Evaluating 4 Sample Portfolios: Lead-Up to SWOT Exercise

WSAC Meeting
Santa Cruz

June 11, 2015

STRATUS CONSULTING

Reminder: Objectives of the 4 Portfolios

- Foster discussion of issues related to
  - Tapping winter flows, and
  - Restoring regional aquifers (e.g., ASR)

- Set up SWOT Exercise
  - Portfolios that provide interesting differences
  - NOT intended to be "THE" portfolios

- "This has been a test…. Had these been real portfolios…."
  - Preliminary cost estimates, as fodder for exercise

Caveats to Keep in Mind

- Individual components, versus their contribution within a portfolio, within the overall system
- Estimates are very preliminary (developed in great haste)
- Yields and supplies in the packet tables reflect results ***IF*** ASR functions as required

Key Terms: Supply versus Yield

- **Supply**: How much water is produced by an option (source production)
  - Independent of the rest of the water system
  - E.g., recycled water @3.6 mgd, 365 days => 1.3 BG/year

- **Yield**: How much water does the option provide toward meeting peak season demand…
  - Integrated with the rest of the water system
  - Contribute to filling peak season supply-demand gap
  - Worst year peak season shortage is 1,110 mg (avg. yr 340)

Key Findings from April/May: Winter Flows

- ***IF*** all applicable infrastructure and storage constraints eliminated …
- Then winter flows available under existing water rights eliminate future shortages
  - Even under climate change and DFG-5 scenario
- Key remaining issues:
  - 3 BG storage is needed, and time to fill it!
  - Infrastructure and institutional needs, feasibility, cost, risks, uncertainties, etc…
  - Factoring in CIP, other risks and vulnerabilities

April/May Finding: Drought-Proof Options (Recycled Water, Desal)

- ***IF*** all applicable infrastructure constraints eliminated…
- Recycled water or desal can eliminate future shortages
  - Absent added storage, few shortages, and none > 15%
  - Even under climate change and DFG-5 scenario
- Adding storage addresses small remaining shortages
  - Requires much less storage than winter flow regimes

Filling the Gap: Some Key Observations

1. Winter flows can fill the gap, … **BUT**
   a) Requires large volume of storage (3 BG)
   b) Need upfront years to provide the water to store
   c) Many questions about ASR viability, timing, and cost
2. Drought-proof options can fill the gap
   a) Modest storage helps
   b) Cost and energy requirements pose challenges
3. A combination of above is very resilient and robust
   a) Handles interim period, and provides back-up
   b) Diversifies against risks
4. There are no inexpensive options

Table 2-3: Probabilities and projected peak season supply shortfalls of in any year: Climate change, DFG-5, and revised interim mid-range demand forecast

Shortage (mg)	Shortage %	Probability
> 950 mg	>50%	6%
480-950 mg	25% to 50%	31%
290-450 mg	15% to 25%	12%
100-290mg	5% to 15%	6%
0-100 mg	<5%	45%

Table 1-1: Portfolio 1/Plan A-1: In-Lieu Recharge Using Winter Flows (w/ Current Loch Operating Rule – Reserve of 1000 MG), Coupled with Program C Rec

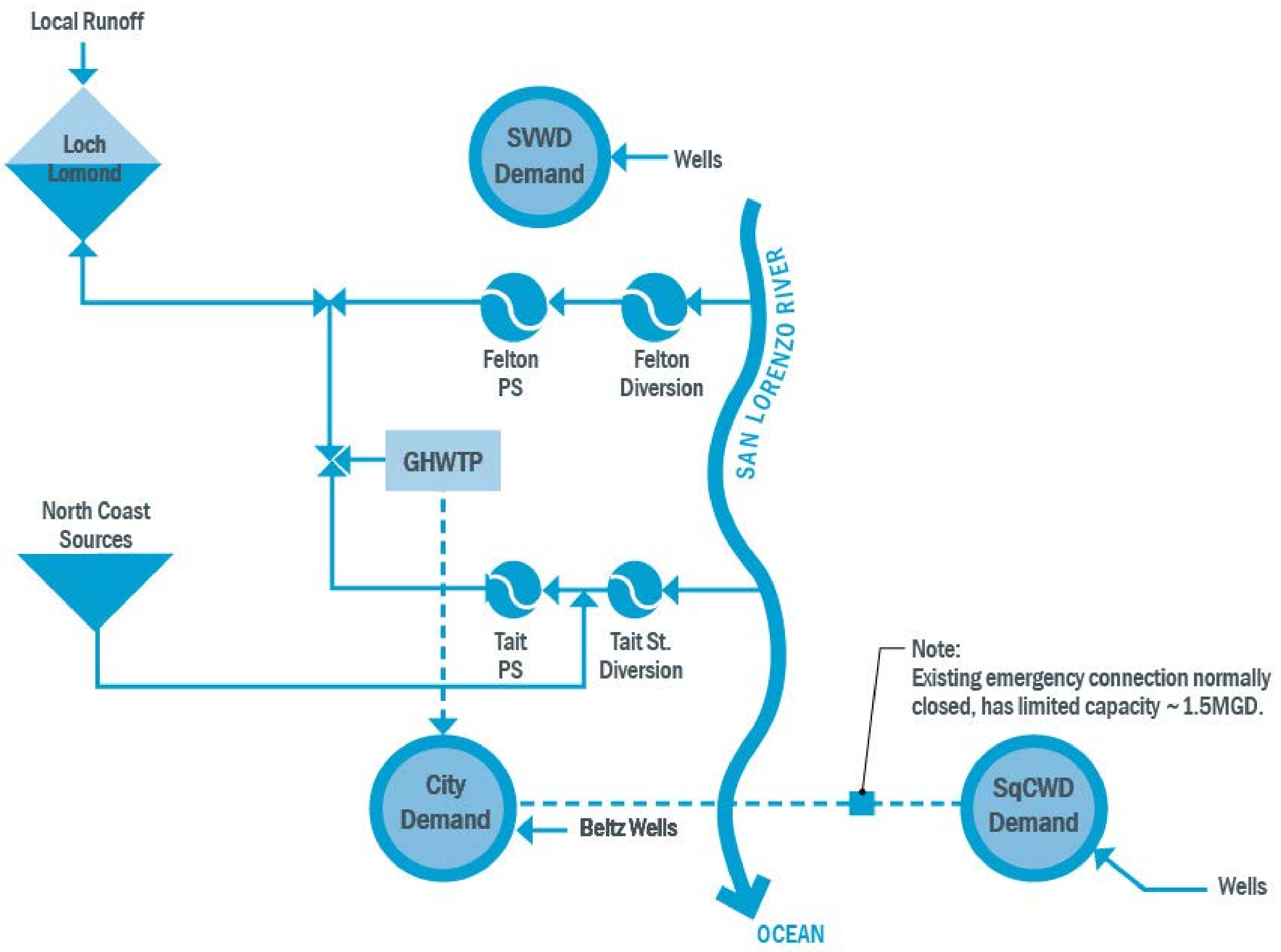
	Estimates	Component 1: Program C Rec	Component 2: In-lieu Recharge	Totals [weighted average]
A	Capital (upfront) costs ($M)	n/a	$232 M	$232 M +
B	Annual O&M costs ($M/yr)	n/a	$2.1 M	$2.1 M +
C	Total Annualized Cost ($M/Yr)	$1.1 M	$17.5 M	$18.6 M
D	PV Costs (30 years) ($M)	$23 M	$401 M	$424 M
E	Production Supply (mgy)	173 mgy	500 mgy	673 mgy
F	Average Year peak season Yield (mg)	100 mg	10 mg	110 mg
G	Worst year peak season Yield (mg)	130 mg	10 mg	140 mg
H	Energy Use (MWh/MG)	(1.6)	8.6	[$7.4]
I	Annualized Unit Cost (C/E; $/mg)	$6,532	$35,000	[$27,682]
J	PV Unit Cost (D/PV[E*years]; $/mg)	$8,301	$38,274	[$30,569]
K	Average SV & SqCWD demand served (mg and %)	n/a	490 mg (32%)	490 mg (32%)

