central
Susquehanna Valley
transportation project

FINAL

ENVIRONMENTAL IMPACT STATEMENT
and
SECTION 404 PERMIT EVALUATION

S.R. 0015, Section 088
Snyder, Union, and Northumberland Counties, Pennsylvania

Federal Highway Administration
Pennsylvania Department of Transportation

VOLUME #1 - SECTIONS I-IV

JULY 2003

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CENTRAL SUSQUEHANNA VALLEY TRANSPORTATION PROJECT
S.R. 0015, SECTION 088
SNYDER, UNION, AND NORTHUMBERLAND COUNTIES, PENNSYLVANIA

FINAL
ENVIRONMENTAL IMPACT STATEMENT
SECTION 404 PERMIT APPLICATION

Submitted Pursuant to 42 U.S.C. 4332(2)(c)

By The:
U.S. Department of Transportation, Federal Highway Administration,
Pennsylvania Department of Transportation,
and
Cooperating Agencies:
U.S. Army Corps of Engineers, U.S. Environmental Protection Agency,
and the Pennsylvania Department of Environmental Protection

JUL 16 2003
Date Approved

David C. Lawton
for Federal Highway Administration

JUL 16 2003
Date Approved

Gary L. Hoffman
for Pennsylvania Department of Transportation

A range of alternatives, including the No-Build Alternative, was developed for the Central Susquehanna Valley Transportation Project, S.R. 0015, Section 088 in Snyder, Union, and Northumberland Counties, Pennsylvania. A reasonable range of alternatives that would correct the problems defined as the project needs were developed. These alternatives include three Build (New Alignment) Alternatives in the southern section of the project area (Section 1) and four Build (New Alignment) Alternatives in the northern section of the project area (Section 2) including new river crossings across the West Branch of the Susquehanna River. All Build Alternatives are four-lane, limited access highways. This Final Environmental Impact Statement (EIS) describes the social, economic, environmental, and cultural impacts of the project alternatives. Mitigation measures are recommended. This Final EIS also documents consideration of all substantive comments received on the Draft EIS. The DA Modified Avoidance (DAMA) Alternative is being recommended as the Preferred Alternative in Section 1; the River Crossing 5 (RC5) Alternative is being recommended as the Preferred Alternative in Section 2.

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Comments on this Final EIS/Section 404 Permit Application are due by SEP 10 2003 and should be directed to the Pennsylvania Department of Transportation, as noted above.

Summary

SUMMARY

WHAT IS THE PROJECT?

The Central Susquehanna Valley Transportation (CSVT) Project is proposed as a new highway to reduce congestion on study area roadways, improve safety and accessibility, and support the expected population and economic growth in the Central Susquehanna Valley area of Snyder, Union, and Northumberland Counties, Pennsylvania.

It consists of a new four-lane, limited access facility that extends approximately 19-20 kilometers (12-13 miles) from the existing Selinsgrove Bypass (US Routes 11/15) in Monroe Township, Snyder County, just north of Selinsgrove, to the interchange between PA Route 147 and PA Route 45 in West Chillisquaque Township, Northumberland County (see Figure I-1).

WHAT IS THIS REPORT?

This report is Volume 1 of a two-volume set of reports that make up the Final Environmental Impact Statement (Final EIS or FEIS) for the proposed CSVT Project. The Pennsylvania Department of Transportation (PENNDOT) and the Federal Highway Administration (FHWA) have prepared this report to fulfill the requirements set forth by the National Environmental Policy Act (NEPA) of 1969. An EIS is required by NEPA when a Federally sponsored, funded or permitted project could have a significant effect on the human environment. This report also complies with the regulations established by the Council on Environmental Quality (40 CFR 1500-1508) and the FHWA's Environmental Impact and Related Procedures (23 CFR 771).

The Draft EIS presented the need for the project, reasons why alternatives were carried forward or eliminated from detailed study, environmental consequences of the alternatives studied in detail, and mitigation measures for potential adverse impacts. It also identified a Recommended Preferred Alternative. The purpose of this Final EIS is to document consideration of all substantive comments received on the Draft EIS, to discuss the recommendation of the Preferred Alternative, and to present the conceptual mitigation and enhancement measures to be incorporated in further project development. This Final EIS has been prepared and distributed to the public and to the federal, state, and local resource and planning agencies.

This Final EIS reflects considerable condensing of technical information. Data summarized in this report are provided in detail in the project's technical support data. Technical support data files have been compiled on topics including Project Needs, Social and Economic Considerations, Natural Resources, Cultural Resources, Farmlands, Floodplains, Noise, Air Quality, Waste Management, Traffic, Engineering, Public Involvement, and Agency Coordination. These technical support data are available for review at the PENNDOT, District 3-0 Office in Montoursville. Readers desiring more information about the data and methodologies employed are encouraged to review these files.

The Final EIS also includes:

- Documentation in support of a permit application for involvement with the waters of the United States (including wetlands) that is required under Section 404 of the Clean Water Act; and
- The Pennsylvania Department of Environmental Protection's Environmental Assessment Form (PA DEP EAF), which is in support of a Section 401 Water Quality Certification.

In accordance with the policies and procedures of the FHWA and PENNDOT, this Final EIS has been prepared using both metric and standard English units of measurement. The metric units are listed first followed by the English units in parenthesis: Metric measure (English measure).

This volume (Volume 1) contains the following sections as presented in the Table of Contents.

- Summary
- Table of Contents
- Section I - Purpose and Need for Action
- Section II - Affected Environment
- Section III - Alternatives
- Section IV - Environmental Consequences and Mitigation

Volume 2 contains the following sections:

- Section V - Comments and Coordination
- Section VI - Recommendation of the Preferred Alternative
- Section VII - List of Preparers and Reviewers
- Section VIII - Distribution List
- Section IX - Appendices
- Section X - Constraint Mapping

This document is available in a hard copy or CD ROM format. The document is available for review in either hard copy or CD format at the following locations.

- PENNDOT District 3-0 Office, Montoursville
- Snyder County Planning Commission
- Union County Planning Commission
- Northumberland County Planning Commission
- Monroe Township Building
- Shamokin Dam Borough Building
- Union Township Building
- Point Township Building
- West Chillisquaque Township Building
- Selinsgrove Community Center Library
- Union County Public Library
- Priestley Memorial Library
- Degenstein Community Library (previously known as the John R. Kauffman, Jr. Public Library)
- Milton Public Library
- SEDA Council of Governments (SEDA COG)
- Central Susquehanna Valley Chamber of Commerce
- Union County Chamber of Commerce
- Selinsgrove Chamber of Commerce
- Milton Area Chamber of Commerce
- PENNDOT Maintenance District Office 3-4 (Northumberland County)*
- PENNDOT Maintenance District Office 3-5 (Snyder County)*
- PENNDOT Maintenance District Office 3-8 (Union County)*

* = hard copy only

WHY WAS THE STUDY CONDUCTED?

The regulations for implementing NEPA ensure the development of all reasonable alternatives as part of the environmental evaluation process for a transportation project. In addition, a cooperative process with participating agencies is required in the consideration of the range of alternatives. The Draft EIS documents the project needs, preliminary alternatives development and review, and detailed alternatives development and review.

The Council on Environmental Quality's (CEQ's) regulations for Implementing the National Environmental Policy Act (NEPA) state that the lead agency shall "identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement". Therefore, although a recommended preferred alternative is not always presented in a Draft EIS, it was decided to include a recommendation on a preferred alternative in the CSVT Draft EIS.

This Final EIS has been prepared to document consideration of all substantive comments received on the Draft EIS, to continue to discuss the recommendation of the Preferred Alternative, and to present the conceptual mitigation and enhancement measures to be incorporated in further project development.

WHAT IS A COOPERATING AGENCY?

The Federal Highway Administration (FHWA) is the lead Federal agency and PENNDOT is the sponsoring agency for the project. The US Army Corps of Engineers (US ACOE), the US Environmental Protection Agency (US EPA), and the Pennsylvania Department of Environmental Protection (PA DEP) are cooperating agencies in the project development. A cooperating agency is any agency, other than the lead agency, with jurisdiction by law or with special expertise with respect to any environmental impact involved in a major Federal action significantly affecting the quality of the human environment. The cooperating agencies also agree to work with the lead and sponsoring agencies through a project's development. The US ACOE has jurisdiction by law for the Clean Water Act Section 404 Permit and determines compliance with Section 404 (b)(1) guidelines. The US EPA has discretionary veto authority over the Section 404 Permit under Section 404(c), and special expertise with respect to NEPA and the Clean Water Act Section 404 (b)(1) guidelines. The PA DEP has jurisdiction for Chapter 105 of Pennsylvania's Dam Safety and Waterway Management Regulations, Chapter 106 of Pennsylvania's Floodplain Management Regulations, and Section 401 Water Quality Certification. Therefore, these three agenices (the U.S. Army Corps of Engineers, the U.S. EPA and the PA DEP) have agreed to be cooperating agencies for the CSVT Project (see letters in Appendix J).

To link similar environmental procedures and to enhance the environmental review process, it is intended that the Draft EIS (DEIS) and Final EIS (FEIS) will serve as the documentation required by the U.S. ACOE for review and evaluation of the Section 404 permit. The integration of NEPA and the Section 404 process increases the effectiveness of the transportation project development process.

PROJECT NEEDS

The project needs were identified early in the transportation project development process. Documentation of the needs formed the foundation for subsequent environmental and engineering studies. One of the central criterion used for evaluating, comparing, and screening alternatives is how well the alternatives would satisfy the needs for the project.

In 1994, PENNDOT District 3-0 received authorization to proceed with a renewed effort to investigate improvements to the roadway network in the Central Susquehanna Valley. In late 1995 and 1996 a needs analysis was performed to determine if existing and future transportation requirements warrant improvements to the traffic network in the study area. The documentation and conclusions of that analysis were presented in PENNDOT Report, Central Susquehanna Valley Transportation Project, S.R. 0015, Section 088, Needs Analysis, June 1996.

The project needs analysis identified transportation problems in the roadway corridor.

- High levels of traffic congestion exist. These high levels are due, in part, to the large percentage of trucks present in the traffic stream.
- Safety problems exist including high numbers of injury and fatal crashes and crashes involving trucks. Many of the crashes are rear-end, angle and sideswipe collisions caused by free access from driveways and local roads.
- The origin and destination survey conducted to determine travel patterns indicated that over half of the autos and over 90% of the trucks surveyed did not have an origin or a destination within the study area. Thus, one of the conclusions of the needs analysis was that high truck volumes and through traffic cause conflicts on study area roadways. The separation of through and local traffic was therefore identified as an objective of the project.
- Over the past 20 years the Central Susquehanna Valley has been a growth region in Pennsylvania. All indicators predict this growth will continue. By the year 2020, traffic is anticipated to more than double on study area roadways. Thus, another identified project need is to ensure sufficient capacity on study area roadways for the growth in population and employment that is expected in the area.

The completion of the needs analysis served to define the logical termini for the CSVT Project. Logical termini are the rational endpoints for a proposed transportation improvement project, and they are the basis for study area boundaries. The southern project terminus is the end of the Selinsgrove Bypass, where the existing US Routes 11/15 roadway changes from a four-lane, limited access facility to a five-lane (four lanes with center turn lane), free access facility. The northern project terminus, originally defined as the interchange between PA Route 147 and I-80 north of Milton was subsequently refined during the Phase I (preliminary) Alternatives Analysis. The revised northern terminus is the interchange between PA Route 147 and PA Route 45 (see Figure I-2).

DETERMINING ENVIRONMENTAL CONSTRAINTS

Prior to developing reasonable alternatives to meet the project needs, environmental studies were undertaken to locate sensitive environmental features in the study area. These features include: the local roadway system and travel patterns; socioeconomic resources such as homes, businesses, neighborhoods, and communities; natural resources such as wetlands, streams, forest areas, and threatened and endangered species and other vegetation and wildlife; cultural resources such as historic properties and historic and prehistoric archaeological sites; and agricultural security and productive farmland areas. Locating these resources on project maps aided in the development of a full range of reasonable alternatives. Working with this environmental information, planners, engineers, and environmental specialists located improvement alternatives to avoid and minimize impacts to important resources.

ALTERNATIVES

The engineers and environmental specialists worked jointly to develop a full range of preliminary alternatives that could satisfy the transportation requirements and avoid or minimize impacts to important community, natural, and cultural resources.

Phase I (Preliminary) Alternatives Development
(Figures III-1 and III-2)

In the southern section of the study area, Section 1 (Section 1 extends from the end of the Selinsgrove Bypass [southern terminus] to just west of the new interchange with U.S. Route 15 near Winfield), seven preliminary alternatives were developed to provide access and connection choices while avoiding major engineering and environmental constraints (Alternatives A through G). Various combinations of these alternatives (Alternatives BA, BE, and DA), suggested through local public input, expanded the number of alternatives under consideration in Section 1 to ten. Four different river crossing options and connections to existing PA Route 147 in the northern section of the study area, Section 2 [Section 2 extends from just west of the Winfield area interchange with U.S. Route 15 to PA Route 147, just south of the PA Route 147/PA Route 45 interchange (northern terminus)], were also developed (River Crossings 1, 2, 3, and D). Connections from the new alignment alternatives to the local roadway system were also developed. These connections between the new alignment alternatives and the existing local roadway system were made in one of two ways: 1) by a direct connection through an interchange; or 2) through new two-lane side roads (i.e., 61 Connector and 15 Connector) that connect to the existing roadway system.

All of the preliminary alternatives under investigation were four-lane, limited access facilities. In addition, all preliminary alternatives included a connection at their northern end to the section of PA Route 147 which is currently two lanes of roadway built on a four-lane right-of-way. This section of limited access roadway, extending approximately 12.87 kilometers (8 miles) from the Chillisquaque Creek north to I-80, is proposed to be "built out" from two lanes (one lane in each direction) to four lanes (two lanes in each direction) to increase capacity and improve safety. The build out of the "Two on Four" Section was proposed with all Phase I Alternatives.

