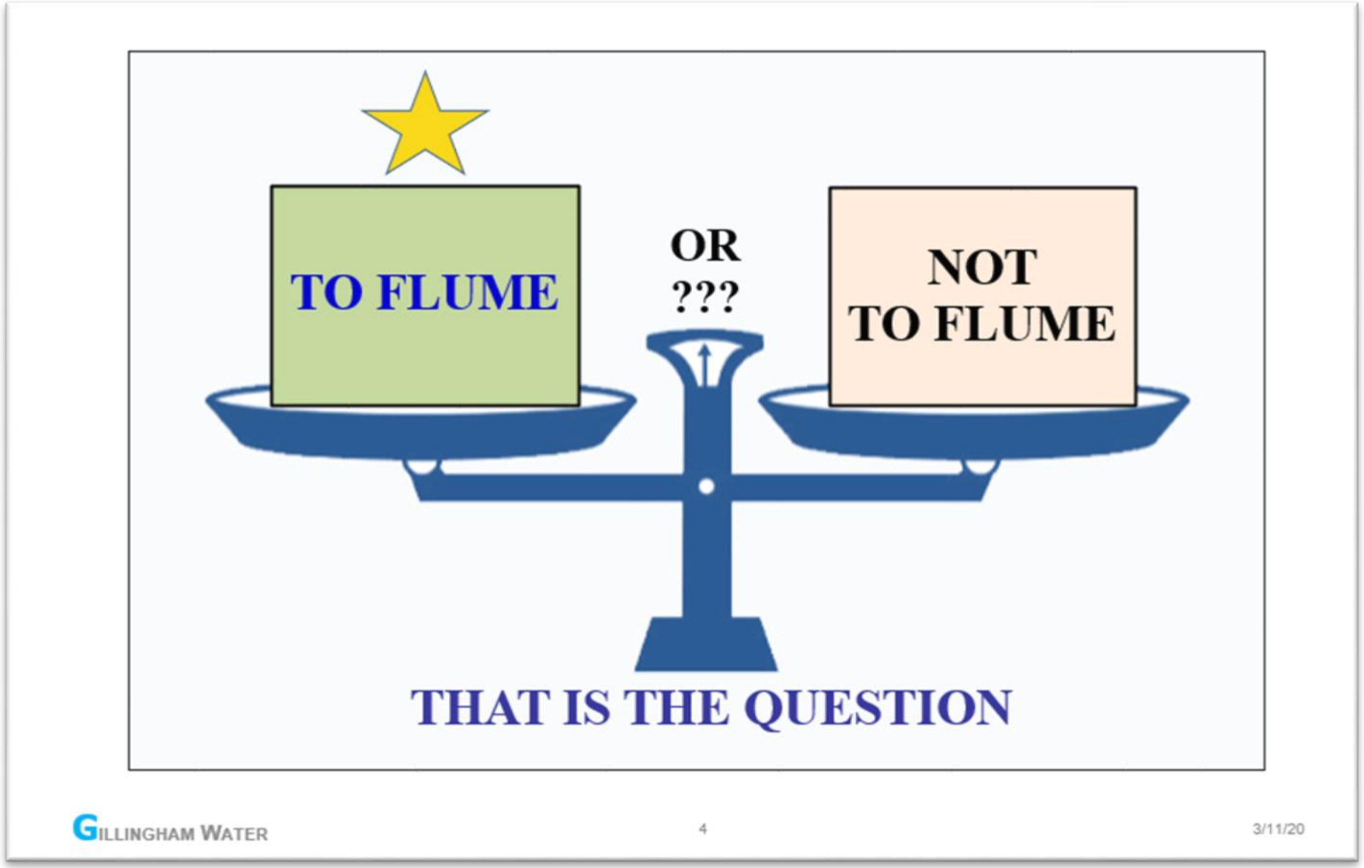
Flume Replacement Alignment Study

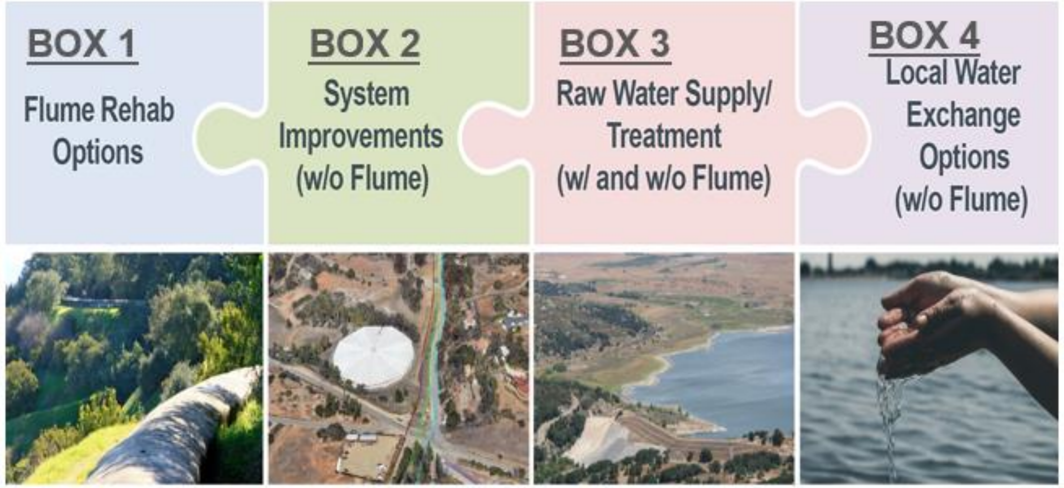
Board Workshop #3 – Fine Screening

December 11, 2023

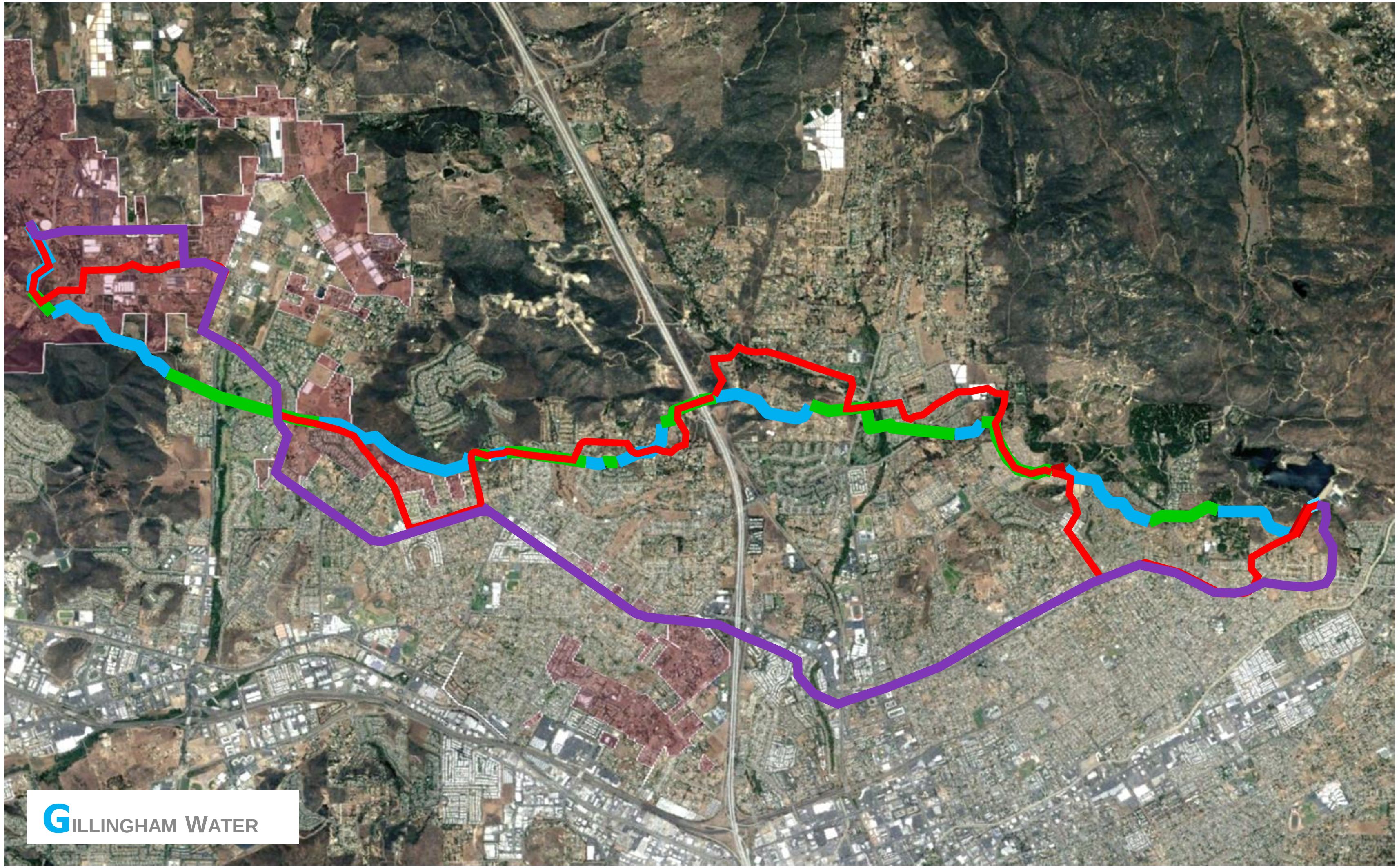
Defining the **next** legacy

Where we came from: **To Flume or Not to Flume?**





Where we came from: **Two Alternatives Captured the Range of Possibilities**



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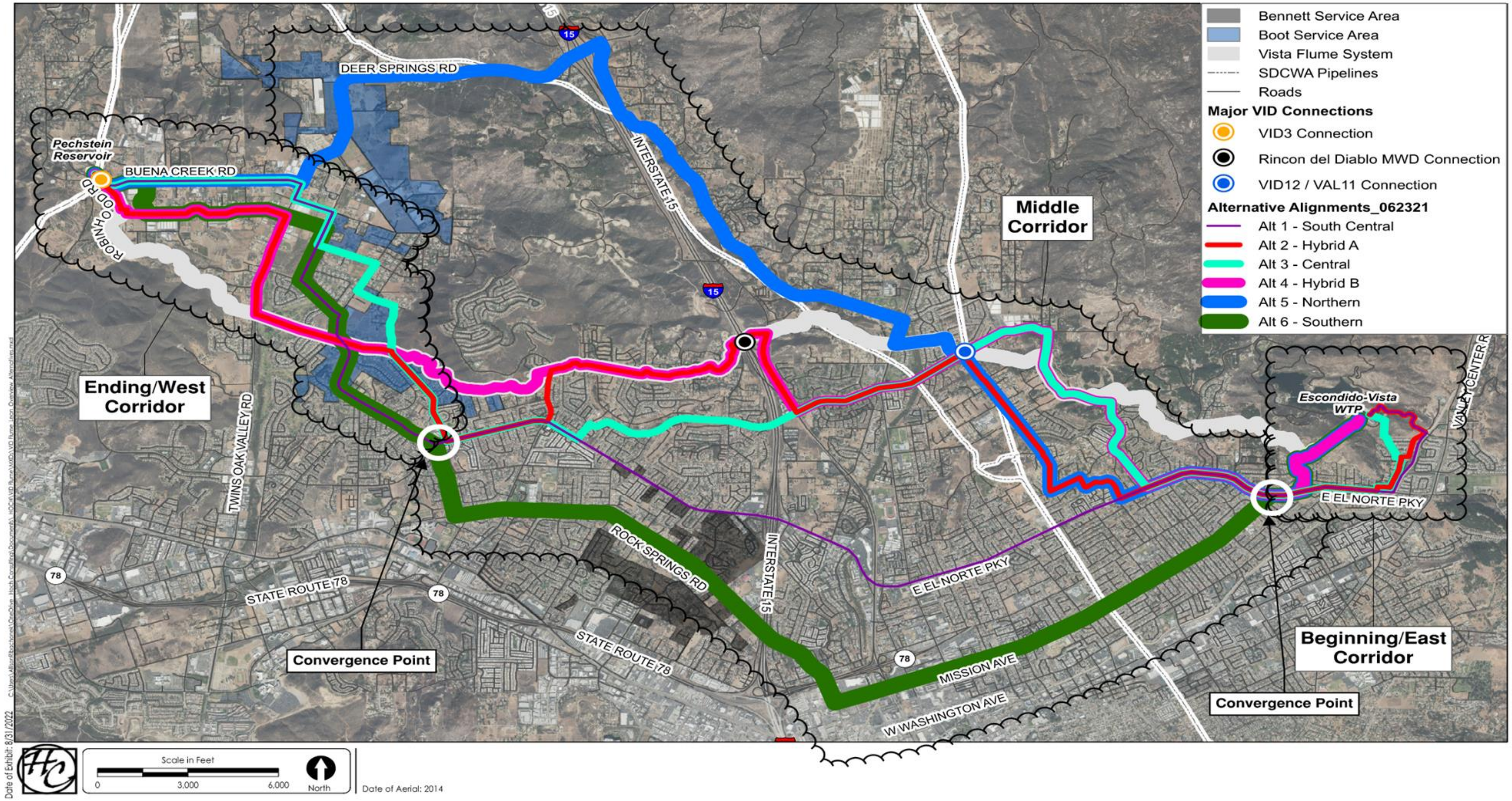
RELIABLE

