# Scenario Planning at the Sub-Regional Level

Knoxville Regional Transportation Planning Organization
TPO

KCI TECHNOLOGIES

A Case Study on How One Region Linked and Tested Land Use Decisions, Community Priorities, and Needed Transportation Investments

# PROJECT OVERVIEW

The Hardin Valley Mobility Plan examines existing and future mobility needs for all users, including pedestrians, cyclists, and motorists with the goal of providing an efficient, safe, and effective multimodal network.

# PROJECT OVERVIEW


**Identify**
additional small- and large-scale transportation improvements to accommodate future growth

**Estimate**
planning-level costs for improvements

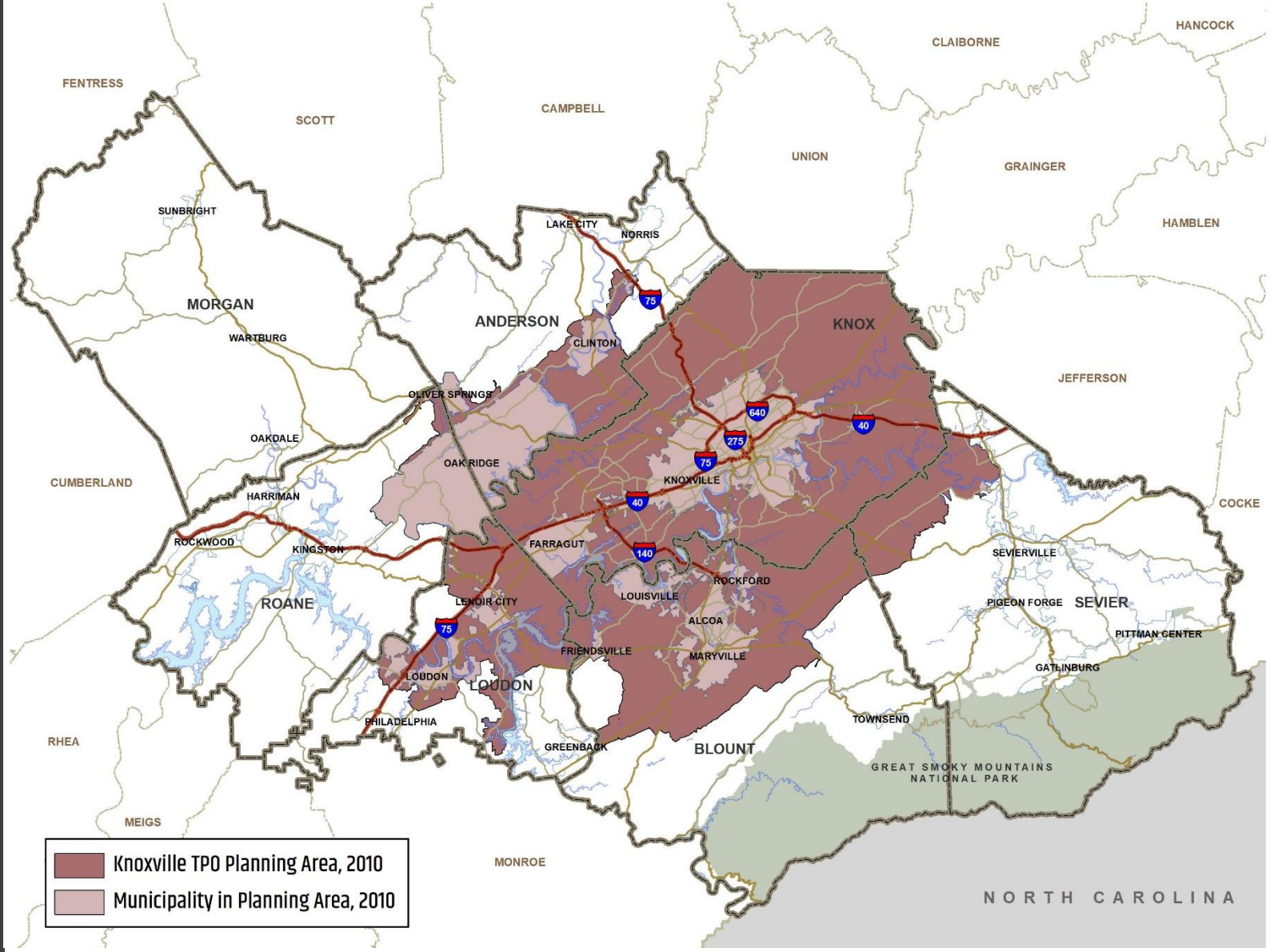
**Prioritize**
improvements and develop implementation timeline