The preliminary alternatives were evaluated based on their ability to meet the transportation needs of the project, their environmental impact, and their engineering feasibility and practicality. The development and evaluation of the preliminary alternatives were documented in the Phase I Alternatives Analysis Report dated October 1997. The following general points summarize the conclusions.

- The No-Build Alternative does not address the project needs.
- The TSM/Upgrade Alternative does not fully address the project needs and would have substantial socioeconomic impacts that would adversely alter the social environment of the CSVT study area.
- A connection to PA Route 61 is a critical element of any alternative to fully address the project needs.
- All New Alignment Alternatives have the potential for environmental impacts to social, natural, and cultural resources. There is no minimum environmental impact alternative.
- The build out (widening of S.R. 147 from two to four lanes) of the Two on Four Section of PA Route 147 represents the only practical and feasible alternative to connect the alternatives to I-80. This project was officially separated from the CSVT Project and advanced on its own merit, because it has independent utility from the Section1 and Section 2 Alternatives.

The preliminary alternatives evaluation process resulted in a narrowing of the scope of alternatives. Some alternatives were carried forward for further detailed study and some were not. The following provides information on the results of the preliminary alternatives evaluation in Sections I and II (see Figure III-11). Please see page III-31 for a detailed discussion of the section limits.

Section 1

Alternatives Carried Forward for Detailed Study	Alternatives Not Carried Forward for Detailed Study
Alternative A	Alternative B
Alternative BA	Alternative BE
Alternative DA	Alternative C (portions)
Alternative C (portions)	Alternative D
Alternative F	Alternative E
61 Connector*	Alternative G
	15 Connector*

* The 61 Connector and 15 Connector serve as connecting roadways linking the proposed alternatives to the existing roadway network. Both connector roadways are located in Shamokin Dam Borough. The 61 Connector serves as a direct connection to PA Route 61 and US Routes 11/15. The 15 Connector serves as a direct connection to US Route 15 and an indirect connection to PA Route 61. Both the 61 Connector and the 15 Connector could be used in conjunction with multiple alternatives.

Section 2

Alternatives Carried Forward for Detailed Study	Alternatives Not Carried Forward for Detailed Study
River Crossing 1 (RC1)	River Crossing D (RCD)
River Crossing 2 (RC2)	
River Crossing 3 (RC3)	

Since multiple alternatives were carried forward for detailed study in Section 1, these alternatives were melded into two different corridors, designated the A-A Hybrid Corridor and the Old Trail Corridor. These two corridors became the basis of the Phase II, or detailed, engineering and environmental studies. These Phase II study corridors are shown on Figure III-12 and are described as follows.

- A-A Hybrid Corridor - The goal of this corridor analysis is to take the best features of Alternatives A, BA, and DA and refine the resultant alternative as much as possible to minimize impact.

- Old Trail Corridor - The goal of this corridor analysis is to take the best features of Alternatives C and F and refine the resultant alternative as much as possible to minimize impact.

Separation of the Two on Four Section from CSVT

On October 7, 1997, FHWA granted approval to separate the Two on Four Section from the CSVT Project and advance the widening of this section of PA Route 147 as an independent project. The widening of PA Route 147 from the PA Route 45 Interchange north to I-80 is needed even if the CSVT Project is not constructed. Additionally, this widening does not presuppose the construction of any CSVT alternative since all of the preliminary alternatives evaluated in the CSVT Phase I study (including all new alignment alternatives and the TSM/Upgrade Alternative) included the widening of PA Route 147 from 2 to 4 lanes. The regulatory agencies and the public were also in general agreement that the widening (or build out) of Route 147 from 2 to 4 lanes represents the most practical and reasonable way to connect the CSVT Alternatives with I-80.

The widening of PA Route 147 has independent utility because it satisfies the following transportation needs. The build-out of PA Route 147 from 2 to 4 lanes would improve the safety of PA Route 147. The Two on Four Section of PA Route 147 currently carries between 7,000 - 8,000 vehicles per day, including a very high percentage of heavy trucks (>25% during peak hours). Peak hour traffic is expected to increase by 71% in the future. The CSVT Needs Analysis Report (June 1996) indicated that between 1990 and 1994 there were more than 120 crashes on PA Route 147 in the Two on Four Section, including 4 fatal crashes. All of the fatal crashes and a high percentage of the non-fatal crashes involved trucks. Of the four fatal crashes in this area, three were head-on collisions. The limited passing opportunities on this limited access but two-lane stretch of roadway are a factor leading motorists to take unnecessary chances to get by slower-moving vehicles.

In summary, the widening or build-out of PA Route 147 was separated from the CSVT Project in October of 1997 to improve safety and better accommodate existing and future traffic growth. Additionally, the build-out of the Two on Four Section would not increase traffic problems in Northumberland Borough since the widening would not be a "draw" to new traffic, but would simply better accommodate the traffic already using this section of PA Route 147.

The build-out or widening of the Two on Four Section of PA Route 147 was granted environmental clearance in March 1999. Final design followed. The first phase of the project, which included construction of three of the four new northbound bridges has been completed. The remainder of the project was let in May of 2002. The remainder of the construction includes construction of the fourth new northbound bridge and new northbound roadway, as well as improvements to the existing interchanges, overpasses, and portions of the southbound roadway on PA Route 147. This construction began in July of 2002. It is expected that construction will be completed on the 2 on 4 project in 2004.

Phase II (Detailed) Alternatives Development (Figure III-11)

The development of the Phase II Alternatives within the identified study corridors began in January 1998. Following the delineation and mapping of the Phase II study corridors and the detailed environmental investigations, possible alternatives in the corridor were evaluated. The alternatives that best met the engineering criteria (AASHTO and PENNDOT Design Manual criteria for a limited access, rural arterial roadway), while minimizing environmental impacts, were identified. Numerous issues were addressed in each corridor including the following.

- Option to the 61 Connector - Substantial opposition to the 61 Connector prompted PENNDOT and the study team to develop and investigate additional alternatives that incorporated options to the 61 Connector. As a result, a new option was developed in the Old Trail Corridor. This new alternative included a Route 15 Connector and a new interchange with existing US Routes 11/15 near Stetler Avenue. Based on preliminary traffic figures, this alternative appears to meet the project needs (reduce congestion, improve safety, and ensure sufficient capacity for the growth of the region) nearly as well as the other alternatives that include the 61 Connector.

- Use of PPL Ash Basins 1, 2, and 3 - Preliminary alternatives, originally designed to avoid the use of the Ash Basins, were redesigned to make use of the Ash Basins based on public and agency comment.

- Historic properties were avoided wherever prudent and feasible - Sites that are eligible for the National Register of Historic Places are afforded special protection under Section 4(f) of the US Department of Transportation Act of 1966 (amended 1968). This act requires that this project avoid use of publicly owned public parks, publicly owned recreational lands, wildlife and waterfowl refuges, and publicly or privately owned historic or archaeological resources listed on or eligible for the National Register of Historic Places. Avoidance of these sites is mandatory unless:

  1) there is no feasible and prudent alternative to the use of such land; and

  2) all efforts have been made to minimize harm to these resources.

  As a result, whenever an alternative affects these protected resources, an alternative to avoid this impact is also investigated.

- Study river crossings further north and further south - For a variety of environmental and engineering reasons, alternatives further to the north of RC1 and south of RC3 were suggested for further detailed evaluation.

Between January of 1998 and November 1998, alternatives in the Phase II study corridors were developed and continuously refined. By November of 1998, the following alternatives were identified for detailed study in the Draft EIS (see Figure III-12).

Section 1

- A-A Hybrid Corridor
  - DA West (includes 61 Connector)
  - DA West Avoidance (includes 61 Connector and avoids historic farmstead)
- Old Trail Corridor
  - OT1A (includes 61 Connector)
  - OT1A Avoidance (includes 61 Connector, avoids PPL Ash Basin 1, a historic industrial site)
  - OT1B (includes 15 Connector and Stetler Avenue Interchange)
  - OT1B Avoidance (includes 15 Connector, Stetler Avenue Interchange, and avoids PPL Ash Basin 1, a historic industrial site)

Section 2

- RC1-East
- RC1-West
- RC5
- RC6

Refinements to Phase II Alternatives

Following the fourth Public Meeting in November of 1998, a series of issues arose that necessitated additional refinements to the Phase II Alternatives. These issues and refinements include the following.

- 61 Connector/US Routes 11 and 15 Interchange - Eight different options for the interchange between the 61 Connector and US Routes 11/15 were developed. Based on input from the public and businesses in the vicinity, one of the interchange concepts, Sketch 8, was advanced for further detailed study (see Figure III-13).

- Additional Ash Basin Modifications - Originally (May 1998) the historic property boundary at the PPL site included Ash Basin 1 within its limits. Subsequently, the Ash Basin Avoidance Alternatives were developed. These alternatives necessitated numerous residential and commercial acquisitions.

  A letter to PENNDOT dated October 30, 1998, from the Pennsylvania Historic and Museum Commission (PHMC), who serves as the State Historic Preservation Officer (SHPO) in Pennsylvania, indicated that the SHPO had re-evaluated the boundaries for the National Register eligible, PA Power and Light Steam Electric Station. The SHPO suggested that the boundaries at the PPL site should be revised to an area 2,000 feet north and 2,000 feet south (4,000 feet north to south) of the main generating facilities. The SHPO indicated that an area of this size would encompass all the eligible resources present at the site. A further investigation of the site followed, and in late November of 1998 the FHWA made the determination that the boundary of the PPL site would be revised to omit the coal storage yard to the north of the main generating facilities and the Ash Basin to the south of the main generating facilities. The SHPO examined this boundary modification and concurred with the FHWA's assessment on December 14, 1998 (see Appendix C).

  Although Ash Basin 1 was no longer part of the historic property boundary, Old Trail Alternatives 1A and 1B still impacted a small portion of the property within the revised historic property boundary. As a result, a "hybrid" of the Old Trail Alternatives that impacted the historic boundary (OT1A and OT1B) and those alternatives that avoided the historic boundary (OT1A Avoidance and OT1B Avoidance) was developed. This hybrid alternative was called Old Trail 2. Old Trail 2A included the 61 Connector and Old Trail 2B included the 15 Connector and Stetler Avenue interchange (see Figures III-14, III-15, and III-16).

- Landfill Issues - At the November 1998 Public Meeting, members of the public raised concerns about the DA West Alternative and potential impacts to a closed municipal landfill. These concerns were accurate, and due to the expense and potential future liability of impacting the landfill, the DA West Alternative was not advanced for further study. Other options to avoid the landfill were studied. Three options around the landfill were investigated. The original DA Alternative was restudied. In addition, an option to the southeast and northwest of the landfill, DA Modified and DA West Modified, respectively, were developed (see Figure III-17). During the spring and summer of 1999 four meetings were held with property owners affected by the alternatives in the area of the landfill. The DA Modified Alternative and DA West Modified Alternative were closely refined to minimize impacts. In August 1999, it was decided not to carry the DA West Modified forward for further evaluation due to engineering considerations. The DA Modified Alternative was carried forward for detailed analysis in the Draft EIS.

- Historic Properties - Alternatives continued to be studied to avoid impacts to historic properties.

- Colonial Acres Concerns - At the request of residents in the Colonial Acres neighborhood, several special purpose community meetings were held to discuss the impacts of the DA Modified (DAM) Alternative and DA Modified Avoidance (DAMA) Alternatives and to listen to community concerns. Three meetings were held throughout the spring and summer of 2000. In response to requests received at these meetings, the DAMA Alternative was modified to relocate Colonial Drive and move the alignment further south on Colonial Drive, closer to the intersection of Colonial Drive and Fisher Road (see Figure III-19). Residents expressed a desire for this shift to minimize the impacts of bisecting the neighborhood. The height of the bridge and roadway embankment were lowered through the development and surrounding areas. Additionally, the alignment was shifted from the western to the eastern side of the ridge just east of Colonial Acres and Fisher Road. These modifications would increase the residential impacts in Colonial Acres, but decrease the residential impacts in the area of 11th Avenue.

Draft EIS Alternatives

As a result of continual refinement to the Phase II Alternatives, the following set of alternatives was evaluated in the Draft EIS.

Section 1

- DA Modified Avoidance (DAMA) - includes 61 Connector
- Old Trail 2A (OT2A) - includes 61 Connector
- Old Trail 2B (OT2B) - includes 15 Connector and Stetler Avenue Interchange

Section 2

- River Crossing 1 East (RC1-E)
- River Crossing 1 West (RC1-W)
- River Crossing 5 (RC5)
- River Crossing 6 (RC6)

Following the full consideration of all substantive comments received to date on the Draft EIS, it was determined that this same set of alternatives was appropriate for investigation in the Final EIS. Therefore, the set of alternatives evaluated in the Draft EIS is identical to the set of alternatives evaluated in the Final EIS.

CONSEQUENCES AND MITIGATION

The alternatives carried forward for detailed study were evaluated in the Draft EIS and Final EIS. Impacts were studied in the following areas.

- Community and Social Issues
- Economic Issues
- Land Use
- Noise
- Air Quality
- Agricultural Resources
- Visual Quality
- Wetlands
- Vegetation and Wildlife (including Threatened and Endangered Species)
- Surface Waters/Aquatic Resources
- Geology and Soils
- Public/Private Water Supplies
- Historic Structures
- Archaeological Resources
- Floodplains
- Waste Sites
- Energy Consumption
- Secondary and Cumulative Impact Assessment
- Traffic and Transportation Network
- Scenic Rivers

Table S-1 summarizes impacts associated with the alternatives carried forward for detailed study. Section IV of the Draft and Final EIS, Environmental Consequences and Mitigation, discusses these impacts in greater detail.

Environmental protection measures to reduce impacts, referred to as "mitigation measures", are also identified. These include, but are not limited to, designing the roadway to avoid or minimize disturbances to the resource, relocating residents whose homes are displaced, financial compensation to farmers, businesses, and residents whose lands are acquired, construction of wetlands to replace those wetlands that are filled or dredged, and special designs to reduce impact of water impacted by leachate from the Ash Basin areas.