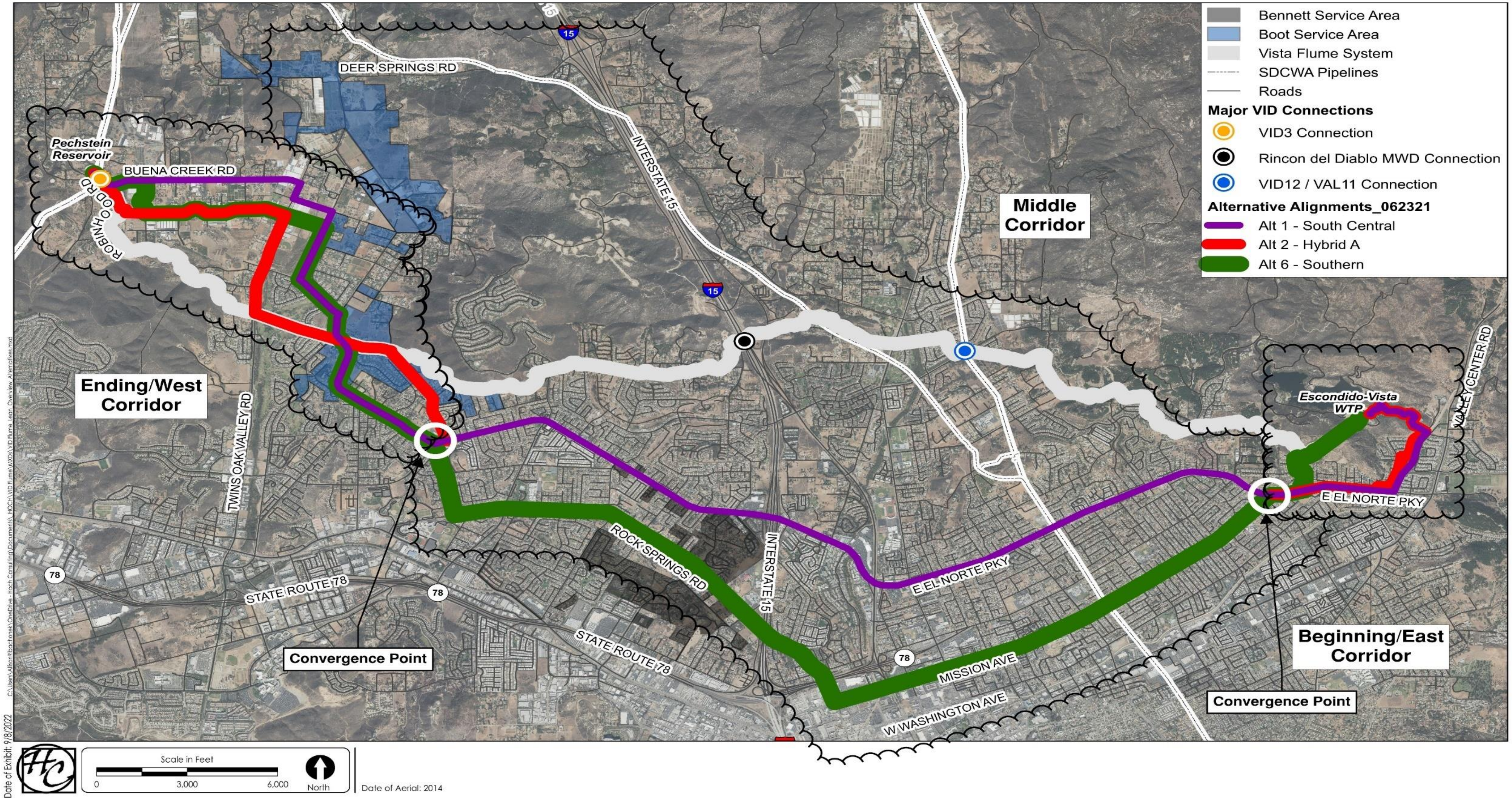
AFFORDABLE

RESPONSIBLE

This study developed a total of **six alignments alternatives.**



Coarse screening shortlist; **two alignments plus two corridors**



Fine screening recommends; Alternative #1 plus One Corridor

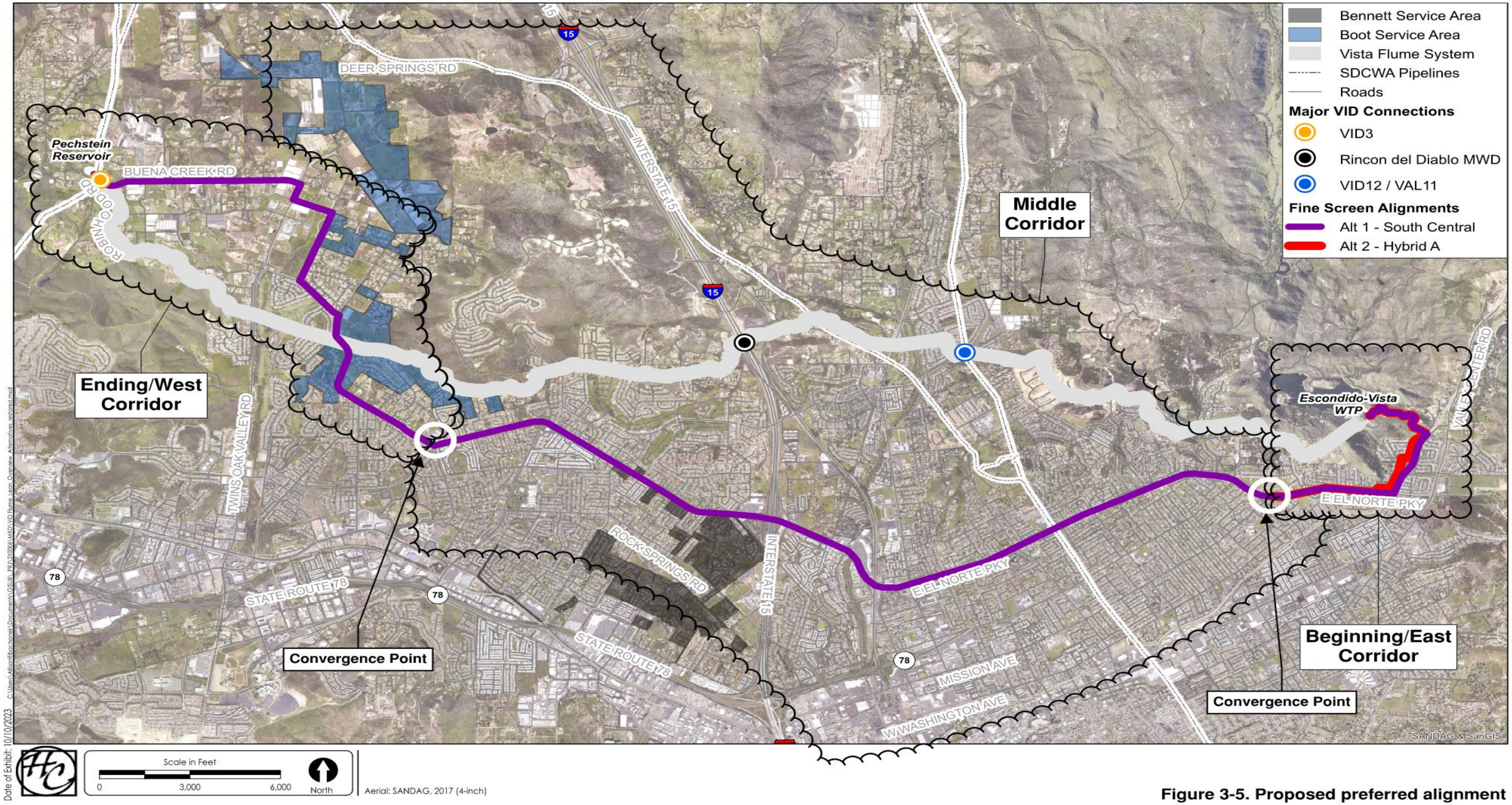


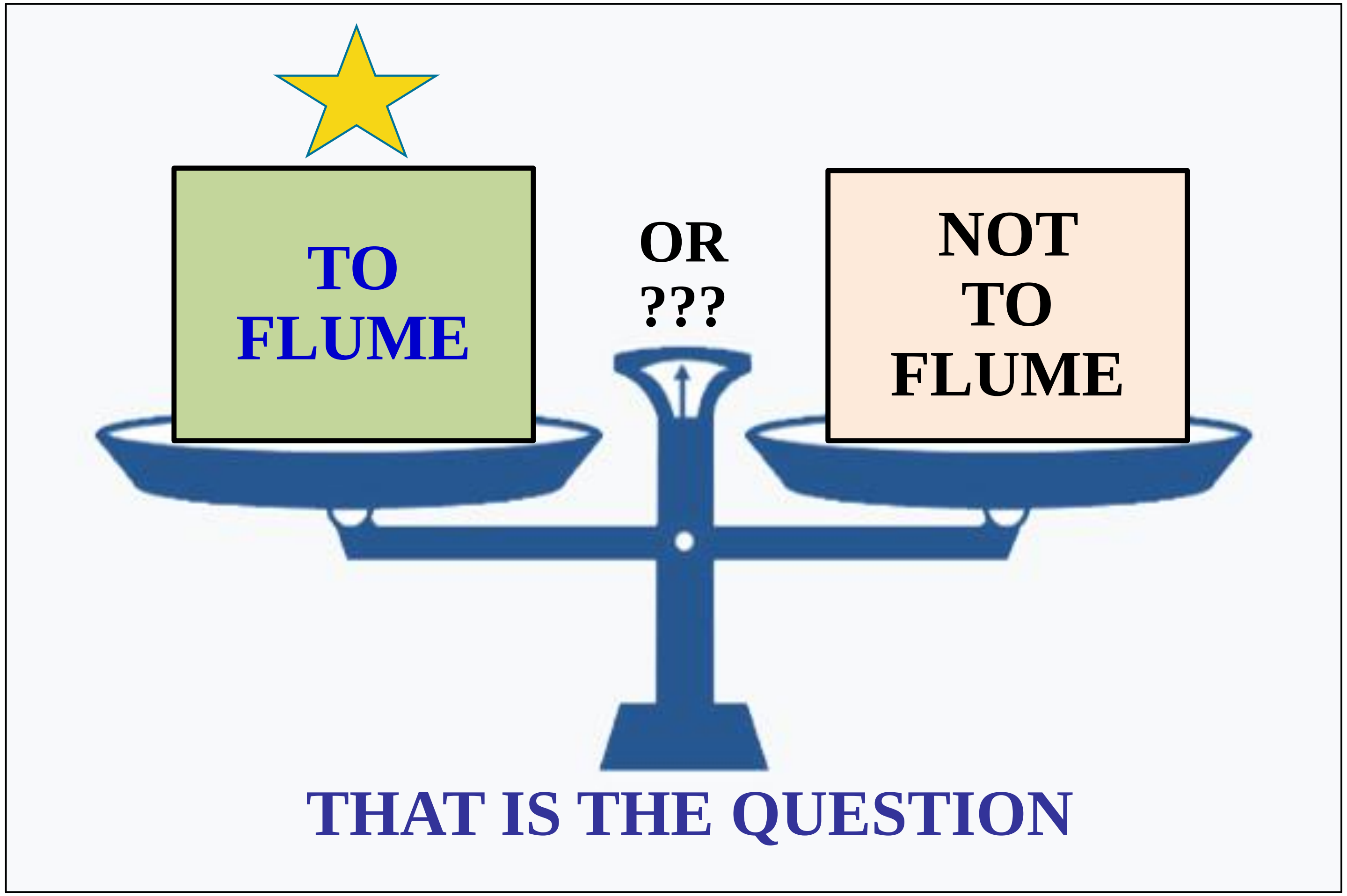
Figure 3-5. Proposed preferred alignment

Predictive climatological modeling **supports the To Flume decision for 80% of climate scenarios modeled**.

Table 4-2. Possible Range of Local Water System Investment Scenarios

Local Water System Investment Scenario	Capital Costs[a]	Anticipated Range of Average Annual Local Yield (AFY) [b,c]		
		Dry [b,c] (CMCC_CMS RCP8.5)	Baseline [b,c] (Historical)	Wet [b,c] (CanESM2 RCP8.5)
Scenario #1: Low-range • Maintain wellfield as-is; no new wellheads • No long-term in-lake HABs solution • Respond to HABs using algaecide when needed • No lake bypass pipeline or additional operational flexibility	$8M	1,700	2,500	3,000
Scenario #2: HABs Control Only • Replace wellheads as-needed to preserve historical yield • Implement long-term in-lake HABs solution • Preventative HABs control using chemical treatment • No lake bypass pipeline or additional operational flexibility	$13M	1,900	2,700	3,300
Scenario #3: Baseline or "Mid-Range" • Optimize wellfield to achieve the historical, and can achieve sustainable yield over 12-months [d] • Implement long-term in-lake HABs solution • Preventative HABs control using chemical treatment • No lake bypass pipeline or additional operational flexibility	$23M	4,700	5,600	7,500
Scenario #4: Max. Allowable Sustainable Yield • Maximize wellfield to achieve allowable sustainable yield [e] • Implement long-term in-lake HABs solution • Preventative HABs control using chemical treatment • No lake bypass pipeline or additional operational flexibility	$37M	5,400	6,200	7,800
Scenario #5: High-range • Maximize wellfield to achieve allowable sustainable yield [e] • Implement long-term in-lake HABs solution. • Preventative HABs control using chemical treatments • Install a lake bypass pipeline for additional operational flexibility	$57M	6,900	7,200	7,900

Despite escalating costs, need for financing, and future local water system investments, **the decision To Flume still maintains the economic advantage.**



Workshop Objectives

- **Report** on work completed to-date
  - field investigations and alternatives analysis
  - fine screening evaluation results and shortlist
  - predictive climatological modeling
  - cost & affordability check
- **Obtain Board's feedback** on work performed and recommended next steps
- **Reach consensus** on:
  - advancing study to Phase 5 – Recommended Alignment Report

Agenda

1. Introduction and Objectives
2. Overview of Shortlisted Alternatives
3. Alternatives Evaluation – Fine Screening
4. Predictive Climatological Modeling
5. Project Affordability Update
6. Conclusions & Next Steps

1. Introduction and Objectives

Speaker: J.P. Semper, P.E.

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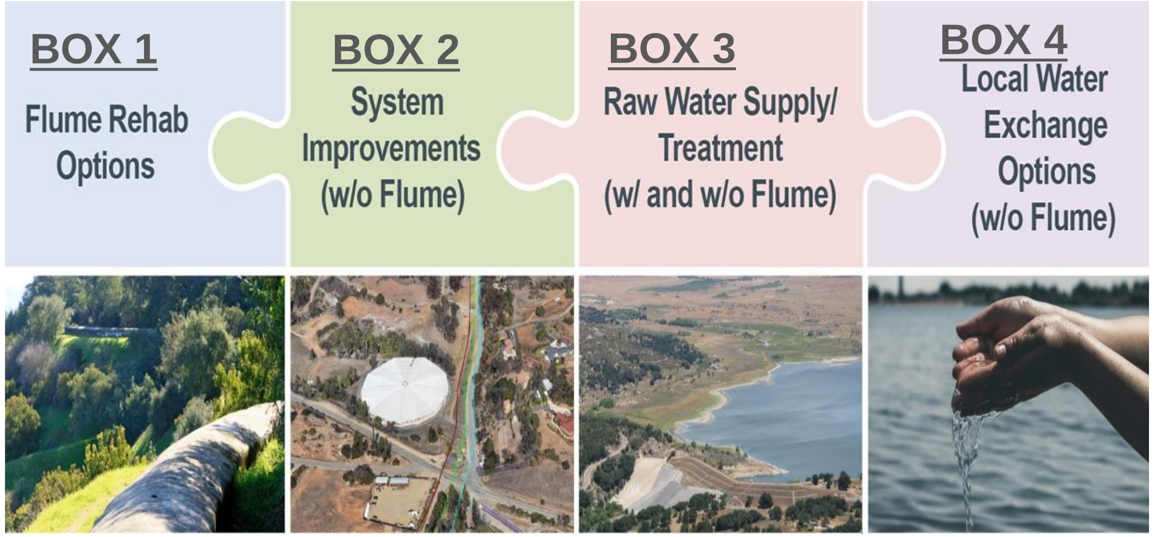
Where we came from: To Flume or Not To Flume?

- WSPS, which concluded in Jan. 2020, Four “Boxes” were evaluated
- 2 alignment alternatives defined the range of the “To Flume” project
- Determined “To Flume” was most favorable option



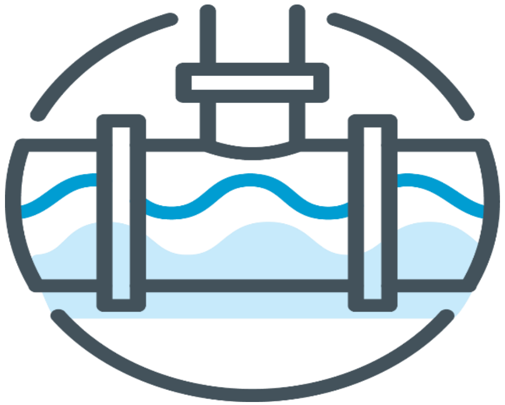
Next Steps: To Flume

Action	Schedule / Budget
1. Alignment Study	18-24 months $0.75M - $1.25M
2. Environmental Documentation	18-24 months $0.75M - $1.25M
3. Financial Planning	12-18 months $0.1M - $0.25M
4. Miscellaneous • Average Local Yield: Refine estimates	12-18 months $0.1M - $0.25M
TOTAL	24-36 months $1.7M - $3M

Where are we headed: How to Flume?

PLANNING FACTORS:

- feasibility and cost-effective construction
- reliability
- environmental effects
- long-term operations and maintenance (O&M)
- affordability, impacts to rates, and funding options
- *NEW* predictive climatological modeling



RELIABLE

AFFORDABLE

RESPONSIBLE

Where are we headed: How to Flume?

SUCCESS FACTORS:

- **Consider a reasonable range of potentially feasible alternatives** that will foster informed decision-making and public participation, per CEQA.
- **Avoid surprises related to feasibility or cost** that unexpectedly tips the scale on the "To Flume or Not to Flume" decision by regularly tracking pertinent cost data and preparing more detailed construction cost estimates.
- **Support the District's decision to replace the Flume by presenting a clear project roadmap** in a preliminary design report that includes a project funding plan for the preferred alignment.

RELIABLE AFFORDABLE RESPONSIBLE

Where are we headed: How to Flume?

<u>PLANNING OBJECTIVES:</u>

1. Alignment Criteria and Alternatives Evaluation
2. Funding Support
3. Project Affordability Checks
4. Assess Potential Environmental Impacts
5. Convene Multiple Workshops with the Board

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Recap of Board Workshop #1

CONCLUSIONS:

1. Six alignments have been developed
2. To Flume continues to be economically preferred
3. Retiring the Flume remains a high priority
4. Advancing financial planning for this project would be prudent

"For Workshop No. 2, we will prepare a discussion related to project affordability, funding opportunities, prioritization within the District's Capital Improvement Plan (CIP), and next steps for preparing the District in securing financial assistance may it be through grants or loans."

NEXT STEPS:

1. Collect detailed data for the six alignments
2. Develop capital costs for the six alignments
3. Conduct Coarse Screening and shortlist top 2-3 alignments
4. Begin preliminary financial planning to understand the cost of funding
5. Repeat the affordability check with refined information
6. Report back to the Board at Workshop #2

Recap of Board Workshop #2

CONCLUSIONS:

1. Alternatives 1 & 6 plus two corridors shortlisted for Fine Screening
2. PAYGO is no longer an option and capital financing is needed
3. To Flume retains significant cost advantage over Not To Flume
4. Investing in the local water system will improve local yield and improve the economic advantage

"For Workshop No. 3, we will prepare a climatological model that will consider a range of possible local yields based on varying climate scenarios."

NEXT STEPS:

1. Proceed with Fine Screening
2. Continue investigating HABs mitigation and wellfield optimization
3. Perform predictive modeling of future yield
4. Hire municipal 'financial' advisor
5. Continue collecting data required for environmental documents
6. Conduct another Affordability Check-in and report back to the Board at Workshop #3

Where are we today: Phase 4 – Fine Screening

1. Conducted field investigations and collected additional data on the shortlisted alignments.
2. Updated planning level cost estimates for each alignment.
3. Refined evaluation criteria and performed Fine Screening.
4. Selected and recommended one preferred alignment.
5. Completed affordability check-ins confirming the To Flume decision.
6. Conducting final Board workshop.

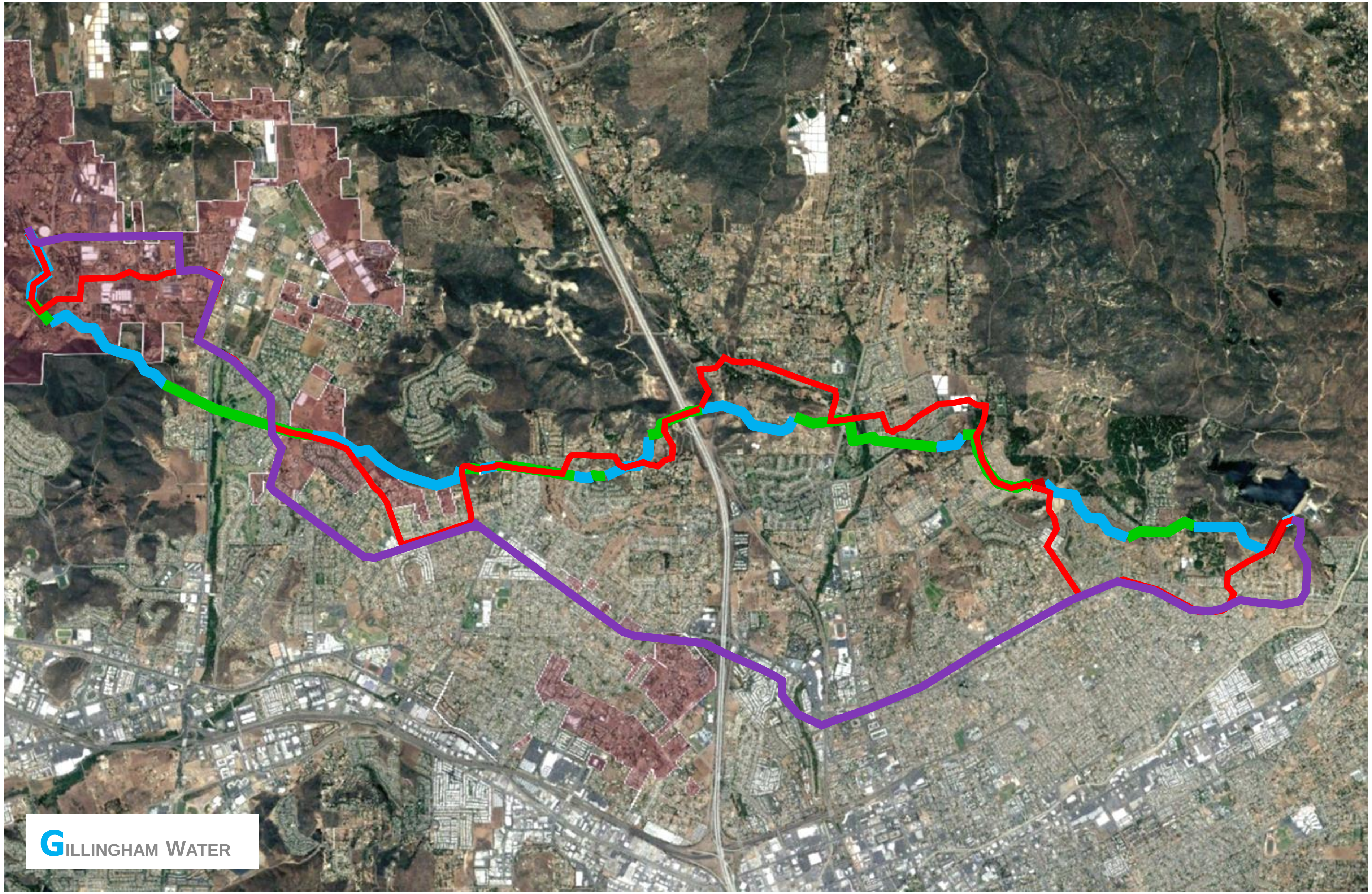
What's Next?

Complete the Study under,
Phase 5 - Recommended Alignment Report (RAR)

2. Overview of Shortlisted Alternatives

Speaker: Octavio Casavantes, P.E.