[1] 25-year average annual cost to utility and customers, omitting administrative costs borne by the Water Department
[2] Average annual water savings over 25 years; maximum savings of 220 mg attained in 2030

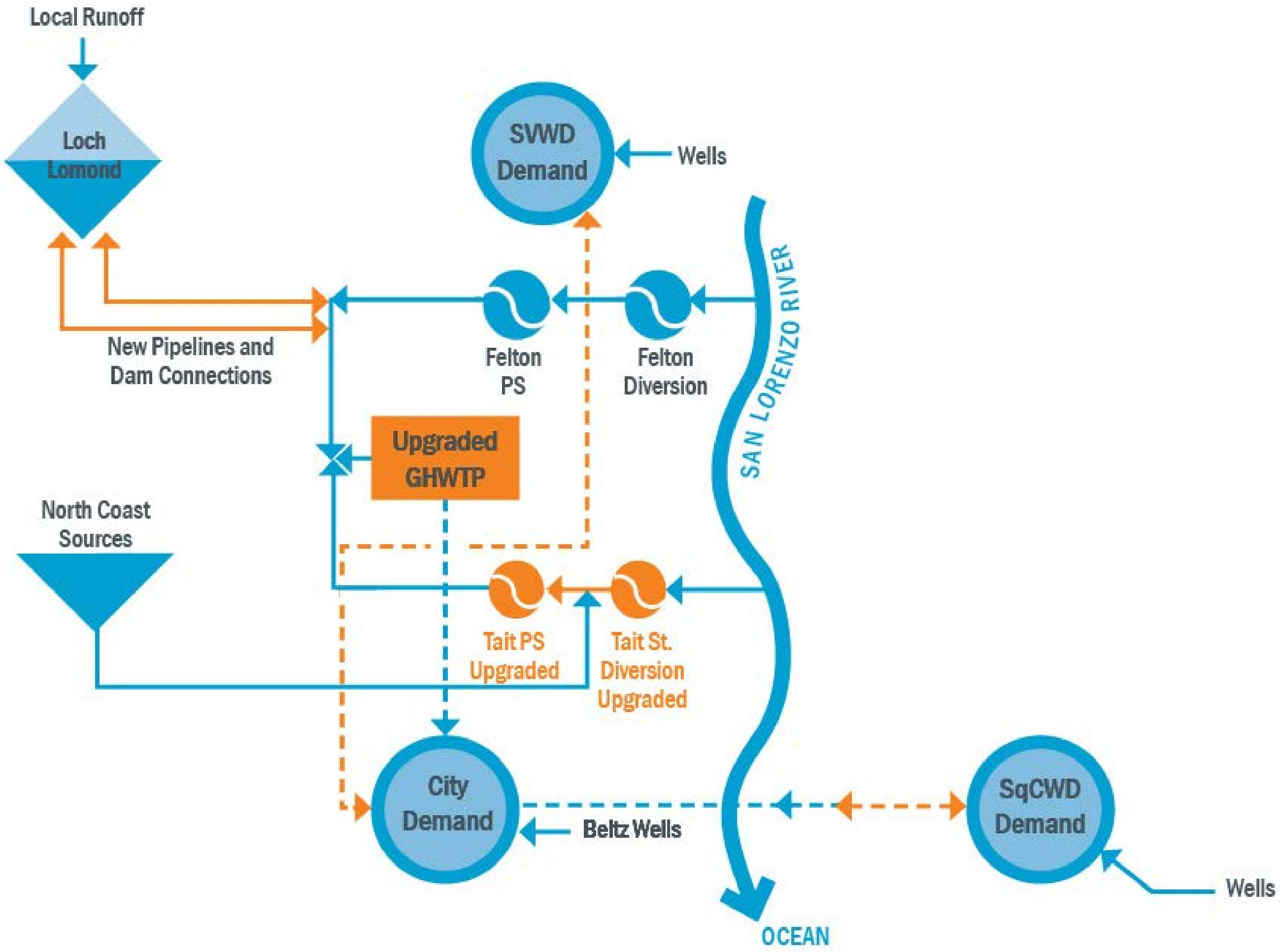
The 4 Portfolios for SWOT Exercise

1. Winter Flows for In-Lieu
   a) Purified recycled to Loch Lomond as Plan B (IPR)
   b) Modified Loch Lomond operating rule curve (reserve)
2. ASR using winter flows
   a) Shortages/curtailments in the interim
   b) Purified recycled water (DPR) as Plan B