COMMENTS AND COORDINATION

NEPA requires that the lead Federal agency provide the opportunity for other agencies and the public to participate in major steps of the project development process through timely and relevant input. In addition, PENNDOT's Public Involvement Handbook, Publication 295, suggests public and agency participation throughout the project development process to build consensus regarding major project issues. Continuous cooperation and communication among agencies, the public, and the project team ensure that all parties stay abreast of issues at every step and promote consensus-building.

TABLE S-1

	Section 1 (Southern) Alternatives			Section 2 (Northern) Alternatives			
	DA Modified Avoidance	Old Trail 2A	Old Trail 2B	RC1-W	RC1-E	RC5	RC6
TOTAL AREA (ACRES)	561.22	423.23	470.69	389.95	403.49	400.48	415.31
Displacements (No.)							
Residential	33	43	46	46	28	25	26
Commercial	7	2	12	10	7	0	8
Agriculture (Acres)							
Agricultural Security Area (In Production)	71.2	20.70	20.90	12.6	2.6	25.5	2.6
Productive Farmland	151.60	74.00	76.70	140.1	162.4	165.6	142.6
Habitat (Acres)							
Wetlands (Direct and Indirect)	4.79	14.13	14.19	2.62	3.10	2.98	4.18
Forest Land	183.89	81.93	123.68	164.47	208.43	181.13	209.99
Old Field (Herbaceous and Shrubland)	157.02	118.81	124.26	21.77	33.64	38.92	35.17
Waste Sites (No.)	5	5	10	3	1	0	2
Surface Water Resources							
Stream Relocations (No.)	3	4	2	0	0	2	0
Bridge Crossings (No.)	2	0	0	3	3	4	3
Culverts (No.)	14	14	14	8	7	5	7
Total Length of Impact (Ft.)	16,445	13,770	14,945	7,395	7,210	8,480	6,825
Cultural Resources							
Historic Properties (No.)	0	0	0	0	0	0	0
Prehistoric Archaeological Resource Potential (Acres)							
High	14.93	49.79	47.30	10.03	9.59	8.25	15.59
Moderate	155.26	103.42	92.08	57.62	54.18	44.40	62.36
Low	164.12	106.00	120.88	136.56	134.58	151.88	134.67
Historic Archaeological Resources Potential (Acres)							
High	11.14	10.10	14.78	3.02	1.28	1.26	1.40
Moderate	32.83	66.50	73.98	56.61	38.80	23.91	41.50
Low	44.64	20.88	40.92	56.58	52.92	51.89	62.56
Noise Impacts (No.)							
Residences Impacted	109	234	209	37	36	42	35
Residences with Reasonable Mitigation	32	192	167	15	15	15	15
Earthwork (Net C.Y.)	2,357,000	-949,000	-8,000	-175,000	1,505,000	2,108,000	1,246,000
Segment Length (Ft./Mile)	35,984/6.82	32,333/6.12	32,333/6.12	28,816/5.46	28,943/5.48	29,196/5.53	29,767/5.64
Total Project Cost ($)	**122,275,129**	**173,049,069**	**186,233,028**	**152,498,574**	**163,872,588**	**140,619,592**	**161,349,258**

An extensive public outreach program was conducted for the CSVT Project. Approximately 150 meetings were held between December 1995 and June 2003. These meetings ranged from full public meetings where a variety of issues were discussed with a broad spectrum of meeting attendees to special purpose meetings held to discuss issues specific to individual property owners, neighborhoods, or communities. Four standing committees were also established for the project, including the Citizens Advisory Committee (CAC), Public Officials Work Group (POWG), Monroe Township/ Shamokin Dam Borough Focus Group, and Point Township/Union Township Focus Group. Coordination with these committees continues to be provided on a regular basis to furnish project updates and answer questions. A breakdown of Public and Committee meetings held for the CSVT Project is as follows:

- 5 Public Meetings
- 1 Public Hearing
- 4 Citizens Advisory Committee (CAC) Meetings
- 5 Public Officials Meetings/Public Officials Work Group (POWG) Meetings
- 14 Joint Citizens Advisory Committee and Public Officials Work Group Meetings
- 10 Monroe Township/Shamokin Dam Borough Focus Group Meetings
- 4 Point Township/Union Township Meetings

In addition, several meetings were held with environmental resource agencies to keep them abreast of project developments. In all, 50 meetings, including 20 field views, were held with the environmental resource agencies. The Public and Agency Involvement Programs are discussed in detail in Section V of this Final EIS.

AREAS OF CONTROVERSY

Throughout the transportation project development process for the CSVT Project, active involvement has been maintained with the general public, public officials, and resource agencies. Most area residents feel the CSVT Project is needed to address existing and future congestion and safety concerns. However, as the CSVT Project has developed, issues and concerns have arisen. Each has been addressed appropriately through discussion at meetings and through other methods of public input and communication. The primary areas of controversy are listed below, and they are described in more detail in Section V of this document.

- **Balancing of Social, Natural, and Cultural Resources** - The public has expressed concern that the transportation project development process protects natural and cultural resources more than their homes and businesses. It has been explained that the process identifies all potential impacts and then seeks to avoid, minimize, or mitigate impacts to the greatest extent possible. Since avoidance is not always possible, the EIS explains the impact to a resource when a decision is made to avoid one resource and impact another.

  Concerns were also raised regarding the level of protection afforded properties determined eligible for the National Register of Historic Places relative to other resources impacted by the project alternatives. Any property listed or determined eligible for listing on the National Register of Historic Places is protected by Section 4(f) of the U.S. Department of Transportation Act of 1966 (amended in 1968). This Act states "The Secretary (of Transportation) may approve a transportation program or project requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge, or land of an historic site of national, state, or local significance (as determined by the federal, state, or local official having jurisdiction over the park, recreation area, refuge or site) only if:

- there is no prudent and feasible alternative to using that land; and

- the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife refuge, or historic site resulting from the use."

Section 4(f) requires that a feasible and prudent alternative that avoids the use of Section 4(f) resources be selected as the Preferred Alternative, if such an avoidance alternative exists. Alternatives can be found to not be feasible only if they cannot reasonably be constructed. Alternatives can be found to not be prudent if they do not meet the established project needs, or if they would result in unique problems or environmental (natural and socioeconomic) impacts of an extraordinary magnitude.

Some members of the public commented that the burden for the protection of National Register eligible historic structures is placed disproportionately on the community. Multiple questions raised on the application of Section 4(f) of the U.S. Department of Transportation Act of 1966 (as amended 1968) are addressed in the responses to comments section of this Final EIS (see Section V - Comments and Coordination).

- **61 Connector** - The proposed 61 Connector passes between the neighborhoods of Orchard Hills and the Gunter Development. Its location has caused considerable controversy within these neighborhoods. The issues of concern include the following.

  - Maintaining community cohesion

  - Noise impacts

  - Reduction in the developable land and the resultant impact to the future tax base of Shamokin Dam Borough

  - Interchange between the 61 Connector and US Routes 11/15

  These issues were discussed with community members. To help maintain community cohesion and to provide additional emergency access, an access road crossing over the 61 Connector (Courtland Avenue Extension) has been proposed to connect the two neighborhoods. Noise impact information has been presented to give residents an idea of the impact and to explain where and why noise mitigation is and is not feasible and reasonable. Also, representatives of both the residential communities and business communities in the area worked through a collaborative process to develop an option for an interchange with US Routes 11/15. Additionally, tax base impacts are presented in the Draft EIS. Both of the options in Section 1 that use the 61 Connector do have an impact on the tax base in Shamokin Dam Borough. However, it is important to note that the OT2B Alternative, which uses the 15 Connector as an option to the 61 Connector, has the potential for an even greater impact to the future tax base than the DAMA or OT2A Alternatives.

- **Floodplain Impacts** - The Old Trail Alternatives impact the Susquehanna River floodplain. The DAMA Alternative does not. Concerns about impact to the floodplain were continually raised by the residents in the Old Trail Corridor.

- **Community Issues** - Residents in neighborhoods impacted by all project alternatives have raised issues with regard to "quality of life" issues within their communities. Concerns such as the visibility of an alternative, decreased air quality, increased noise pollution, decreased community cohesiveness, and potential decreases to property values have been frequently discussed. Alternatives were continually refined to minimize community impacts to the greatest degree possible.

- **Legal Issues** - On February 4, 2002, Monroe Township filed a law suit against the Federal Highway Administration (FHWA), PENNDOT, PA Historical and Museum Commission, and the Keeper of the National Register of Historic Places. The suit alleges that the selection of the DAMA Alternative and the resulting avoidance of the App historic farmstead causes harm to the Township because of its impacts on farmland, businesses, and the tax base. FHWA, PENNDOT, and PHMC filed a motion to dismiss, countering that the DAMA Alternative has not yet been designated the selected alternative. The selection of the alternative to advance for final design and construction occurs when FHWA issues a Record of Decision; this occurs at some point after the circulation and public review of the Final EIS. On November 26, 2002, Monroe Township filed a motion to withdraw their complaint. On November 29, 2002, a court order approved Monroe Township's Motion to Withdraw (without prejudice) the law suit filed in February.

OTHER GOVERNMENT ACTIONS IN STUDY AREA

The US Army Corps of Engineers (US ACOE) is studying the feasibility of constructing levees along the Susquehanna River in various locations upstream of the study area. Specifically, these projects include levee projects in Athens, Duryea, Wyoming Valley (Wilkes-Barre area), Danville, Bloomsburg (potential project), and Lock Haven and the Tioga Hammond and Cowanesque Dam projects. The local communities along the river in both Snyder and Northumberland Counties have expressed concern about the future impact to flooding in the area with the advent of the levee raising projects upstream. The cumulative effect of the Wyoming Valley Levee Raising Project in conjunction with US ACOE studies on the feasibility of a floodwall/levee in the Bloomsburg area (also upstream) has prompted local public officials and area residents to ask the US ACOE to perform a comprehensive study of the impact from all upstream flood protection projects.

At the request of the Northumberland, Snyder, and Union County Commissioners, the US ACOE conducted a cumulative study of these projects in the CSVT Study Area. Based on the US ACOE's work, the net result of the aforementioned flood control and flood protection projects is as follows.

- Northumberland and Snyder Counties will see no increase in 100-year flood stages.

- Sunbury and Shamokin Dam Borough will see an increase of 0.4 feet for recurrence of a storm event similar to the magnitude experienced during Hurricane Agnes in 1972. During Hurricane Agnes in 1972, the Susquehanna River had a gauged flow rate in the Sunbury area of 620,000 cubic feet per second (cfs). As measures of comparison, the 100-year storm event on the Susquehanna River in Sunbury has a flow rate of 540,000 cfs; the 500-year storm event has a flow rate of 790,000 cfs, as provided by the US ACOE.

- Riverside Borough, Point Township, and Northumberland Borough will see a decrease of 0.7', 0.8', and 0.8', respectively, for recurrence of a storm event similar to the magnitude of Hurricane Agnes as defined above.

The potential placement of the CSVT Old Trail Alternatives on the floodplain in Snyder County caused additional concern. Some local officials and the public living along the Susquehanna River are concerned about increases in water surface elevations.

Unrelated to the CSVT project, several governmental agencies, municipalities, and non-profit organizations, including PENNDOT, are exploring the possibility of studying the area for the potential development of a greenway along the West Branch and main stem Susquehanna River. This endeavor, known as the Susquehanna River Greenway Project, is being spearheaded by the Pennsylvania Department of Conservation and Natural Resources (PA DCNR). PENNDOT is coordinating with the study team for the Greenway Project by providing them with various data gathered through the CSVT environmental investigations, and other projects along the river corridor, to assist in the planning effort for the greenway.

RECOMMENDATION OF THE PREFERRED ALTERNATIVE MADE IN THE DRAFT EIS

A Preferred Alternative was recommended in the Draft EIS. The Recommended Preferred Alternative includes:

Section 1

- DA Modified Avoidance (DAMA) - includes the 61 Connector

Section 2

- River Crossing 5 (RC5)

The DAMA/RC5 combination is identified as the Recommended Preferred Alternative for the reasons summarized below.

DAMA

- Least impact to residences (33)
- Least impact to travel patterns on the existing network during construction
- Least impact to wetlands (4.8 acres)
- No impact to Susquehanna River floodplain, including the canal wetland systems located on the floodplain
- Least impact to high probability archaeological areas
- Minimizes impacts to communities
- Lowest total project cost

RC5

- Least impact to residences (25) and businesses (0)
- Does not require the placement of a river bridge pier on a geologic formation prone to sinkholes
- Best avoids areas of high probability archaeology
- Best design for the interchange east of river (with PA Route 147)
- Lowest total project cost

The findings of the Draft EIS indicated that the Recommended Preferred Alternative is the most environmentally sound alignment when all components of the study area environment are considered. The Recommended Preferred Alternative will provide safe and efficient travel while minimizing impacts to valuable community, natural, and cultural resources.

The Recommended Preferred Alternative was subject to further and full evaluation of comments received after the circulation of the Draft EIS, the Public Hearing, and public and agency reviews. The final selection of an alternative will not be made until consideration is given to all substantive comments received on the Final EIS.

SUMMARY OF COMMENTS ON THE DRAFT EIS

The Federal Highway Administration and PENNDOT received comments from over 90 individuals, organizations, municipalities, government agencies, and political officials. These commentors provided a wide range of comments related to the technical accuracy of the Draft EIS, the adequacy of the mitigation proposed in the Draft EIS, and the rationale for the Recommended Preferred Alternative discussed in the Draft EIS (DA Modified Avoidance or DAMA in Section 1, River Crossing 5 or RC5 in Section 2). This Final EIS documents consideration of each of the substantive comments, amends the environmental analysis where necessary, and makes a final recommendation concerning which alternative should be advanced to final design and, ultimately, construction. The comments received on the Draft EIS generally related to the following issues.