# KNOXVILLE TPO REGION

6 Counties
18-Member Executive Board
24-Member Technical Committee

~899,000 existing residents
~1.2 million residents by 2040

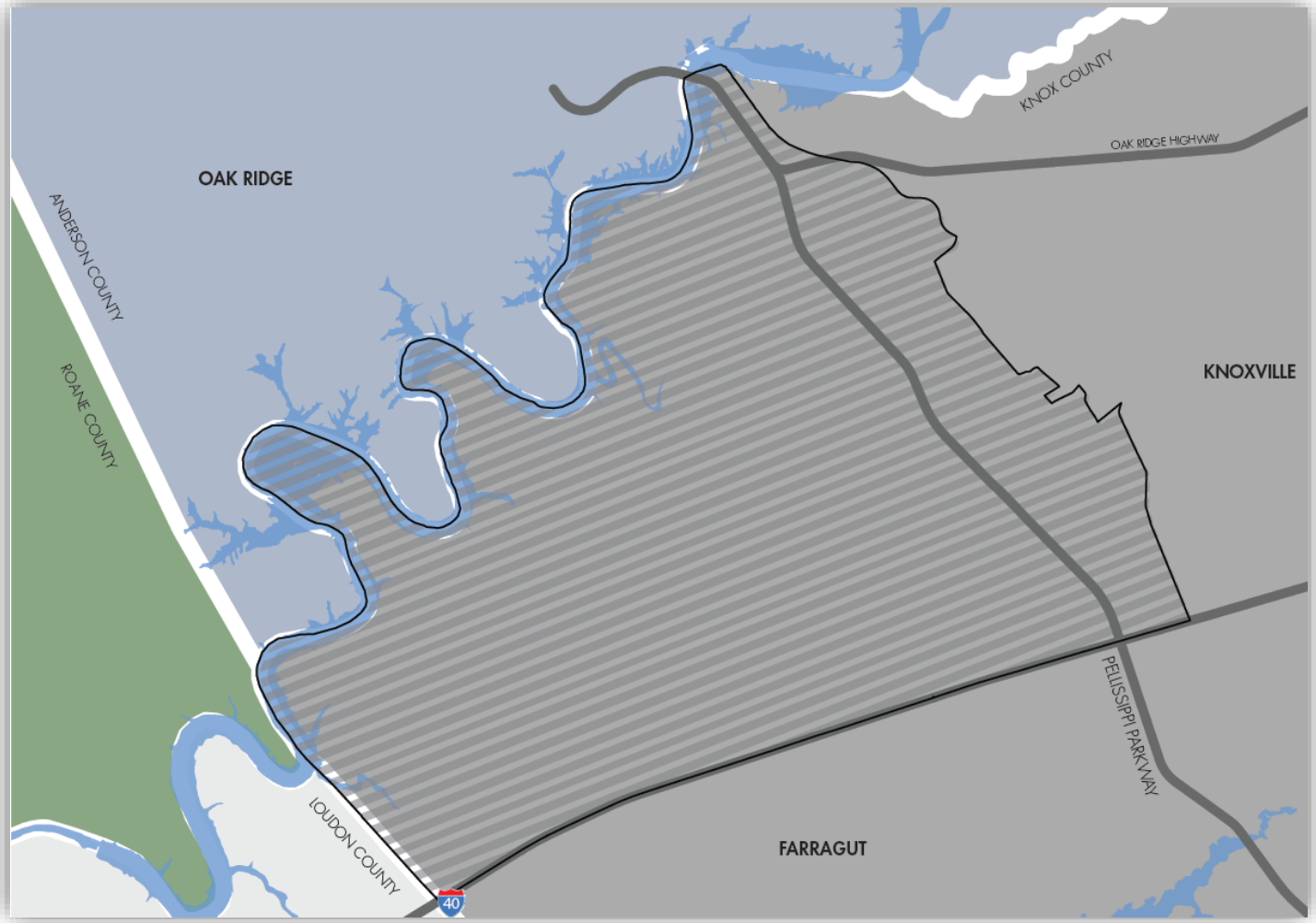
~413,000 existing jobs
~505,000 jobs by 2040



# STUDY AREA

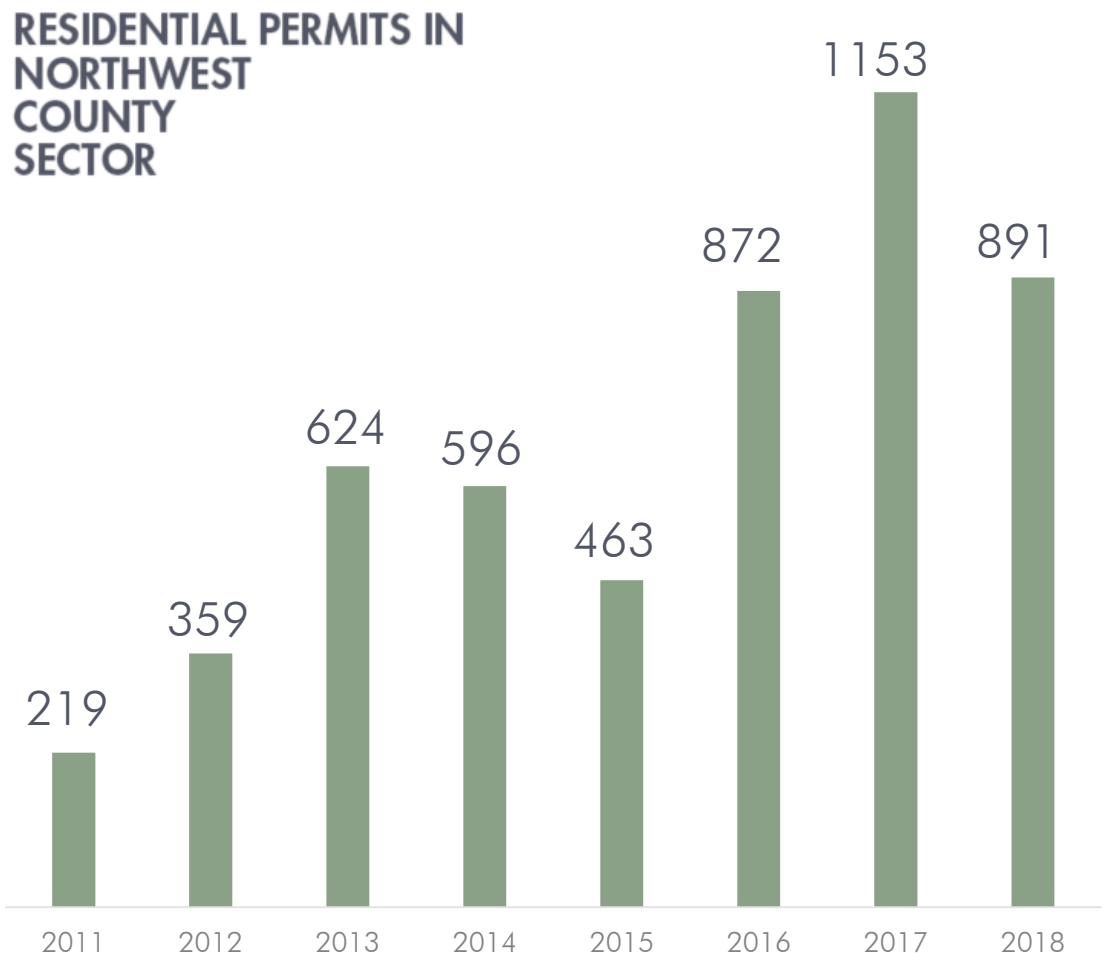
~38 square miles
~170 miles of road

~37,000 residents
~28,000 jobs



# STUDY NEED

Growth in this area of the County has been rapidly increasing, particularly with more and more dense residential development.



