



# JOLLYVILLE WATER TRANSMISSION MAIN ROUTE RECOMMENDATION

# Table of Contents

Section	Page #
□ Introduction	3-4
□ Hybrid West-of-620 Route	5-21
□ Hybrid Surface Piped	5-10
□ Hybrid Tunnel/Trench Combination	11-16
□ Hybrid Tunneled Completely	17-20
□ Recommended Spicewood Springs Route	22-25
□ Shaft Sites	26-39
□ Shaft Alternative 1	31
□ Shaft Alternative 2 (recommended)	32
□ Shaft Alternative 3	33
□ Shaft Alternative 4	34
□ Shaft schedule comparison/Matrix	35-37
□ Summary of Recommendations	38-39

# Route Analysis

3

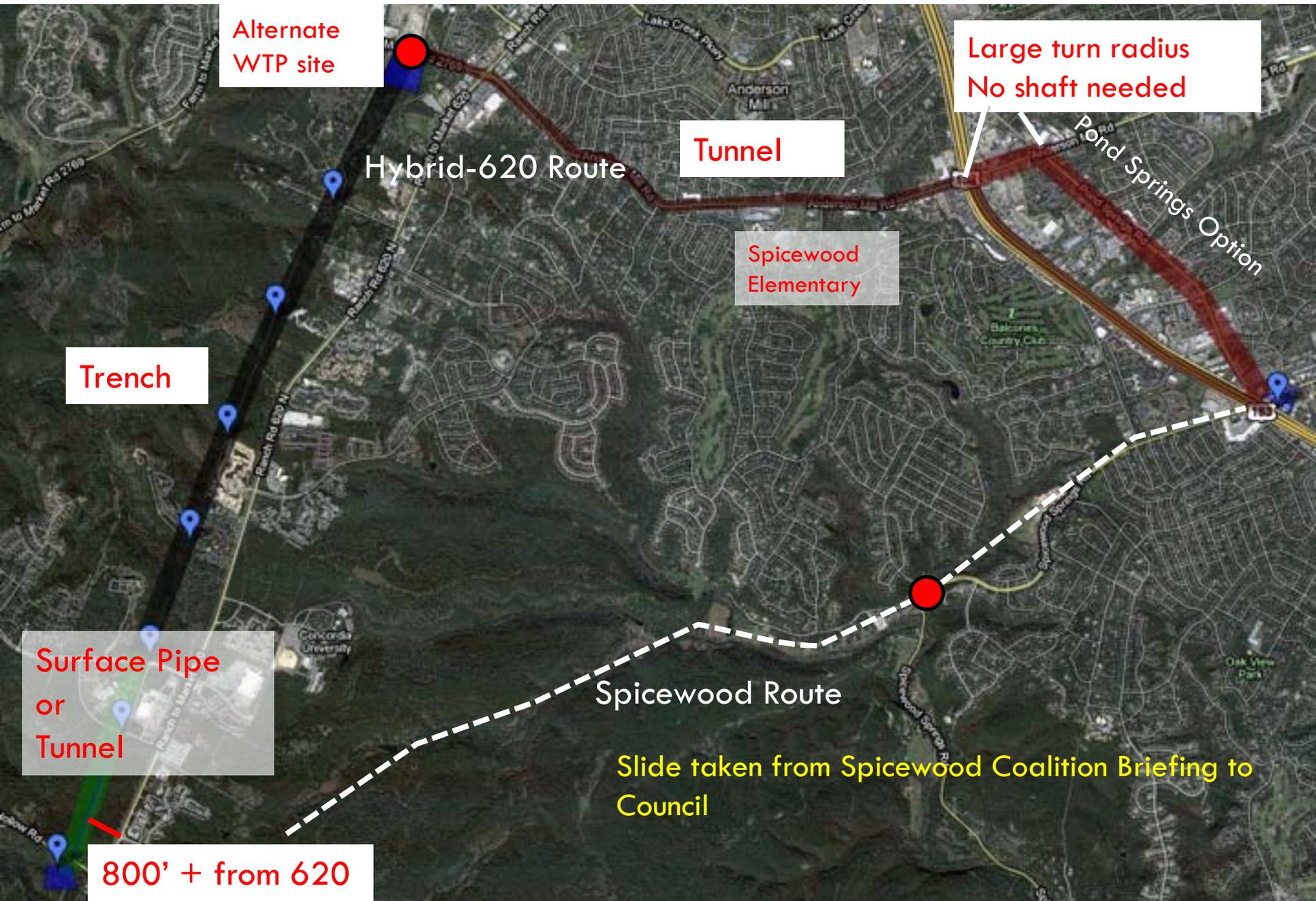
- Hybrid West-of-620 Route
  - Surface piped
  - Trench/Tunnel
  - All Tunnel
  
- Spicewood Springs Route

# Issues Reviewed for Alternatives

4

- Constructability
- Environmental Impact
- Community Impact
- Construction Cost

# The Hybrid-West-of-620 Route



Alternate WTP site

Large turn radius  
No shaft needed

Tunnel

Spicewood Elementary

Trench

Surface Pipe or Tunnel

800' + from 620

Slide taken from Spicewood Coalition Briefing to Council



# Hybrid West-of-620 Surface Piped

7

## Constructability Issues:



Route is more than 2 miles longer than the Spicewood Springs route. Several streams would have to be crossed between WTP4 and Anderson Mill.

Foundations would need to be built every 40 to 50 feet to support pipe- Additional support is needed with hills.

Alaskan Pipeline is 48 in. in diameter— this waterpipe is nearly twice that size



# Hybrid West-of-620 Surface Piped

8

## Environmental Issues:

More than 70 % of surface pipe route is in Karst Zones 1 and 2, a formation most likely to contain Karst invertebrate habitats.