- **Historic Property Issues and the Application of Section 4(f) of the U.S. Department of Transportation Act of 1966 (amended 1968) -** Numerous comments (approximately 30% of the total comments received) were opposed to the avoidance of the Simon P. App Farm Property with the DA Modified Avoidance (DAMA) Alternative, the designation of the property as eligible for listing on the National Register of Historic Places, and the determination of the boundaries for the historic property. These comments are discussed in Sections III, IV.H and V of the Final EIS.

- **Property Issues related to Acquisition and/or Access -** Various individuals who are directly and/or indirectly affected by the Recommended Preferred Alternative commented to express their concern regarding the acquisition of their property, access issues related to their property, or the potential for decreased property values. These issues are discussed in Section V.

- **Engineering Issues -** Concerns were expressed regarding the placement of alternatives, the relocation of County Line Road, the potential impact of stormwater, and the placement of excess excavated material. Various alignment modifications were considered. However, each suggested modification had more environmental impacts associated with it and each was less desirable from an engineering perspective. Therefore, none of the suggested alignment modifications were recommended for further study and none of the Draft EIS Alternatives has changed. These design modifications and the rationale behind the decision not to consider them further are discussed in Section V.

- **Opposition to the 61 Connector -** Issues were raised regarding the need for the 61 Connector. Property values, noise, aesthetics, and quality of life were concerns expressed regarding the placement of the Connector. These issues are discussed in Section V.

- **Economics -** Individuals wrote to express their concern regarding the economics of the various alternatives. Impacts to the tax base as well as the overall costs and benefits to the region were discussed. These are discussed in Section V.

- **Public Boat Access Ramp -** Letters in opposition to and in support of the proposed public boat access ramp along RC5 in the Winfield area were received. Other locations for the boat ramp were suggested. Other areas were considered by the PA Fish and Boat Commission and PENNDOT for the ramp, but no other area provided a location as desirable as the location proposed along RC5. Therefore, the public boat access ramp along RC5 remains a component of the proposed mitigation package to mitigate for the possible impacts to the recreational potential of the river in this location.

- **Mitigation Proposal -** Several comments received from the regulatory and review agencies indicated that more information is needed on the mitigation plan for natural resource impacts. More information has been added to Section IV to discuss the status of the mitigation proposal to date.

- **Updated Traffic Studies -** To address comments received on the Draft EIS and to determine when a third lane may be needed (in each direction), additional traffic studies were conducted in 2001 for the entire CSVT study area. In addition, to be consistent with FHWA policy to design projects based on a 20-year traffic projection from the time of construction, traffic volumes were developed for year 2030. The change in the design year and the resultant 2030 traffic projections are discussed in detail in Section IV.M - Traffic and Transportation Network.

- **Environmental Issues -** Issues were raised regarding future noise levels and air quality, potential impacts to water supplies, secondary development resulting from the new roadway, and impacts to productive farmland. These issues are discussed in Sections IV and V.

It is important to note that the noise, air, and energy sections of the Draft EIS were prepared using the traffic volumes projected for the year 2020. The traffic projections for this Final EIS have been updated to the year 2030. As a result, the noise, air quality, and energy sections of this Final EIS have been modified based on the 2030 traffic volumes. The results are shown in Sections IV.B (Noise), IV.C (Air Quality), and IV.K (Energy).

RECOMMENDATION OF THE PREFERRED ALTERNATIVE MADE IN THE FINAL EIS

The same alternative that was recommended in the Draft EIS is recommended as the Preferred Alternative in this Final EIS. The Recommended Preferred Alternative includes:

Section 1

- DA Modified Avoidance (DAMA) - includes the 61 Connector

Section 2

- River Crossing 5 (RC5)

The findings of the Final EIS indicated that the Recommended Preferred Alternative is the most environmentally sound alignment when all components of the study area environment are considered. The impacts and costs of the Recommended Preferred Alternative (DAMA/RC5) are shown on Table VI-4 on Page VI-15. The final selection of an alternative will not be made until thorough consideration is given to all substantive comments received on the Final EIS.

UNRESOLVED ISSUES

The mitigation proposal for wetlands, surface water resources, and terrestrial habitat continues to be discussed. The FHWA and PENNDOT are attempting to provide a total ecosystem approach to natural resource mitigation in that attempts are being made to provide replacement of wetland and terrestrial habitat, reconstruction/restoration of streams, enhancement of wetlands and terrestrial habitat, and preservation of existing wetlands, streams, and wildlife habitat in one location. Currently, a site is being investigated for the completion of all the components of the proposal. The ultimate selection and development of the mitigation site or sites will be coordinated with the natural resource agencies. Once a site (or sites) is selected, a draft mitigation plan will be prepared. Appropriate agencies will be included in the further development of the mitigation plan.

A Programmatic Agreement between the FHWA and the SHPO has been prepared. This programmatic agreement will guide the future archaeological investigations for the Selected Alternative.

Due to the substantial controversy concerning the eligibility determination (for the National Register of Historic Places) and the boundaries of the Simon P. App Farm Property, the FHWA elected to raise the questions of eligibility and boundaries with the Keeper of the National Register (Keeper). The Keeper is the individual delegated the authority by the U.S. Department of Interior, National Park Service to list properties and determine their boundaries and eligibility. The Keeper evaluated the information concerning the App Farm and responded that the App farm and boundaries of the App farm met the eligibility requirements. However, the controversy remains. Property owners impacted by the avoidance alternative and Preferred Alternative (DAMA) as well as the local township and other political and municipal officials continue to be opposed to the property's eligibility and boundaries and the alternative to avoid the property.

The impact to agricultural areas continues to be an issue. Coordination with the Pennsylvania Department of Agriculture will continue as the options to avoid and/or minimize impact to productive farmland are evaluated.

Additional lands may be impacted as a result of utility lines and towers that will need to be relocated as a result of this project. Coordination with PPL and other utilities is ongoing to ascertain the impact of the relocated towers and power lines.

In August of 2002, PENNDOT received a letter from the Pennsylvania Fish and Boat Commission (PFBC) indicating that a species of concern, the yellow lampmussel (a rare freshwater mussel), was identified in the project area. The yellow lampmussel is not currently listed as protected in Pennsylvania, nor is it a Federally listed endangered or threatened species, but the PFBC noted that it is a species of concern to them and may be listed for protection in the future. The PFBC noted that mussels have the potential to be adversely impacted through in-stream structures and associated construction activities, both temporary and permanent. Mussels are also vulnerable to various types of water pollution. As such, the PFBC requests that a mussel survey be completed within the zones of direct and indirect effects associated with both the Susquehanna River Bridge and the Chillisquaque Creek Bridge.

A meeting was held with representatives of the PFBC as well as representatives of the U.S. Army Corps of Engineers and the PA Department of Environmental Protection to discuss this request. Coordination regarding the mussel survey request will continue.

FEDERAL OR STATE ACTIONS REQUIRED

The construction and operation of any of the Final EIS Alternatives for the CSVT Project may require the following Federal and State actions.

- FHWA Record of Decision (ROD)
- US Army Corps of Engineers Section 404 Permit
- Executed Programmatic Agreement for cultural resources
- Pennsylvania Department of Environmental Protection Chapter 105 Permit
- Pennsylvania Department of Environmental Protection 401 Water Quality Certification
- National Pollutant Discharge and Elimination System (NPDES) Permit - This permit is issued by the affected County Conservation Service

- Pennsylvania Agricultural Land Condemnation Approval Board (ALCAB) Approval
- Pennsylvania Department of Environmental Protection Residual Waste Permit Modifications

NEXT STEPS IN PROJECT DEVELOPMENT

The Draft EIS has been circulated and public and agency comments have been received. These comments have been considered in this Final EIS. The same Preferred Alternative is recommended in this Final EIS. This Final EIS has been made available for public review and copies have been sent, upon request, to all people and organizations that provided substantive comments or testimony on the Draft EIS.

The general public and the review agencies will be afforded an additional chance to comment on the Preferred Alternative, and all other project issues during the circulation of the Final EIS. The project study team will consider all substantive comments received during the 30 day review period.

Once the FHWA is satisfied that all substantive comments on the Final EIS have been adequately considered, a Record of Decision (or ROD) will be issued. The ROD will determine the Selected Alternative. The Selected Alternative is then advanced to final design and construction.

Parallel to completing the EIS process, the US Army Corps of Engineers will determine whether it is in the public interest, under Section 404 of the Clean Water Act, to issue a permit for the Preferred Alternative.

A mitigation report will be prepared and finalized after the Record of Decision (ROD) is obtained. This report will address unavoidable impacts to socioeconomic, cultural, and natural resources. All properties used for mitigation will be obtained amicably and/or will be remnant parcels associated with other land obtained for roadway purposes. Mitigation activities for individual resources are summarized in the appropriate parts of Section IV of this Final EIS.

ADDITIONAL PROJECT INFORMATION

PENNDOT has prepared two project videos. The first video describes the project purpose, the transportation project development process, and each alternative evaluated in the preliminary phase, Phase I. The second video describes the alternatives studied in detail (Phase II), the impacts associated with each alternative, and concludes by presenting PENNDOT's Recommended Preferred Alternative and the rationale for the preference. Both videos are available at the municipal buildings and libraries as noted on Page S-3.

A third video is currently in production. This video discusses the comments received on the Draft EIS and the responses to those comments. This third video will present a further detailed rationale for the Preferred Alternative.

For additional information on the availability of project information, please contact the CSVT toll free informational hot line at 888-878-2788. This line is answered between 7:30 AM and 4:30 PM, Monday through Friday.

Table of Contents - Volume 1

TABLE OF CONTENTS - VOLUME 1 (SECTIONS I-IV)
(VOLUME 2 CONTAINS SECTIONS V-X)

TABLE OF CONTENTS
(CONTINUED)

PAGE

TABLE OF CONTENTS
(CONTINUED)

PAGE

TABLE OF CONTENTS
(CONTINUED)

PAGE

TABLE OF CONTENTS
(CONTINUED)

PAGE

TABLE OF CONTENTS - VOLUME 2

TABLE OF CONTENTS - VOLUME 2

PAGE

LIST OF TABLES

ILIST OF TABLES (CONTINUED)

LIST OF TABLES (CONTINUED)

LIST OF FIGURES

LIST OF FIGURES (CONTINUED)

LIST OF FIGURES (CONTINUED)

LIST OF FIGURES
(CONTINUED)

PAGE

LIST OF ABBREVIATIONS AND ACRONYMS

ac	Acres
AASHTO	American Association of State Highway and Transportation Officials
Acc/MVMT	Accidents per Million Vehicle Miles Traveled
ACHP	Advisory Council on Historic Preservation
ACM	Agency Coordination Meeting
ADT	Average Daily Traffic
ALCAB	Agricultural Lands Condemnation Approval Board
ALPP	Agricultural Land Preservation Policy
APE	Area of Potential Effect
ASA	Agricultural Security Area
ASCS	Agricultural Stabilization and Conservation Service
AST	Aboveground Storage Tank
ATR	Automatic Traffic Recorder
BEQ	PENNDOT Bureau of Environmental Quality
BHP	Bureau for Historic Preservation
BOD	PENNDOT Bureau of Design
BMP's	Best Management Practices
CAC	Citizen Advisory Committee
CAL3QHC	Air Quality Model used to Determine Dispersion of CO from Highway Sources
CEQ	Council on Environmental Quality
cf	Cubic Feet
CFR	Code of Federal Regulations
CLOMR	Conditional Letter of Map Revision
cm	Centimeters
CO	Carbon Monoxide
CORSIM	Traffic Engineering Microsimulation Software Program
CSVT	Central Susquehanna Valley Transportation Project
cy	Cubic Yards
DAMA	DA Modified Avoidance Alternative
dBA	Decibels in A-Weighted Sound Level
DEIS (or Draft EIS	Draft Environmental Impact Statement
District	PENNDOT Engineering District 3-0
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EV	Exceptional Value Wetlands
FAR	Farmland Assessment Report
FCIR	Farmland Conversion Impact Rating Form
FEIS (or Final EIS	Final Environmental Impact Statement

LIST OF ABBREVIATIONS AND ACRONYMS (CONTINUED)

FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FNL	Future Noise Level
FPPA	Federal Farmlands Protection Policy Act
ft	Feet
GIS	Geographic Information System
gpm	Gallons Per Minute
GPS	Global Positioning System
ha	Hectares
HEC-2	Hydraulic Engineering Circular, Version 2
HEC-RAS	Hydraulic Engineering Circular - River Analysis System
HFC	Hydrogeomorphic and Functional Classification
HQ	High Quality
HQTSF	High Quality Trout-Stocked Fishery
I-	Interstate
IHS	Interstate Highway System
IM	Inspection Maintenance Program
in	Inches
ISA	Initial Site Assessment
km	Kilometers
km^2	Square Kilometers
kph	Kilometers Per Hour
l	Liters
LOS	Level of Service (a measure of how well traffic flows)
m	Meters
m^2	Square Meters
m^3	Cubic Meters
MENL	Monitored Existing Noise Level
MFPN	Major Forest Patch Network
mi	Miles
mm	Millimeters
mm^2	Square Millimeters
MOBILE 5a	Vehicular Emission Rates Calculation Model
MOE	Measures of Effectiveness
mph	Miles Per Hour
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria

LIST OF ABBREVIATIONS AND ACRONYMS (CONTINUED)