WSPS Alternatives: captured a wide-range of “replacement” costs



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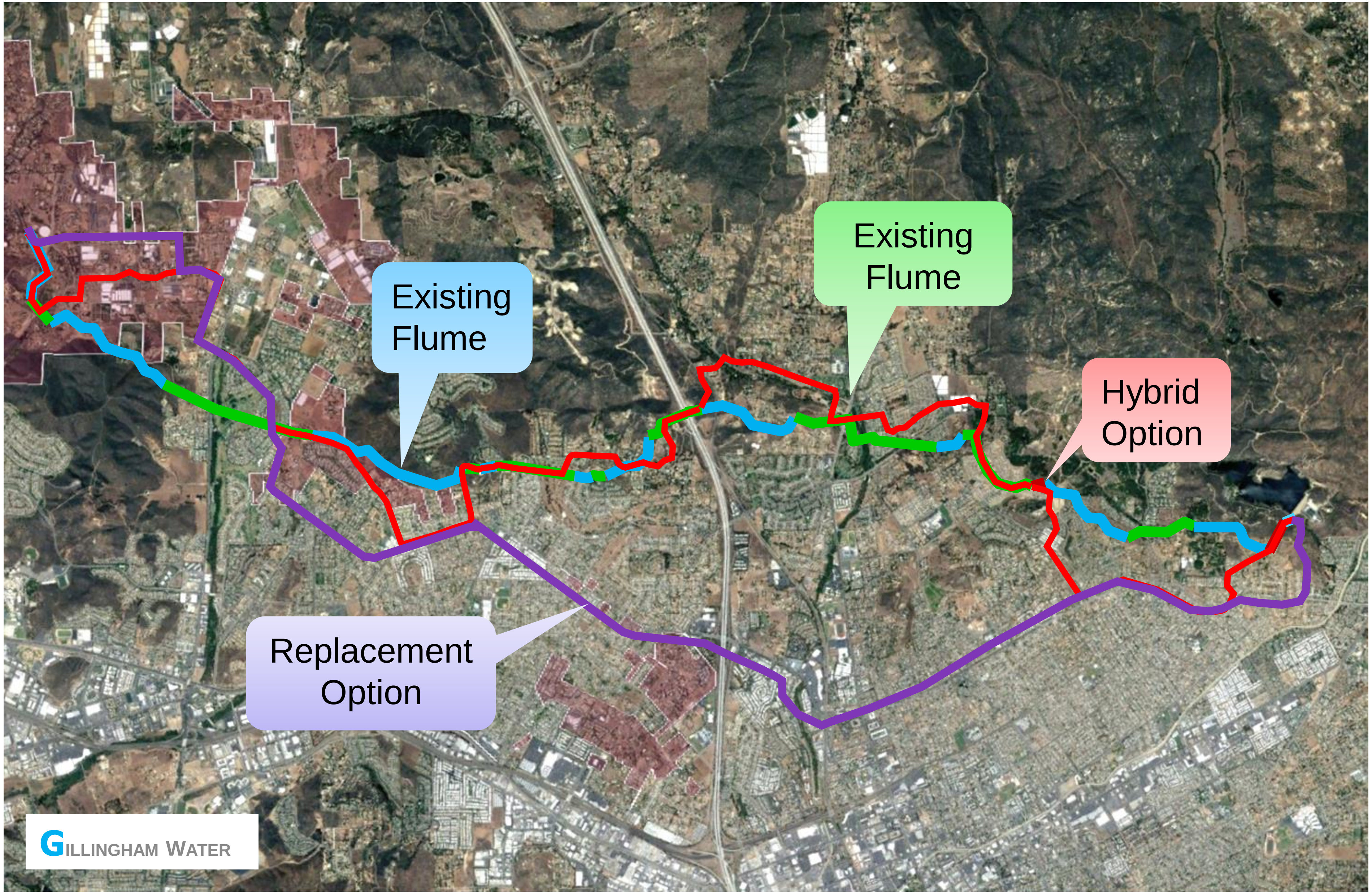
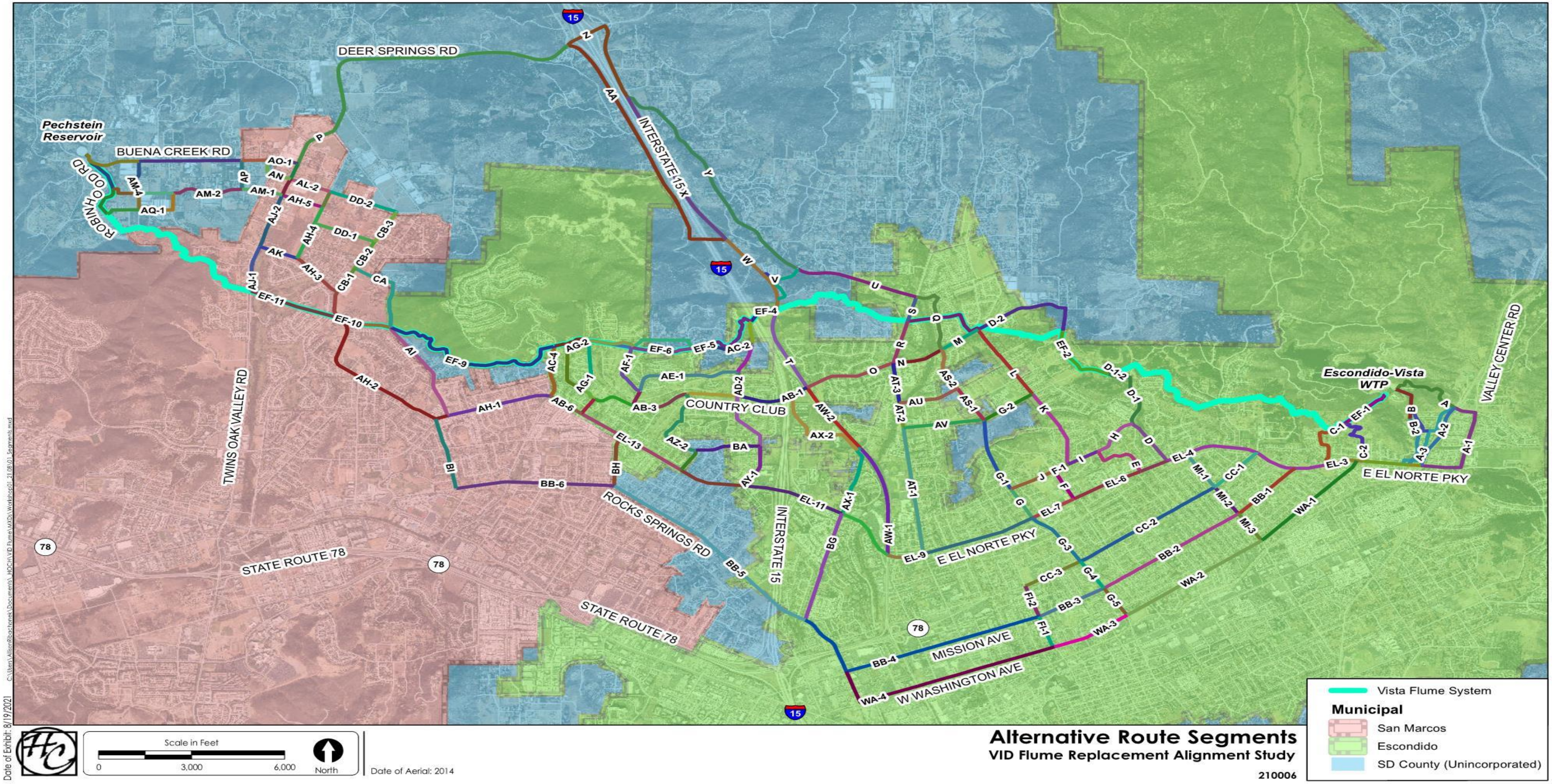
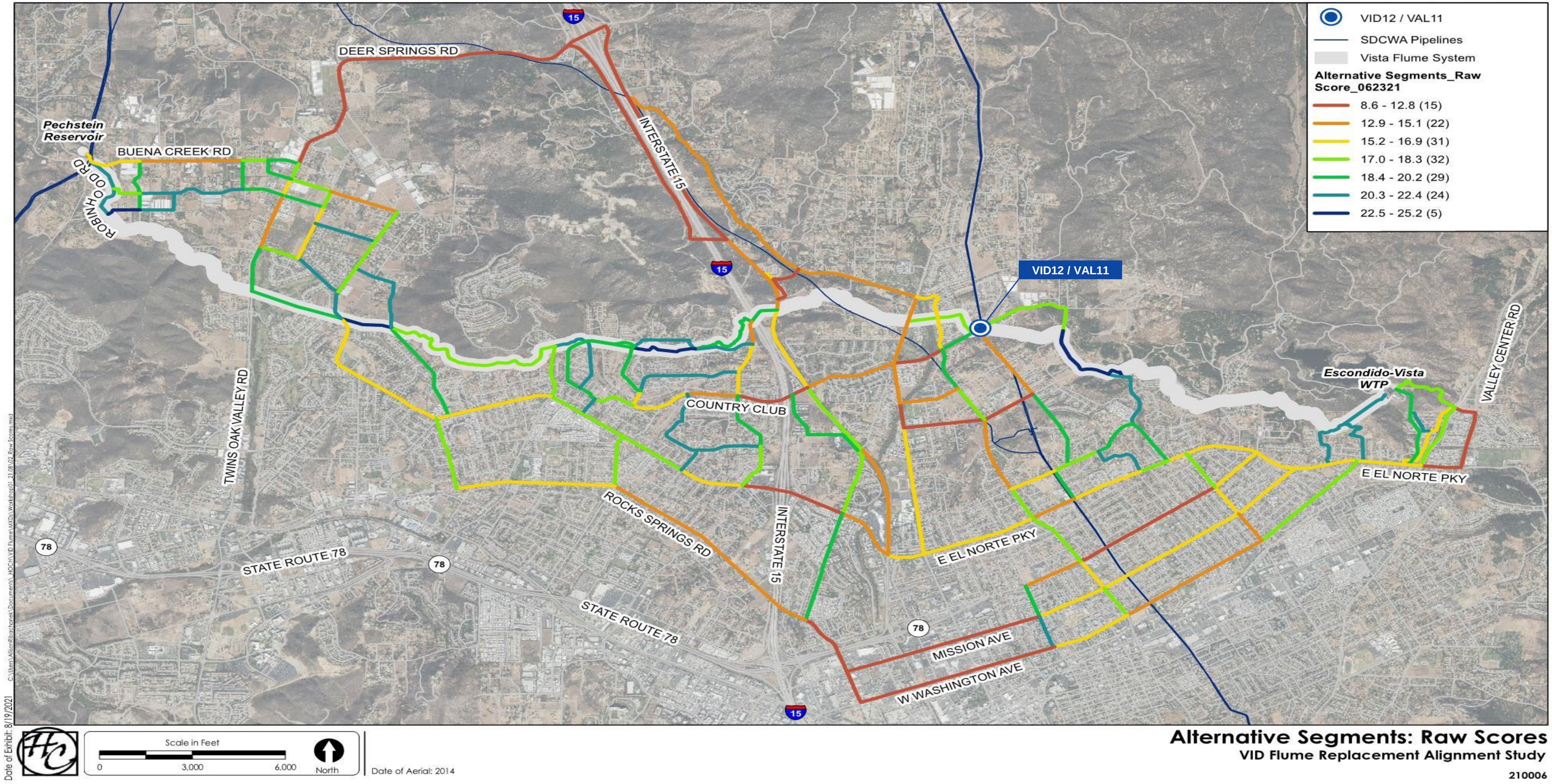


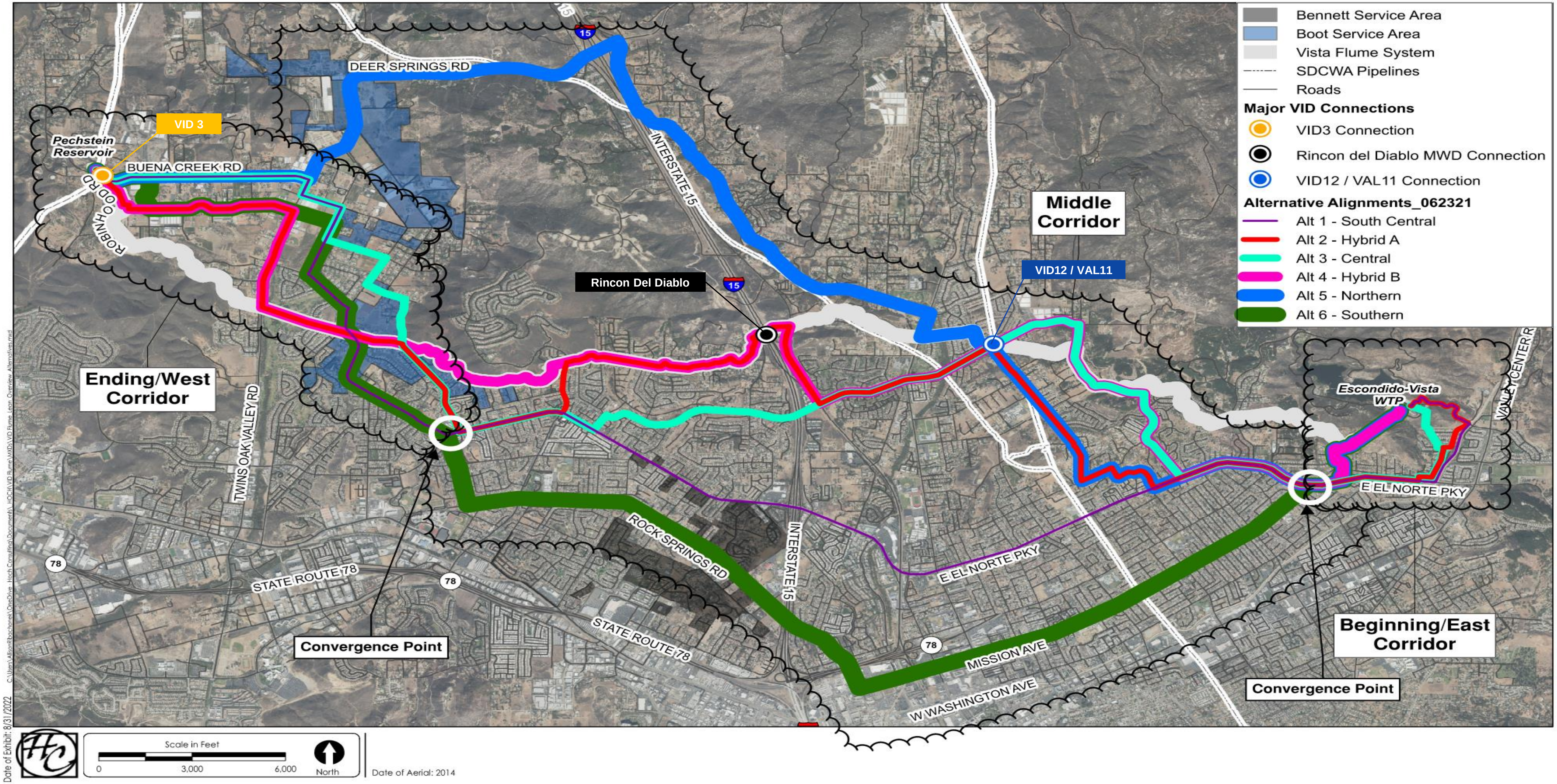
Constructible Corridors: total of 158 segments evaluated



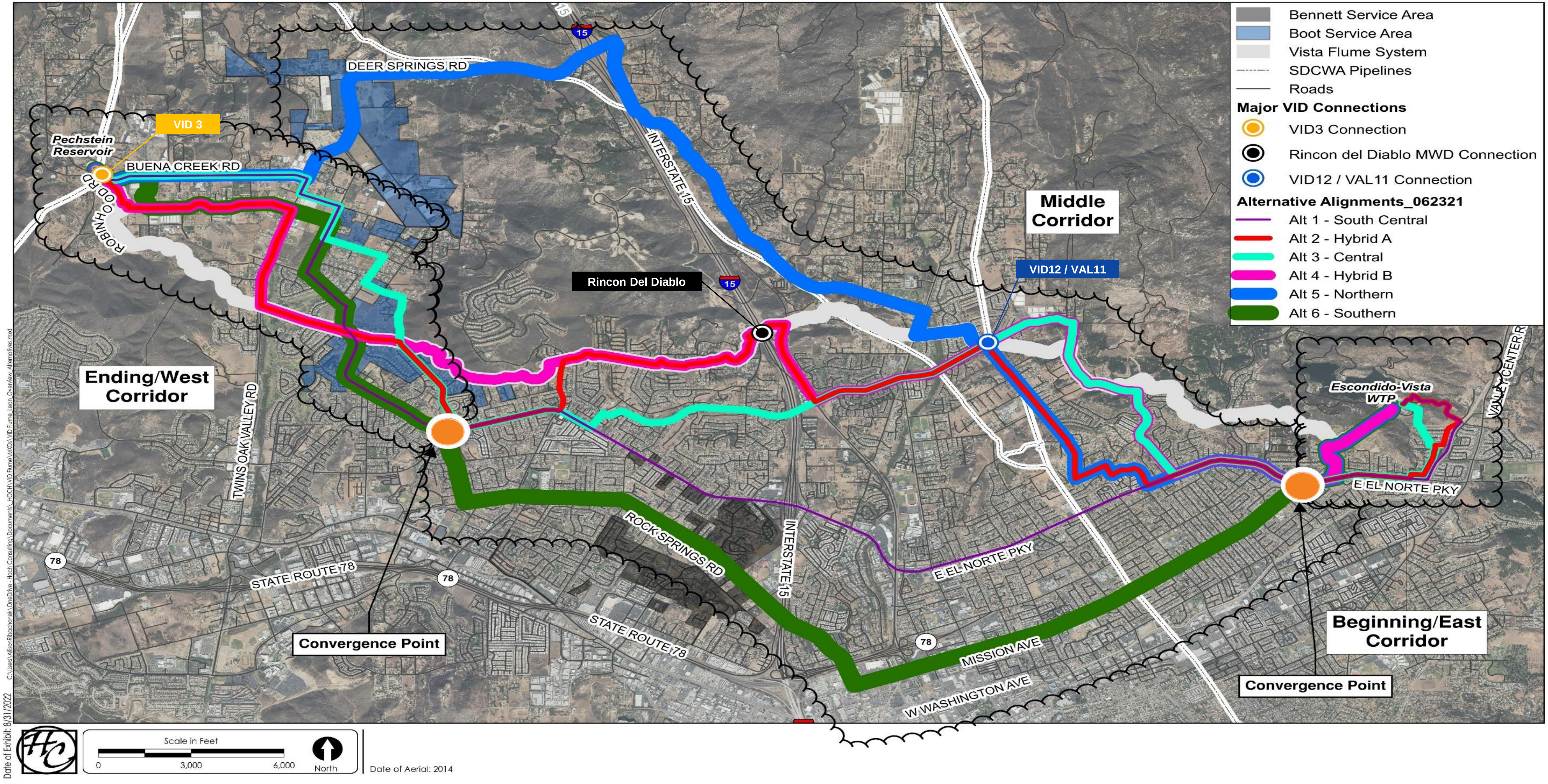
Constructible Corridors: preferred segments identified



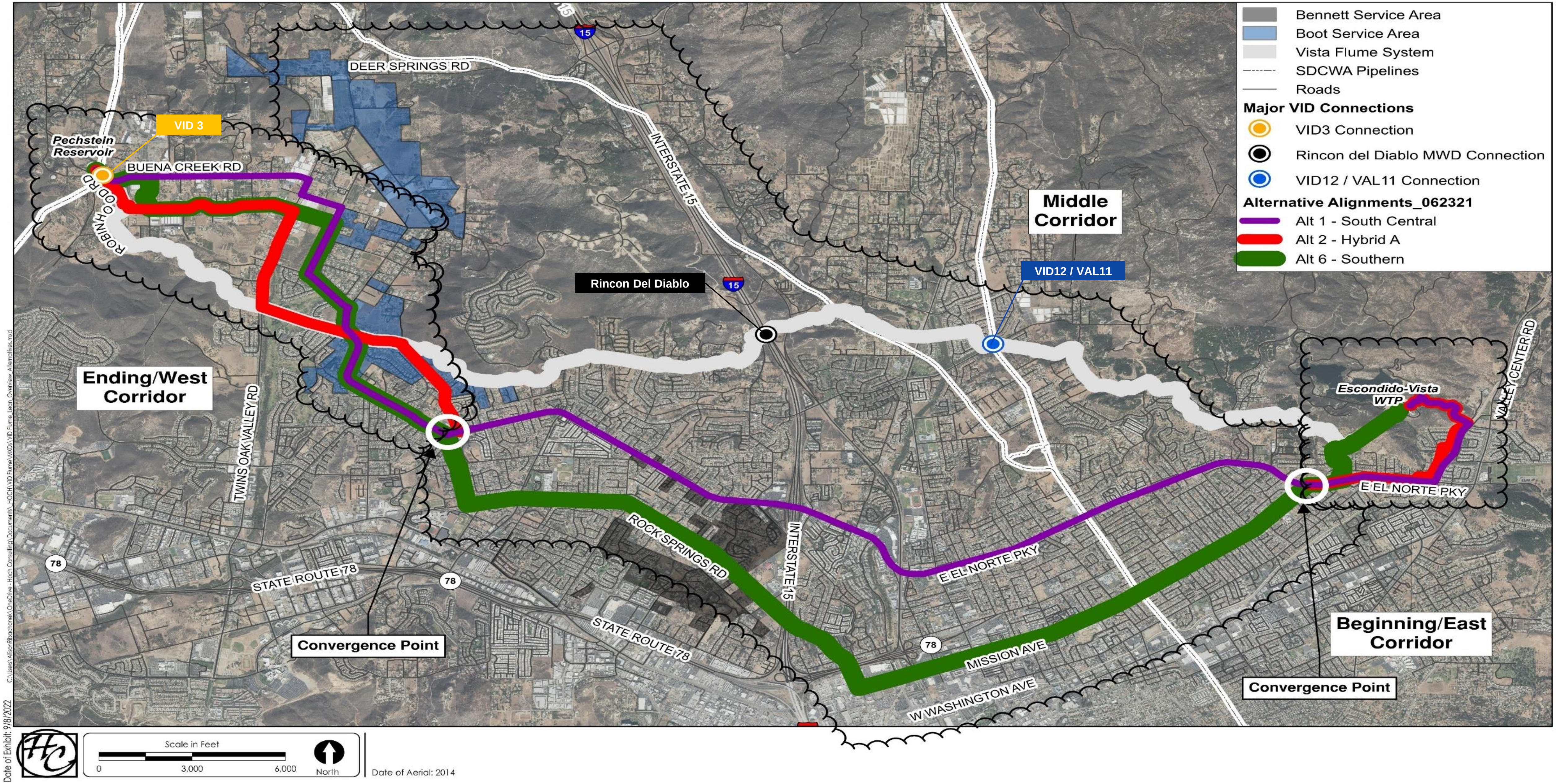
Alternative Alignments: a total of six were identified