3. ASR w/winter flows, plus seawater barrier wells (IPR)
   a) Increased groundwater use in interim, when needed
   b) Purified recycled water as Plan B (convert IPR to DPR)
4. ASR w/winter flows, plus DW Desal as supplement
   a) DW Desal retained, as Plan B

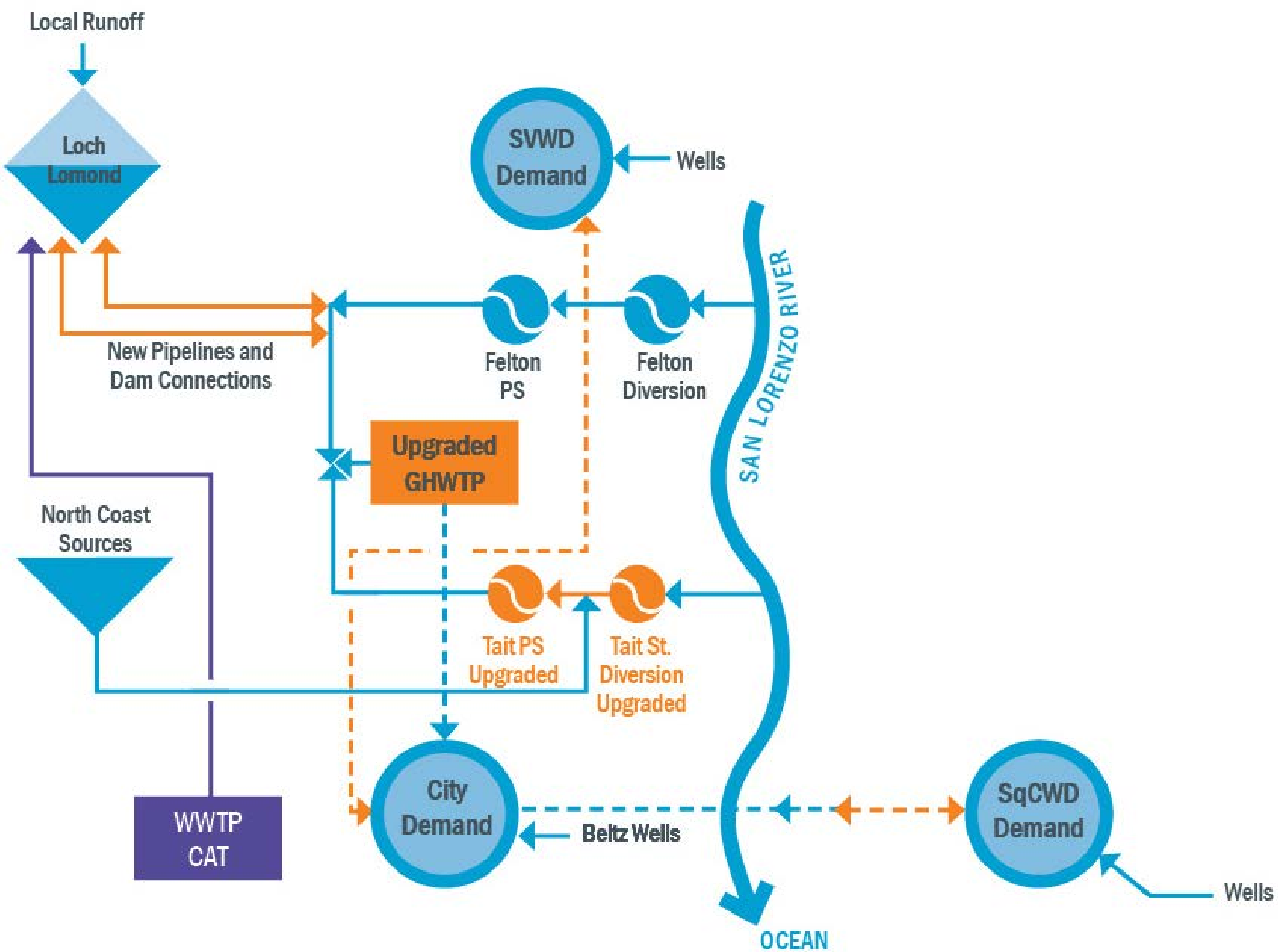
Existing


Local Runoff
Loch Lomond
SVWD Demand
Wells
Felton PS
Felton Diversion
SAN LORENZO RIVER
GHWTP
North Coast Sources
Tait PS
Tait St. Diversion
Note:
Existing emergency connection normally closed, has limited capacity ~1.5MGD.
City Demand
Beltz Wells
SqCWD Demand
Wells
OCEAN