NEPA	National Environmental Policy Act
NHS	National Highway System
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
NR	National Register (of Historic Places)
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
O_3	Ozone
O/D	Origin/Destination Survey
OPTIMA	Computer Model for Traffic Noise Reduction
OSHA	Occupational Safety and Health Administration
OT2A	Old Trail 2A Alternative
OT2B	Old Trail 2B Alternative
PA DCED	Pennsylvania Department of Community and Economic Development
PA DCNR	Pennsylvania Department of Conservation and Natural Resources
PA DEP	Pennsylvania Department of Environmental Protection
PA DOA	Pennsylvania Department of Agriculture
PAR	Preliminary Area Reconnaissance
PASS	Pennsylvania Archaeological Site Survey
PEM	Palustrine Emergent Wetland
PEMA	Pennsylvania Emergency Management Agency
PENL	Predicted Existing Noise Level
PENNDOT	Pennsylvania Department of Transportation
PFBC	Pennsylvania Fish and Boat Commission
PFNL	Predicted Future Noise Level
PFO	Palustrine Forested Wetland
PGC	Pennsylvania Game Commission
pH	A value use to express relative acidity and alkalinity
PHMC	Pennsylvania Historical and Museum Commission
PM	Particulate Matter
PNDI	Pennsylvania Natural Diversity Inventory
POW	Palustrine Open Water Wetland
POWG	Public Officials Work Group
PPL	Pennsylvania Power and Light Corporation
PPM	Parts Per Million
PSI	Preliminary Site Investigation
PSS	Palustrine Scrub/Shrub Wetland
RC1-E	River Crossing 1 East
RC1-W	River Crossing 1 West
RC5	River Crossing 5
RC6	River Crossing 6

LIST OF ABBREVIATIONS AND ACRONYMS (CONTINUED)

ROD	Record of Decision
ROW	Right-of-Way
RC1-E	River Crossing 1 East
RC1-W	River Crossing 1 West
RC5	River Crossing 5
RC6	River Crossing 6
ROD	Record of Decision
ROW	Right-of-Way
SCIA	Secondary/Cumulative Impact Area
sf	Square Feet
SHPO	State Historic Preservation Officer
sm	Square Miles
SR	State Route
STAMINA 2.0	Computer Model for Highway Traffic Noise Prediction
STIP	Statewide Transportation Improvement Program
SYNCHRO	Traffic Engineering Software Package
T&E	Threatened and Endangered Species
TIP	Transportation Improvement Program
TPDP	Transportation Project Development Process
TSD	Treatment, Storage, or Disposal
TR	Traffic Route
TSF	Trout Stocked Fishery
TSM	Transportation Systems Management
US ACOE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
US DOI	United States Department of Interior
US DOT	United States Department of Transportation
US EPA	United States Environmental Protection Agency
US FWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UST	Underground Storage Tank
Volume-to Capacity Ratio (v/c)	The ratio of demand flow rate (volume) to capacity of a traffic facility
VPD	Vehicles Per Day
WET 2.0	Wetland Evaluation Technique Version 2.0
WWF	Warm Water Fishery
yd	Yards

METRIC TO ENGLISH CONVERSION FACTORS					
	SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
Length	cm	centimeters	.03937	inches	in
	cm	centimeters	.3937	feet	ft
	m	meters	1.094	yards	yd
	km	kilometers	.6214	miles	mi
Area	m^2	square meters	10.7639	square feet	ft^2 (or sf)
	m^2	square meters	1.1960	square yard	yd^2 (or sq yd)
	km^2	square kilometers	0.3861	square mile	mi^2 (or sq mi)
	ha	hectares	2.471	acres	ac
Volume	ℓ	liters	.2642	gallons	gal
	c^3	cubic meters	35.32	cubic feet	ft^3
	c^3	cubic meters	1.3079	cubic yard	yd^3 (or cy)
Speed	kph	kilometers per hour	0.6214	mile per hour (vehicles)	mph

ENGLISH TO METRIC CONVERSION FACTORS					
	SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
Length	in	inches	2.54	centimeters	cm
	ft	feet	30.48	centimeters	cm
	yd	yards	0.9144	meters	m
	mi	miles	1.6093	kilometers	km
Area	in^2	square inches	645.16	square millimeters	mm^2
	ft^2 (or sf)	square feet	0.0929	square meters	m^2
	yd^2(or sq yd)	square yard	0.8361	square meters	m^2
	mi^2 (or sq mi)	square mile	2.59	square kilometers	km^2
	ac	acres	0.4046	hectares	ha
Volume	gal	gallons	3.785	liters	ℓ
	ft^3 (or cf)	cubic feet	0.03	cubic meters	m^3
	yd^3 (or cy)	cubic yard	0.76	cubic meters	m^3
Speed	mph	mile per hour (vehicles)	1.609	kilometers per hour	kph
Concentration	PPM	parts per million	1137 1170 (carbon monoxide only)	micrograms per cubic meter	$\mu g/m^3$

I. Purpose and Need for Action

I. PURPOSE AND NEED FOR ACTION

A. PROJECT DESCRIPTION

The Central Susquehanna Valley Transportation (CSVT) Project is proposed as a 19.3 to 20.9 kilometer (12 to 13 mile) four lane, limited access highway from the existing Selinsgrove Bypass (US Routes 11/15 Expressway) in Monroe Township, Snyder County, just north of Selinsgrove, to PA Route 147 in West Chillisquaque Township, Northumberland County, just south of the interchange between PA Route 147 and PA Route 45.

> More detailed purpose and need information can be found in the Purpose and Need Technical Support Data* as well as the Central Susquehanna Valley Transportation Project, S.R. 0015, Section 088, Needs Analysis, June 1996.
>
> * Technical Support Data Index is located in Section IX, Appendix A.

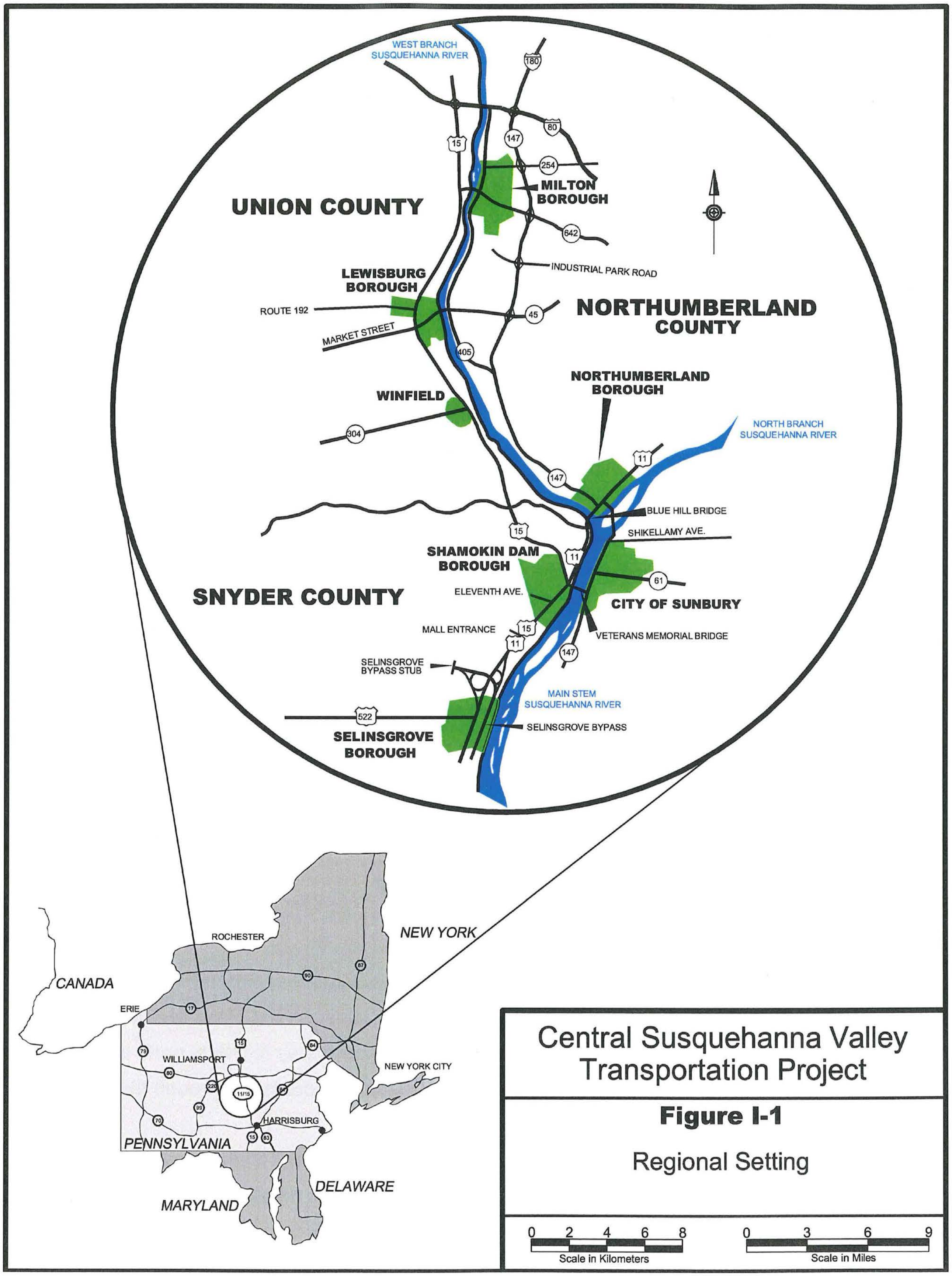
The CSVT will reduce congestion, provide better access to the region, improve safety by reducing conflicts, and support population and economic growth that is expected in the region.

The proposed project has been the subject of years of support by local governments, organizations, and political officials. Detailed planning, engineering, and environmental studies for the proposed project have been undertaken by the Pennsylvania Department of Transportation, in cooperation with the Federal Highway Administration. The results of these extensive studies are presented in the Draft and Final Environmental Impact Statements.

1. Regional Setting

The Central Susquehanna Valley is located in the central part of Pennsylvania. The valley is situated along the West, North, and Main Branches of the Susquehanna River and forms a natural north-south transportation corridor serving points south of Pennsylvania to points north including New York State and Canada (see Figure I-1). Three major north/south routes go through the study area - U.S. Route 15, U.S. Route 11 and PA Route 147.

US Route 15 begins in South Carolina and extends into New York State, where it connects with highways serving New York and Canada. In Pennsylvania, US Route 15 travels through the mid-state. It is the only major north-south corridor in central Pennsylvania and one of the major north-south



Central Susquehanna Valley Transportation Project

Figure I-1

Regional Setting

highways in the Commonwealth. The location of US Route 15 makes it strategically important, not only to Pennsylvania, but to the entire northeast and Canada.

US Route 15 is called upon to serve the long distance travel demands of motorists traveling through central Pennsylvania. The use of US Route 15 for long distance travel stems from its strategic location. It provides the most direct route between the Baltimore-Washington metropolitan area and Harrisburg to the south and Rochester, Buffalo, and Canada to the north. For this reason, a significant proportion of traffic is interstate and international, and it is a vital route for long distance carriers.

Not only does US Route 15 serve intrastate, interstate, and international traffic, it is the economic lifeline of Central Pennsylvania.

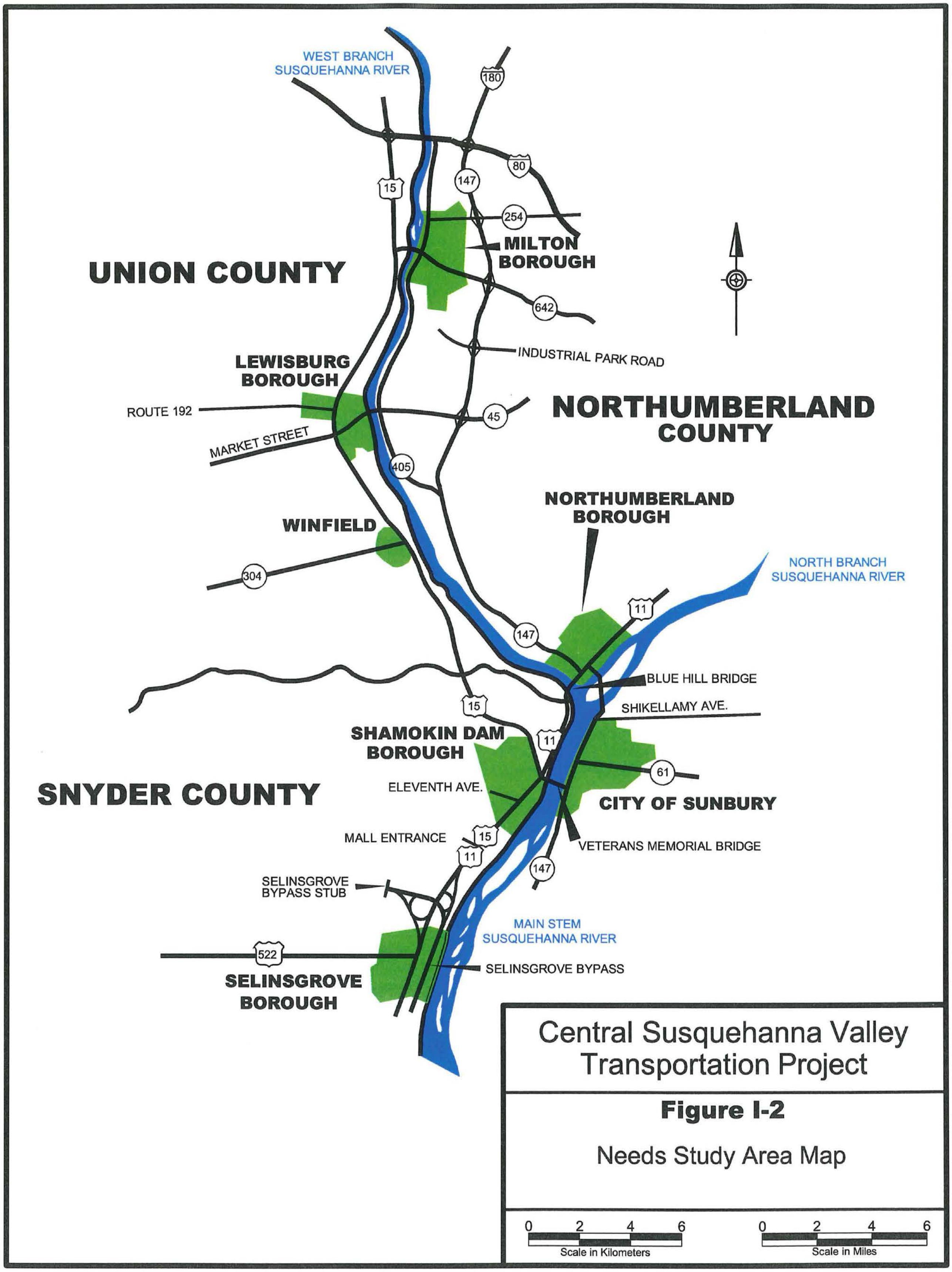
US Route 11 begins in Louisiana and extends northward to Canada, serving major cities along its route. In the northeast, it serves Harrisburg, Wilkes-Barre, and Scranton, Pennsylvania and Binghamton, New York. US Route 11 has been supplemented by Interstate 81. However, through Pennsylvania, US Route 15 traffic is not served by an interstate highway. This is particularly true in the Central Susquehanna Valley. Significantly, the study area is not served by an interstate highway, except Interstate 80 to the north.