Spring near Wilson Park Ave. is known Jollyville Plateau Salamander habitat

# Hybrid West-of-620 Surface Piped

9

## Community Issues:



## Alignment Cuts Through Grandview Hill Elementary School Property



# Hybrid West-of-620 Surface Piped

10

## Cost and Other Issues:

- Length of piping more than 2 miles longer than Spicewood Springs route
- As routed currently, would have to be evaluated as a potential amendment to Section 10a Permit
- Environmental mitigation costs
- Homeland security risks would need to be evaluated
- Operation and maintenance costs increase significantly

## Conclusion:

- Surface piping is not recommended

# Hybrid West-of-620 Tunnel/Trench

11

## Constructability Issues:

Soil Conditions may dictate use of rock trenchers



Large Trench  
Boxes  
Required by  
OSHA



“Hill Country”  
slopes add time  
and cost

Disturbed  
Area is Much  
Wider than  
Trench



# Hybrid West of 620 Tunnel/Trench

12

## Constructability Issues:

Cranes would be needed to trench and tunnel in the PEC Utility Easement.



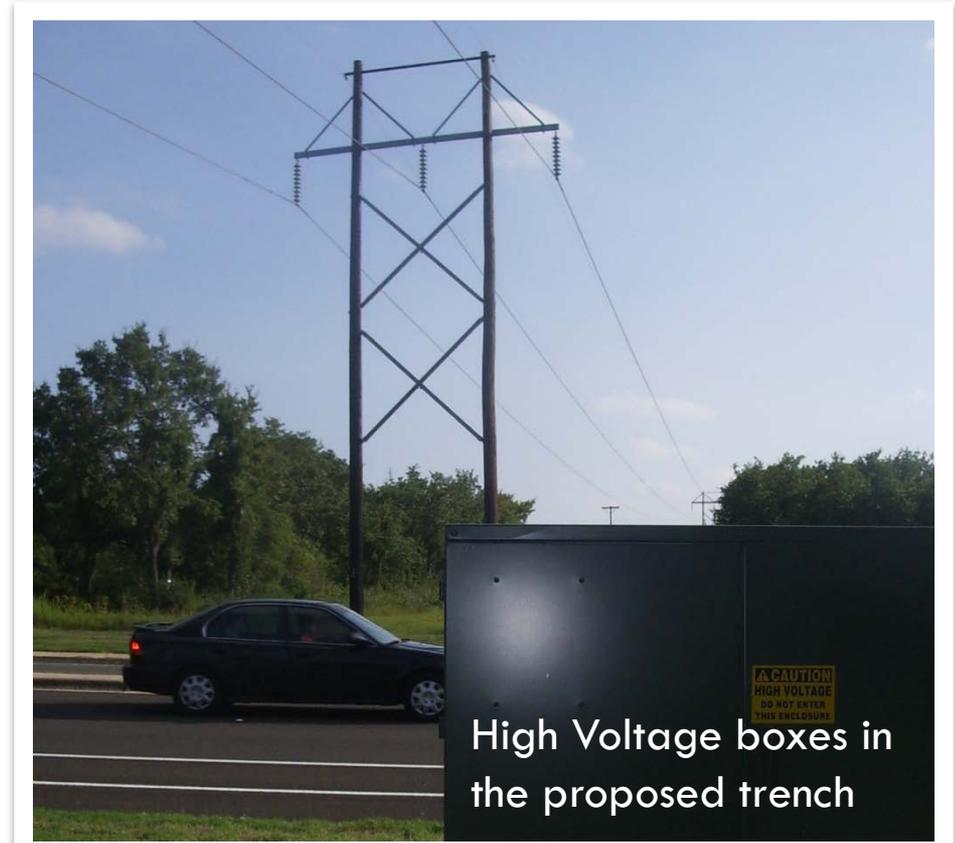
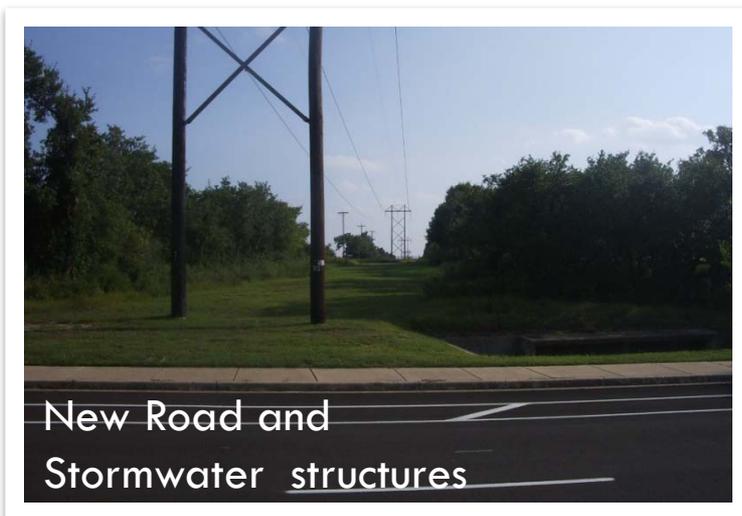
Construction of trench would be near tower foundations

Terrain is hilly - water pipe construction would need to follow the contours

# Hybrid West-of-620 Tunnel/Trench

## Constructability Issues:

13



# Hybrid West-of-620 Tunnel/Trench

14

## Environmental Issues:

- ▣ Trenching activities have the potential to generate sediment-laden runoff, if not controlled properly
- ▣ Trench and shaft construction are in the vicinity of known Black Capped Vireo and Golden Cheeked Warbler Habitat
- ▣ Trenching crosses several streams and up to 4,000 feet of drainage areas that feed known JPS habitat.
- ▣ More than 80 % of trenched portion of route is in Karst Zones 1 and 2. This option would also require clearing 5-10 acres of vegetation in Sensitive environmental areas.



