

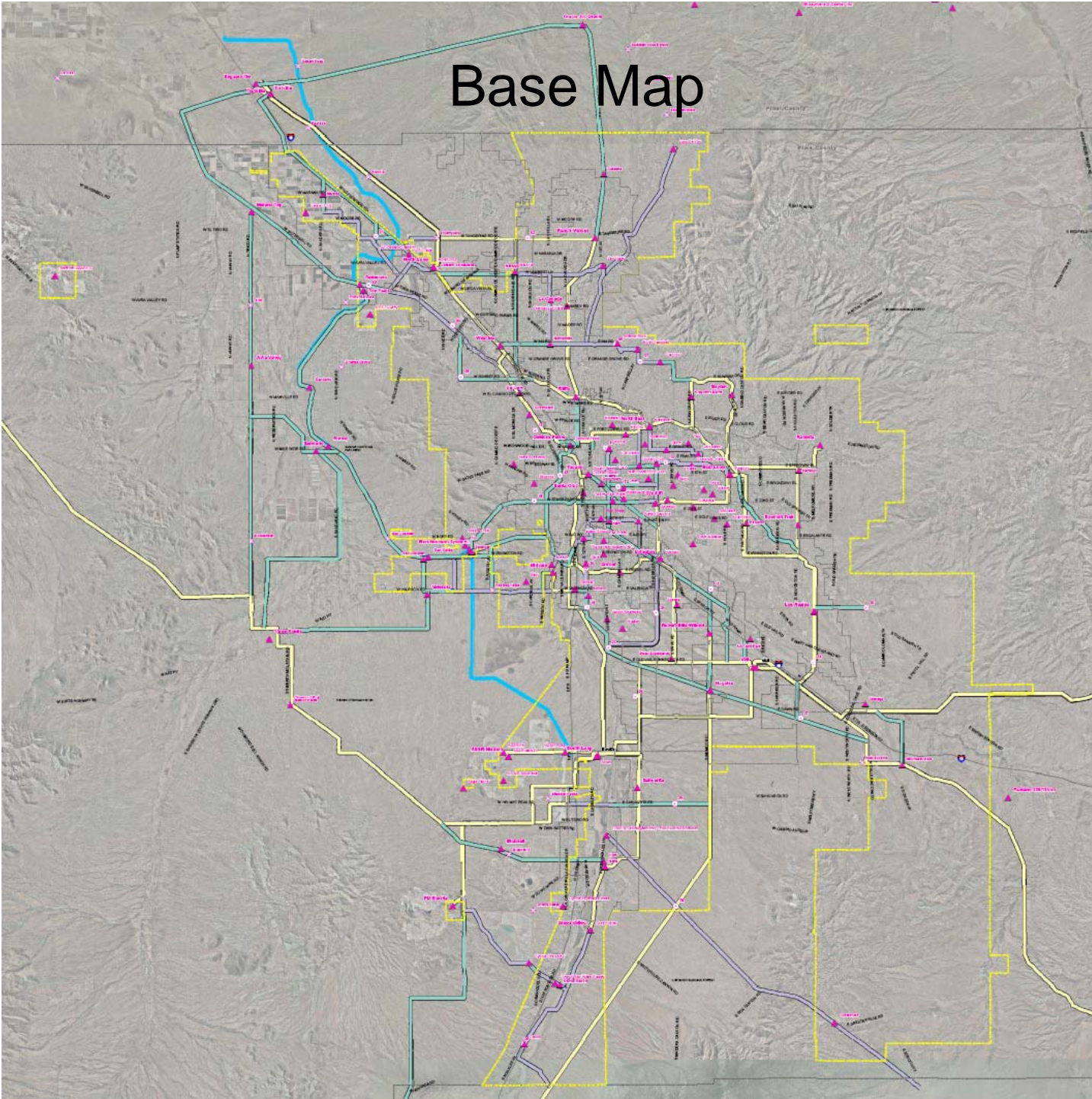
Preliminary Saturation Study Results

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SATS Meeting
9/26/07

Alternative Strategies

- Strategy A: 2 – EHV lines through Tucson
- Strategy B: 1 – EHV line through Tucson
- Strategy C: EHV Reach-in to Tucson
- Strategy D: EHV East-West Tucson Path
- Strategy E: No EHV into Tucson

Base Map



STRATEGY A

Eastern 345kV Path:

- Tortolita – North Loop 345kV
- North Loop – East Loop 345kV
- East Loop – Vail 345kV

Western 345kV Path:

- Tortolita – Marana 345kV
- Marana – SS30 345kV
- SS30 – South Loop 345kV

EXTERNAL SYSTEM ASSUMPTIONS

Possible Joint Projects:

- Tortolita – Winchester 500kV
- Tortolita – Marana 345kV
- Marana – Three Points 345kV
- CS1 (Three Points) – Bicknell 230kV
 - Three Points – Bicknell 345kV
- Bicknell – Vail 345kV (Existing)
 - South Loop-In not in service
- 2nd Winchester – Vail 345kV

Possible TEP Projects:

- 2nd Vail – South 345kV

Committed TEP Projects:

- Pinal West 500/345kV
- Pinal South – Tortolita 500kV

Saturation Strategy A: 2 EHV NW-SE & NW-S Paths Through Tucson



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Strategy A Results

- Solution Log
 - 1 DNS (PS-TO 500)
- EHV Thermals (worst outages)
 - Vail T2 for loss of parallel transformer
 - Tortolita 500/345 kV transformer for loss of parallel transformer
 - Winchester – Vail 345 kV line for loss of parallel line
- Voltage Deviations
 - Marana 115 for loss of Marana 345/115 kV transformer

Pinal South – Tortolita Outage

- Mitigate DNS condition with 1 additional 138kV cap bank at Northeast controlled by SVC
- Thermal overloads
 - PW – Three Points 345 kV overload
 - Pinal West 500/345 kV transformer
 - SWTC 115 kV overloads in TO-NL corridor

Strategy A – Gateway Alternative 1

- Displace Palo Verde generation with Gateway generation (500 MW)
- No DNS cases
- Voltage Deviations
 - SWTC 115 kV buses in TO – NL corridor for loss of PS – TO 500
 - Marana 115 for loss of Marana 345/115 kV transformer
 - Localized TEP 138 kV

Gateway Alternative 1 – con't.

- Thermal overloads (worst outages)
 - 3Pts – PW for loss of PS – TO 500
 - WN – VL 345 for loss of parallel line
 - WN 500/345 transformer for loss of parallel transformer
 - Tortolita 500/345 transformer for loss of parallel transformer
 - PW 500/345 transformer for loss of PS – TO 500

Strategy A – Gateway Alternative 2

- Displace Winchester generation with Gateway generation (500 MW)
- 3 DNS cases
 - PS – TO 500
 - Mtn. View – Ft. Huachuca 138
 - SS 13 – DMP 138
- EHV Thermal Overloads (worst outages)
 - Vail T2 for loss of parallel transformer
 - Tortolita 500/345 kV transformer for loss of parallel transformer
 - Winchester – Vail 345 kV line for loss of parallel line
- Voltage Deviation Issues
 - Marana 115 for loss of Marana 345/115 kV transformer

Saturation Strategy B: 1 EHV Path Through Tucson

STRATEGY B

Western 345kV Path Only:

- Tortolita – Marana 345kV
- Marana – DMP 345kV
- DMP – SS30 345kV
- SS30 – South Loop 345kV

EXTERNAL SYSTEM ASSUMPTIONS

Possible Joint Projects:

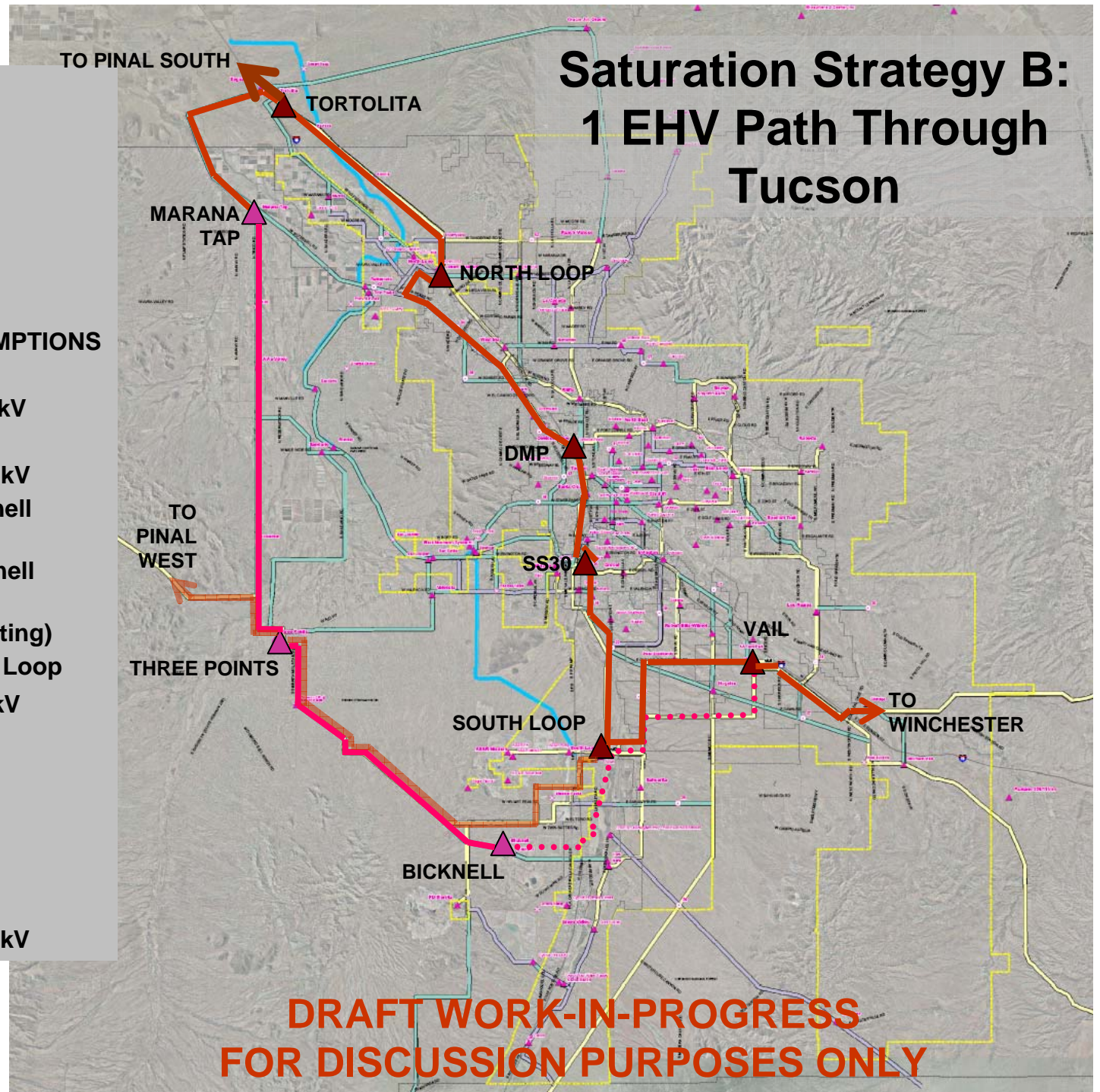
- Tortolita – Winchester 500kV
- Tortolita – Marana 345kV
- Marana – Three Points 345kV
- CS1 (Three Points) – Bicknell 230kV
 - Three Points – Bicknell 345kV
- Bicknell – Vail 345kV (Existing)
 - No Loop-In @ South Loop
- 2nd Winchester – Vail 345kV

Possible TEP Projects:

- 2nd Vail – South 345kV

Committed TEP Projects:

- Pinal West 500/345kV
- Pinal South – Tortolita 500kV



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STRATEGY C

Reach-In to NL, EL & SS30:

- Tortolita – North Loop 345kV
- Tortolita – Marana 345kV
- Marana – North Loop 345kV
- South Loop – SS30 345kV
- Vail – South Loop 345kV
- Vail – East Loop 345kV

EXTERNAL SYSTEM ASSUMPTIONS

Possible Joint Projects:

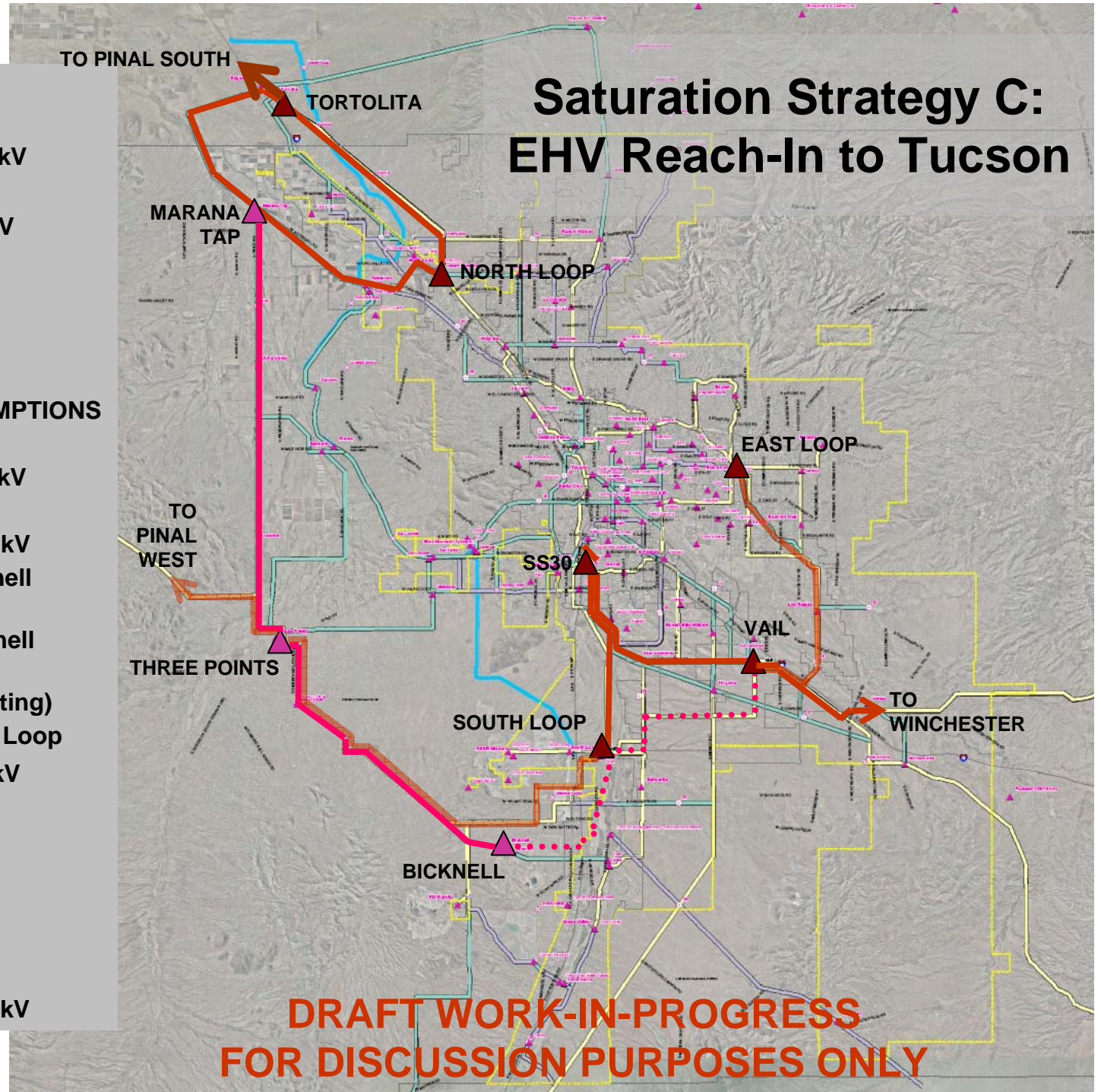
- Tortolita – Winchester 500kV
- Tortolita – Marana 345kV
- Marana – Three Points 345kV
- CS1 (Three Points) – Bicknell 230 kV
 - Three Points – Bicknell 345kV
- Bicknell – Vail 345kV (Existing)
 - No Loop-In @ South Loop
- 2nd Winchester – Vail 345kV

Possible TEP Projects:

- 2nd Vail – South 345kV

Committed TEP Projects:

- Pinal West 500/345kV
- Pinal South – Tortolita 500kV



Strategy C Results

- Solution Log
 - 1 DNS (PS-TO 500)
- Thermal Overloads (worst outages)
 - Vail T2 345/138 transformer for loss of parallel transformer
 - Tortolita 500/345 transformer for loss of parallel transformer
 - WN-VL 345 line for loss of parallel line
- Voltage Deviations
 - Morenci area buses for loss of SP-VL
 - Marana 115 for loss of Marana 345/115 transformer

Saturation Strategy D: EHV East-West Path Through Tucson

STRATEGY D

East – West Path:

- Tortolita – North Loop 345kV
- Tortolita – Marana 345kV
- Marana – North Loop 345kV
- Vail – SS30 345kV
- Three Points – SS30 345kV
- Vail – East Loop 345kV

EXTERNAL SYSTEM ASSUMPTIONS

Possible Joint Projects:

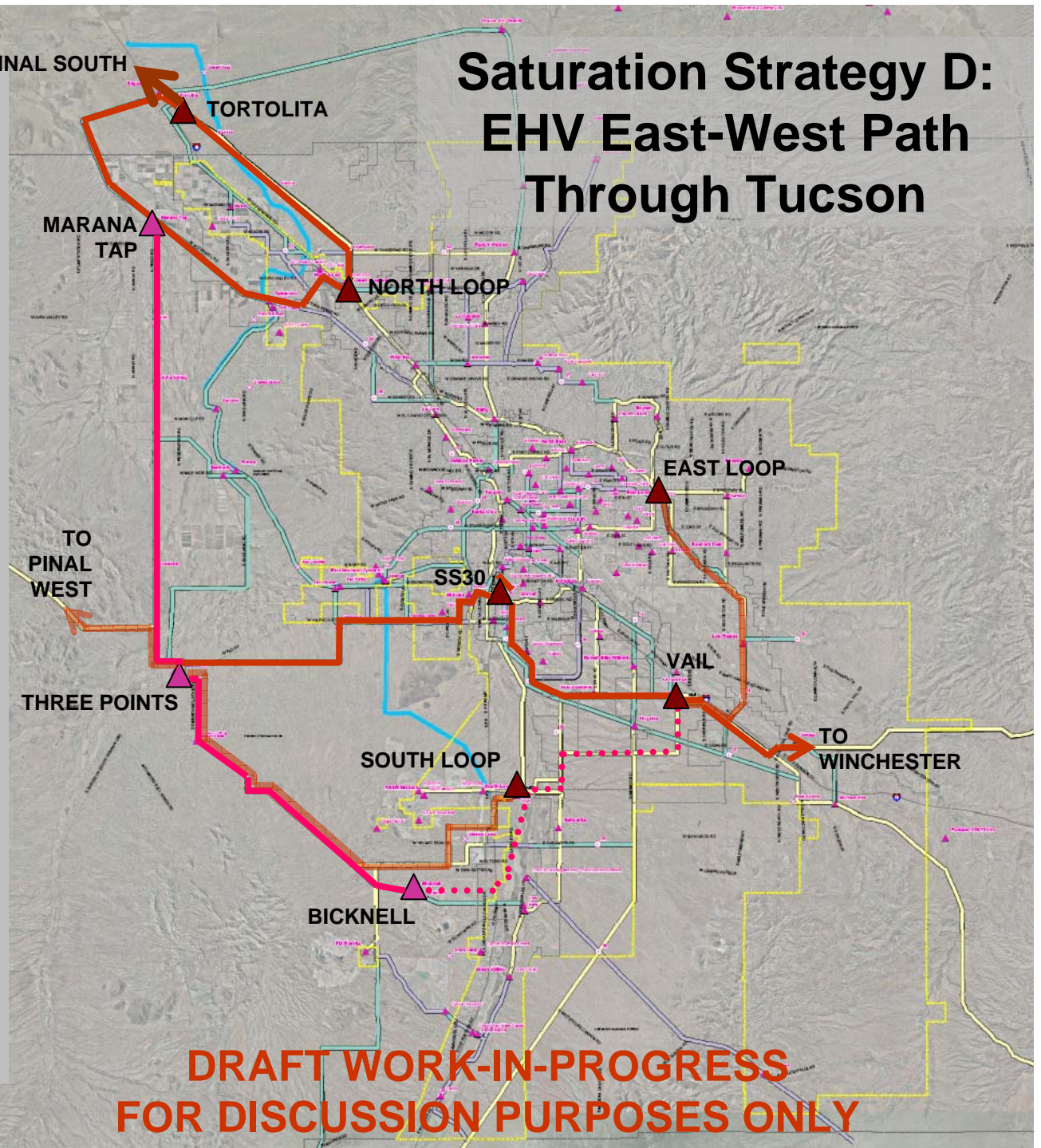
- Tortolita – Winchester 500kV
- Tortolita – Marana 345kV
- Marana – Three Points 345kV
- CS1 (Three Points) – Bicknell 230kV
 - Three Points – Bicknell 345kV
- Bicknell – Vail 345kV (Existing)
 - No Loop-In @ South Loop
- 2nd Winchester – Vail 345kV

Possible TEP Projects:

- 2nd Vail – South 345kV

Committed TEP Projects:

- Pinal West 500/345kV
- Pinal South – Tortolita 500kV



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Strategy D Results

- Solution Log
 - 1 DNS (PS-TO 500)
- Thermal Overloads (worst outages)
 - Vail T2 345/138 transformer for loss of parallel transformer
 - Tortolita 500/345 transformer for loss of parallel transformer
 - WN-VL 345 line for loss of parallel line
- Voltage Deviations
 - Marana 115 for loss of Marana 345/115 transformer

Strategy E Results

- Solution Log
 - 1 DNS (PS-TO 500)
- Thermal Overloads
 - Three Points 345/230 transformer
 - TEP Tie Transformers
 - WN-VL 345 line
- Voltage Deviations
 - Multiple TEP 138 kV and Morenci area buses for SP-VL outage
 - Marana 115 for Marana 345/115 kV transformer outage

Questions