Keeping our options open with a Beginning, Middle, and End



Coarse Screening: two alignments shortlisted plus two corridors



A comprehensive dataset to support Fine Screening

- Site/Community Characteristics
  - Schools
  - Fire Department
  - Parcel/Property owners
  - Existing utility records
  - ROWs and Easements
- Traffic
  - Routing studies
  - Road classification
  - Speed limits
  - Traffic
- Environmental
  - Vegetation maps
  - Conserved lands
  - Cultural
  - Draft MSCP
- Geology
  - Groundwater maps
  - Liquefaction maps
  - Field - Rock Classifications
  - USGS Hydrologic Data
  - Fault maps
  - Creeks
  - Flood maps
- Interagency
  - CIP plans
  - CWA aqueduct maps
  - Freeway crossings
- Permitting
  - DDW Regulations
  - Jurisdictional areas
  - Wetlands
  - Waters of the U.S.
  - Sensitive/protected species & vegetation
- Hydraulics
  - Existing VID system
  - Pechstein Reservoir
  - EVWTP
  - New facilities
- O&M
  - WTP Operations
  - Site access
  - Agency connections
  - Local agreements
  - Boot & Bennet service areas
- Cost/Affordability
  - Funding Sources
  - Pavement Moratoriums
  - Utility Conflicts

Digitized field data and desktop analyses for the District's project file and future use in design

Geotechnical

- Borings and geophysics
- Hardrock rippability
- Groundwater and liquefaction
- Environmental prescreen

Site Walks

- Access and constructability
- Surface features & utility conflicts
- Traffic and community impacts
- Public/Private | Commercial/Residential

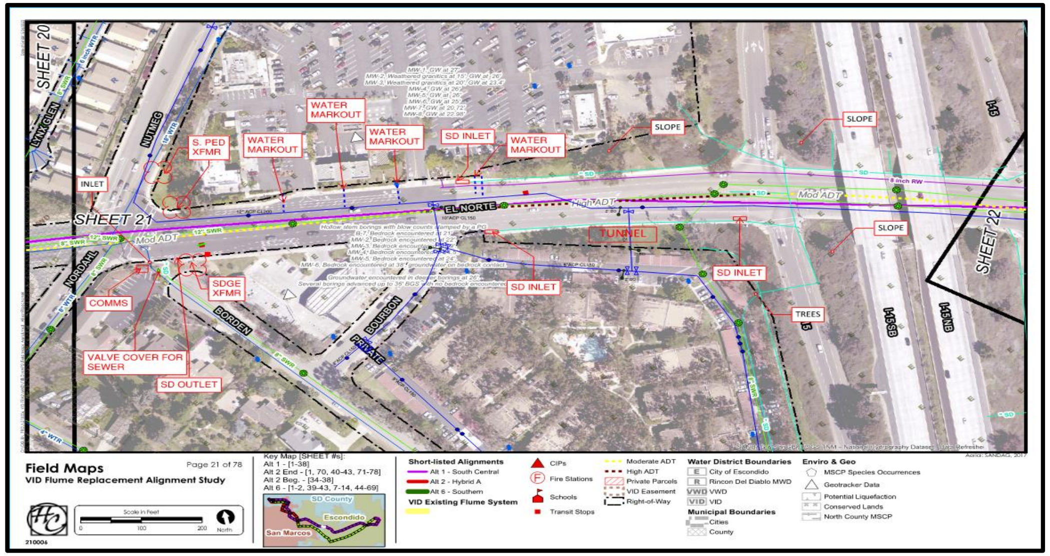
Digitizing the data for Fine Screening & the District's Record

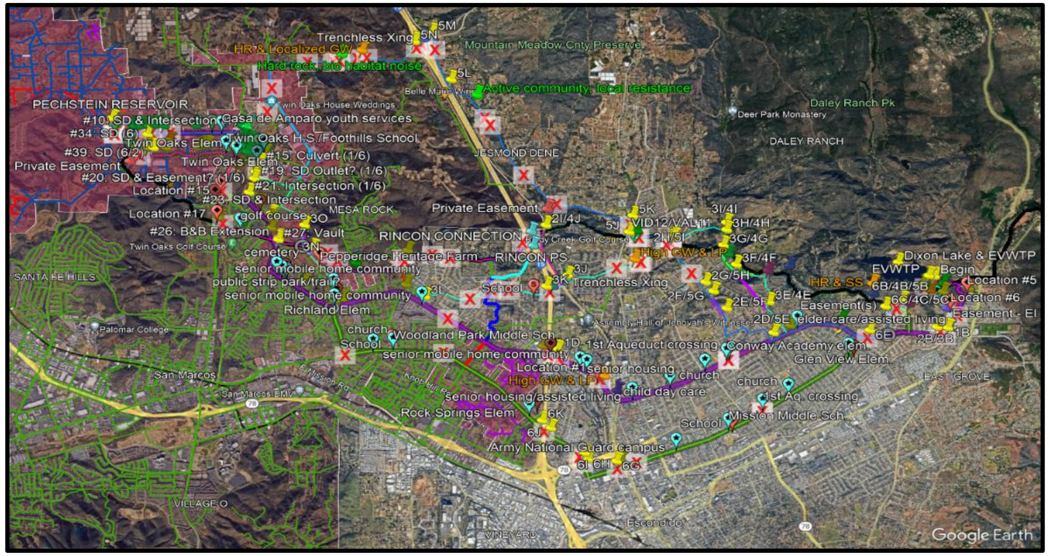
GIS & PDF

- Utility record drawings
- Capital Improvement Plans
- Environmental
- Geotechnical, Land Use & Traffic

Google Earth

- Database of Maps
- Geotechnical & Environmental
- Land Use & Traffic
- Utilities

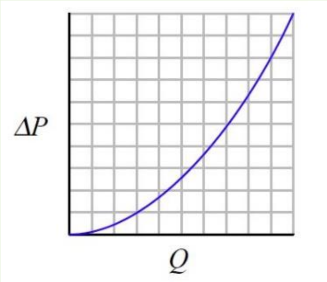




Stakeholder engagements continued through Fine Screening

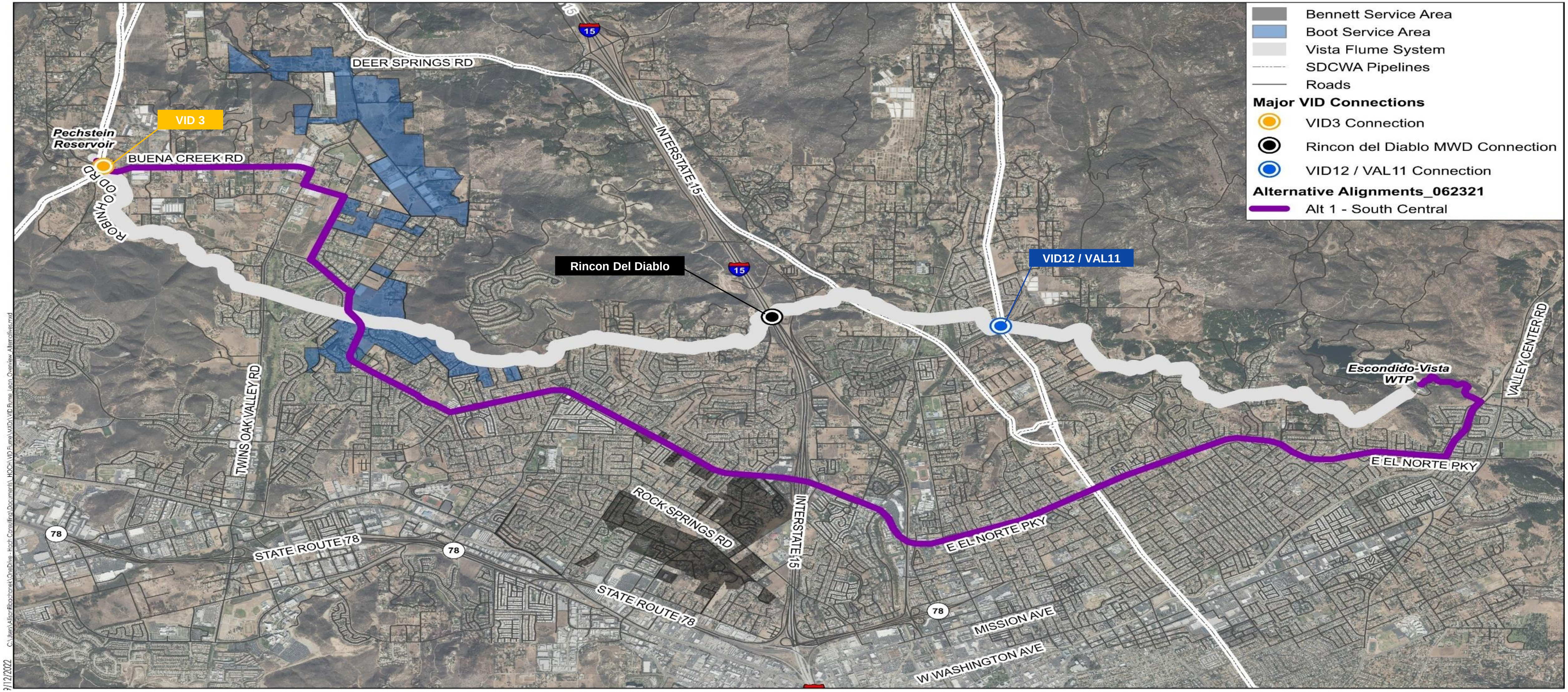
- **Key stakeholder engagements**
  - City of Escondido Public Utilities & Engineering
  - EVWTP operations staff
  - Rincon Del Diablo MWD
  - DDW
  - Other agencies (e.g., Caltrans, County of SD, SDG&E, etc.)

- **Hydraulics (District's Operations)**
  - Meeting regulatory requirements
  - Long-term operations and maintenance



- **Permitting**
  - Environmental – CEQA
  - Construction – County, City, etc.
  - Operating – DDW

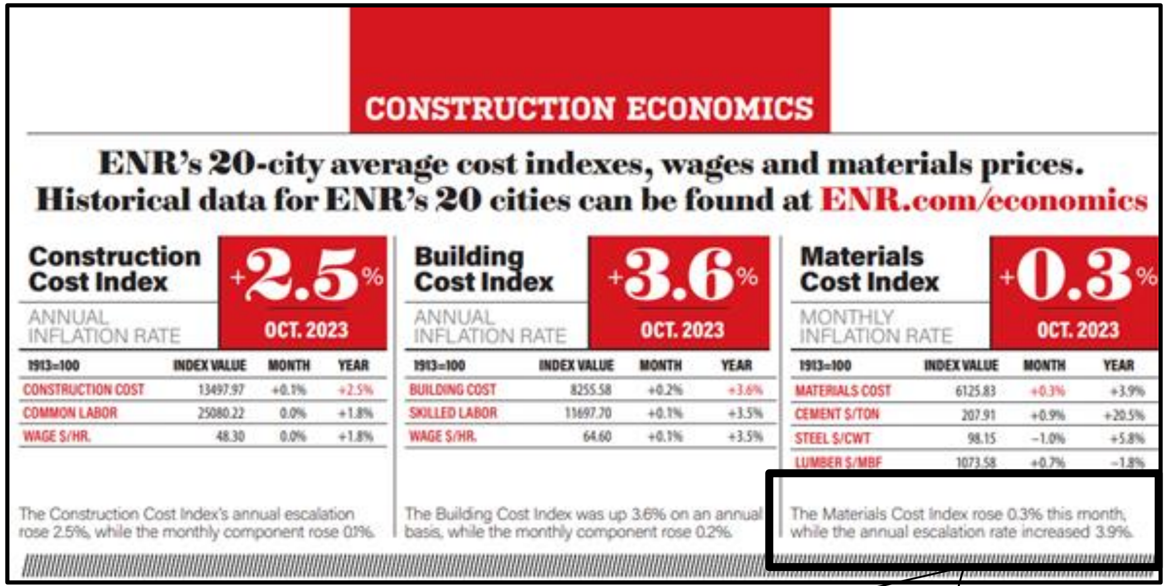
Fine Screening: Alternative #1 – South Central



Fine Screening : Alternative #6 – Southern

Fine Screening : Alternative #2 – Hybrid A

Industry costs are leveling but escalation is still a factor



CONSTRUCTION ECONOMICS

ENR's 20-city average cost indexes, wages and materials prices.
Historical data for ENR's 20 cities can be found at ENR.com/economics

Construction Cost Index — ANNUAL INFLATION RATE — +2.5% OCT. 2023

1913=100	INDEX VALUE	MONTH	YEAR
CONSTRUCTION COST	13497.97	+0.1%	+2.5%
COMMON LABOR	25080.22	0.0%	+1.8%
WAGE $/HR.	48.30	0.0%	+1.8%

The Construction Cost Index's annual escalation rose 2.5%, while the monthly component rose 0.1%.

Building Cost Index — ANNUAL INFLATION RATE — +3.6% OCT. 2023

1913=100	INDEX VALUE	MONTH	YEAR
BUILDING COST	8255.58	+0.2%	+3.6%
SKILLED LABOR	11697.70	+0.1%	+3.5%
WAGE $/HR.	64.60	+0.1%	+3.5%

The Building Cost Index was up 3.6% on an annual basis, while the monthly component rose 0.2%.

Materials Cost Index — MONTHLY INFLATION RATE — +0.3% OCT. 2023

1913=100	INDEX VALUE	MONTH	YEAR
MATERIALS COST	6125.83	+0.3%	+3.9%
CEMENT $/TON	207.91	+0.9%	+20.5%
STEEL $/CWT	98.15	−1.0%	+5.8%
LUMBER $/MBF	1073.58	+0.7%	−1.8%

The Materials Cost Index rose 0.3% this month, while the annual escalation rate increased 3.9%.

The Material Cost Index rose 0.3% this month, while the annuals escalation rate increased 3.9%.

- MARKET (ENR)
  - 20% annual escalation (last year)
  - 4% annual escalation (this year)
- FRAS (ESTIMATE)
  - 10% with project refinements (last year)
  - 5.9% with project refinements (this year)

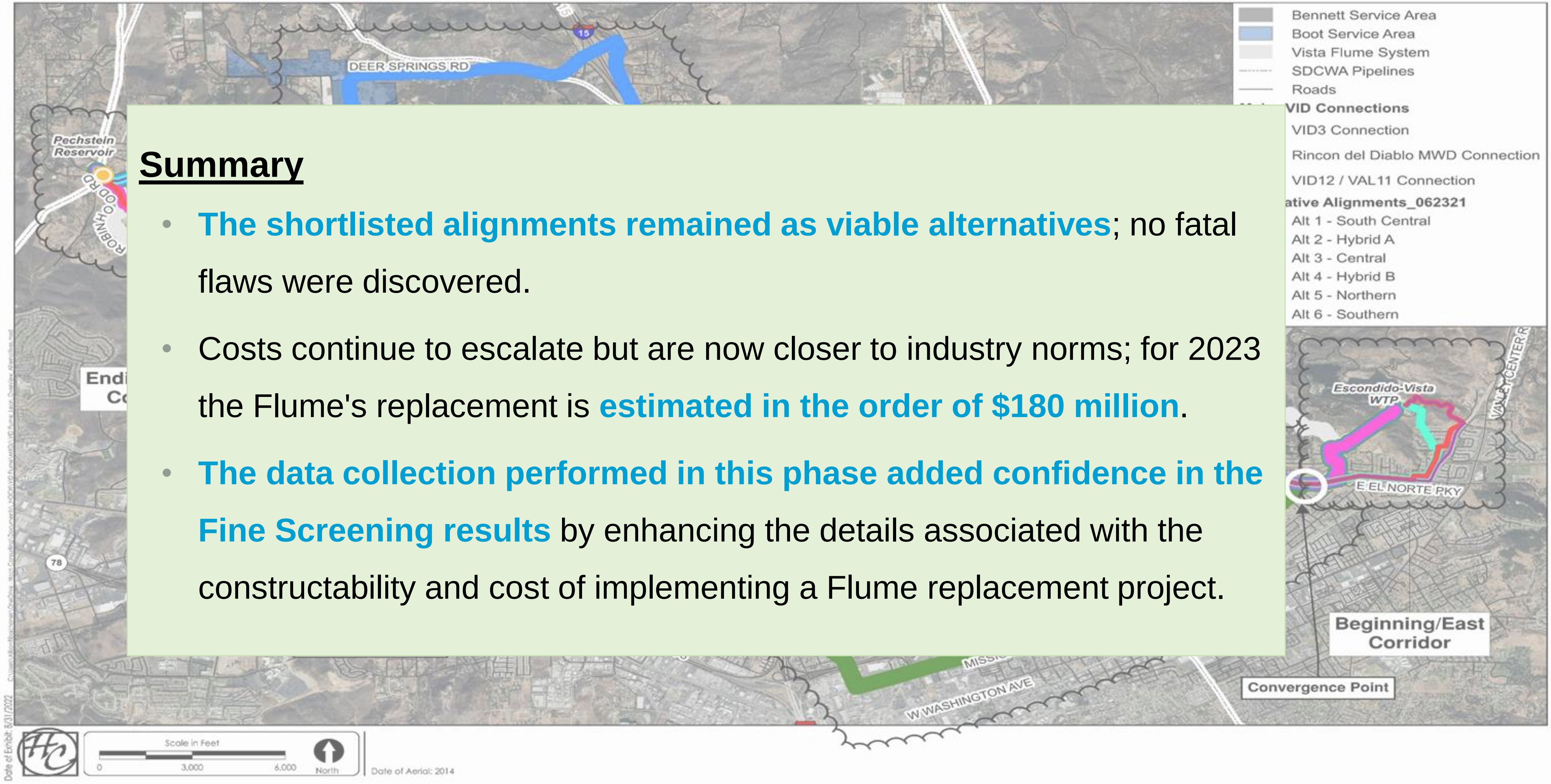
Planning Level Costs Refined to Within +/- 2%

Table 2-3. Planning Level Estimated Costs			
	Alt 1	Alt 2	Alt 6
	South Central	Hybrid A	Southern
Construction Costs [a,b]	$129 M	$122 M [d]	$131 M
Soft Costs [c]	$51 M	$54 M [d]	$52 M
Total	$180 M [e]	**$178 M** [d]	**$183 M**

a. *All costs presented herein are in 2023 dollars and have been rounded to the nearest $1 million.*
b. *Includes labor, materials, subcontracts, equipment, and contractor overhead and profit.*
c. *Includes environmental permitting, easements, design, administration, third party construction management, and onsite environmental and cultural monitoring.*
d. *Alternative 1 Middle corridor cost was added to Alternative 2 Beginning and End Corridors to facilitate a "full alignment" cost comparison. Alternative 1 was selected because it is the preferred Middle corridor from Fine Screening.*
e. *Estimated costs for the preferred alternative recommended in* ***Section 3.2*** *below.*

Orange = recommended alignment

Alignment Evaluation Takeaways



Summary

- **The shortlisted alignments remained as viable alternatives**; no fatal flaws were discovered.
- Costs continue to escalate but are now closer to industry norms; for 2023 the Flume's replacement is **estimated in the order of $180 million**.
- **The data collection performed in this phase added confidence in the Fine Screening results** by enhancing the details associated with the constructability and cost of implementing a Flume replacement project.