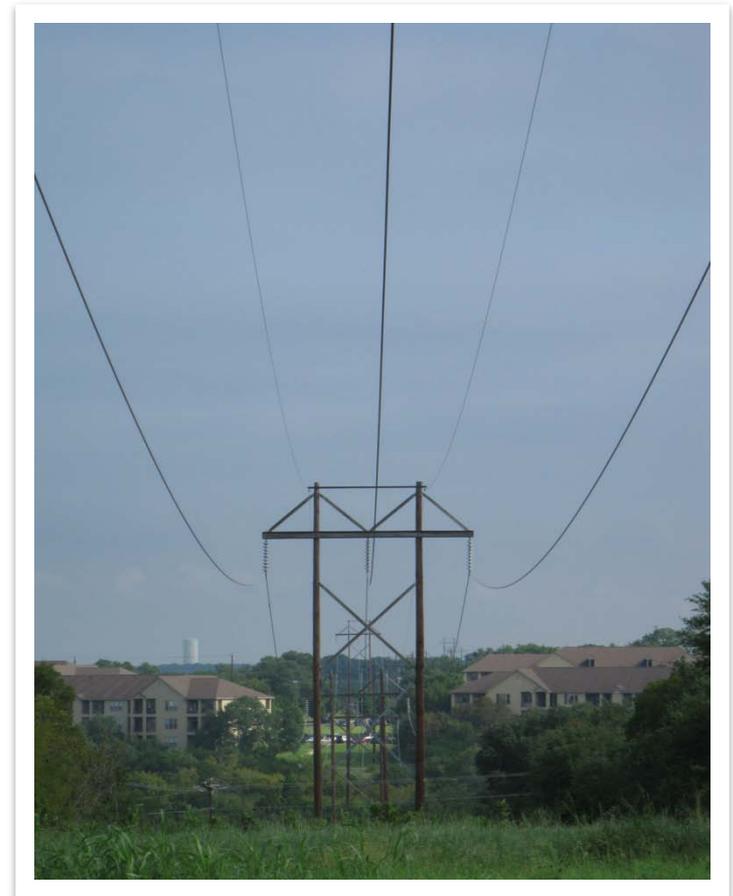
# Hybrid West-of-620 Tunnel/Trench

15

## Community Issues:

Several streets would require closure during trenching activities

Between 350 and 400 residential structure and 200-250 businesses, one school and one day care center would be within  $\frac{1}{4}$  mile of shaft and trench construction.



# Hybrid West-of-620 Tunnel/Trench

16

## Cost and Other Issues:

- In addition to construction costs, up to three miles of surface easements along private property would need to be purchased along the proposed trench
- Additional shaft needed because route is more than 2 miles longer than the Spicewood Springs route
- Hilly terrain would increase operation and maintenance costs
- As routed currently, would have to be evaluated as a potential amendment to Section 10a Permit
- Trenching across several streams could potentially require a U.S. Army Corps of Engineers Section 404 permit

## Conclusion:

- Trenching is not recommended

# Hybrid West-of-620 - All Tunnel

17

## Constructability Issues:

- The route is more than 2 miles longer than the Spicewood Springs Route
- Route would require 3 Intermediate shafts for a total 5 shaft sites
- Construction cost and schedule would increase due to extra length of route and additional shaft

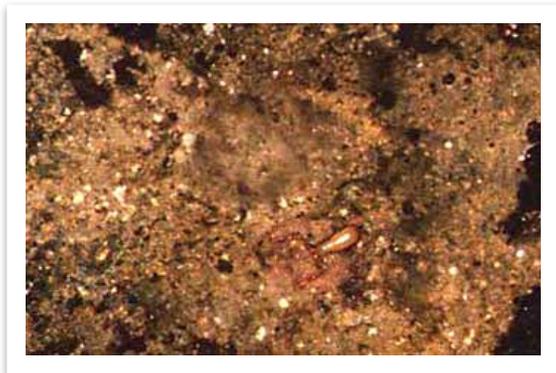


# Hybrid West-of-620 - All Tunnel

18

## Environmental Issues:

- Intermediate shaft necessary along western portion of line may impact Karst Zones 1 and 2, depending on location



# Hybrid West-of-620 - All Tunnel

19

## Community Issues:

- The need for an additional shaft could likely cause community impacts depending on location.
- Approximately 250-300 residential structures and 150-200 commercial structures within  $\frac{1}{4}$  mile of the intermediate shaft construction

# Hybrid West-of-620 - All Tunnel

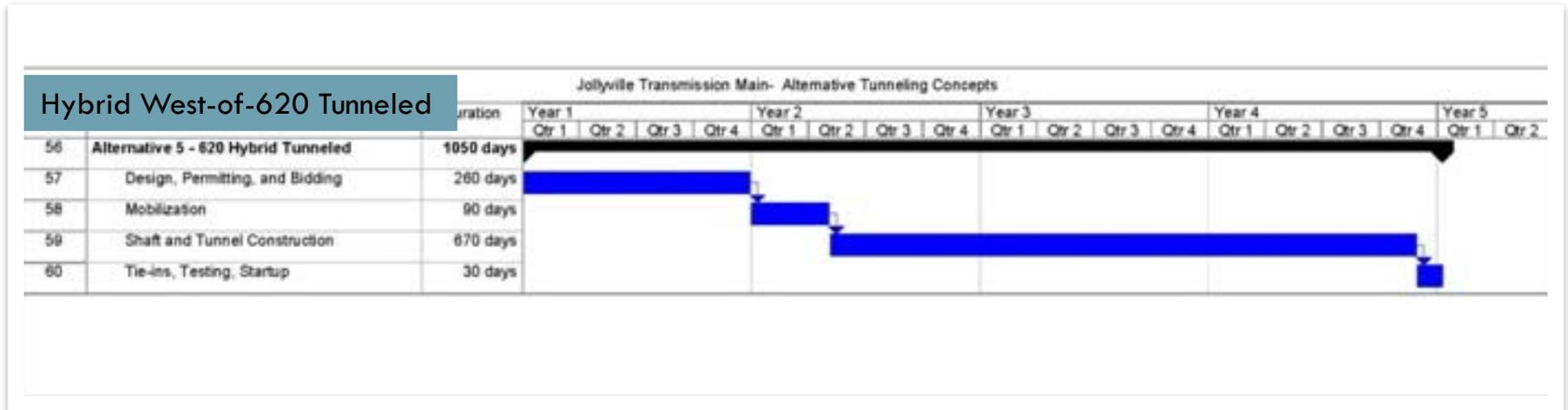
20

## Cost and Other Issues:

- As routed currently, would have to be evaluated as a potential amendment to Section 10a Permit
- Cost estimates approximately **\$50 Million** higher than the preferred Spicewood Springs Route