PA Route 147 begins just north of Harrisburg, in Clarks Ferry, and travels through Millersburg, Sunbury, Northumberland, and Milton before it interchanges with Interstate 80. At Interstate 80, PA Route 147 changes designation to Interstate 180 (I-180) and serves the Williamsport metropolitan area.

2. Study Area

The initial study area for the Central Susquehanna Valley Transportation (CSVT) Project, known as the Needs Study Area, extended from Selinsgrove in the south to Interstate 80 (I-80) in the north, a distance of approximately 32 kilometers (20 miles). In addition, the Needs Study Area was also roughly 8 kilometers (5 miles) wide. (The size of the Study Area was reduced later in the Phase I Alternatives Analysis. This reduction in the Needs Study Area is discussed in detail in Section III, Alternatives.) The main north-south travel corridors include US Route 15, US Route 11, US Routes 11/15, and PA Route 147. The Needs Study Area is situated within a three county area that includes Union and Snyder Counties on the west side of the West and Main Branches of the Susquehanna River and Northumberland County on the east side of the Main Stem Susquehanna River and surrounding the Main Stem Susquehanna River

The roadways in the corridor bind together the towns of Selinsgrove, Shamokin Dam, Sunbury, Northumberland, Milton, and Lewisburg and serve a Needs Study Area population of 73,000 persons and 35,700 jobs. The Needs Study Area is shown in Figure I-2.



Central Susquehanna Valley Transportation Project

Figure I-2

Needs Study Area Map

The corridor also serves a substantial amount of through and commercial or truck traffic traveling from Harrisburg and the south to Williamsport, New York State, and Canada. In addition, the area contains a large number of industries that generate truck trips, such as businesses located in the Milton Industrial Park, which include: BRT, Inc.; Weis Markets Warehousing; ConAg (Chef Boyardee Company); Crest Homes (modular homes manufacturer); Leer Products; and Professional Truck Driver Service and Academy. Other industries in the area that generate a large number of truck trips include AFC Industries, Milton Steel, Milton Transportation (Trucking Terminal), International Home Food Products, H. Warshow and Sons, Woodmode, Inc., Bingman Lumber, Phillips Industries, Apex Homes, Conestoga Wood, Penn-Lyon, Thor Industries, Pennsylvania House Furniture Company, JPM Company, Inc., BBA Nonwovens, Kuhns Brothers Lumber Company, Moore North America, and Playworld Systems, Inc. These industries are located throughout Snyder, Union, and Northumberland Counties.

B. PROJECT BACKGROUND AND HISTORY

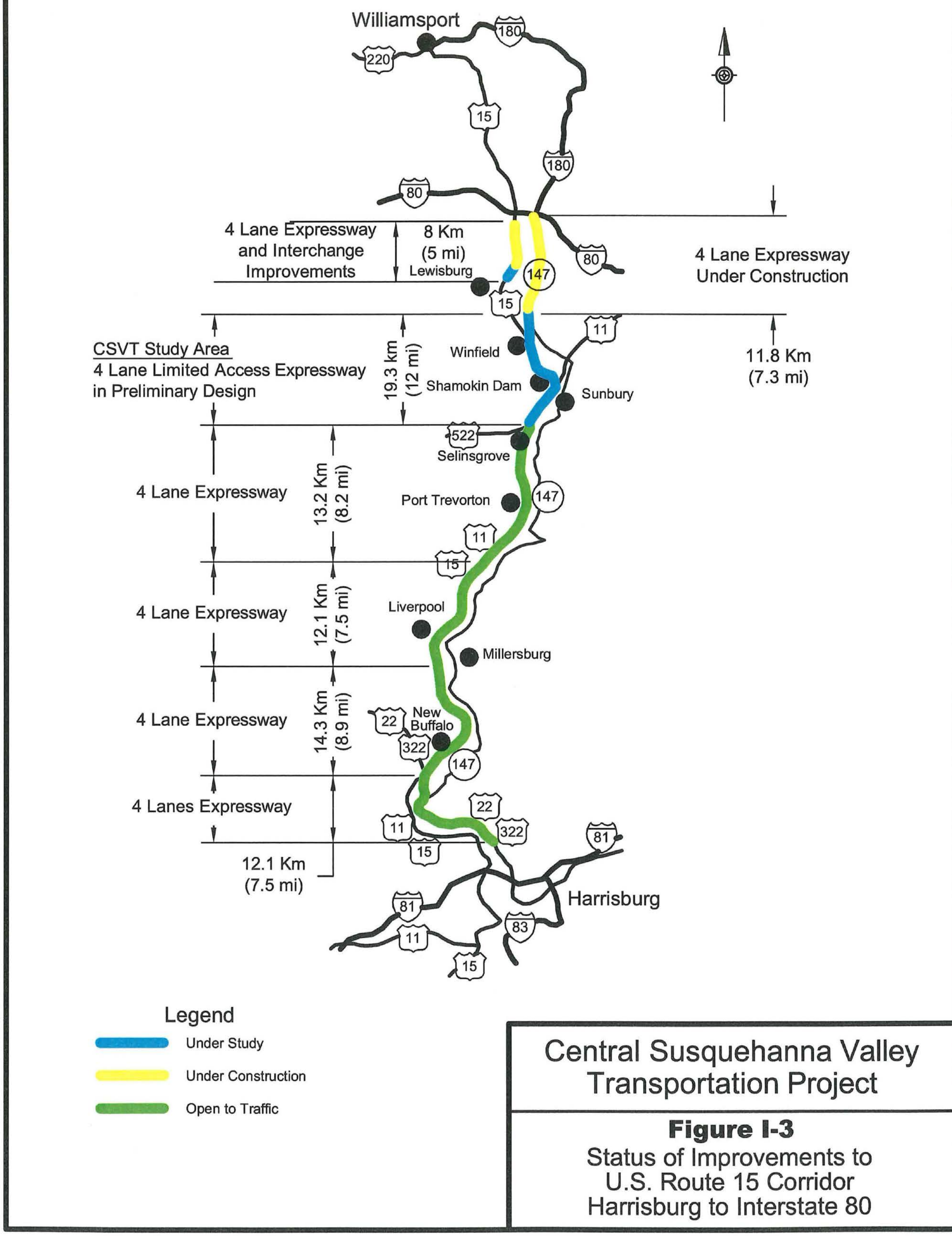
Improvements to US Route 15 have been under study for many years. At any given time since the 1960's, a section of this roadway has been under study, in design, or under construction. The current status of improvements to the US Route 15 Corridor between Harrisburg and Williamsport are shown in Figure I-3.

The improvements to US Route 15 also continue to the north of Williamsport into New York State. At this time, all sections of US Route 15 between Harrisburg and Corning, New York, are either a four-lane expressway or are under construction, in final design or in preliminary design with plans to complete a four-lane expressway.

For years, the citizens, public officials, and business interests of the Central Susquehanna Valley have been petitioning for relief from increasing traffic congestion and the high volume of trucks on their roadway network. To this end, several sections of US Route 15 have been improved within Pennsylvania, from the Maryland to the New York borders. However, US Route 15 continues to have problem areas along its length.

One such problem area occurs in the Central Susquehanna Valley along US Routes 11/15 between Selinsgrove and the US Routes 11 and 15 split. This stretch of highway was originally constructed as a three-lane highway in 1944 and consisted of three 3.35-meter (11-foot) lanes. In 1959, this roadway was widened to a four-lane highway. In the early 1970's, PENNDOT designed a Selinsgrove-Shamokin Dam bypass, but only the Selinsgrove portion was completed in 1977.

Through the 1970's, the section of US Routes 11/15 through the Shamokin Dam area developed into a heavily traveled commercial area, with businesses of every type lining both sides of the highway. With the opening of the Susquehanna Valley Mall in 1978 serving as an additional catalyst for



Central Susquehanna Valley
Transportation Project

Figure I-3
Status of Improvements to
U.S. Route 15 Corridor
Harrisburg to Interstate 80

further development, the so-called "Golden Strip" was born. The "Golden Strip" now serves as the new Main Street of the Central Susquehanna Valley.

Consequently, in 1982, US Routes 11/15 through Shamokin Dam was line striped to provide for five 3.05-meter (10-foot) lanes to allow for a continuous left turn lane. In addition, truck traffic was restricted to the right lane because of narrow lane widths. Through the 1980's and 1990's, US Routes 11/15 in the Golden Strip area remained a free access, four-lane roadway.

Since US Routes 11/15 serve as a free access roadway, the numerous businesses and residences lining the highway have driveway access. For example, a 1999 field view indicated 51 driveways along the southbound lanes and 50 driveways along the northbound lanes of US Routes 11/15 between the Selinsgrove Bypass and the split between US Routes 11 and 15 just north of Shamokin Dam. Several side roads also intersect with US Routes 11/15. There are 24 intersections from the Selinsgrove Bypass to the 11/15 split. Twelve of these intersections are "T" intersections; the remaining 12 are full intersections. Nine (9) of these intersections are signalized.

Transportation planning, as it is currently performed in Pennsylvania, is a cooperative venture between the state, regional agencies, local governments, and the public. Regional transportation plans are created to reflect the long-term transportation policies of the region. This planning process is what leads to the identification of transportation projects that are ultimately funded for study.

Transportation Improvement Programs (TIP's) are four-year outlooks that are cooperatively developed by local, regional, and state transportation officials. TIP's identify specific projects and the resources needed to implement them in a given region. In the Central Susquehanna Valley region the TIP's are developed by the Northern Tier Regional Planning Commission and the SEDA Council of Governments (SEDA COG). TIP's are compiled into a Statewide Transportation Improvement Program (STIP). The STIP is required by the U.S. Department of Transportation and it includes all highway and transit projects to be implemented, statewide, over a four-year period. The Twelve Year Transportation Program, a mid-range plan required by Pennsylvania law, incorporates the STIP as the plan for the first four years. The Twelve Year Program also identifies other projects to be implemented beyond the four-year range of the STIP.

Local citizens and public officials, concerned about the continued residential and economic growth in the Central Susquehanna Valley, and the subsequent traffic congestion that resulted, instituted efforts to have the Shamokin Dam Bypass project restudied. As a result, in July 1993 the Central Susquehanna Valley Transportation (CSVT) Project was added to the TIP, the STIP, and the Twelve Year Program. As a result, in 1994, approval was given to study improvements to the roadway system in the Central Susquehanna Valley, particularly US Routes 11/15, 11, 15, and PA Route 147. The CSVT Project has been continuously maintained on the TIP, the STIP, and the Twelve Year Program as a result of ongoing public and legislative testimony relating to the need for the improvements to the roadway system.

The importance of US Route 15 to Central Pennsylvania is also evidenced by continual maintenance improvements to the Golden Strip, even as plans to improve the overall roadway network in Central Pennsylvania are ongoing. Approximately three kilometers (two miles) of the Golden Strip, from the Selinsgrove Bypass stub north past the Susquehanna Valley Mall were improved in 1997. US Routes 11/15 was widened from five 3.05-meter (10-foot) lanes to five 3.66-meter (12-foot) lanes, and the entire roadway was resurfaced. The underground utilities were relocated and drainage was improved. Curbing was provided and, where possible, shoulders were added. However, access remains free and multiple points of conflict remain.

An additional problem area exists in the Central Susquehanna Valley east of the river in Northumberland County. The topography US Route 15 follows between Shamokin Dam and I-80 has caused the diversion of substantial truck traffic onto US Route 11 just north of Shamokin Dam and across the Susquehanna River into Northumberland Borough. Once in Northumberland Borough, traffic must maneuver through the intersection of US Route 11 (Water Street) and PA Route 147 (Duke Street). Both streets are lined with residences and businesses at this intersection. Delays and traffic stacking occur at this intersection due to maneuvering trucks. From Northumberland, traffic follows PA Route 147 north through the Milton area toward I-80. By default, PA Route 147 has become part of the US Route 15 corridor.

From I-80 south to the Milton area, PA Route 147 is a four-lane, limited access highway. However, in the Milton area, PA Route 147 transitions from a four-lane, limited access highway to a two-lane, limited access highway. And, as PA Route 147 continues into the Borough of Northumberland, the network again changes from a two-lane, limited access highway to a two-lane, free access roadway. Entering Northumberland, the traffic must funnel into a two-lane residential street lined with residences and businesses. Once again, the high traffic volumes, the substantial number of trucks and the numerous access points combine to create a situation where local traffic competes with through traffic, particularly heavy truck traffic. The lack of continuity of access control (free access/two-lane to limited access/ two-lane to limited access/four-lane) also causes motorist confusion and adds to the safety issues associated with this roadway section.

C. PROJECT NEED

As a result of the continual public and legislative support for relief from increasing traffic congestion and the presence of trucks on the roadway network, studies were reinitiated for the CSVT Project in 1994. One of the first steps taken on this large, complex project was the identification of the "Project Needs". The purpose of a Needs Study is to determine if existing and/or future transportation requirements warrant improvements to the traffic network in the project area. These transportation requirements constitute the need for improvements.