3. Alternatives Evaluation – Fine Screening

Speaker: John Bekmanis, P.E.

Brown AND Caldwell

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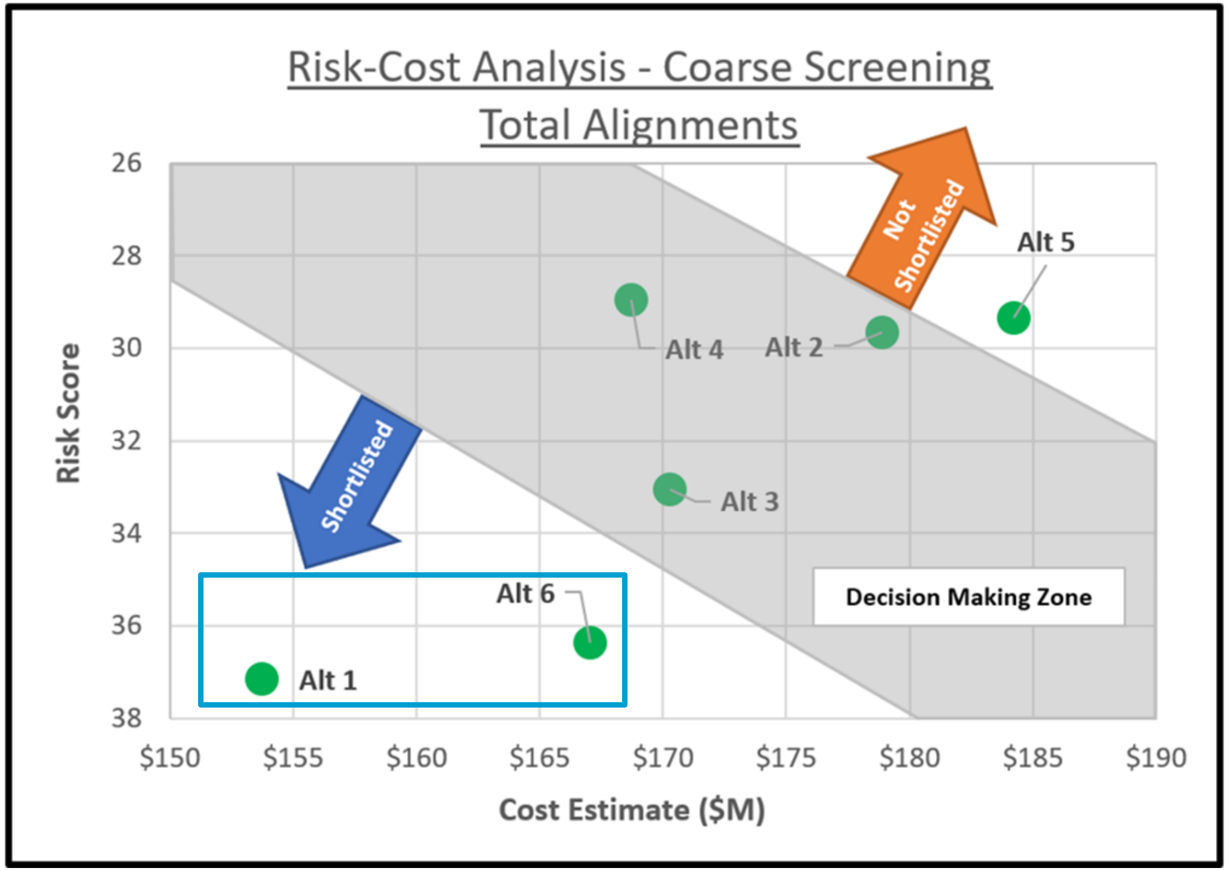
Fine Screening: Process and Objectives

- Goal: select one preferred alignment
- Evaluation process included development of:
  - Risks – constructability, O&M, etc.
  - Costs – capital and soft costs
- Risks - Assigned weighting factors and scores to custom set of criteria
- Conducted sensitivity analysis



Fine Screening: Evaluation Criteria (Part 1/3)

CATEGORIES	CRITERIA GROUPS	CRITERIA
Stakeholder Coordination	Community Impacts ★	• Traffic Impacts • Future Agency Projects • Impacts to Critical Facilities ★
	Land Ownership	• Easements/ROWs
	Environmental	• Biological Resources • Areas of potential Soil Contamination • Cultural Resources • Other CEQA Considerations
	Permitting	• Interagency Coordination • Special Long-lead Permits (Cal DFW/USACE) • DDW Coordination

Fine Screening: Evaluation Criteria (Part 2/3)

CATEGORIES	CRITERIA GROUPS	CRITERIA
System Reliability	System Hydraulics	• Pressurization vs Low-Head • Transient Flow Impacts
	Operations and Maintenance	• Accessibility • Land Use • Operational (Hydraulics) Maintenance • Impacts to EVWTP • Agency Service Connection – Boot & Bennett • Agency Service Connection – Escondido • Agency Service Connection – Rincon

Fine Screening: Evaluation Criteria (Part 3/3)

CATEGORIES	CRITERIA GROUPS	CRITERIA
Project Delivery	Constructability	• Geology • Utility Congestion • Alignment Length • Additional LF for Boot & Bennett Connection • Crossing/Construction Methods • Tunneling Lengths
	Schedule and Risk	• Schedule Factors • Phasing/Sequencing • Long-term Vulnerability
	Project Affordability and Implementation	• Financial Exposure to Construction Costs • Mitigating Revenue Reduction (purchase from other agency) • Pavement Moratoriums

Fine Screening: Evaluation Matrix

Categories	Criteria Groups	Criteria	Alternative Alignments Beginning Corridor			Alternative Alignments Middle Corridor		Alternative Alignments End Corridor		
			1	2	6	1	6	1	2	6
			Raw Score	Raw Score	Raw Score	Raw Score	Raw Score	Raw Score	Raw Score	Raw Score
PROJECT DELIVERY	Constructability	Geology	3	1	5	1	3	3	5	3
		Utility Congestion	1	3	5	3	5	3	5	3
		Alignment Length	3	1	5	5	1	1	5	3
		Additional LF for Boot & Bennett Connections	0	0	0	0	0	3	5	1
		Crossing/Construction Methods	5	5	5	5	1	5	1	5
		Tunneling Length	5	5	5	1	1	3	1	3
	SUBTOTAL (weighted) - Constructability		**2.6**	**2.3**	**3.8**	**2.3**	**1.7**	**2.7**	**3.3**	**2.7**
	Schedule and Risk	Schedule Factors	3	3	5	5	1	1	5	3
		Phasing/Sequencing	3	5	3	3	3	3	5	3
		Long-Term Vulnerability	1	3	5	3	5	3	5	3
	SUBTOTAL (weighted) - Schedule and Risk		**0.7**	**1.1**	**1.3**	**1.1**	**0.9**	**0.7**	**1.5**	**0.9**
	Project Affordability and Implementation	Financial Exposure to Construction Costs	3	1	5	5	1	1	5	3
		Mitigating Revenue Reduction (purchase from other agency)	5	5	1	5	5	5	1	5
		Pavement Moratoriums	5	5	5	1	3	3	1	3
	SUBTOTAL (weighted) - Project Affordability and		**3.3**	**2.8**	**2.8**	**2.8**	**2.3**	**2.3**	**1.8**	**2.8**
	CATEGORY SUBTOTAL - PROJECT DELIVERY		**6.5**	**6.1**	**7.8**	**6.1**	**4.8**	**5.7**	**6.6**	**6.4**
GRAND TOTAL			**12.2**	**12.0**	**11.7**	**12.0**	**9.3**	**12.0**	**10.4**	**11.2**

Fine Screening: Summary of Numerical Results

- Alternatives 1 has the best Beginning, Middle, and End Risk Ranking
- Beginning corridor of Alt 2 has possible advantages

Table 3-2 Risk Ranking per Segment

Corridors		Alt 1 South Central	Alt 2 Hybrid A	Alt 6 Southern
Beginning	Rank [a]	#1	#2	#3
	Score [b]	12.2	12.0	11.7
Middle	Rank [a]	#1	Was not shortlisted	#2
	Score [b]	12.0		9.3
End	Rank [a]	#1	#3	#2
	Score [b]	12.0	10.4	11.2

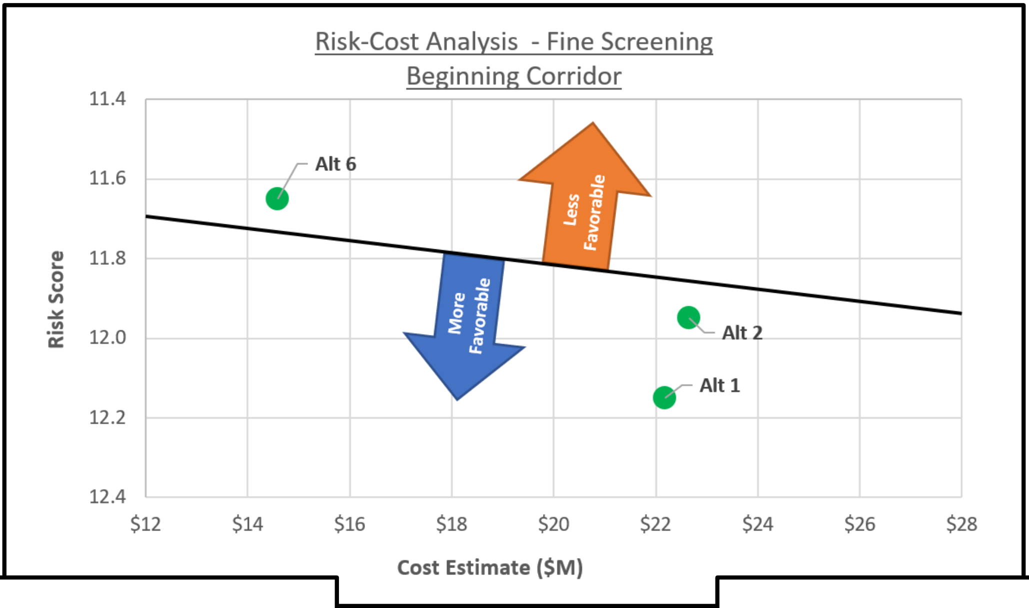
a. *Ranking:*

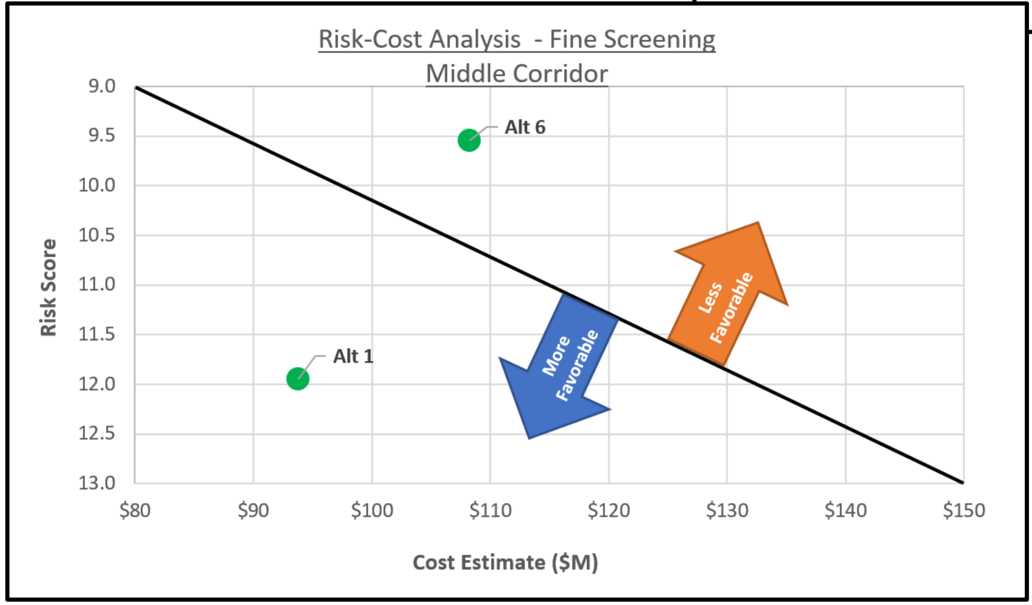
Green = Top ranked alternatives

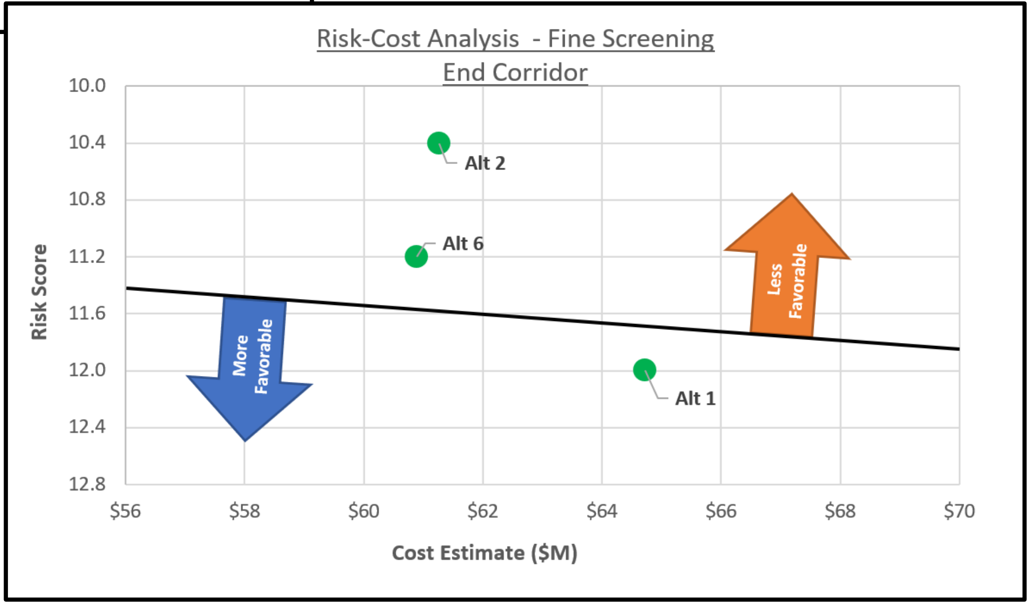
Yellow = Middle ranked alternatives

Red = Lowest ranked alternatives

Fine Screening: Results Isolated by Beginning, Middle, End

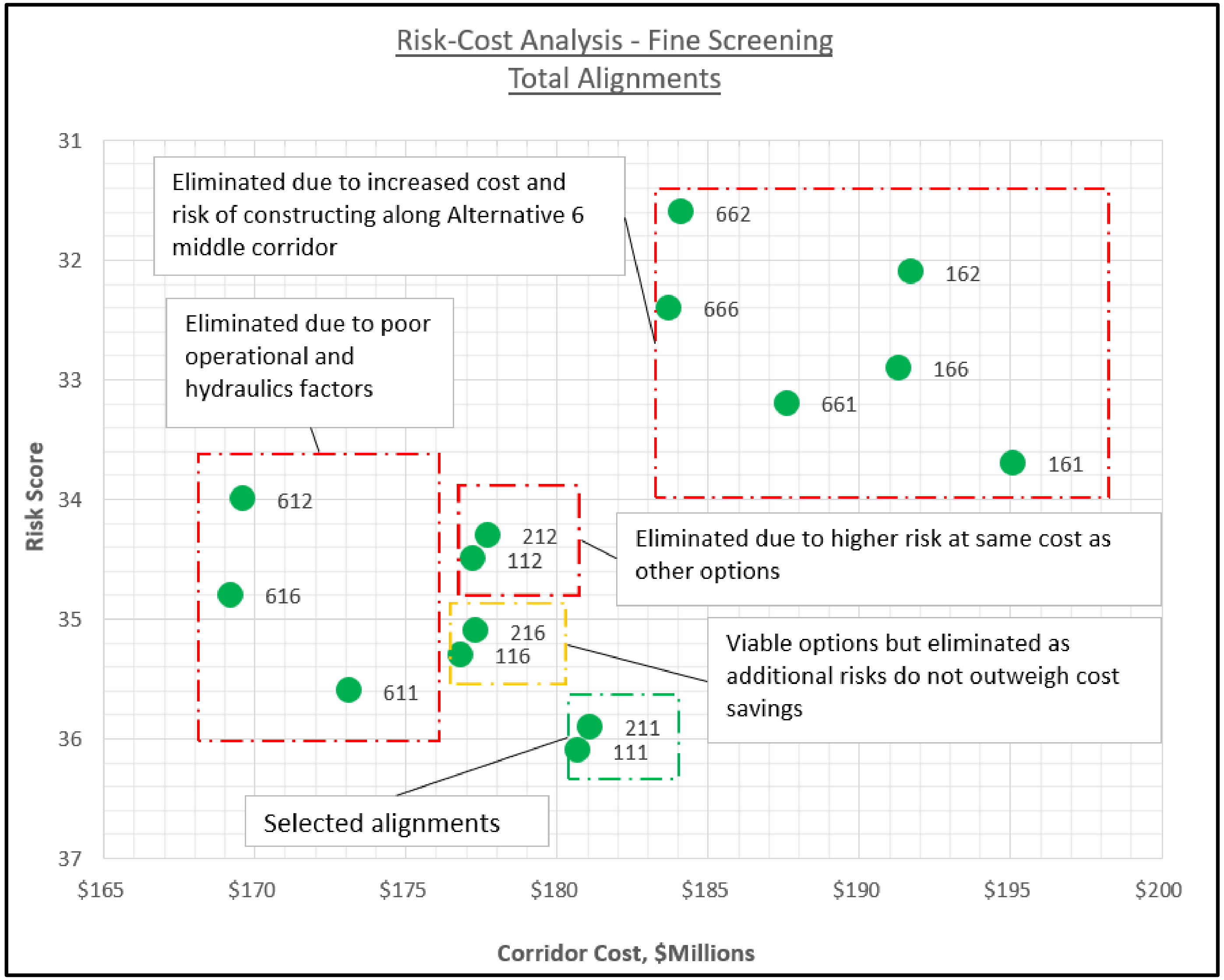






Fine Screening: Results (All Combinations)