# Hybrid West-of-620 Route Schedule

21

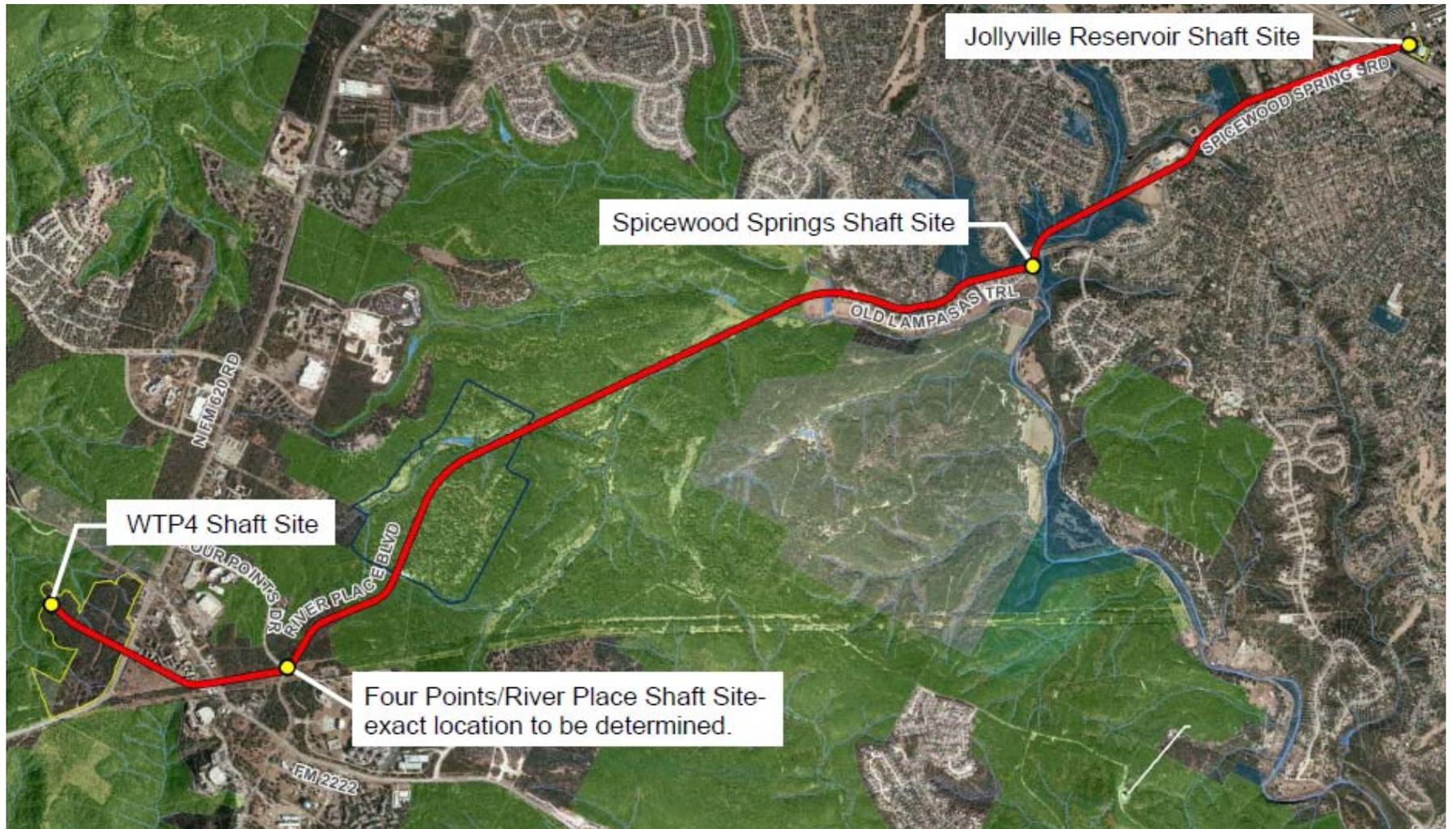


49-month design/construction schedule for the Hybrid West-of-620 Route – All Tunnel

This extends the construction schedule by 19 months, which adds additional cost to overall project.

# Recommended Spicewood Springs Route

22



# Recommended Spicewood Springs Route

23

## Constructability Issues:

- Length is at least 2 miles shorter than the Hybrid West-of-620 routes
- Only 4 shafts needed vs. 5 for Hybrid West-of-620 routes
- Tunneling in deeper Glen Rose rock formation for entire distance avoids major surface disruption and minimizes environmental risk

# Recommended Spicewood Springs Route

24

## Environmental Issues:

- No significant difference in overall environmental risks between tunneled routes
- Fewer shafts than the Hybrid West-of-620 route means less disturbance in the Edwards Formation
- Constructed within easements of the Balcones Canyonlands Preserve- no amendment needed
- Shaft sites in close proximity to Bull Creek

# Recommended Spicewood Springs Route

25

## Community Issues:

- Spicewood Springs neighbors asked for restricted hours for truck traffic from 9:00 am – 3:00 pm
- Community also had concerns with noise and dust associated with construction at shaft site
- Community had concerns about potential impacts to Bull Creek

## Cost Issues:

- Construction costs \$50 million less than Hybrid West-of-620 All Tunnel route



SHAFT SITES ON  
RECOMMENDED SPICEWOOD  
SPRINGS ROUTE

# Why Do We Need Shaft Sites?

27

- Construction of tunnels
- Provide needed safety to workers
- Long-term tunnel operation/maintenance

In order to construct the Jollyville Transmission Mains, 4 total shafts are needed - one at the WTP4 site, one at the Jollyville Reservoir and two intermediate shafts.