# STUDY NEED

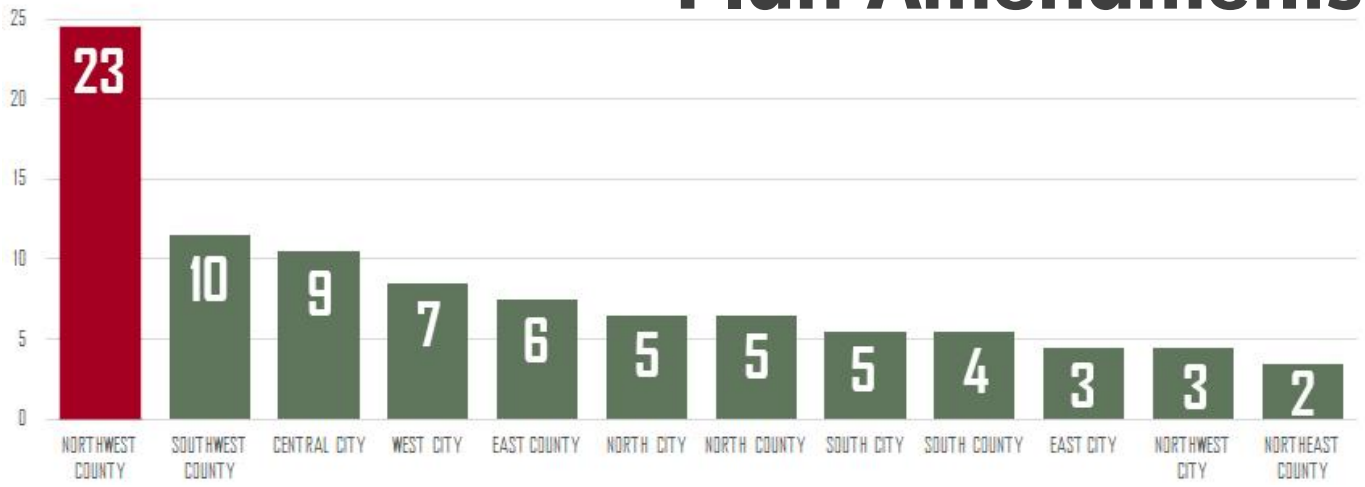
The County developed a land use vision for this area, known as the Northwest County Sector Plan, but never tested the implications of those decisions on the transportation system.


+84% increase in agricultural/rural residential
+86% increase in mixed use
+66% increase in office

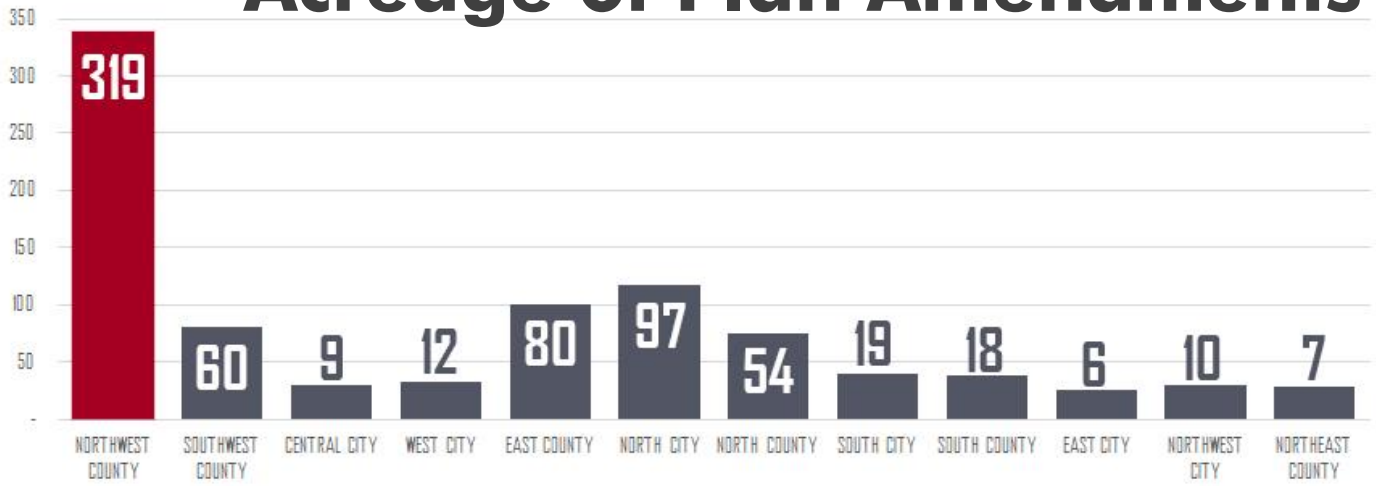
# STUDY NEED

Since the NW Sector Plan was adopted, there have been more plan amendments in this area than anywhere else in the County.

## Plan Amendments




## Acreage of Plan Amendments



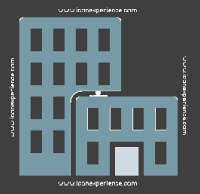
# FUTURE POPULATION GROWTH

+19,500

- TPO projections are derived from the regional travel demand model, which included 2030 as a horizon year.
- Historic growth rates were calculated based on building permit data from 2014-2018.
- Utility District projections include assumptions for full build out conditions needed for water treatment facility planning.

| Data Source | Population Growth | Resulting Annual % Change |
|---|---|---|
| Regional TPO Projection | +11,500 | 2.6% |
| Historic Growth Rates | +21,700 | 4.9% |
| Utility District Projections | +27,500 | 6.2% |

# FUTURE EMPLOYMENT GROWTH

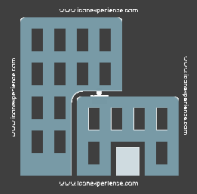


+10,000

- TPO projections are derived from the regional travel demand model, which included 2030 as a horizon year.
- InfoGroup growth rates were calculated based on data purchased in 2014 and 2018.
- LEHD growth rates were calculated based on employment changes from 2010-2015.