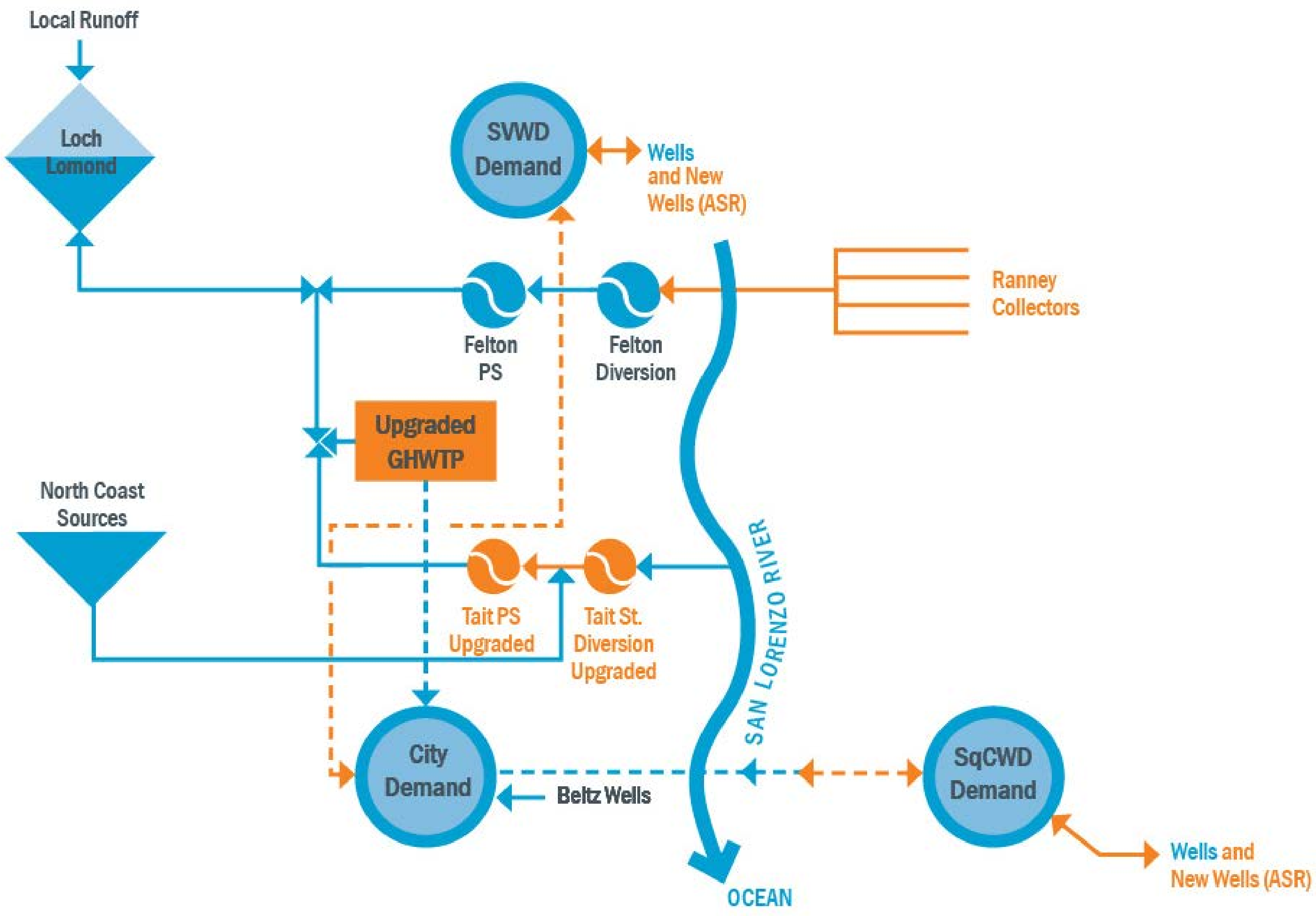
Portfolio 1 Plan A-1/Plan A-2 (In lieu)



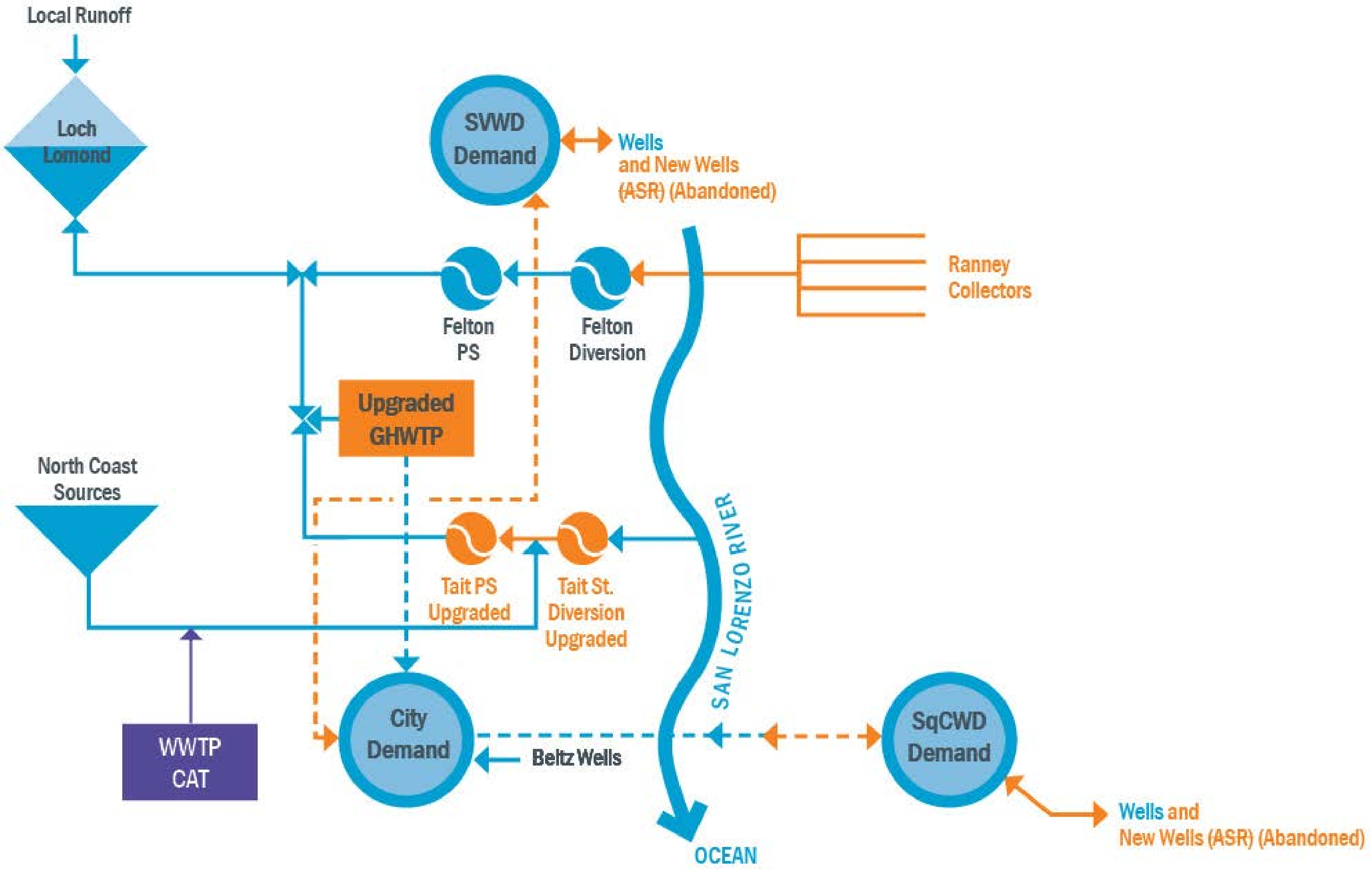
Portfolio 1 Plan B-1/Plan B-2 (Add IPR)