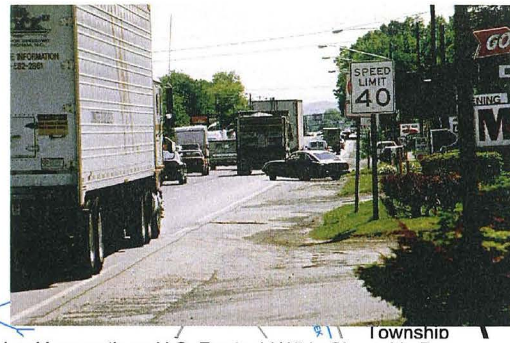
A comprehensive Needs Analysis conducted in 1995-96 revealed substantial current and future transportation problems in the Central Susquehanna Valley. The study determined that the concerns of the community leaders and residents are well-founded, given the current levels of congestion, high volume of trucks in the traffic stream, and multiple access points that serve as potential points of conflict (see Figure I-4). In addition, continued growth is anticipated for the Central Susquehanna Valley causing greater impediments to safe and efficient traffic flow throughout the entire Needs Study Area.

Traffic volumes are typically expressed as Average Daily Traffic (ADT) or 24-hour traffic volumes of any average day. Current (1996) traffic volumes along each major roadway in the Needs Study Area vary based on the adjacent land uses and the traffic volumes carried on the intersecting roadways. Therefore, a range of ADT volumes are shown for each Needs Study Area roadway. Traffic volumes on US Routes 11/15 in the southern part of the study area range from 29,750 to 42,100 vehicles per day. On US Route 15 daily traffic volumes range from 15, 950 to 18,000 vehicles per day. US Route 11 in the Northumberland area carries approximately 13,100 vehicles per day. Volumes on PA Route 147 range from 13,100 vehicles to 14, 750 vehicles per day near the PA Route 147/PA Route 45 interchange. These ADT volumes are shown on Figure I-5.

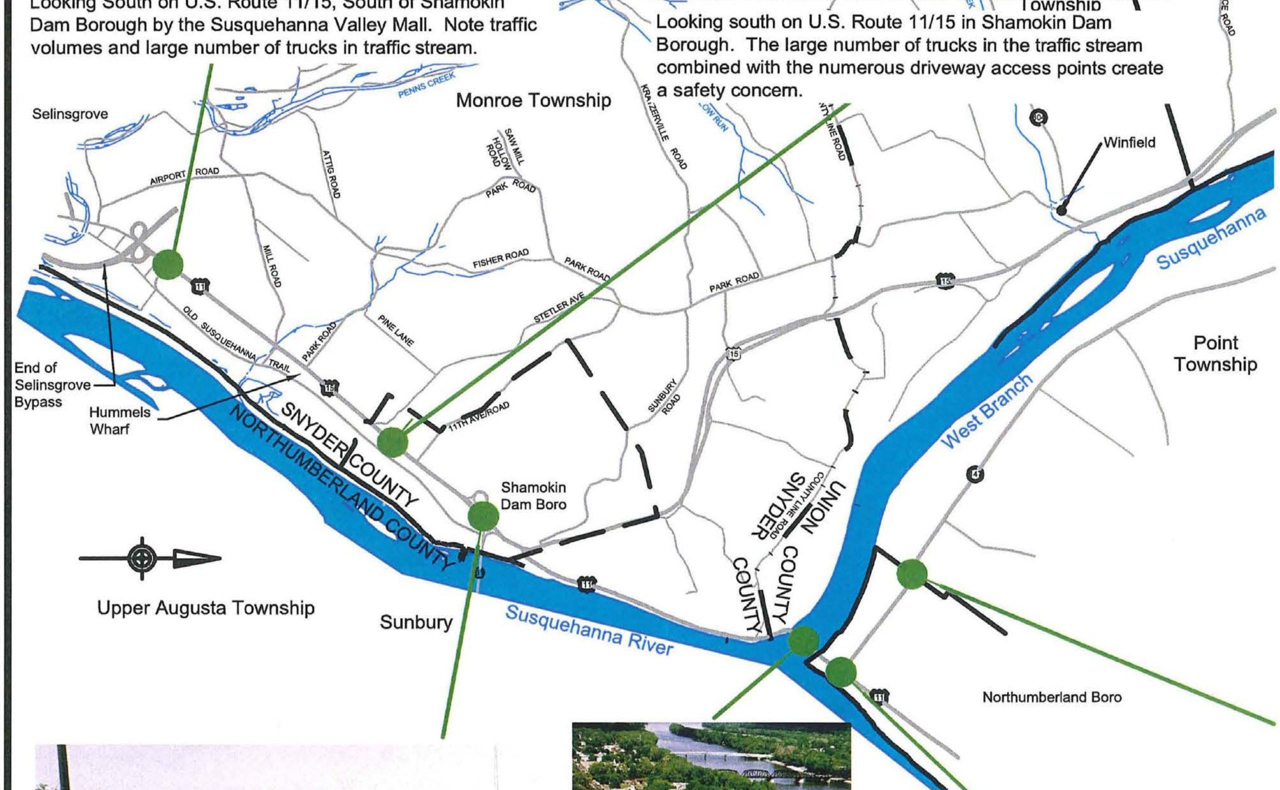
Truck traffic volumes also vary. Truck volumes on US Routes 11/15 in the southern part of the Needs Study Area range from 3,300 to 5,100 trucks per day. On US Route 15 daily truck volumes range from 2,000 to 2,200 trucks per day. US Route 11 in the Northumberland area carries approximately 1,400 trucks per day. Volumes on PA Route 147 range from 1,600 to 2,100 trucks per day near the PA Route 147/PA Route 45 interchange. These volumes are shown on Figure I-6. Overall, trucks represent approximately 13% of the vehicles on the Needs Study Area roadways throughout the day. As overall traffic volumes vary throughout the day, the level of trucks in the traffic stream remains constant, representing a larger percentage of the overall traffic volume during non-peak periods. Trucks account for 1 out of every 5 vehicles on PA Route 147 from 10:00 AM to 11:00 AM and 1 out of every 6 vehicles on US Routes 11/15 from 6:00 AM to 7:00 AM and 9:00 AM to 10:00 AM.

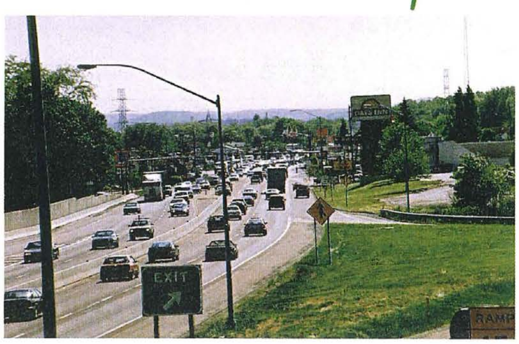
Initially, crash data for the Needs Analysis Report (June 1996) discussed crash data for the years 1990-1994. Crash data for this 5-year period is summarized as follows. Nearly 1,000 crashes including 22 fatal crashes occurred on the study area roadways in the five year period ending in December of 1994. Sixteen percent of the 59.7 kilometers (37.25 miles) of major roadways in the Needs Study Area exceeded the statewide average crash rate for similar roadway types, and 21% of the major roadway miles exceeded the statewide average fatal crash rate for similar roadway types. Nearly half (46%) of the total number of crashes involved a truck; more than half (54%) of the fatal crashes involved a large truck.

Looking South on U.S. Route 11/15, South of Shamokin Dam Borough by the Susquehanna Valley Mall. Note traffic volumes and large number of trucks in traffic stream.

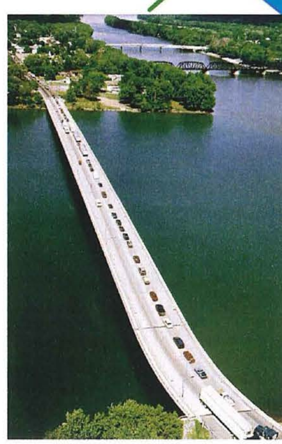


Looking south on U.S. Route 11/15 in Shamokin Dam Borough. The large number of trucks in the traffic stream combined with the numerous driveway access points create a safety concern.





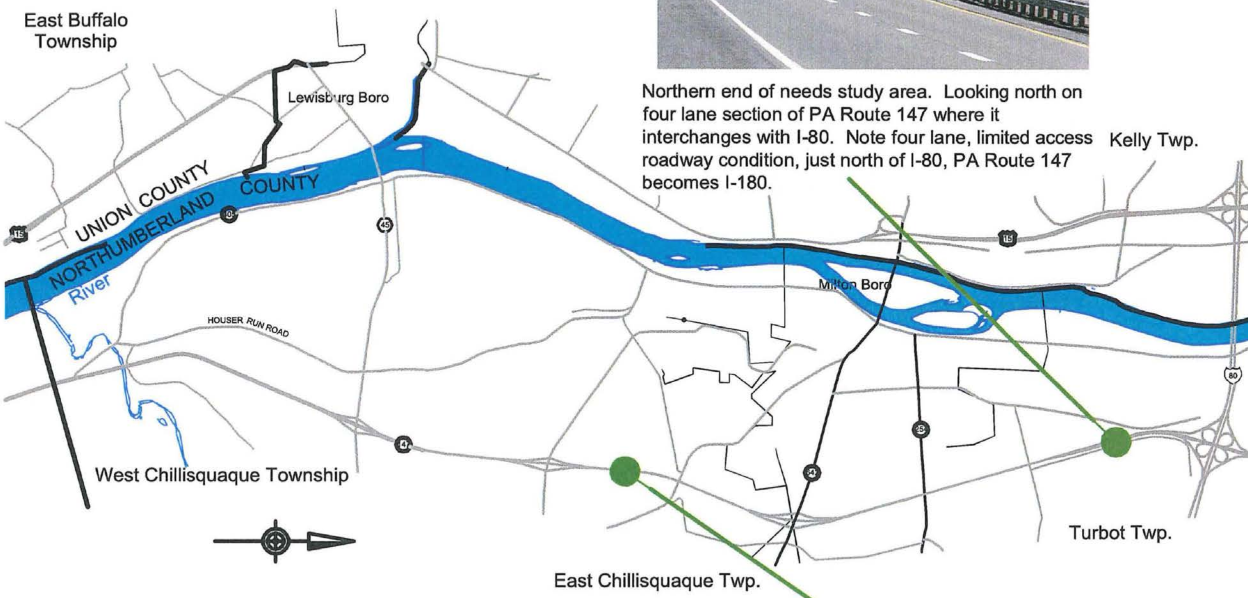
Looking south at the Golden Strip (U.S. Route 11/15) in Shamokin Dam Borough from the PA Route 61 Bridge (Veterans Memorial Bridge) into Sunbury. Note heavy traffic Volumes



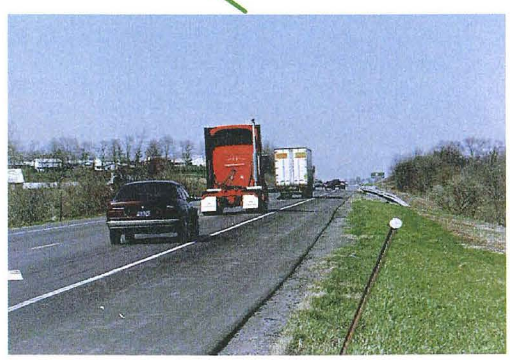
View of U.S. Route 11 Bridge (Blue Hill Bridge) over the West Branch Susquehanna River into Northumberland. Note traffic congestion and stacking on bridge.

Looking south from PA Route 147 (Duke Street) at the intersection of PA Route 147 and U.S. Route 11 (Water Street) in Northumberland. Excessive delays occur at this intersection due to maneuvering trucks.

Northern end of needs study area. Looking north on four lane section of PA Route 147 where it interchanges with I-80. Note four lane, limited access roadway condition, just north of I-80, PA Route 147 becomes I-180.



Looking north on PA Route 147 at northern edge of Northumberland Borough. Note trucks in traffic stream, and proximity of residences and businesses to roadway.



Looking north on PA Route 147 just south of Milton. Note two lane, limited access, roadway on four lane right-of-way. Also note presence of trucks in traffic stream.