Because of the presence of the Balcones Canyonlands Preserve (BCP) the two intermediate shafts will be located near the points the tunnel enters and leaves the BCP land.

# Types of Shaft Sites

28

- ▣ “Working” shaft, approximately 30-40 feet, activities include excavating materials, insertion and retrieval of equipment, placing pipe into tunnel and grouting pipe.
- ▣ “Access and Retrieval” shaft, approximately 20- 30 feet, activities include insertion and retrieval of equipment, placing pipe into tunnel and grouting pipe.
- ▣ A “Ventilation-specific” shaft, approximately 6-8 feet, provides fresh air underground to workers, ventilation for equipment and is commonly used to grout.

***All shafts would allow access for maintenance and operations***

# Shafts are routinely constructed on Constrained Sites

29



Examples of shaft sites with size constraints



Drilling occurring close to homes and residents



# Palmer Event Center Shaft Site Similar Size as Spicewood Springs and Jollyville Site

30

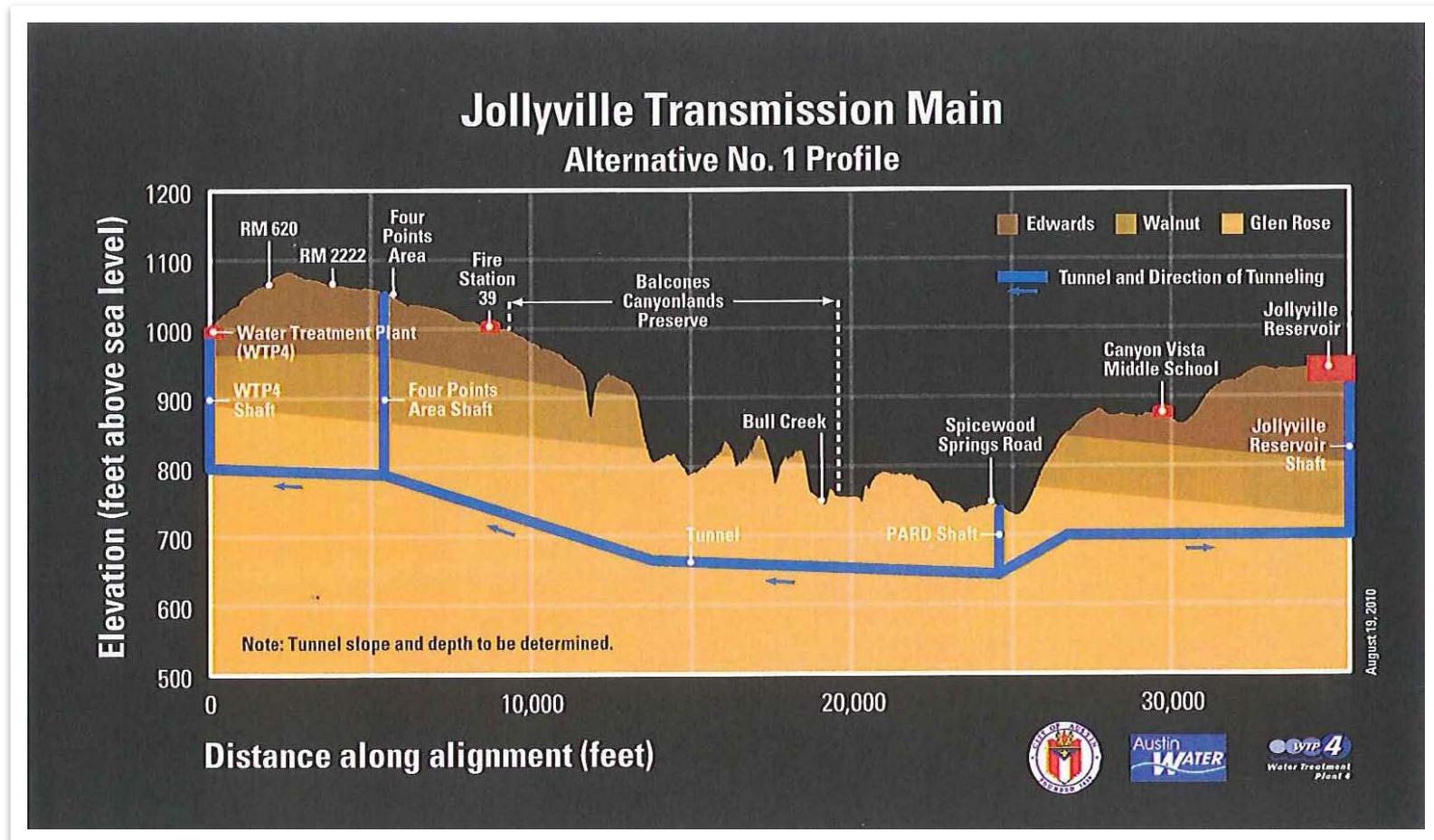


# Original Shaft Proposal

Alternative 1

31

Alt.1: Working Shaft at Four Points and Spicewood Springs; Retrieval Shafts at WTP4 and Jollyville