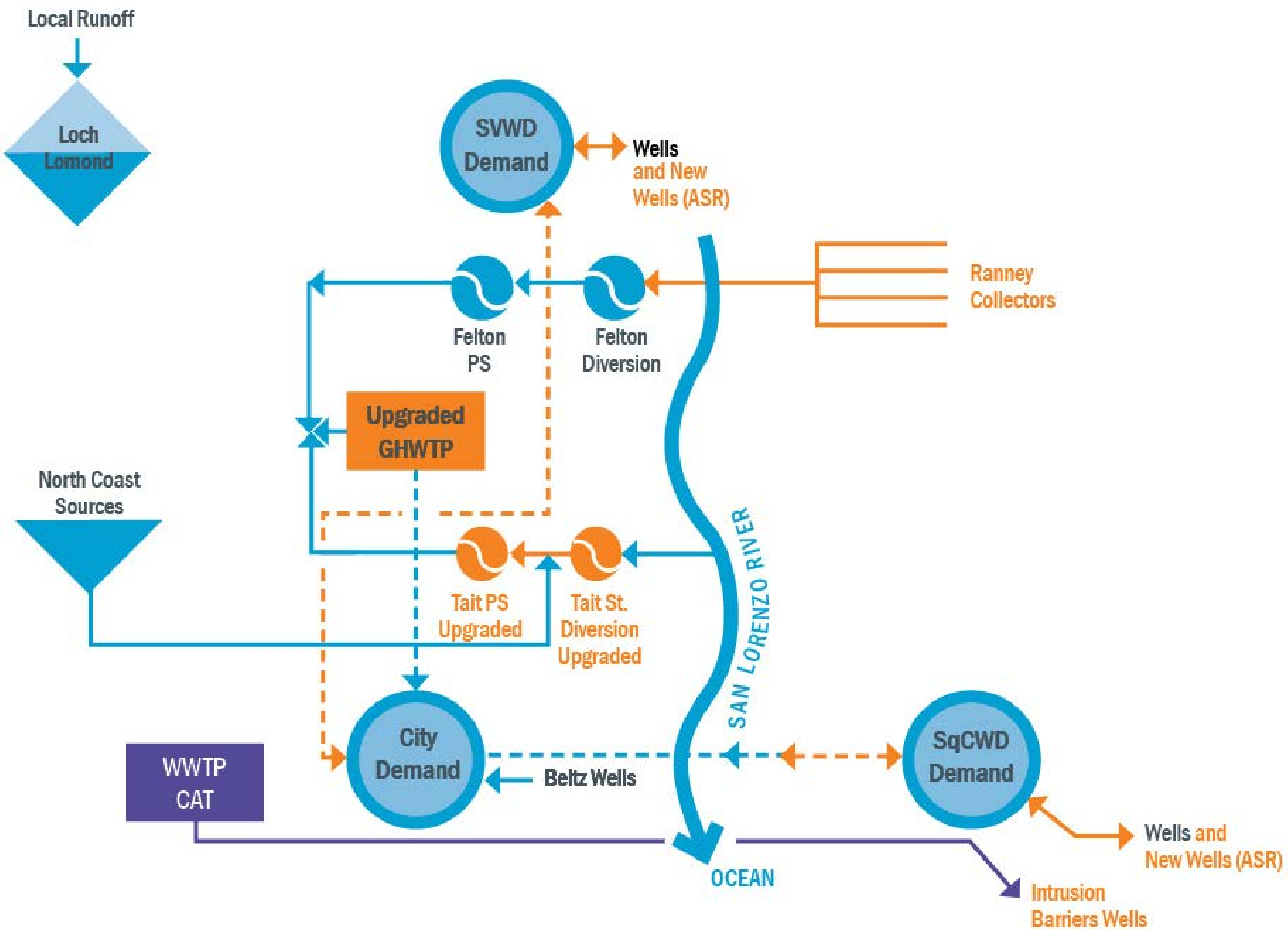
Portfolio 2 Plan A (ASR)