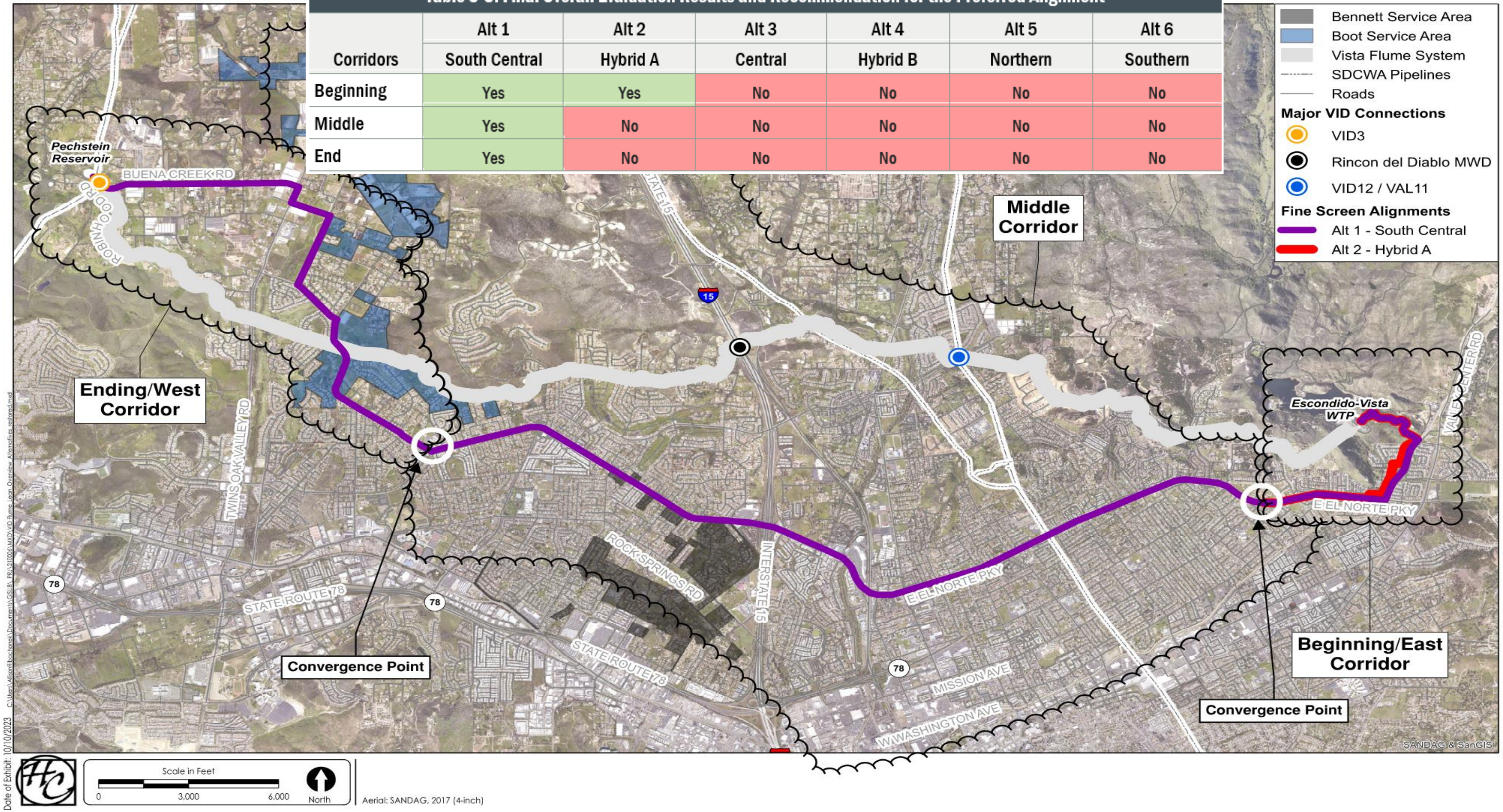
- Alt 1.1.1 and 2.1.1 provide balanced cost vs risk rating
- Top right grouping high in risk and costs
- Bottom left grouping lower cost but higher risks
- Center groupings higher risk vs same cost as selected alignments



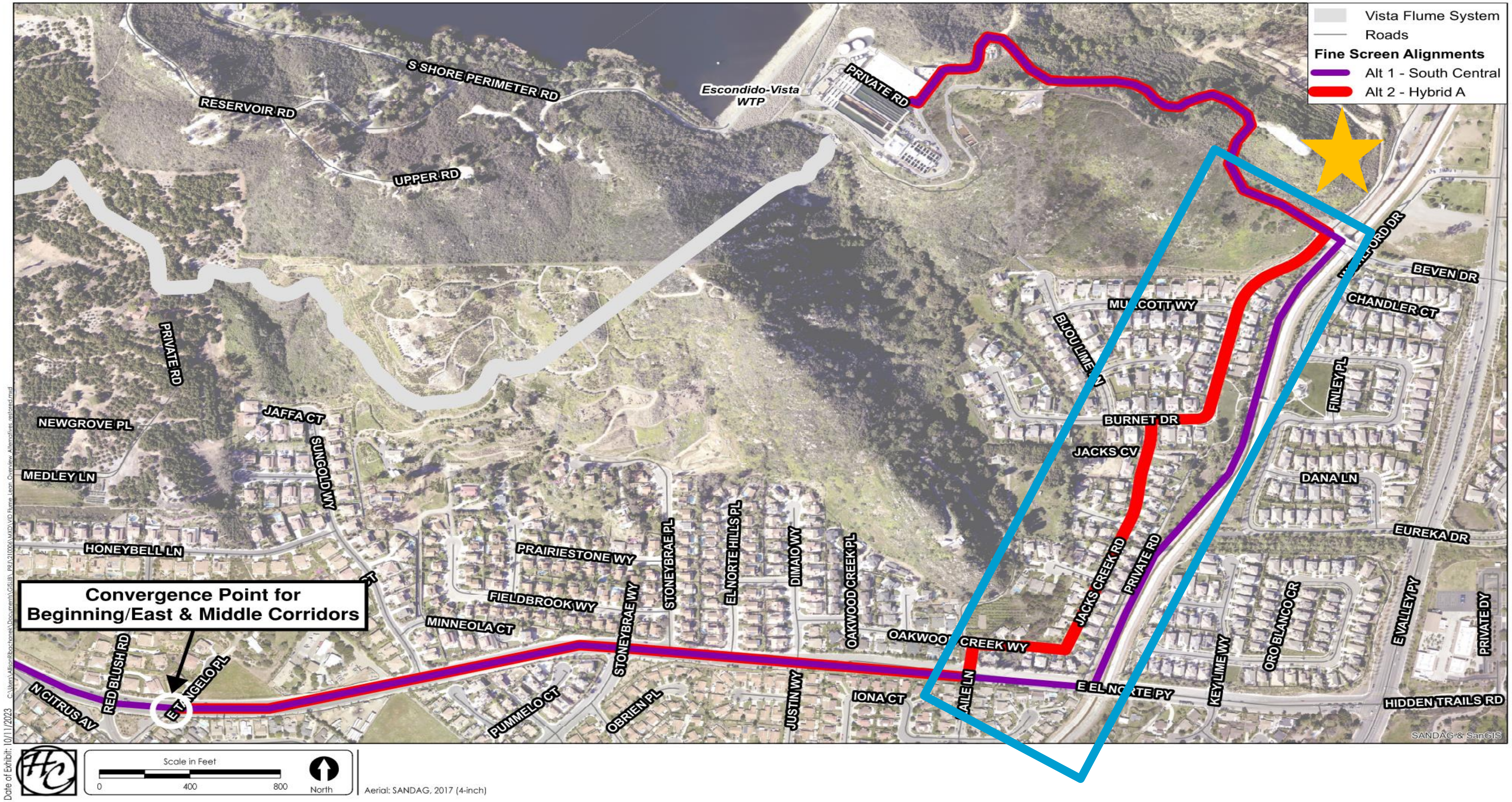
Recommended Alignment

Table 3-3. Final Overall Evaluation Results and Recommendation for the Preferred Alignment

Corridors	Alt 1 South Central	Alt 2 Hybrid A	Alt 3 Central	Alt 4 Hybrid B	Alt 5 Northern	Alt 6 Southern
Beginning	Yes	Yes	No	No	No	No
Middle	Yes	No	No	No	No	No
End	Yes	No	No	No	No	No



Reserving Alternative 2 Beginning as a Contingency



4. Predictive Climatological Modeling

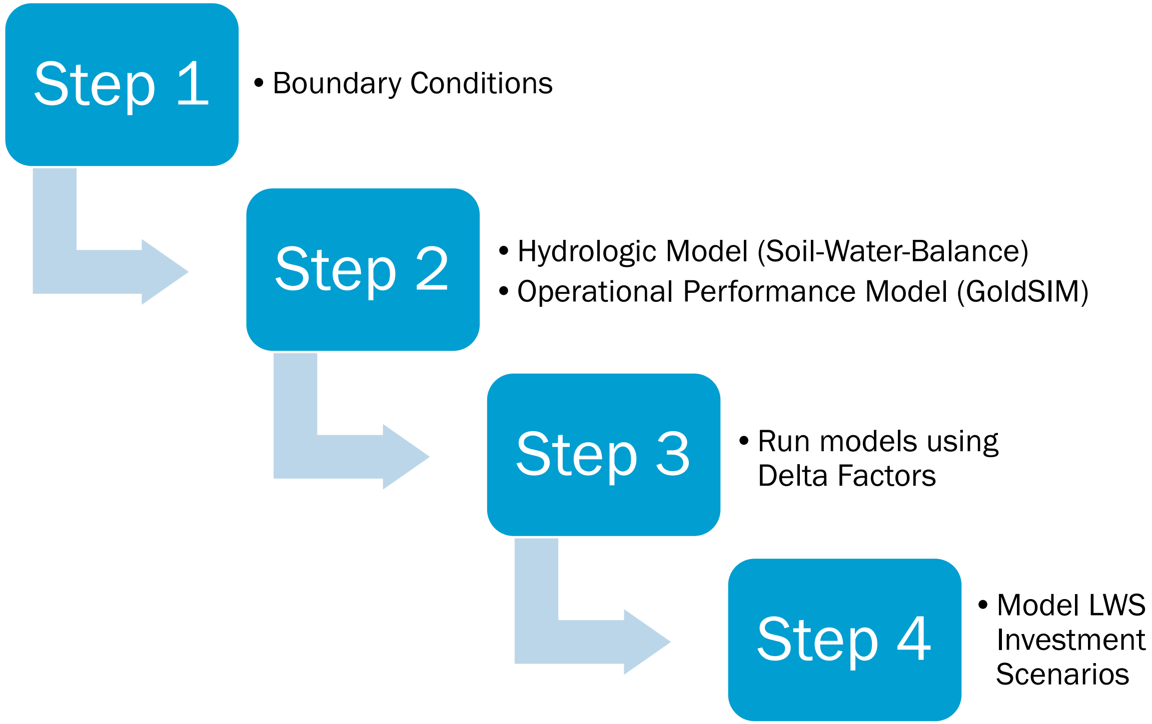
Speaker: Teresa (Tess) Sprague, PhD

Brown AND Caldwell

Defining the **next** legacy

Objective: Project annual local yield under varying climate futures considering various Local Water System (LWS) improvements

Methodology



Step 1:

Define the system and establish its boundary conditions to account for all infrastructure components, interconnects, and sources of inflows and outflows.

Step 2:

Build two models that together can simulate the local hydrology and baseline the current operational performance of the LWS.

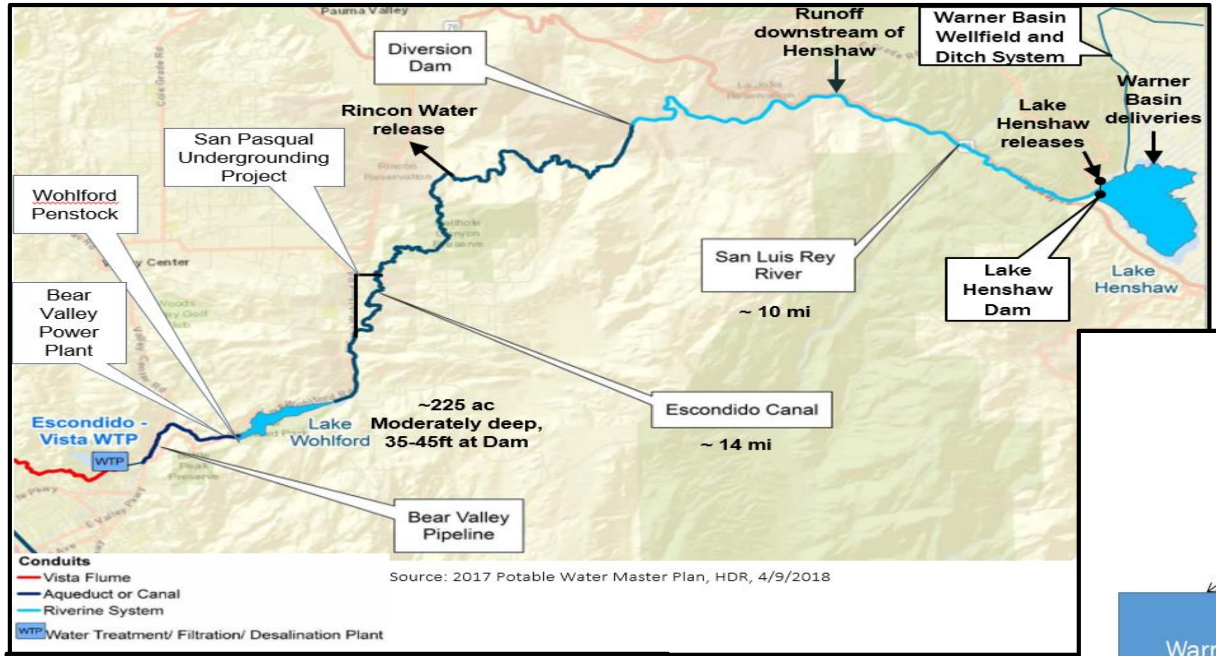
Step 3:

Run the model using climate change adjustment factors to assess possible climatological impacts on local yield.

Step 4:

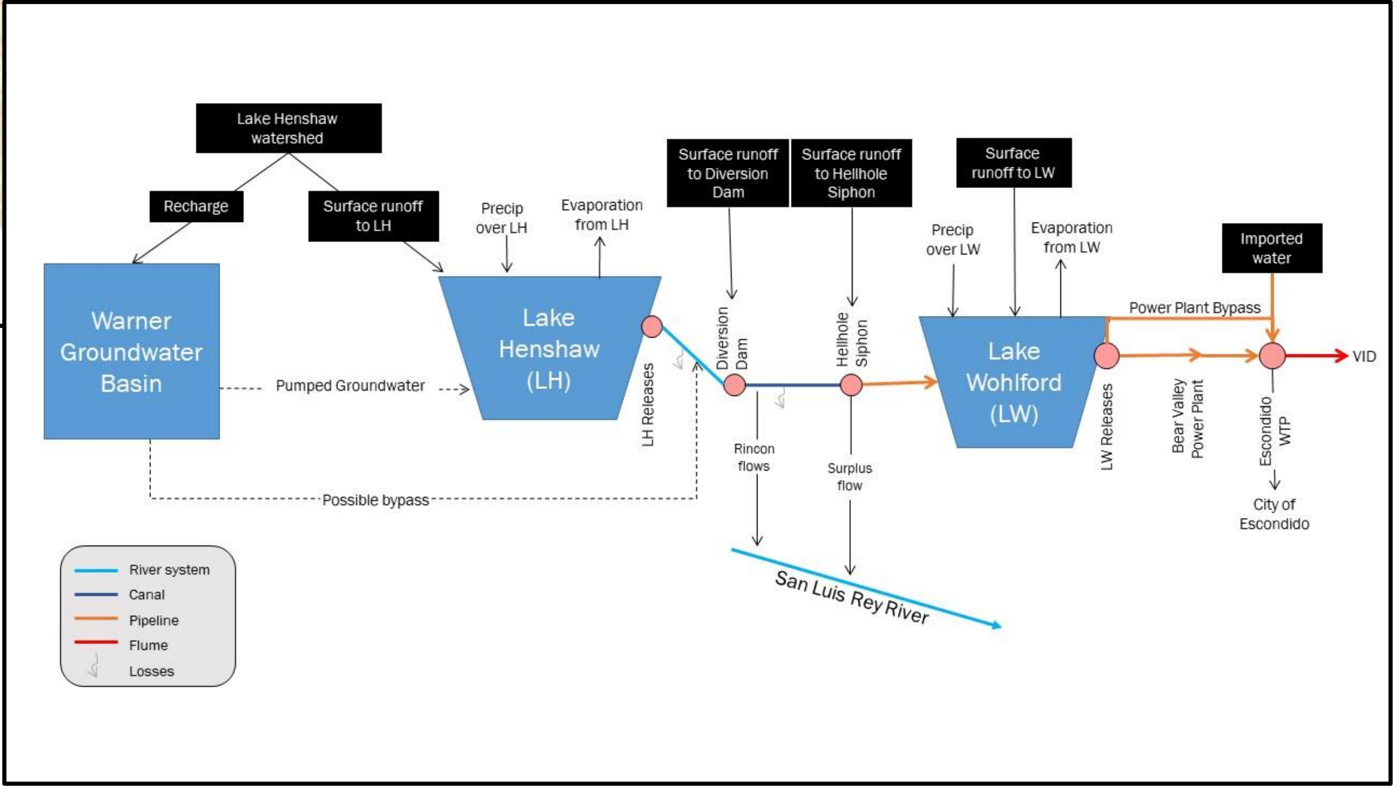
Model future LWS investment scenarios to assess the effects projects like expanding the Warner Basin wellfield or addressing Harmful Algal Blooms (HABs) might have on future local yield.