| Data Source | Employment Growth | Resulting Annual % Change |
|---|---|---|
| Regional TPO Projection | +21,800 | 6.6% |
| InfoGroup Growth Rates | +2,805 | 0.8% |
| LEHD Growth Rate | +7,752 | 2.3% |

# FUTURE GROWTH



**Employment Growth**

+10,000 new jobs

**Residential Growth**

+9,000 new housing units

**Population Growth**

+19,500 additional residents


We developed three different development scenarios to depict possible land use decisions and their implications on likely investments for future transportation needs.

| | |
|---|---|
| Rural Conservation | How much agricultural/rural land is converted to other uses in each scenario? |
| Housing Diversity | How does the mix of single-family and multifamily residential change with each scenario? |
| Location of Growth | How does the location of development density change with each scenario? |
| Hillside & Ridgetop Protection | How well does each scenario limit development with the intent of preserving topographical features? |

# SUB-ALLOCATION PROCESS

## Step #1
Determine Pipeline Developments

Using a combination of parcel lines, building permit data, and building structure data we were able to discern where new residential development had been approved, but not yet constructed.

# SUB-ALLOCATION PROCESS

## Step #2
Determine Target Housing Mix

Using historic building permit data and recent plans, each scenario was assigned a different ratio of SFR and MFR, which was related to historic trends and proposed density locations.

# SUB-ALLOCATION PROCESS

## Step #3
Calculate Capacity for Development

Existing zoning classifications, expected density levels, and assumptions on land utilization varied by scenario and were used to determine where there was available capacity for development.

# SUB-ALLOCATION PROCESS

## Step #4
Assign Future Residential Development

Consideration for historically high-growth areas, availability of large parcels, preservation policies, and accessibility to major roadway facilities drove the geographic location of future residential development.

# SUB-ALLOCATION PROCESS

## Step #5
Assign Future Employment Development

Capacity for non-residential development was calculated based on zoning and redevelopment potential. Geographic assignment was based on proximity to existing employment centers and access to major infrastructure.

# SUB-ALLOCATION PROCESS

## Step #6
## Manual Adjustments and Model Runs

All future development allocations were checked with minimal adjustments made where necessary. These projections served as inputs into the regional travel demand model to determine transportation impacts of the development scenarios.

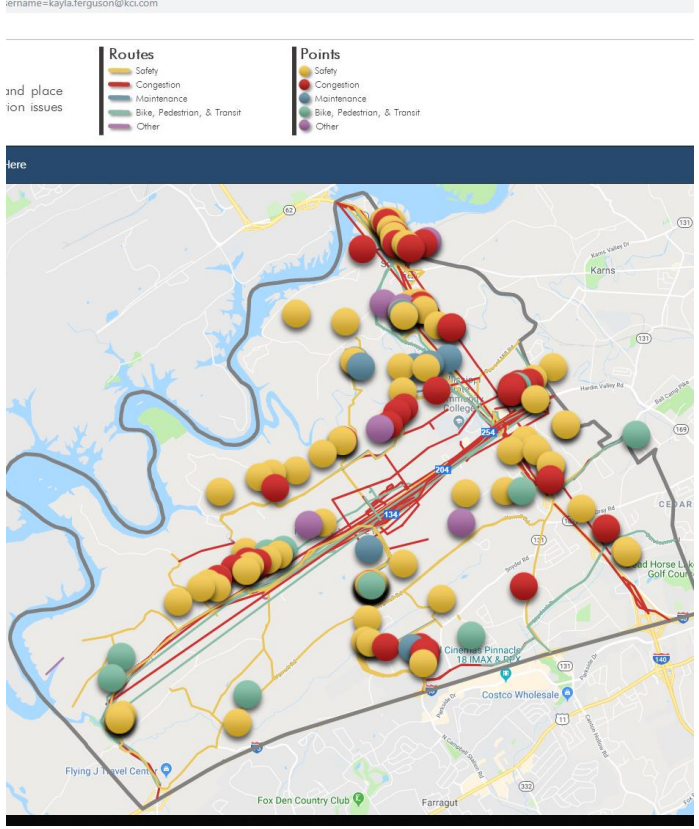
# PROJECT ENGAGEMENT

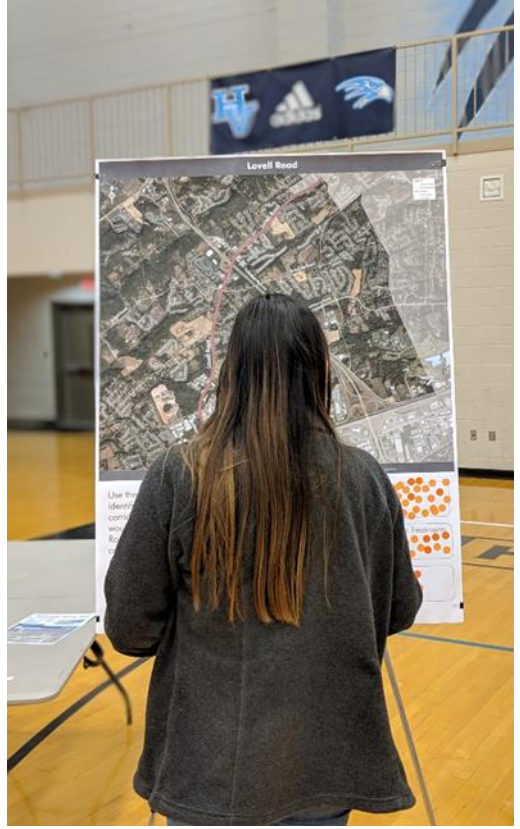
**500** public meeting participants

**7** one-on-one stakeholder interviews

**3,500** points of online map input

**860** online survey responses




# PROJECT ENGAGEMENT

*Round #1*

Educating the public on the completed Sector Plan and what it accomplished as well as how future development can impact infrastructure needs


# Process Outputs and Priorities

1. Increasing Roadway Safety
2. Preservation of Rural Areas, Open Space, & Hilltops
3. Increased Opportunities to Walk & Bike
4. Greater Connectivity to Interstate & Pellissippi Pkwy
5. Development Options that Require Less Driving
6. Homes on Large Lots
7. Access to Jobs, Shopping, & Schools
8. Diverse Housing Options
9. Grow in Undeveloped Areas
10. Reduce Greenhouse Gas Emissions