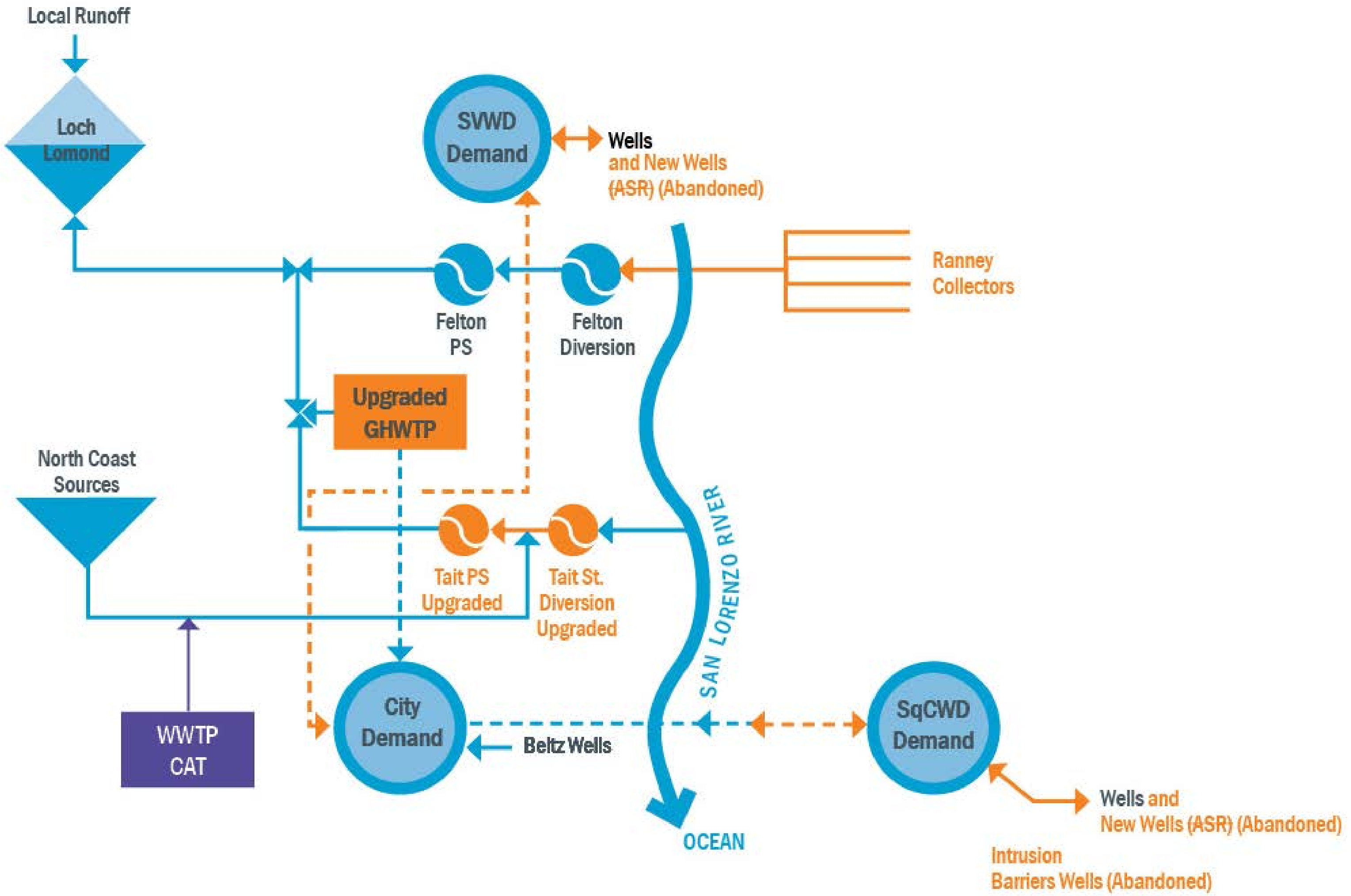
Portfolio 2 Plan B (add DPR, abandon ASR)



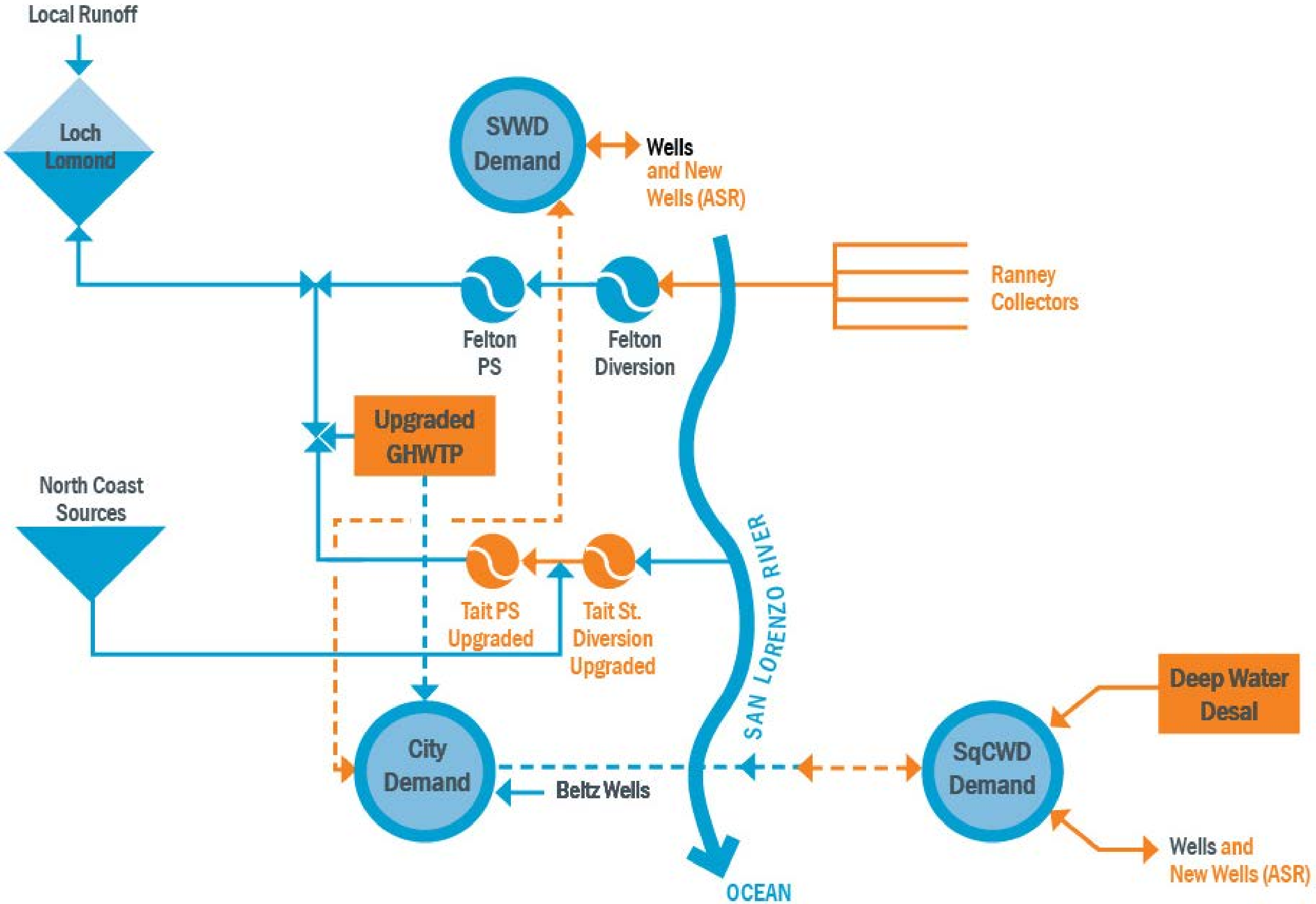
Portfolio 3 Plan A (ASR plus Seawater barrier)