Establishing Boundary Condition by Capturing the District's LWS

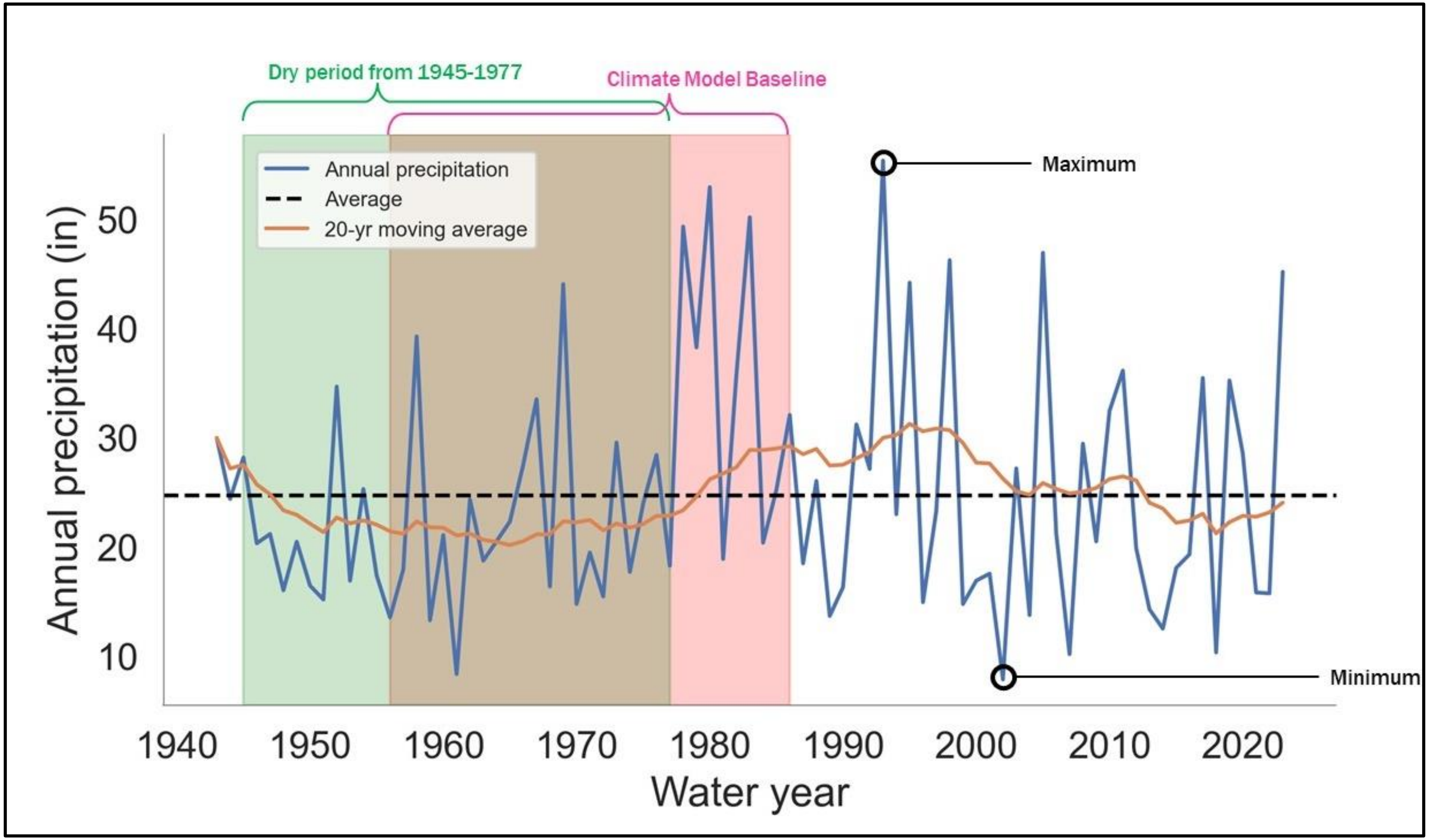


LWS Map of Key Components

Schematic of LWS Operations



Study Precipitation to Establish a Climate Model Baseline



Using Probability Statistics to Confirm the Baseline

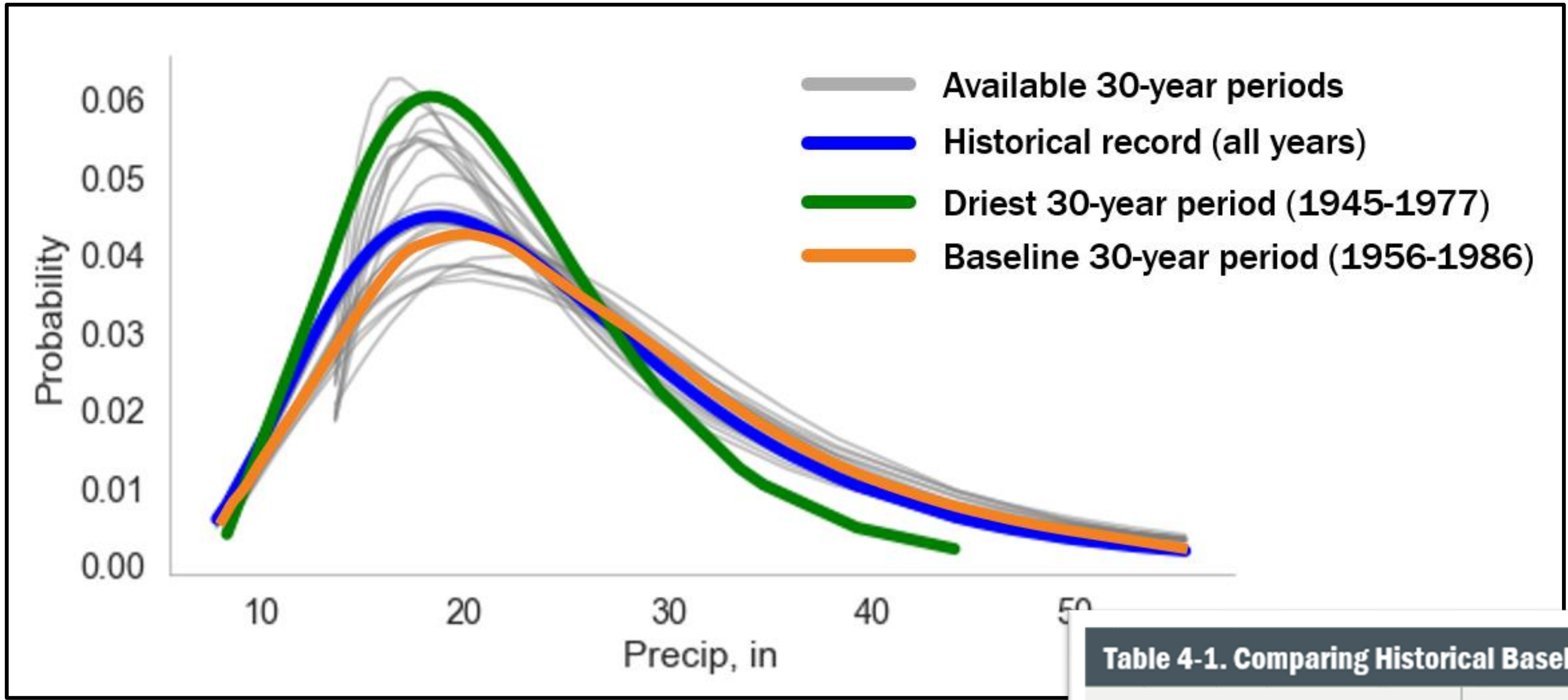
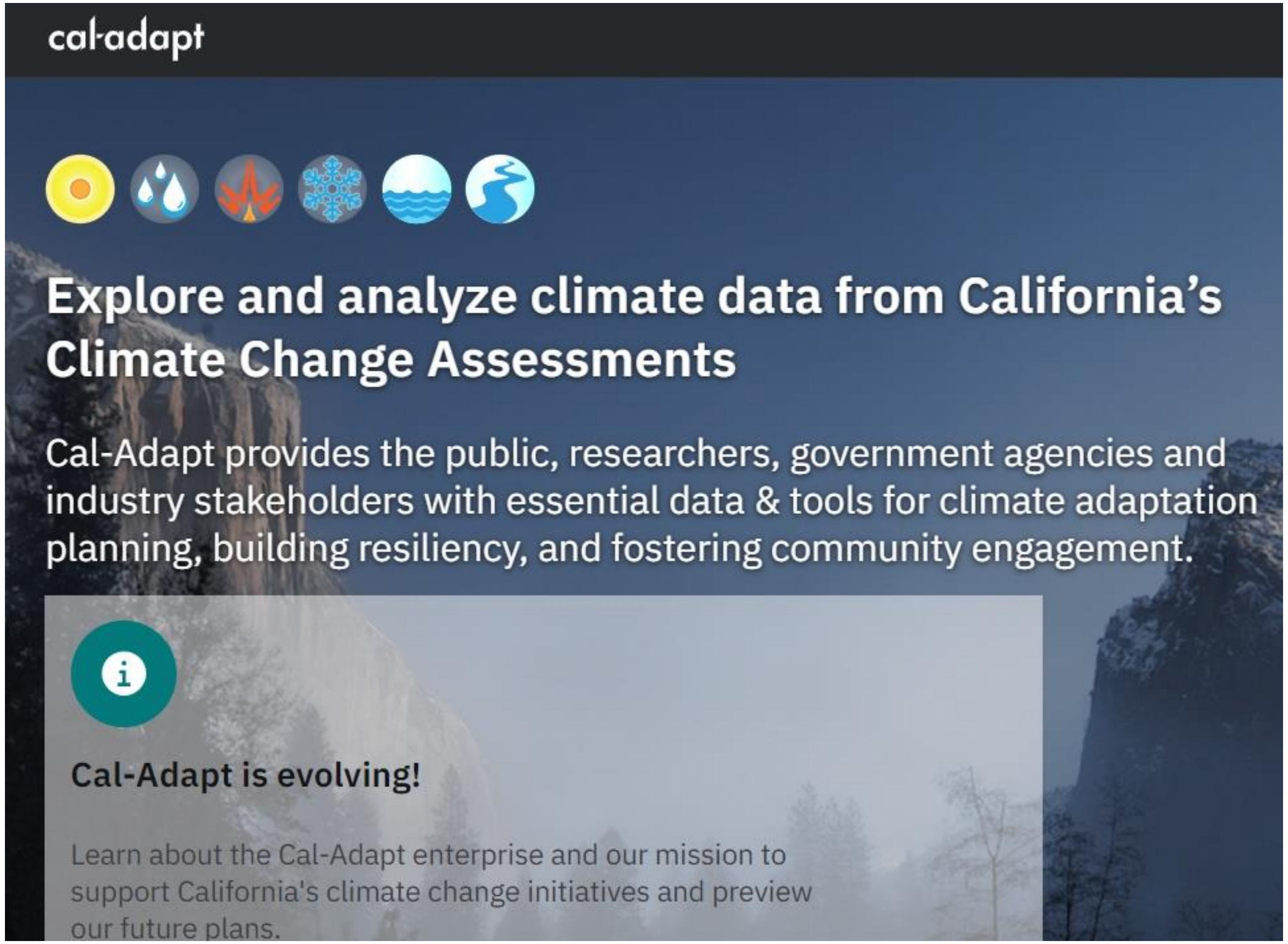


Table 4-1. Comparing Historical Baseline (1956-1986) to Historical Driest Period (1945-1977)

Probability of Water Year Type	Baseline 1956-1986	Driest 1945-1977
Extreme Dry	12.9%	12.1%
Dry	22.6%	33.3%
Normal	35.5%	42.4%
Wet	19.4%	12.1%
Extreme Wet	9.7%	0.0%

Delta Change Factors: Models Drier and Wetter Conditions

- Data Source:
  - Cal-Adapt portal
  - Downscaled CMIP5 climate data
- Data Used:
  - “Dry” (CMCC_CMS RCP8.5)
  - “Baseline” (Historical) – no delta factor necessary
  - “Wet” (CanESM2 RCP8.5)
- Objectives for Use:
  - Model emission factors to establish a range of climate futures
  - Scale baseline to dry & wet scenarios



Two Models: One for Hydrology and One for Operations

Soil-Water-Balance

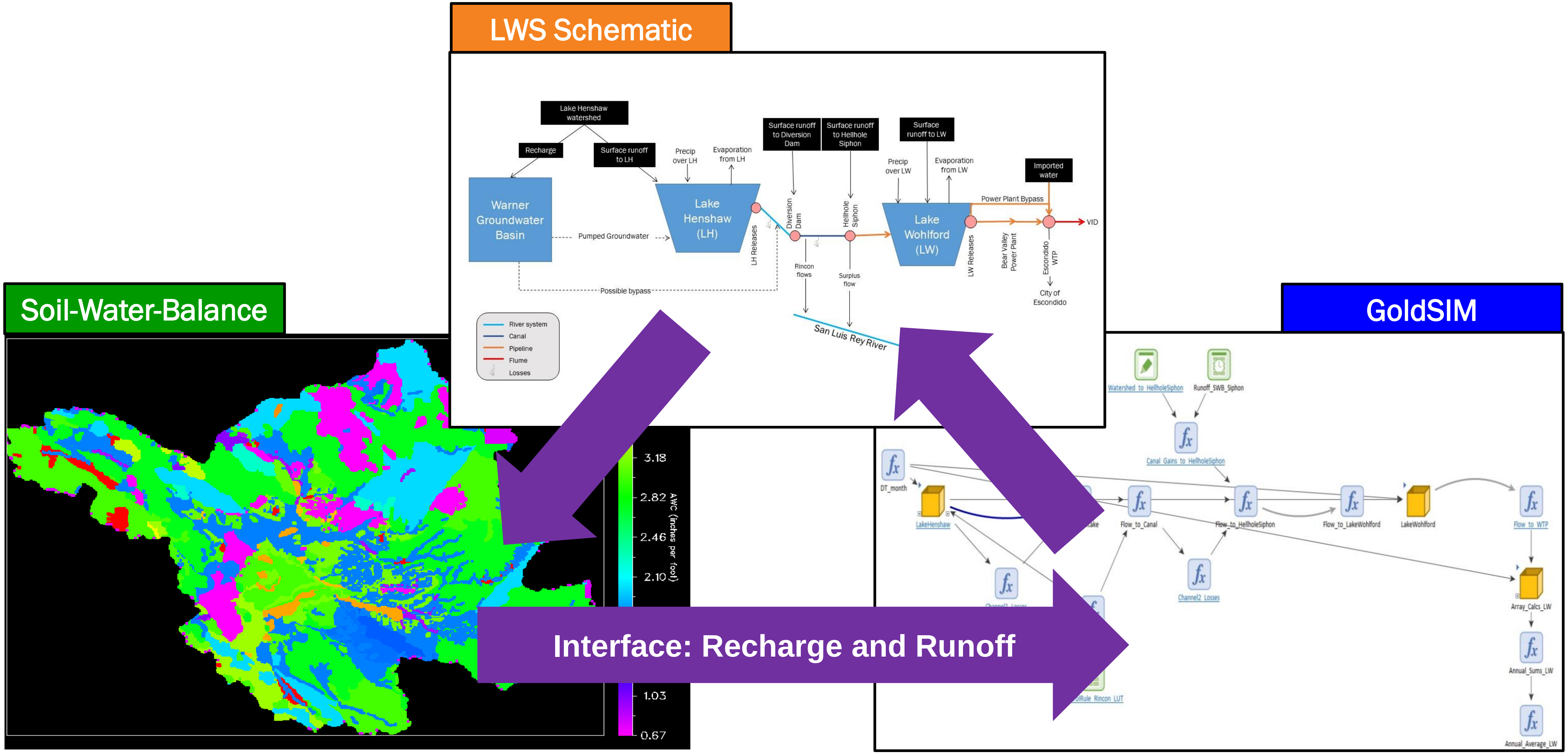
- Hydrologic model
- Peer reviewed USGS sourced
- Estimates water balance (runoff and recharge)

GoldSIM

- Dynamically model complex systems
- Flexibility to build in operational controls

Interface:
Calculated recharge and runoff to the wellfield and Lake Henshaw

The LWS: From Schematic to GoldSIM Model



GoldSIM: Water System Storage and Operations

- Physical system: build the system with inputs and functions for…
  - Rainfall
  - Runoff
  - Percolation
  - Pumping efficiency
  - Seepage
  - Lake area
  - Water depth
  - Evaporation
  - Lake volume

- Water balance: account for inflows and outflows
- Future climate conditions: apply climate change factor inputs
- Investment scenarios: run model to generate yields under future infrastructure investments

LWS Investment Scenarios

Scenario #1: Low-range

Little-to-no investments (i.e., No new wells, no HABs mitigations, algicide treatments as-needed)

Scenario #2: HABs Control Only

Modest investments (i.e. replace wells as-needed, implement HABs mitigation, preventative HABs control)

Scenario #3: Baseline or “Mid-Range”

Reasonable investments (i.e., optimize wellfield, implement HABs mitigation, preventative HABs control)

Scenario #4: Max. Allowable Sustainable Yield

Higher investments (i.e., maximize wellfield, implement HABs mitigation, preventative HABs control)

Scenario #5: High-range

Maximized investments (i.e., maximize wellfield, implement HABs mitigation, preventative HABs control, and lake by-pass pipeline)

Results

Table 4-2. Possible Range of Local Water System Investment Scenarios				
Local Water System Investment Scenario	Capital Costs[a]	Anticipated Range of Average Annual Local Yield (AFY)[b,c] Dry[b,c] (CMCC_CMS RCP8.5)	Baseline[b,c] (Historical)	Wet[b,c] (CanESM2 RCP8.5)
Scenario #1: Low-range • Maintain wellfield as-is; no new wellheads • No long-term in-lake HABs solution • Respond to HABs using algaecide when needed • No lake bypass pipeline or additional operational flexibility	$8M	1,700	2,500	3,000
Scenario #2: HABs Control Only • Replace wellheads as-needed to preserve historical yield • Implement long-term in-lake HABs solution • Preventative HABs control using chemical treatment • No lake bypass pipeline or additional operational flexibility	$13M	1,900	2,700	3,300
Scenario #3: Baseline or "Mid-Range" • Optimize wellfield to achieve the historical, and can achieve sustainable yield over 12-months[d] • Implement long-term in-lake HABs solution • Preventative HABs control using chemical treatment • No lake bypass pipeline or additional operational flexibility	$23M	4,700	5,600	7,500
Scenario #4: Max. Allowable Sustainable Yield • Maximize wellfield to achieve allowable sustainable yield[e] • Implement long-term in-lake HABs solution • Preventative HABs control using chemical treatment • No lake bypass pipeline or additional operational flexibility	$37M	5,400	6,200	7,800
Scenario #5: High-range • Maximize wellfield to achieve allowable sustainable yield[e] • Implement long-term in-lake HABs solution. • Preventative HABs control using chemical treatments • Install a lake bypass pipeline for additional operational flexibility	$57M	6,900	7,200	7,900

Used as basis for affordability analysis

Take Aways

- Most climate futures, 80% of the modeled scenarios, predict the District can confidently rely on local water being available over a wide variety of climate conditions, and the economics weigh in favor of a To Flume project if modest investments are made to the LWS.
- Six of the 15 model runs (40%) predicted local yields greater than the EVWTP's current 40:60 local-to-imported water blend ratio limit, which would require additional investments in treatment system modifications to realize the full benefit of this additional yield.

a. *Capital costs presented are in 2023 dollars, and only include District's share of costs (e.g., 70% for wellfield projects and 50% for Henshaw projects).*
b. *District's share of the anticipated average annual local yield in AFY estimated for the corresponding modelled scenario.*
c. *The District's share of local yield presented herein are results from the predictive climatological model described above in Section 4.*
d. *Warner Basin's historical yield is ~7,140 AFY which equates to a District share of ~1,750 AFY.*
e. *Warner Basin's maximum allowable sustainable yield is 9,125 AFY, which equates to a District share of ~2,400 AFY.*
f. *Legend:*
   a. Red = Future Flume replacement project is not economically viable (VID LW yield is less than 2,700 AFY).
   b. Green = No modifications needed to Lake Wohlford or EVWTP keeping to 40:60 Local-to-Imported water blend ratio.
   c. *Yellow = Requires improvements to Lake Wohlford or EVWTP to local yields which are more than the current 40:60 Local-to-Imported water blend ratio limitation.*

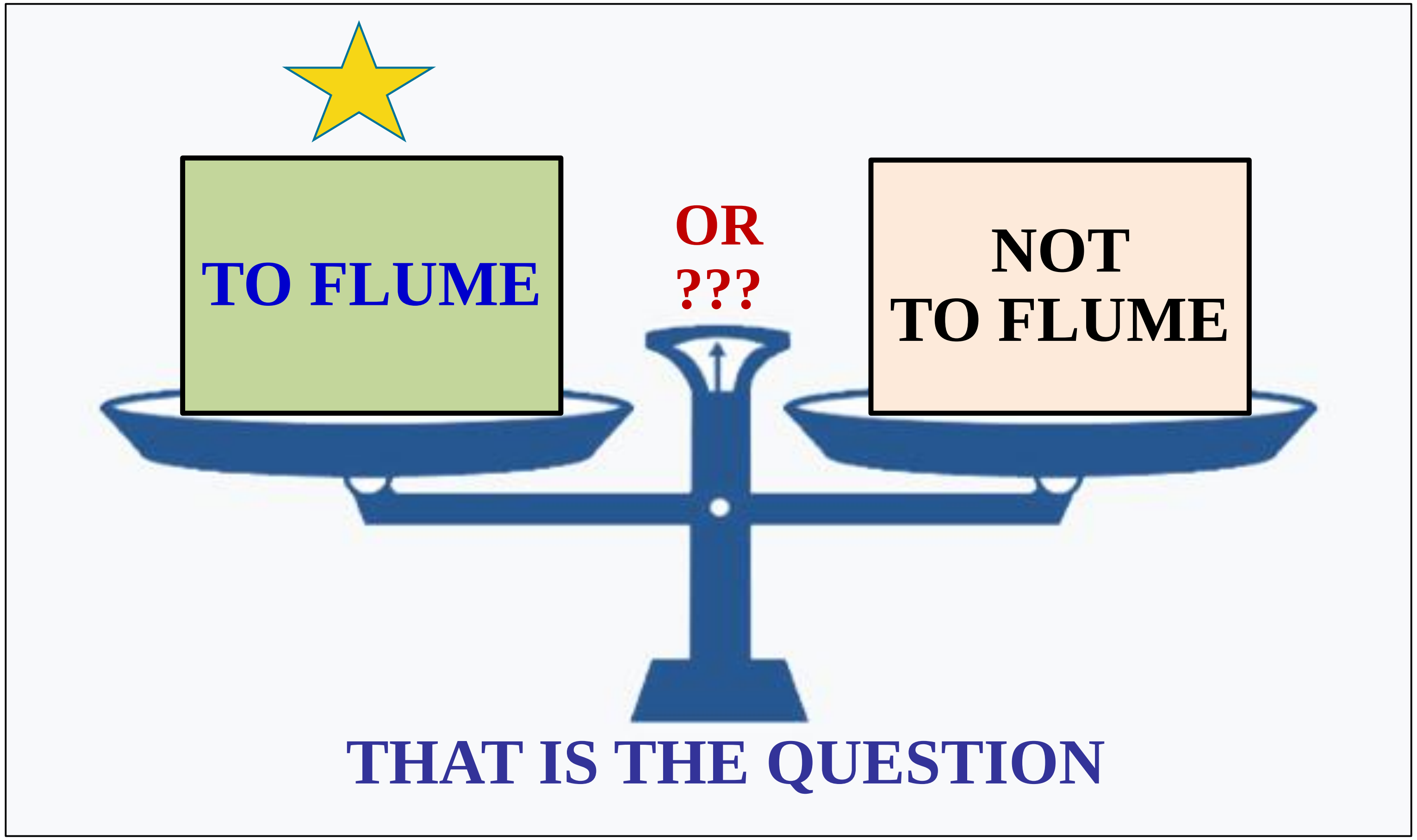
5. Project Affordability Including the HABs Plan

Speaker: J.P. Semper, P.E.

