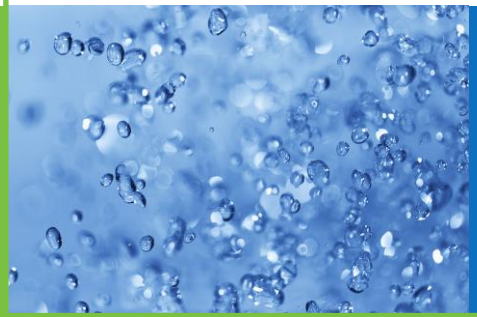
Using Blend Wells for RO feed is Inefficient and Costly

Recent Peak Day Operation (August 24, 2013)



Use Freshwater Blend Wells for Blending Only
Recommended Peak Operation





Plans for the Future

Immediate Improvements

Needed to maintain 27.5 mgd production

- Projects underway
  - Rehab source wells (underway)
  - Modelling for “bottleneck” in source well delivery network
  - Upgrade deficiencies in source well network
  - “Freshwater Express” pipeline for wells 601-609
- Upcoming Improvements
  - Replace RO Membranes
  - Install Interstage Boosters

Need for Expansion

- Drought conditions mean shorter irrigation season= less surface water available for less time
- KBH is Critical when surface water (Rio Grande) is not available.
  - No surface water in non-irrigation season (winter)
  - Supplements a finite supply of fresh groundwater wells
- In summer, KBH provides peaking capacity to support surface water plants. In winter, provides (emergency) high capacity supply
- Supplies base demand in nearby service area + Ft Bliss
- With water quality decline, blending ratio decreases= total production drops

Phase 1- Near Term Improvements

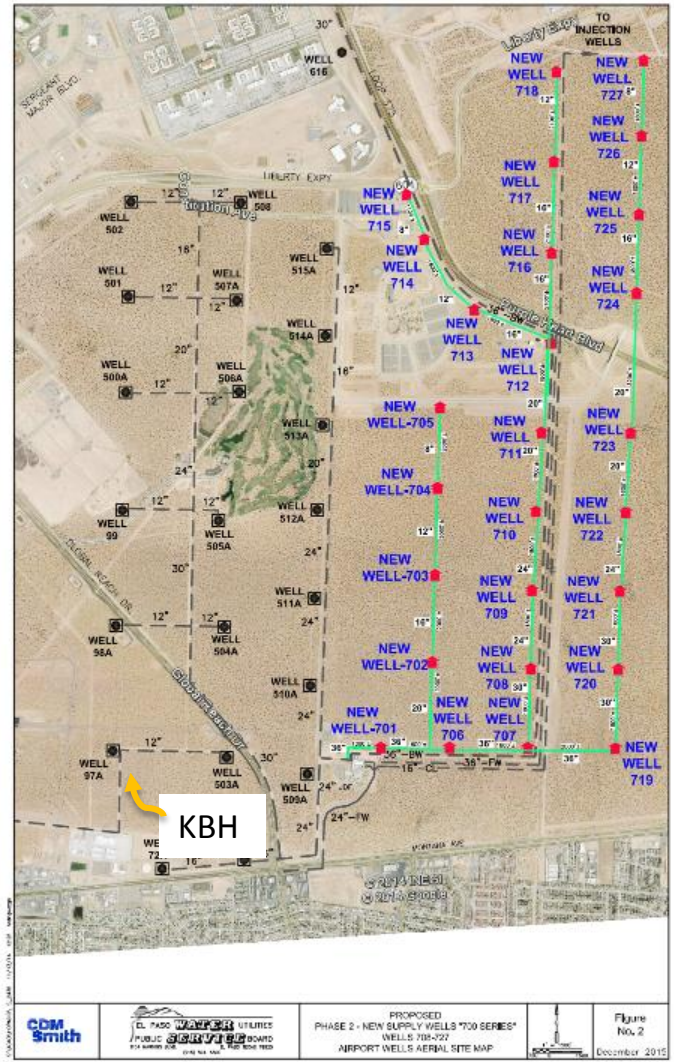
- Add 6th skid in existing building (3 mgd)
- ~7 new wells and collector pipeline (minimum 3.6 mgd supply)
- Manage increase in concentrate with brine minimization (EWM partnership)
  - Well injection currently limited by pipeline capacity and permit restrictions
- 3-7 year timeline

Phase 2- Long Term Improvements

- Increase permeate production capacity by 12 mgd to a total of 30 mgd
  - New treatment building
  - Additional finished water pumping capacity
- 20+ new wells
  - Each well only ~500 gpm
- Concentrate Management:
  - Install parallel (20”) concentrate pipeline to injection wells
  - Add 1-2 new concentrate disposal wells
  - Improvements to concentrate pump station
  - Ongoing Coordination with EWM
- 8-10 year timeline

Phase 2- Wellfield Addition

- “700 Series” wellfield at full buildout
- 20 new wells, in addition to Phase 1
- 500-700 gpm each
- Total Supply: 20 mgd
- 4+ miles of additional collector pipeline



Ultimate Buildout

- Net finished water production: 42.5+ mgd on peak day
- Will run at max capacity only seasonally and as “emergency” supply
- Continued blending of 12 mgd with 30 mgd permeate, due to degrading blend water quality
- $120 M capital investment (preliminary)

Thank you!

- Special thanks to El Paso Water Utilities
  - Scott Reinert, PE
- CDM Smith Colleagues
  - Jim Steele, PE
  - Horacio Juarez, PE
  - Doug Brown, PE

Source Well Data

Well#	Flow, gpm	Chloride, mg/L	TDS, mg/L
47	0	3000	7000
72	944	1100	1900
97	900	900	1900
98	1000	1150	2495
503A	650	1200	2500
504A	820	1625	3476
505A	900	999	2610
507A	1030	1303	2588
508	700	343	743
509A	450	1753	4255
510A	700	1990	4512
511A	502	1770	3828
512A	610	1184	2513
513A	1000	1177	2475
514A	978	1296	2710
515	920	1407	2808
Total Flow	**12104**		
Composite Water Quality		**1249**	**2664**

Blend Well Data

Blend wells			
Well No	Capacity[1] (gpm)	Chloride (mg/l)	TDS[2] (mg/l)
601	880	90	422
602	600	101	425
603	805	155	604
604	780	188	609
605	835	285	687
606	710	325	797
607	825	393	1095
608	850	414	1014
609	800	498	1414
610	700	353	1116
611	752	362	1184
612	800	851	3260
613	725	1122	3878
614	850	1167	2306
615	715	1269	1430
616	770	1118	2618
Totals	12397	542.7268	1428.823
	17.85282		

Phase 1- Wellfield Addition

- 7 new wells in short-term
- 500-700 gpm each
- New 2-mile collector pipeline to KBH
- “700 series” wellfield
- Wells located on Ft Bliss, subject to “royalty fee” ($/af TBD)
- Water quality expected: 2000-4000 mg/L TDS