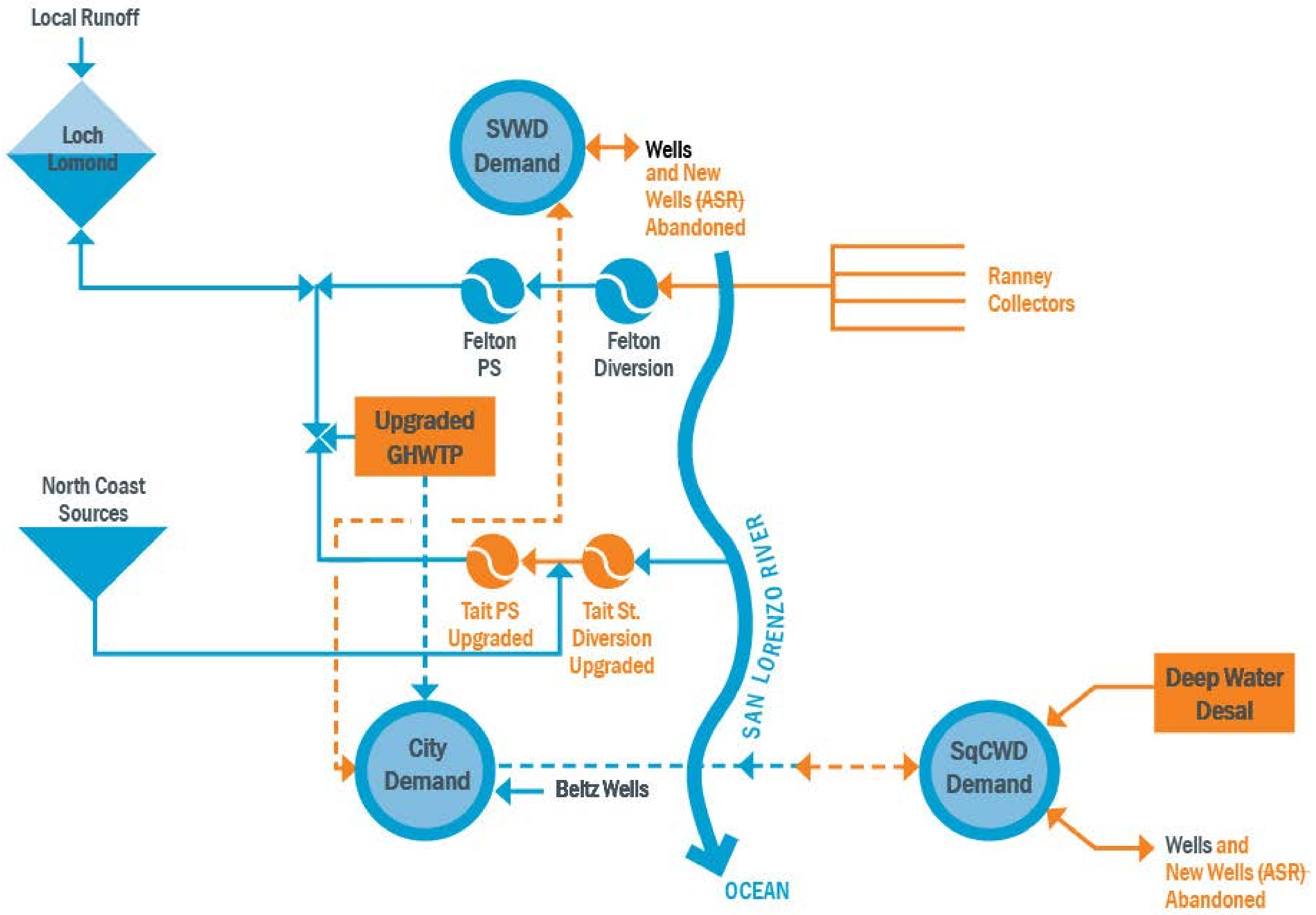
Portfolio 3 Plan B (Switch to DPR, abandon ASR)



Portfolio 4 Plan A (ASR plus DW Desal)



Portfolio 4 Plan B (Abandon ASR, Keep DW Desal)