# Process Outputs and Priorities

| | |
|---|---|
| Safety | Relative Exposure with Vehicle Miles Traveled (VMT) |
| Rural Preservation | Growth in Rural and Protected Areas |
| Walk & Bike | Intrazonal Trips |
| Connectivity | Growth in Close Proximity to Facilities |
| Less Driving | Vehicle Miles Traveled (VMT) Total and on Rural Facilities |
| Large-Lot Homes | Growth in Rural Areas |
| Accessibility | Population in Close Proximity to Schools and Employment |
| Diverse Housing | Mix of SFR/MFR |
| Rural Growth | Percent of Households in Rural Areas |
| Air Quality | Vehicle Hours Traveled (VHT) |

# Process Outputs and Priorities

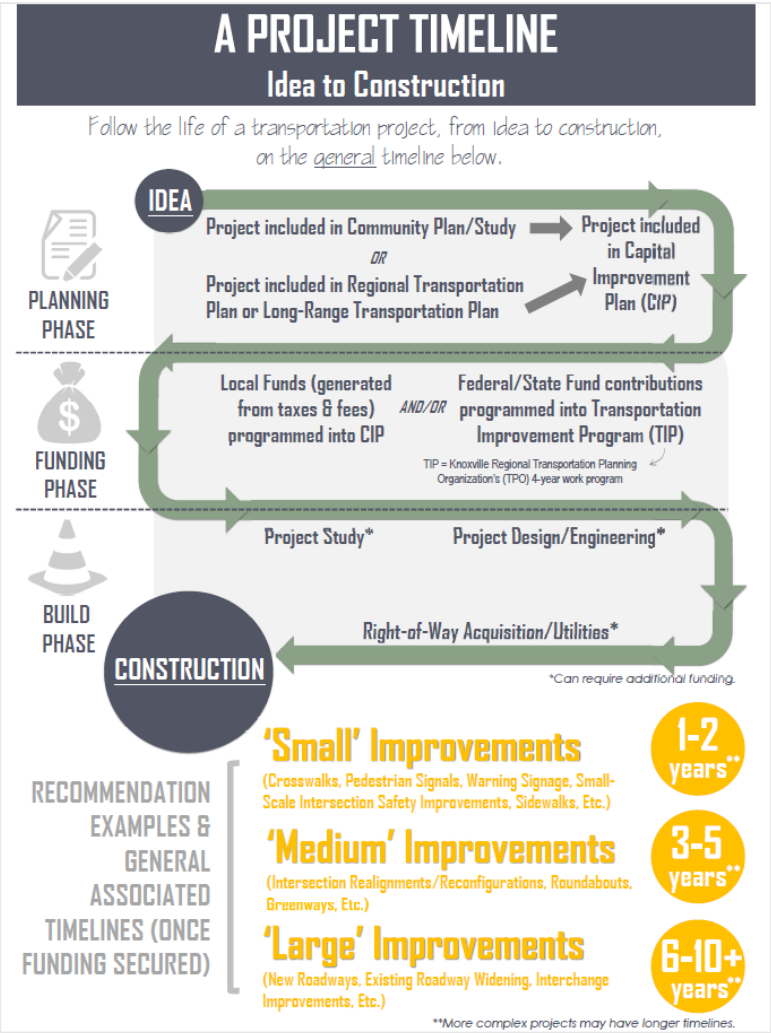
| | Scenario #1 Current Trends | Scenario #2 Sector Plan | Scenario #3 Nodes |
|---|---|---|---|
| Safety | -- | ↑ | ↑ ↑ |
| Rural Preservation | -- | ↑ | ↑ ↑ |
| Walk & Bike | -- | ↑ | ↑ ↑ |
| Connectivity | -- | ↑ ↑ | ↑ |
| Less Driving | -- | ↑ | ↑ ↑ |
| Large-Lot Homes | -- | ↓ | ↓↓ |
| Accessibility | -- | ↑ ↑ | ↑ |
| Diverse Housing | -- | ↑ | ↑ ↑ |
| Rural Growth | -- | ↓ | ↓↓ |
| Air Quality | -- | ↑ | ↑ |

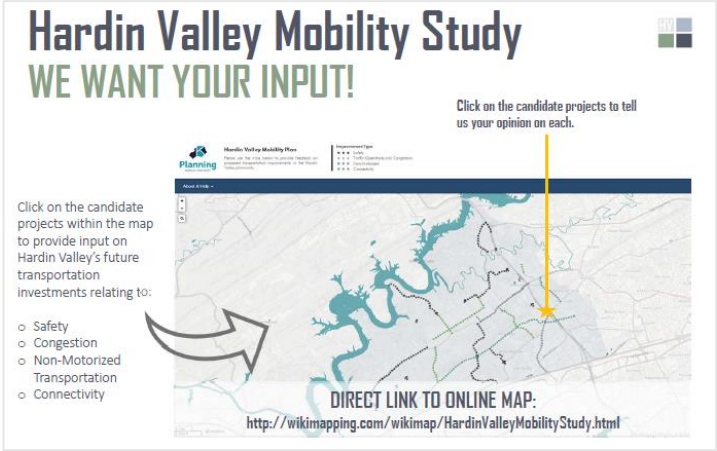
# PROJECT ENGAGEMENT
*Round #2*

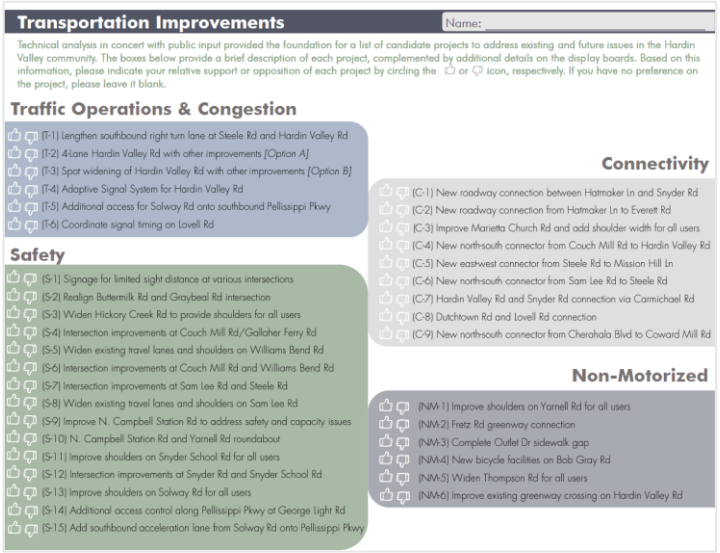
Showing the public that accommodations for anticipated growth will likely require investment in the transportation infrastructure with types of improvements directly linked to land use decisions

# PROJECT ENGAGEMENT
*Round #2*

Engagement resulted in a list of projects, prioritized based on cost, constructability, previous input, and implementation timeframes.