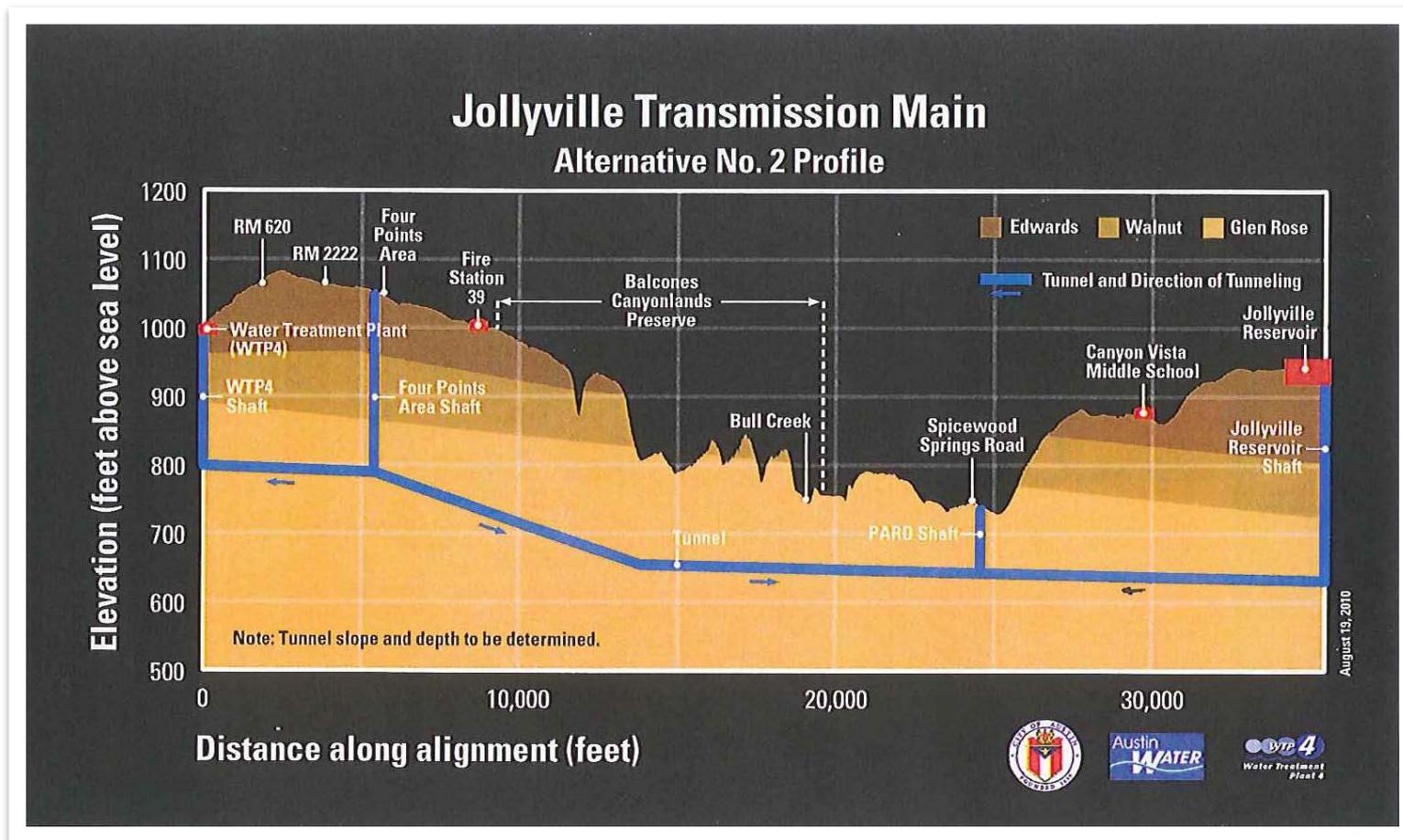


# Shaft Site Alternatives

**Alternative 2**  
**(Recommended)**

32

Alt.2: Working Shaft at Four Points & Jollyville; Retrieval Shaft at Spicewood Springs and WTP 4