Defining the **next** legacy

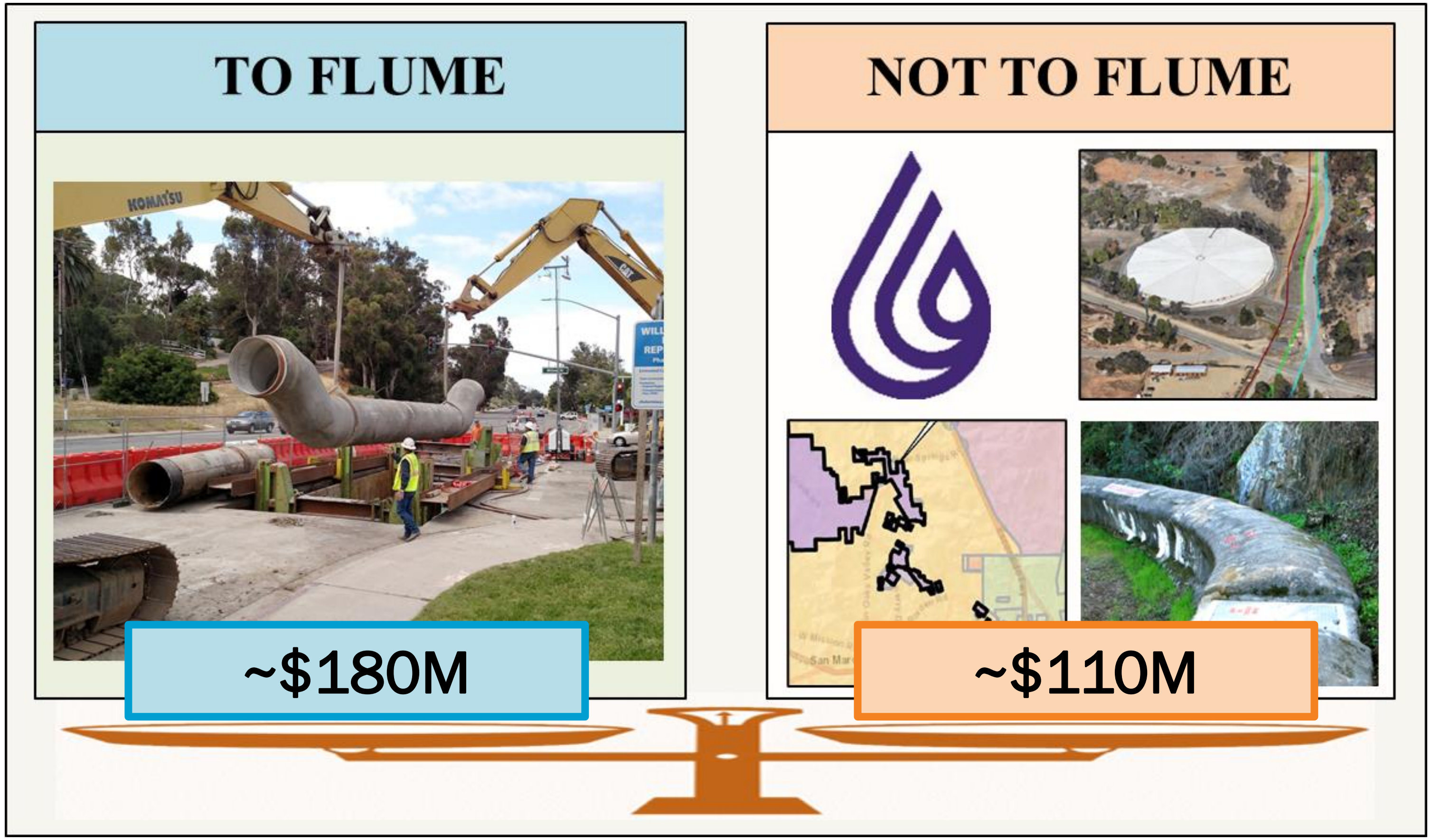
FLUME BALANCE SCALE INTERIM REVIEW

The balance scale continues to favor To Flume



BACKGROUND: There is not a No Project option.

The Not To Flume option has many components and costs



30-Year NPV Cost Comparison

Avg. Local Yield - Dry Climate Model -	SDCWA Escalation	NPV / Ops. Term	District Discount Rate:
4,700 AF/yr	Mid-Range	30 Yrs	5.50%

Net Present Value (NPV) Analysis, in FY 2023 Dollars

NPV Cost Summary -- To Flume vs. Not To Flume

TO FLUME

Cost Component	30-Year NPV
Flume Replacement	$179M
Local Water System	**$103M**
-- Wells	*$30M*
-- HABs Management	*$21M*
-- All Other LWS Items	*$52M*
Water Treatment	$28M
Flume O&M	$11M
Self-Treatment Benefit	-$16M
TOTAL	**$305M**

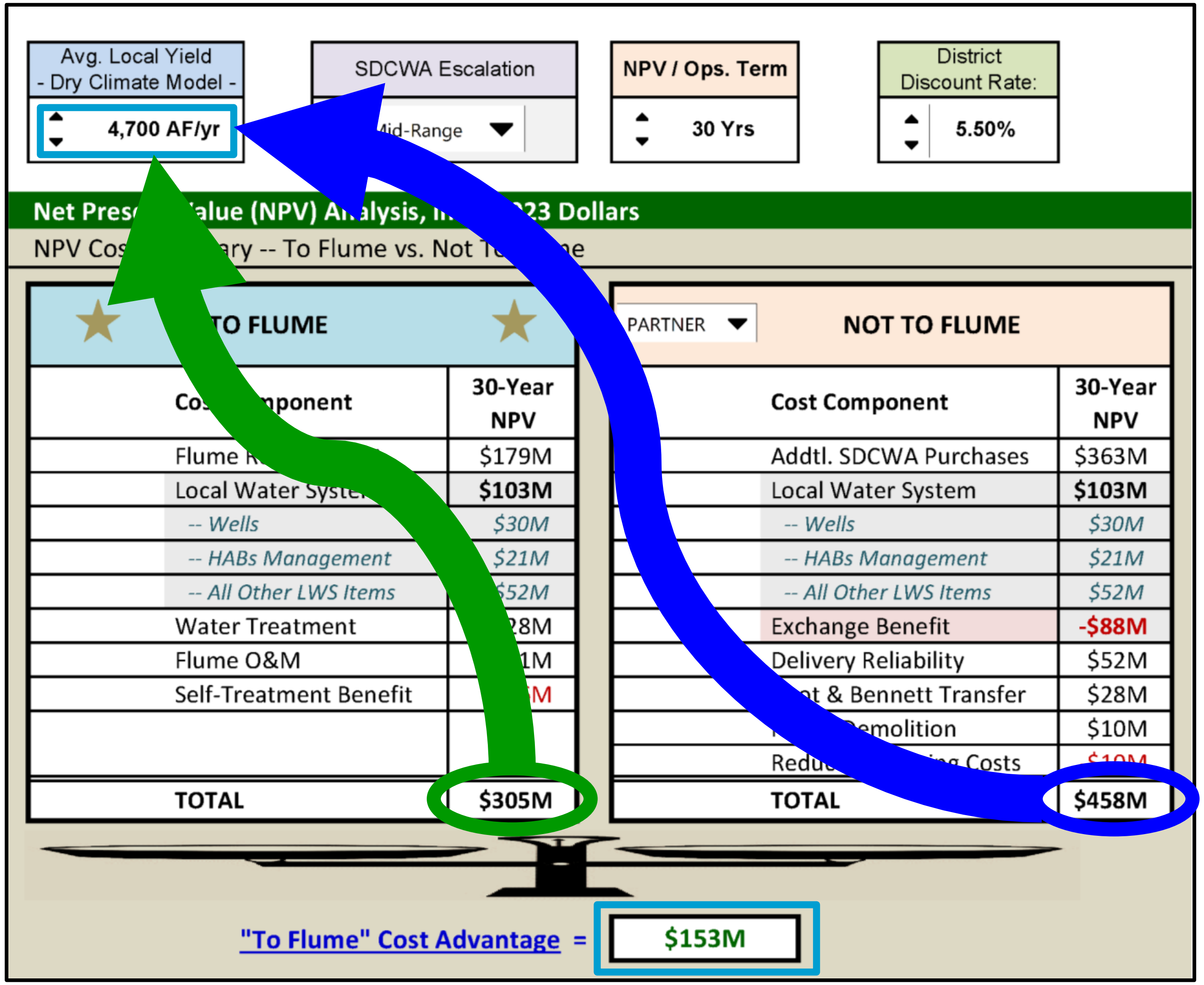
PARTNER — **NOT TO FLUME**

Cost Component	30-Year NPV
Addtl. SDCWA Purchases	$363M
Local Water System	**$103M**
-- Wells	*$30M*
-- HABs Management	*$21M*
-- All Other LWS Items	*$52M*
Exchange Benefit	**-$88M**
Delivery Reliability	$52M
Boot & Bennett Transfer	$28M
Flume Demolition	$10M
Reduced Pumping Costs	-$10M
TOTAL	**$458M**

"To Flume" Cost Advantage = **$153M**

Cost per Acre-Foot Comparison

To Flume
$2,200/AF



Not To Flume
$3,200/AF

Breakeven Local Yield has increased

Table 4-2. Possible Range of Local Water System Investment Scenarios

Local Water System Investment Scenario	Capital Costs[a]	Anticipated Range of Average Annual Local Yield (AFY)[b,c]: Dry[b,c] (CMCC_CMS RCP8.5)	Baseline[b,c] (Historical)	Wet[b,c] (CanESM2 RCP8.5)
Scenario #1: Low-range • Maintain wellfield as-is; no new wellheads • No long-term in-lake HABs solution • Respond to HABs using algaecide when needed • No lake bypass pipeline or additional operational flexibility	$8M	1,700	2,500	3,000
Scenario #2: HABs Control Only • Replace wellheads as-needed to preserve historical yield • Implement long-term in-lake HABs solution • Preventative HABs control using chemical treatment • No lake bypass pipeline or additional operational flexibility	$13M	1,900	2,700	3,300
Scenario #3: Baseline or "Mid-Range" • Optimize wellfield to achieve the historical, and can achieve sustainable yield over 12-months[d] • Implement long-term in-lake HABs solution • Preventative HABs control using chemical treatment • No lake bypass pipeline or additional operational flexibility	$23M	4,700	5,600	7,500
Scenario #4: Max. Allowable Sustainable Yield • Maximize wellfield to achieve allowable sustainable yield[e] • Implement long-term in-lake HABs solution • Preventative HABs control using chemical treatment • No lake bypass pipeline or additional operational flexibility	$37M	5,400	6,200	7,800
Scenario #5: High-range • Maximize wellfield to achieve allowable sustainable yield[e] • Implement long-term in-lake HABs solution. • Preventative HABs control using chemical treatments • Install a lake bypass pipeline for additional operational flexibility	$57M	6,900	7,200	7,900

Avg. Local Yield	SDCWA Escalation	NPV / Ops. Term	District Discount Rate:
2,700 AF/yr	Mid-Range	30 Yrs	5.50%

Net Present Value (NPV) Analysis, in FY 2023 Dollars

NPV Cost Summary -- To Flume vs. Not To Flume

TO FLUME

Cost Component	30-Year NPV
Flume Replacement	$179M
Local Water System	**$103M**
-- Wells	*$30M*
-- HABs Management	*$21M*
-- All Other LWS Items	*$52M*
Water Treatment	$16M
Flume O&M	$11M
Self-Treatment Benefit	-$19M
TOTAL	**$290M**

PARTNER **NOT TO FLUME**

Cost Component	30-Year NPV
Addtl. SDCWA Purchases	$209M
Local Water System	**$103M**
-- Wells	*$30M*
-- HABs Management	*$21M*
-- All Other LWS Items	*$52M*
Exchange Benefit	**-$103M**
Delivery Reliability	$52M
Boot & Bennett Transfer	$28M
Flume Demolition	$10M
Reduced Pumping Costs	-$10M
TOTAL	**$288M**

"To Flume" Cost Advantage = $0M

So, interest rates have increased. What's the impact?

Table 5-1. Interest Rate Increases from 2022 to 2023			
	2022 Interest Rate	2023 Interest Rate	% Increase
Drinking Water State Revolving Fund (DWSRF)	1.10%	2.10%	91%
Water Infrastructure Finance and Innovation Act (WIFIA)	3.50%	5.00%	43%
Infrastructure State Revolving Fund (ISRF) Program	2.30%	4.36%	90%
Municipal Bonds	3.50%	6.00%	171%

Rolling back interest rates improves the cost advantage

Net Present Value (NPV) Analysis, in FY 2023 Dollars

NPV Cost Summary -- To Flume vs. Not To Flume

TO FLUME

Cost Component	30-Year NPV
Flume Replacement	$188M
Local Water System	**$125M**
-- Wells	*$35M*
-- HABs Management	*$25M*
-- All Other LWS Items	*$66M*
Water Treatment	$35M
Flume O&M	$14M
Self-Treatment Benefit	-$20M
TOTAL	**$343M**

PARTNER

NOT TO FLUME

Cost Component	30-Year NPV
Addtl. SDCWA Purchases	$459M
Local Water System	**$125M**
-- Wells	*$35M*
-- HABs Management	*$25M*
-- All Other LWS Items	*$66M*
Exchange Benefit	**-$111M**
Delivery Reliability	$57M
Boot & Bennett Transfer	$30M
Flume Demolition	$11M
Reduced Pumping Costs	-$12M
TOTAL	**$560M**

"To Flume" Cost Advantage = $217M

	Current Rates	Last Year's Rates
Discount Rate	5.50%	3.50%
Melded Costs of Funds	5.00%	3.00%
Water System Base Inflation	4.50%	3.50%
30-year NPV (Model Output)	**$153 M**	**$217 M**

Interest rates must double to tip the scales

Net Present Value (NPV) Analysis, in FY 2023 Dollars

NPV Cost Summary -- To Flume vs. Not To Flume

TO FLUME

Cost Component	30-Year NPV
Flume Replacement	$130M
Local Water System	**$41M**
-- Wells	*$14M*
-- HABs Management	*$11M*
-- All Other LWS Items	*$16M*
Water Treatment	$9M
Flume O&M	$3M
Self-Treatment Benefit	-$5M
TOTAL	**$179M**

PARTNER **NOT TO FLUME**

Cost Component	30-Year NPV
Addtl. SDCWA Purchases	$113M
Local Water System	**$41M**
-- Wells	*$14M*
-- HABs Management	*$11M*
-- All Other LWS Items	*$16M*
Exchange Benefit	**-$28M**
Delivery Reliability	$31M
Boot & Bennett Transfer	$17M
Flume Demolition	$6M
Reduced Pumping Costs	-$5M
TOTAL	**$176M**

"To Flume" Cost Advantage = **-$3M**

	Current Rates	Last Year's Rates
Discount Rate	5.50%	11.00%
Melded Costs of Funds	5.00%	10.00%
Water System Base Inflation	4.50%	4.50%
30-year NPV (Model Output)	**$153 M**	**-$3 M**

Findings and Recommendations

1. The To Flume option retains significant economic advantage, despite escalating capital and financing costs.
2. The To Flume delivery costs are ~$1,000/AF cheaper than the Not To Flume option. Making local water treated at EVWTP more affordable to the District's customers than purchasing treated water.
3. Although interest rates are variable and hard to predict, sensitivity analysis shows that tipping the Balance Scale away To Flume is not plausible.
4. The District may move forward with confidence in:
   - Finishing the alignment Study,
   - Preparing the Flume Replacement project for full implementation,
   - Advance the HABs long-term capital improvements, and
   - Beginning planning efforts for future wellfield optimization.

6. Conclusions & Next Steps

Speaker: J.P. Semper, P.E.

Defining the **next** legacy

Summary of Conclusions: Phase 4 – Fine Screening

1. The Alignment Study has finished evaluating a broad range of alternatives and **recommends Alternative 1 advance to conceptual design**, while retaining the Beginning corridor of Alternative 2 as a contingency during final design.
2. The **Flume Replacement Project requires a diverse funding portfolio**; interest rates for the funding mechanisms which will plausibly comprise this portfolio have increased significantly.
3. **Most climate futures, 80% of the modeled scenarios,** predict the District can confidently rely on local water being available over a wide variety of climate conditions, and the economics **weigh in favor of a To Flume project if modest investments are made to the LWS**.
4. **The To Flume option retains significant cost advantage** in comparison to the Not To Flume option, and still supports LWS improvements at Lake Henshaw and Warner Basin wellfield; **so long as the District's share of average annual local yield is above 2,700 AFY**.

Final Conclusion & Next Steps

RELIABLE AFFORDABLE RESPONSIBLE

5. The **analyses presented herein supports the District's continued investment** in HABs mitigation, wellfield improvements, and the future Flume Replacement project. Recommended next steps include:

A. Proceed with Phase 5 – Recommended Alignment Report.

B. Inform DDW of the District's intent to advance the Flume's replacement.

C. Advance preparation of CEQA supporting documents.

D. Continue investigating HABs mitigation and wellfield optimization.

D. Work with the District's Municipal Advisor to develop the project's funding strategy.

E. Develop an RFP for the final design of the Flume Replacement Project.

F. Use the planning, environmental, and financial documents prepared in the above steps as supporting documentation to pursue a diverse funding portfolio.

Thank you.
Questions?

Brown AND Caldwell