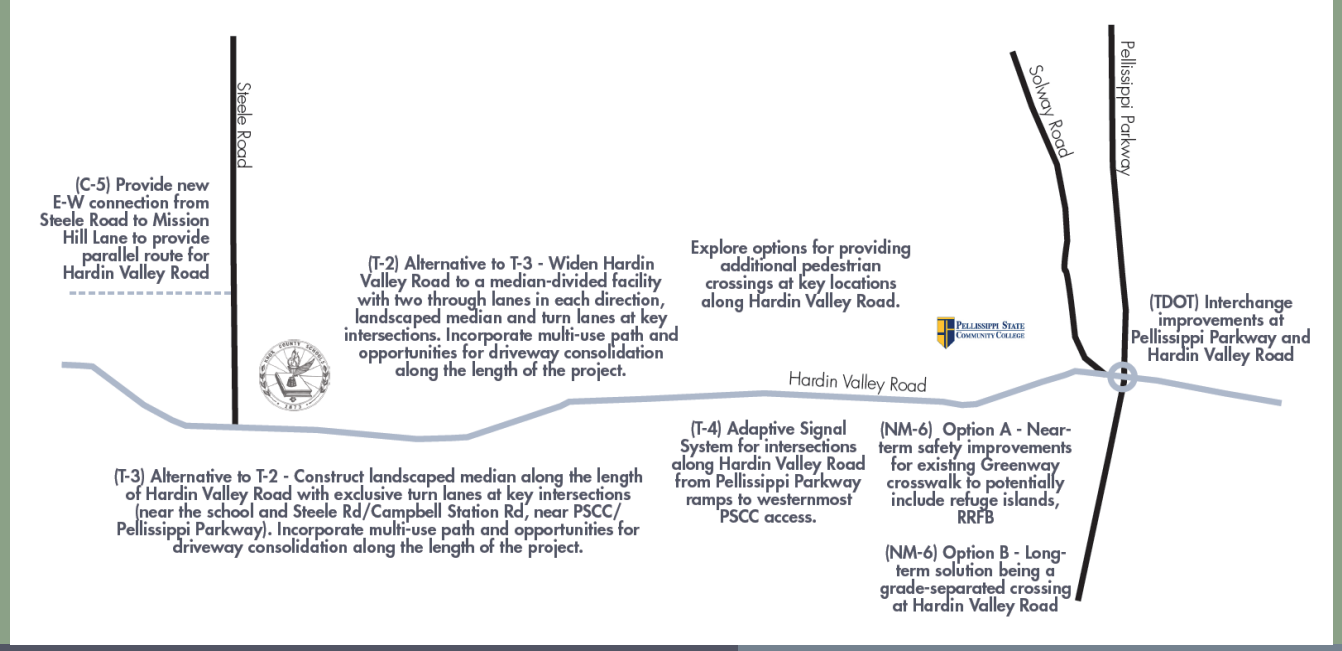


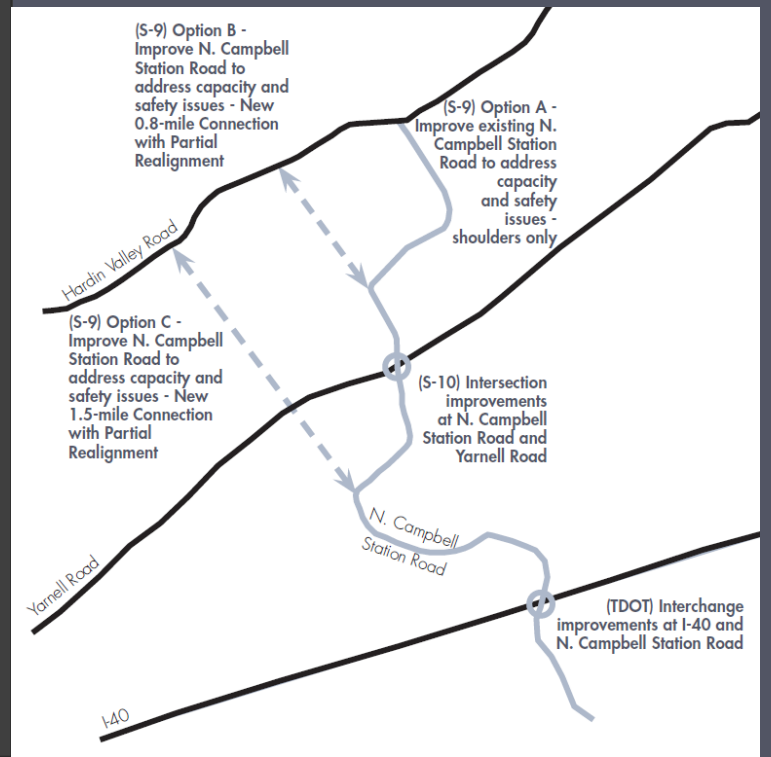



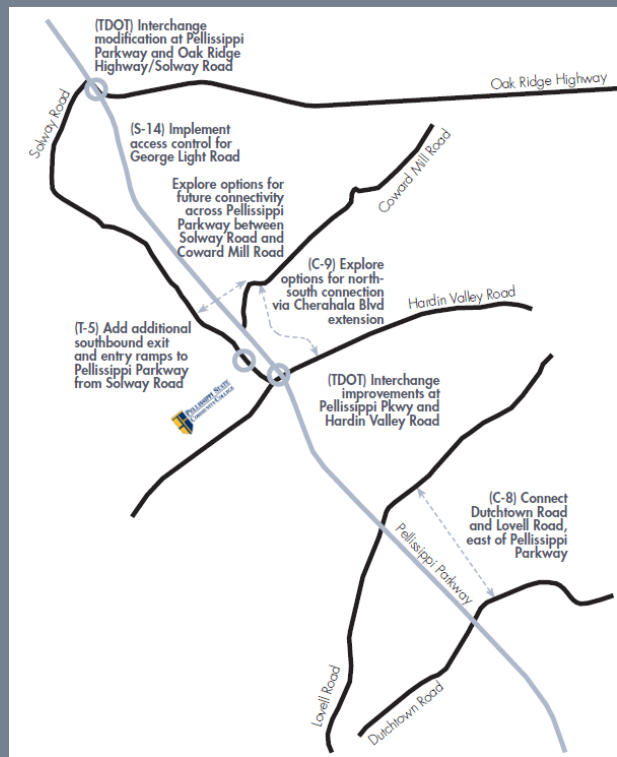



# PROJECT RESULTS

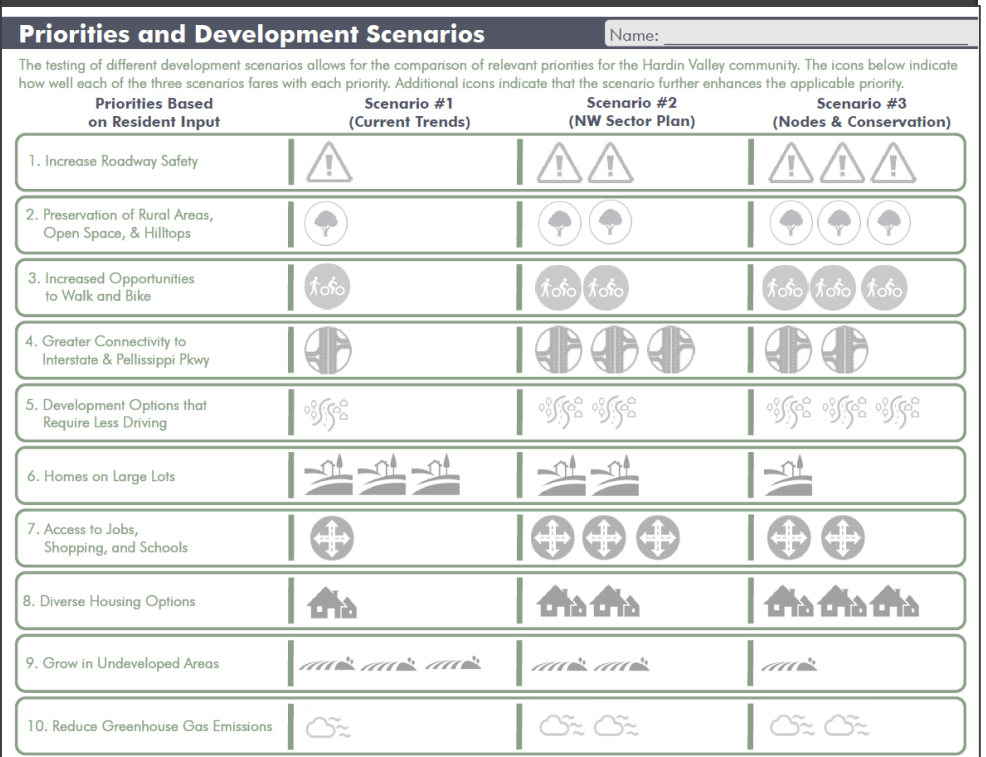
Final product resulted in the identification of 3 priority corridors for the County to move forward with improving.



# LESSONS LEARNED




- **Challenge** - Granularity of travel