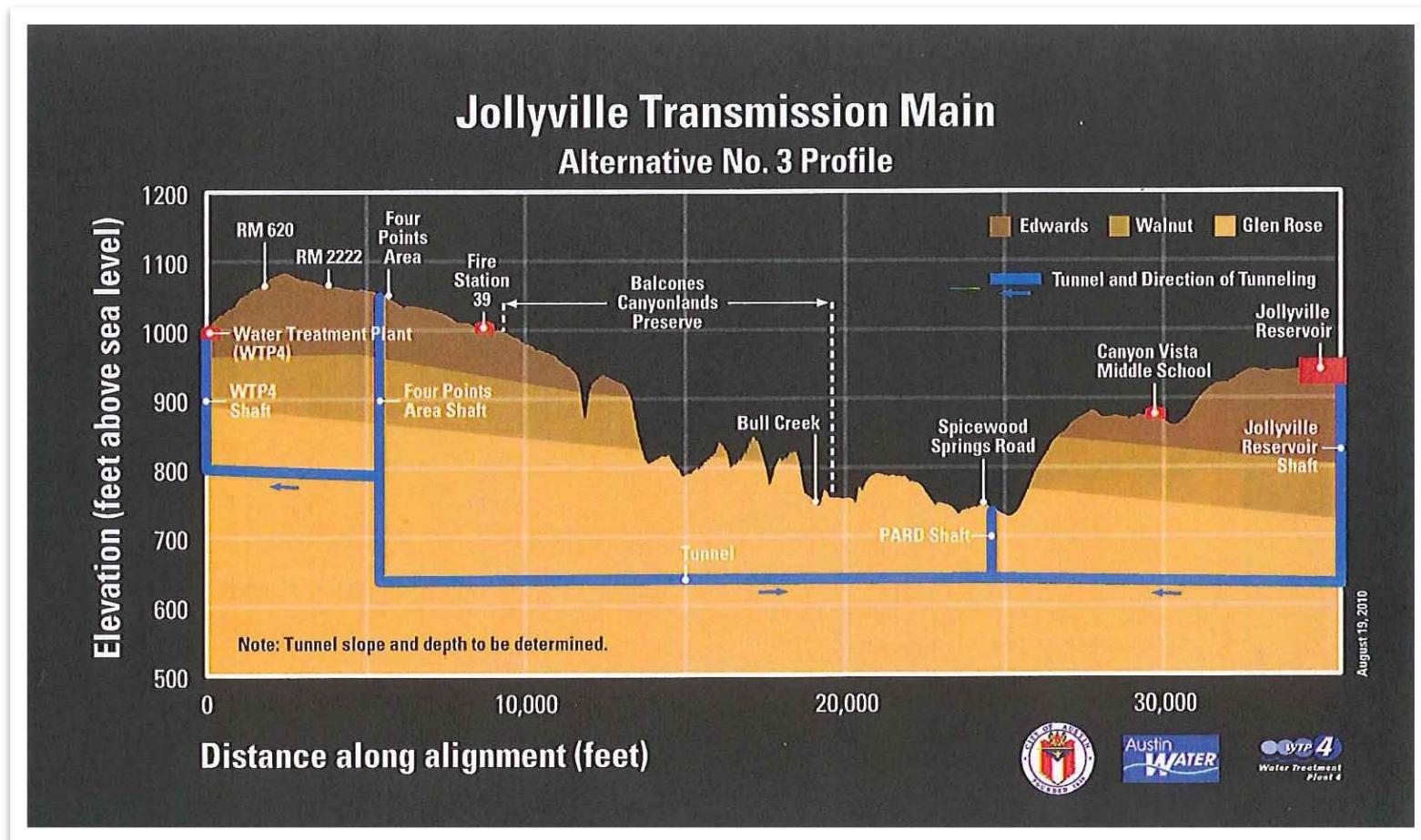


# Shaft Site Alternatives

## Alternative 3

33

Alt.3: Deeper Working Shaft at Four Points & Jollyville; Retrieval Shafts at Spicewood Springs and WTP 4