Summary of Capital Costs

Summary of Capital Costs for Portfolios			
Portfolios	Capital Cost by Plan (million $)		
	A	B	**Total**
1	232	241	**473**
2	95	114	**209**
3	232	7	**239**
4	197	102	**197**

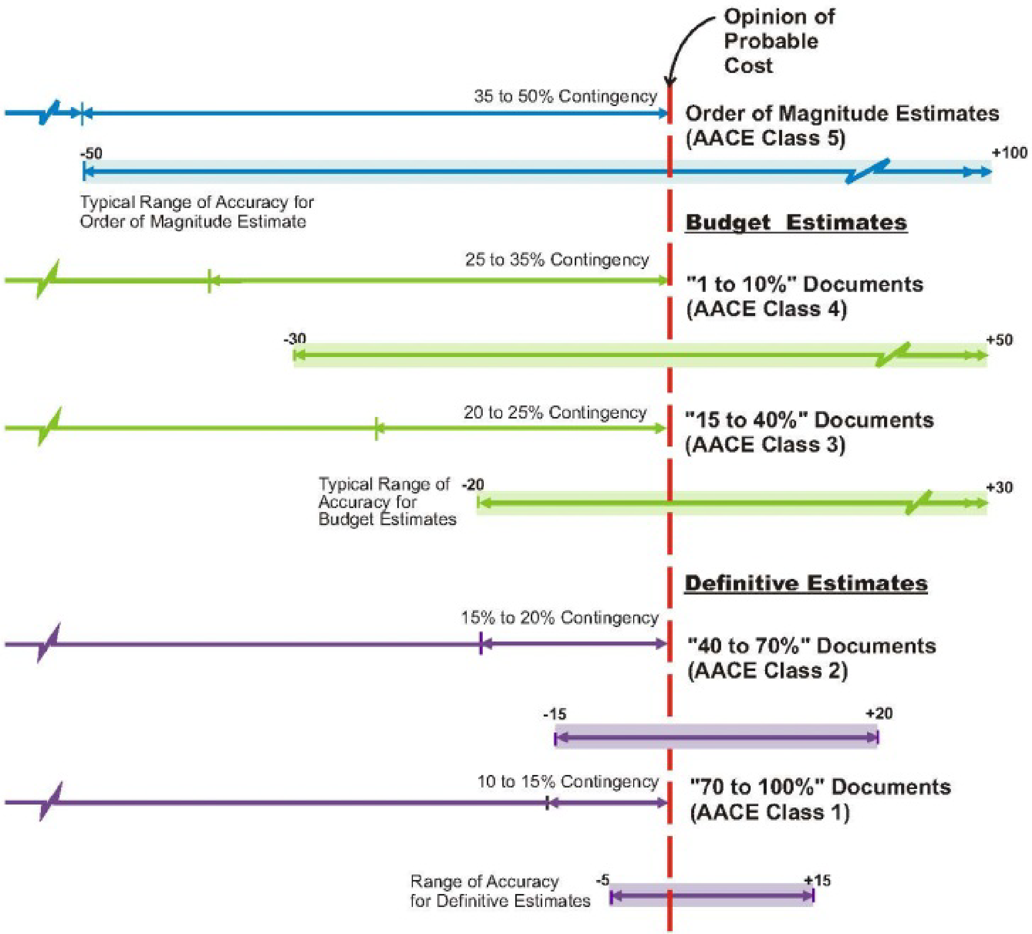
“Soft Costs”

Summary of “Soft Costs”	
Components	Percent (%)
Engineering and Administration	20
Legal	5
Geotechnical Investigation	1
Permitting – CEQA/NEPA	5
Total	**31**

Contingency Categories

- Unforeseen site conditions
- Bidding climate
- Changes in regulations
- Unexpected environmental mitigation requirements
- Stakeholder-requested or necessitated changes

Opinions of Probable Cost
Typical Contingencies and Ranges of Accuracy



Note:

1. Contingencies shown are typical
2. Ranges of Accuracy indicated are typical values from AACE document 18R-97 (REV 02/06)

- Discussion
- Questions?

Thank you!

Some Observations: Portfolio 1

- Plan A provides limited benefit
  - Shortages and curtailments likely for SCWD
  - Perhaps modestly abated by added groundwater
- Changing Loch Lomond reserve (1 bg to 500 mg)
  - Modest increase in in-lieu recharge
  - Places SCWD at risk
- Adding purified recycled water to Loch Lomond helps significantly
  - Addresses all needs in SCWD, and SVWD and SqCWD
  - But adding IPR comes at a fiscal and energy cost

Some Observations: Portfolio 2

- Plan A, ***IF*** ASR functions as required, addresses City needs
  - Will take at least a decade to reach this point
  - Does not address needs in SVWD or SqCWD
- Plan B, switching to DPR, meets all SCWD needs
  - Also enables in lieu recharge (by meeting 57% of SVWD and SqCWD demands)
  - Costs a bit more than Plan A (ASR)
  - Higher energy use than ASR

Some Observations: Portfolio 3

- Plan A, ***IF*** ASR functions as required, addresses City needs (after a decade or so)
  - Purified recycled water for seawater intrusion barrier wells may facilitate more near-term groundwater use
  - Does not address needs in SVWD or SqCWD
- Plan B, switching to DPR, meets all SCWD needs
  - Also enables in lieu recharge (by meeting 57% of SVWD and SqCWD demands)
  - Adds a modest added costs to Plan A (convert IPR to DPR)

Some Observations: Portfolio 4

- Plan A, ***IF*** ASR functions as required, addresses City needs
  - Having DW Desal water in Plan A assures SCWD needs are met
  - Also addresses 100% of demands in SVWD and SqCWD
- Plan B, switching to DPR, meets all SCWD needs
  - Also enables in lieu recharge (by meeting 57% of SVWD and SqCWD demands)
  - Costs a bit more than Plan A (ASR)
  - Higher energy use than ASR

- Discussion
- Questions?

Thank you!