demand model inputs limited the ability to link scenario outputs and project needs.

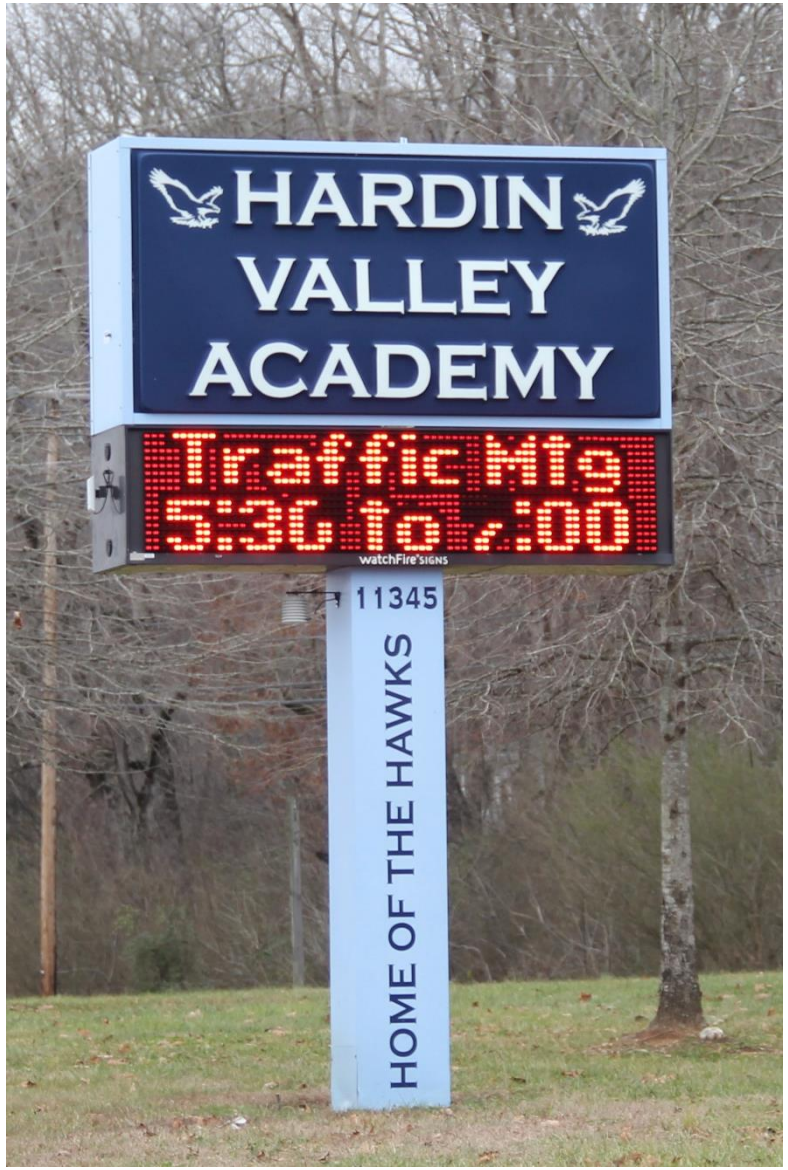
  → Future Consideration: Use different planning tool when looking at micro-level land use changes

- **Challenge** – Linking proposed land use and transportation needs in separate efforts, two years apart, was slightly confusing for public.