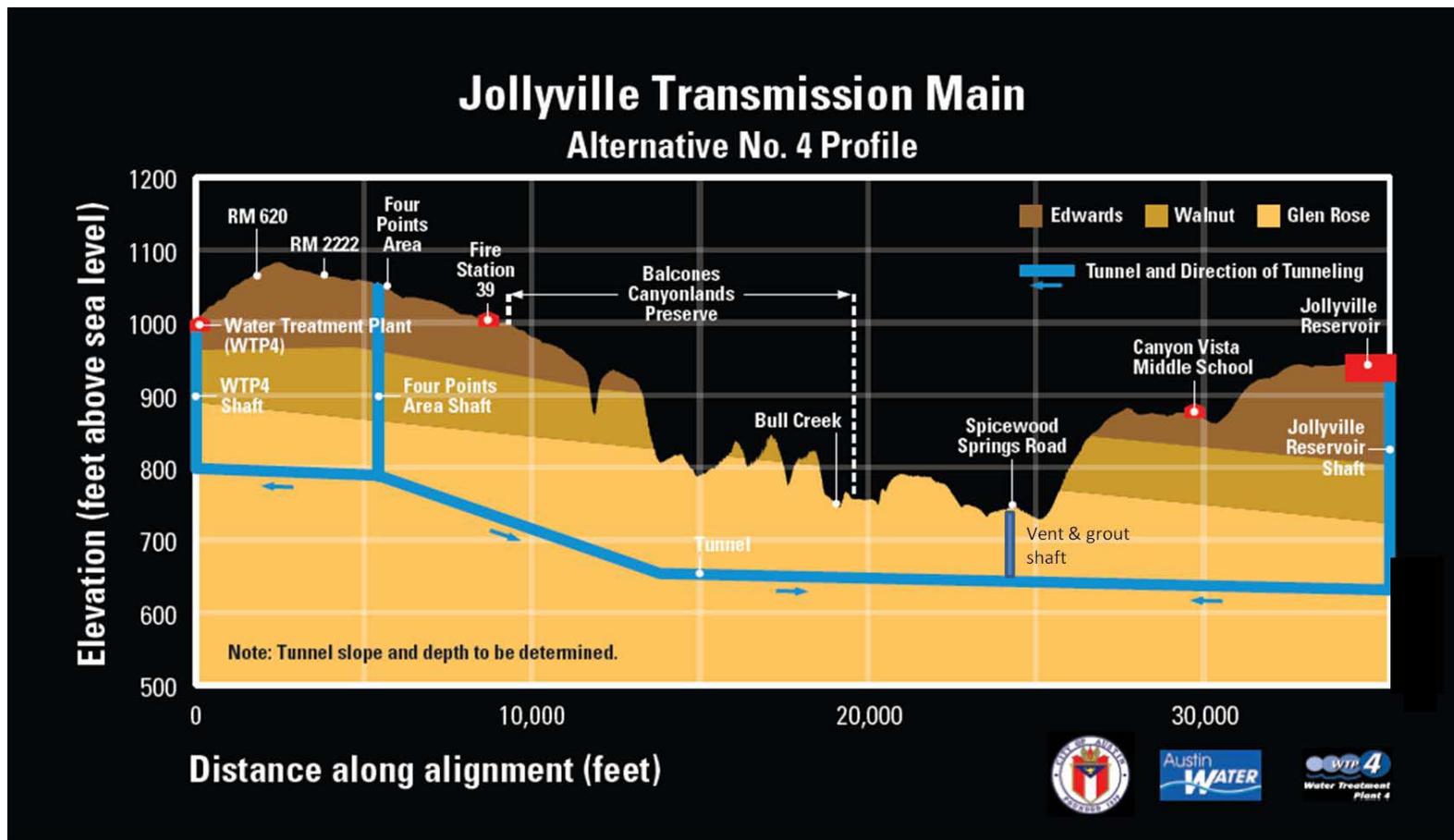


# Shaft Site Alternatives

## Alternative 4

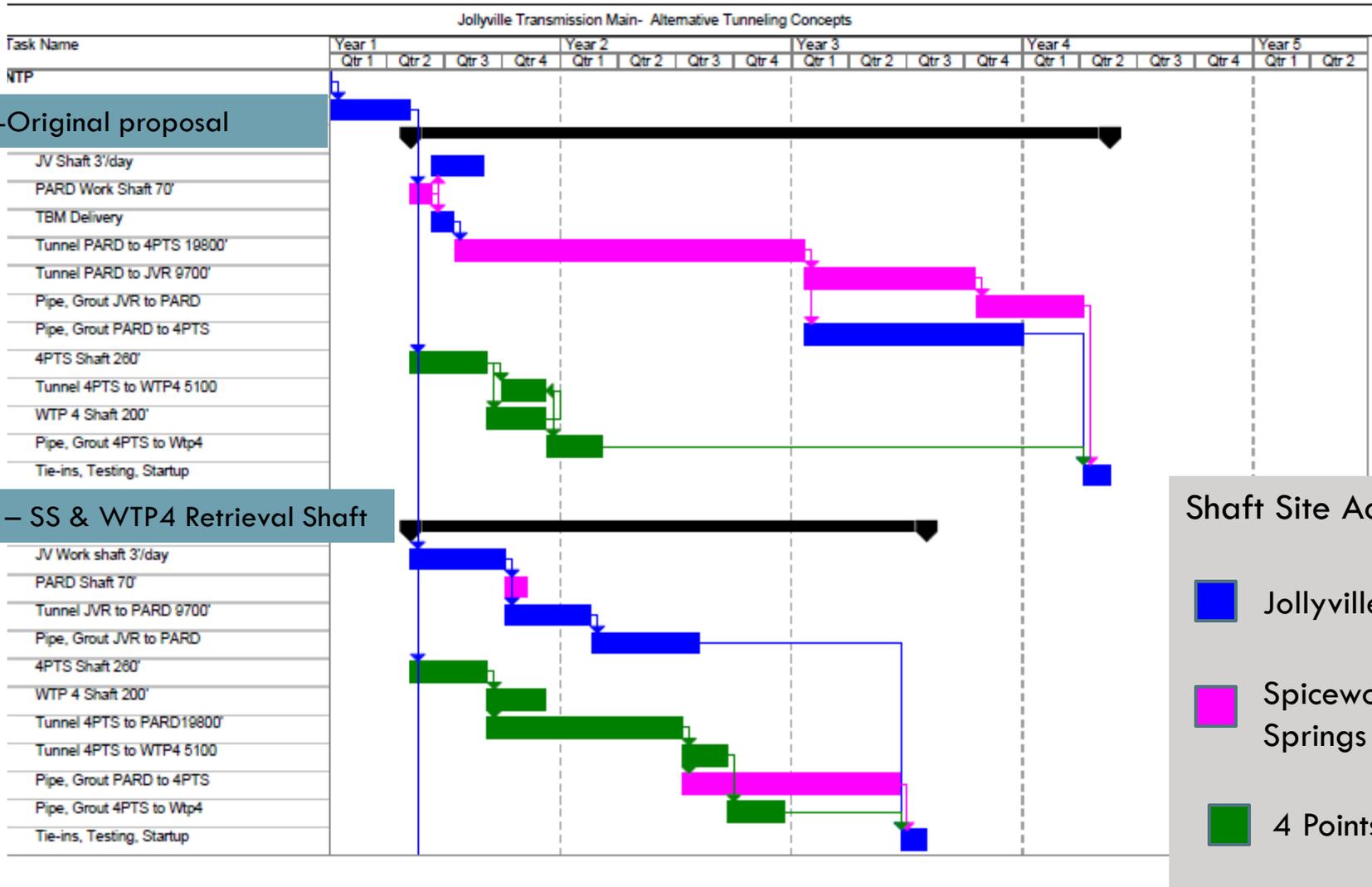
34

Alt.4: Working Shaft at Four Points & Jollyville; Retrieval Shaft at WTP 4; Ventilation Shaft at Spicewood Springs



# Shaft Alternatives – Schedule Comparison

35



**Shaft Site Activities**

- Jollyville
- Spicewood Springs
- 4 Points



# Shaft Alternatives Evaluation Matrix

37

Tunneling Options	Const. Costs	Schedule Impact > Spring 2014	Schedule Related Cost Impact	Total Cost Range	Enviro. Impacts	Tunneling Risks	Operation/ Maint.	Community Impacts
Alt 1 (Working Shaft at Four Points and SS)	\$90-\$100M	+ 10 months	+ \$ 7 M	\$95-\$105M	Moderate	Moderate	Acceptable	High
Alt 2 (Retrieval Shaft at WTP4 and SS)	\$95-\$105M	None	0	\$95-\$105M	Moderate	Moderate to Low	Preferred	Moderate
Alt 3 (Retrieval Shaft at WTP4 and SS-Deeper shaft at Four Points)	\$100-\$110M	+ 5 months	+ \$3.5 M	\$100-\$115M	Moderate	Low	Not preferred	Moderate
Alt 4 (Ventilation Shaft at SS)	\$105-\$115M	+ 6 months	+\$4.2 M	\$105-\$120M	Moderate	High	Acceptable	Low
Alt 5 (Hybrid West-of-620 Route Alignment)	\$145-\$155M	+ 19 months	>\$10 M	>\$155-\$165M	Moderate	Info not available	Not preferred	Moderate

# Balances Environment, Community & Cost

## Shaft Site Alternative 2 – Recommended

38

- Reduces truck traffic at the Spicewood Springs/Old Lampasas Trail shaft site by more than 90 percent from over 11,500 total truck trips to less than 800 total trucks trips.
- Reduces the number of construction days by half at the Spicewood Springs site from nearly 1,000 days to less than 400.
- Reduces the potential impact to Bull Creek.
- Honors the restricted hours of 9:00 a.m. to 3:00 p.m. at Spicewood.
- Moves the vast majority of truck traffic to RM620 & Hwy. 183.
- Shifts the bulk of excavation work from residential to commercial areas, where construction impacts are more easily absorbed.
- Tunnels are well below known Karst environment and the Balcones Canyonlands Preserve
- Provides the lowest cost solution when schedule impacts are considered.

# Shaft Alternative 2

## *Shaft Design on the Recommended Route:*

39

- Balances the needs of the environment & community, constructability and costs.
- And meets the water utility's mission to provide safe, reliable, high-quality drinking water to its customers now and in the future.