  → Future Consideration: Combine the planning of land use and transportation investments in a side-by-side effort

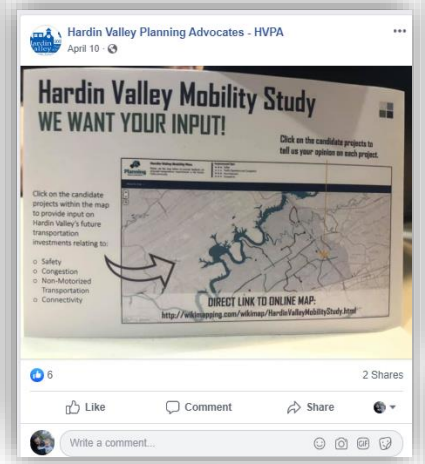
# LESSONS LEARNED

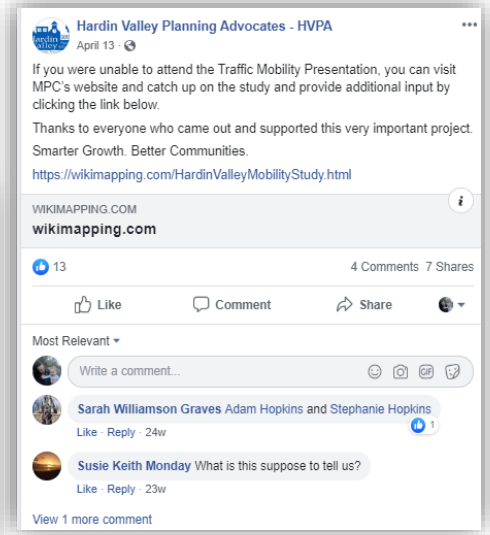
Dynamic Message Signs (DMS) in congested locations *really* boost attendance at public meetings.

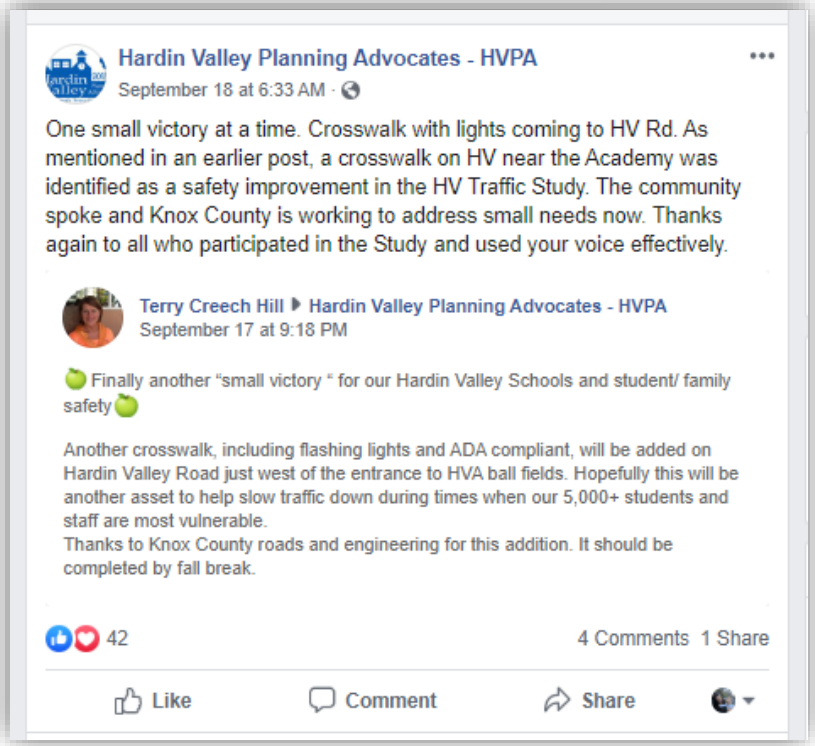


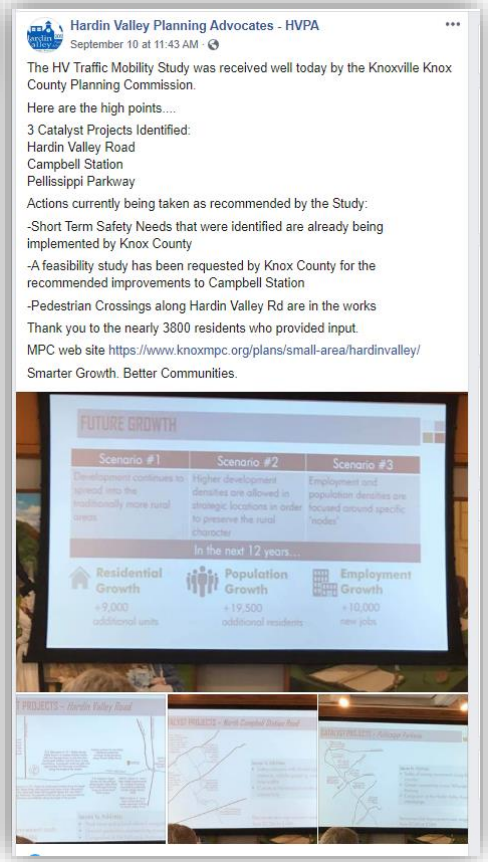

# LESSONS LEARNED

Stakeholder advocates helped spread the word, manage crowds at the meetings, and provide feedback heard in the community.

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