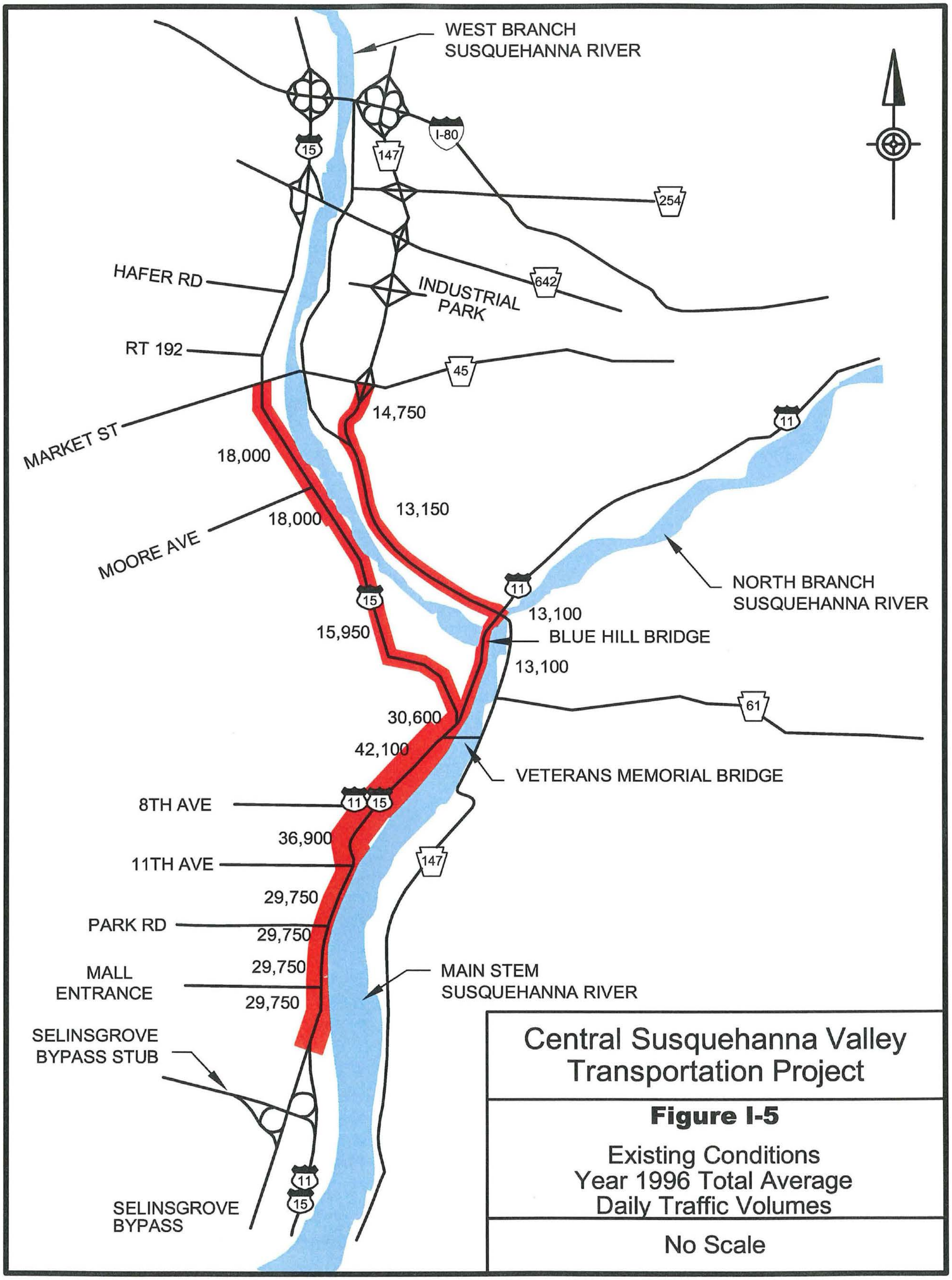
Central Susquehanna Valley Transportation Project

Figure I-4

Needs Study Area Map
Areas of Concern

0	750	1500	2250	0	3000	6000	9000

Scale in Meters — Scale in Feet

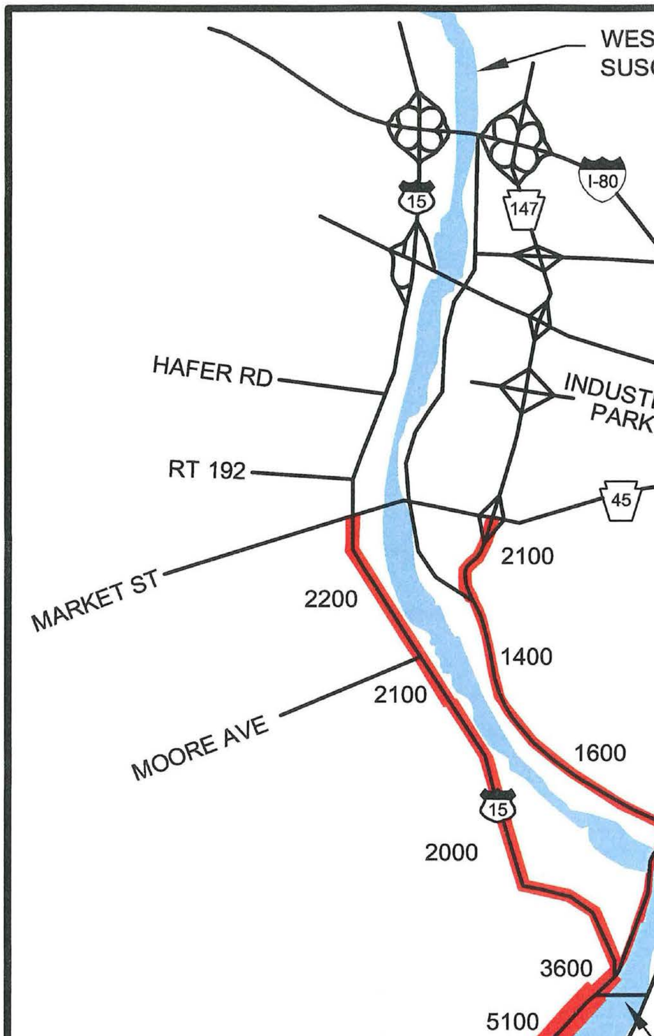


Central Susquehanna Valley
Transportation Project

Figure I-5

Existing Conditions
Year 1996 Total Average
Daily Traffic Volumes

No Scale



Central Susquehanna Valley
Transportation Project

Figure I-6

Existing Conditions
Year 1996 Average Daily
Truck Traffic Volumes

No Scale

Updated crash data for the years 1995 through 1999 was obtained in October 2000. This data was analyzed to determine whether or not the crash patterns identified in the Needs Analysis were still the same. This analysis included comparing the locations of high crash rates, crash cluster areas, and the causes and types of crashes along the study area roadways.

There were nine more crashes during the 1995-1999 period (990 crashes) than during the 1990-1994 period (981 crashes). Table I-1 summarizes the distribution of crashes along study area roadways for the two five-year periods. Table I-1 shows that the distribution of crashes along study area roadways has not changed substantially between the last two five-year periods either for overall crashes or for fatal crashes.

TABLE I-1
CRASH LOCATION COMPARISON*

ROADWAY	1990-1994				1995-1999			
	TOTAL CRASHES	PERCENT	FATAL CRASHES	PERCENT	TOTAL CRASHES	PERCENT	FATAL CRASHES	PERCENT
US ROUTES 11/15	323	33	2	9	371	37	2	15
US ROUTE 11	91	10	2	9	64	7	3	23
US ROUTE 15	444	45	14	64	455	46	4	31
PA ROUTE 147	123	12	4	18	100	10	4	31
TOTAL	**981**	**100**	**22**	**100**	**990**	**100**	**13**	**100**

* Based on "reportable" crashes. Reportable means the crash involved a fatality or injury, or "property damage only" where at least one vehicle was damaged to the extent that towing was required.

There are also similarities in crashes that involve a truck. The number of crashes involving a truck in the previous crash study was 451, and the number of fatalities was 12. From 1995 through 1999, there were 483 crashes involving a truck, and 10 fatalities. Table I-2 compares the truck crashes between the two analysis periods.

It is important to note that nearly half (46% in 1990-1994 and 49% in 1995-1999) of the total number of accidents in the study area involved a truck. In the 1995-1999 period, all of the fatal accidents on US Routes 11/15 and PA Route 147 involved a truck.

The 1996 Needs Analysis reported that over 320 crashes within the five year study period (1990-1994) occurred on US Routes 11/15 in the Shamokin Dam area, which is a free access, urbanized section of roadway. On this short, 7.2-kilometer (4.5-mile) section of highway, numerous drive-

TABLE I-2
TRUCK CRASH SUMMARY

ROADWAY	1990-1994		1995-1999	
	CRASHES INVOLVING A TRUCK	FATAL TRUCK CRASHES	CRASHES INVOLVING A TRUCK	FATAL TRUCK CRASHES
US ROUTES 11/15	136	1	184	2
US ROUTE 11	43	2	29	2
US ROUTE 15	204	5	218	2
PA ROUTE 147	68	4	52	4
TOTAL	**451**	**12**	**483**	**10**

ways and traffic signals exist. In this free access urbanized section of the study area, 84% of the crashes occurred at or because of intersections and driveways. This high percentage represents the conflict among traffic patronizing businesses, local traffic, and traffic passing through the Needs Study Area because through traffic is accustomed to higher speeds and has trouble adjusting to the quick and frequent stops and starts of the local traffic.

The analysis of crash data from the five-year period 1995-1999 verified this situation. Six of the top ten crash cluster areas occur on this same portion of US Routes 11/15 in the Shamokin Dam area, which is free access. The crash types are also similar. Angle crashes, rear-end collisions, and hitting a fixed object collisions were the top three crash types for both five-year analysis periods.

The study area roadways were also compared to current design standards for major arterial highways for both rural and urban roadway areas. The goal is to maintain the roadway network to an acceptable level to meet the transportation needs. Accordingly, the roadways of the Central Susquehanna Valley have been improved over the years. However, there are design deficiencies that are becoming undesirable.

An analysis of the physical condition of the roadways in the transportation system indicated that US Route 15 has 28 horizontal curve locations and 44 vertical curve locations that do not meet current criteria. Most of these locations exist with an approximate 11.2 kilometers (7 mile) section of US Route 15 beginning just north of the US Routes 11 and 15 split at Tedd's Landing and extending north to the Lewisburg area. In this area, almost 3.2 kilometers (2 miles) of roadway were above the statewide average fatal crash rate.

On US Routes 11/15, access control is another key issue affecting the traffic carrying capacity of the roadway. A review of the number and types of crashes on the existing roadway system indicates that a number of the crash types occurring are rear-end collisions, angle collisions or side-swipes. These types of crashes can often be associated with conflicts between through and local traffic. The two distinct types of users (through trips and local trips) on US Routes 11/15 expect different access control. Local traffic desires unrestricted access to facilities and services along the corridor while through vehicles desire uninterrupted high speed traffic flow with little or no cross traffic. Due to the high usage and different types of roadway users, conflicts between through and local trips are prevalent. Regional and through traffic often does not expect traffic traveling in front of them to slow down to turn off the roadway, often resulting in rear-end accidents. A similar situation exists when vehicles turn onto a roadway and an angle accident results.

The free access nature of US Routes 11/15 creates multiple conflict points as vehicles turn off and onto the roadway, contributing to the high crash rate in the study area. Additionally, the mix of local and through traffic is an additional contributor to the crash situation in the study area. Therefore, the separation of through and local traffic is important not only to reduce congestion, but to improve safety.

In addition, another access control issue exists on the east side of the river. In Northumberland Borough, observations indicated that trucks had difficulty negotiating the intersection of US Route 11 (Water Street) and PA Route 147 (Duke Street) causing delays in excess of two minutes. These delays and the resulting vehicle queues limit access to PA Route 147 from many of the side streets and driveways lining the roadway. Again, the separation of through and local traffic is highlighted as an important issue.

An origin/destination (O/D) survey was conducted as part of the Needs Analysis to determine travel patterns. It identified that over 50% of the autos and over 90% of the trucks surveyed did not have an origin and destination within the Needs Study Area. In addition, 71% of the traffic in Northumberland, in the vicinity of the Blue Hill Bridge (US Route 11 Bridge over the Susquehanna River), did not have an origin and/or destination within the borough. With over half of all trips traveling entirely through or beyond the limits of the Central Susquehanna Valley, accommodating these through and regional trips is a key element of the project. The O/D survey also indicated that twice as many trucks use PA Route 147 as use US Route 15, due to the major truck generators located on the east side of the river in the Milton Industrial Park, such as BRT, Inc., Weis Markets Warehousing, ConAg (Chef Boyardee Company), Crest Homes, Leer Products, and Professional Truck Driver Service and Academy. The more severe topography of US Route 15 west of the river between Shamokin Dam and I-80 also encourages more trucks to use PA Route 147 over US Route 15. Travel through Northumberland represents the primary route for trucks to and from the south to the major truck generators to the north and east of Northumberland.

Over the past 20 years, the Central Susquehanna Valley has been a growth region in Pennsylvania. All indicators predict that this growth will continue to occur. Approximately 1,500 new housing units are in the approval process or under construction. Also in the development "pipeline" are 290 motel/hotel rooms and approximately 1.3 million square feet of commercial/office/industrial development, which will provide jobs for over 3,000 people. By the year 2020, almost 5,700 housing units are estimated to be built and approximately 9,300 new jobs are expected to be generated in the study area. This growth will lead to increased traffic.

Some of the local planning entities have realized the need to update their comprehensive plans to accommodate the projected growth. Snyder County recognized that their existing comprehensive plan, dated 1974, is out of date and has begun the process of completing an updated county-wide Comprehensive Plan. Union County completed a plan for their future development (the Union County Vision 21 Plan) in 1996. Improvements to Route 15, 45, and 192 are listed as important issues for Union County. Northumberland County does not have a Comprehensive Plan nor is any currently being developed.

The existing Comprehensive Plans in effect for a majority of the local municipalities were prepared in the mid 1980's and early 1990's (Monroe Township, Snyder County - 1986, Shamokin Dam Borough, Snyder County - 1984, Point Township, Northumberland County - 1985, West Chillisquaque Township, Northumberland County - 1992). Both Monroe Township's and Shamokin Dam Borough's Comprehensive Plans make references to improvements to US Routes 11/15 or the Shamokin Dam Bypass as ways to accommodate the anticipated growth. Among other techniques encouraged to accommodate future traffic growth, the West Chillisquaque Comprehensive Plan specifically addresses the completion of a new PA Route 147 connection to US Routes 11/15 on the west side of the Susquehanna River. However, there are no references to major improvements to PA Route 147 in the Point Township Plan. Union Township, Union County does not have a Comprehensive Plan in effect.

By the year 2020, traffic is anticipated to increase on US Routes 11/15 in Shamokin Dam Borough from 36,900 to 79,000 vehicles daily. Similarly, increases are expected on PA Route 147 which is anticipated to grow from 13,550 to 29,500 vehicles per day. On US Route 11, traffic is expected to double to 26,550 vehicles daily. Significant growth on US Route 15 is expected to increase volumes from 15, 950 to 44,500 vehicles per day.

During the morning and evening peak hours an additional 6,500 and 10,000 new trips, respectively, are anticipated. The major Needs Study Area roadways are expected to increase between 65% and 160% during the morning and evening peak hours.

Due to the high usage and conflict of through and local traffic, safety along this facility is a major concern.

Regarding the current traffic operations of the Needs Study Area roadways and intersections, all of PA Route 147, several intersections on US Routes 11/15, and the intersection of King and Water Streets in Northumberland operate at undesirable levels of service (LOS) during most of the afternoon and evening peak hours. LOS is a qualitative measure describing operational conditions within a traffic stream and the perception of the condition by motorists. Six levels of service (A-F) exist for certain types of facilities. The definitions of these different LOS can be found on Figure I-7. Generally, as the actual traffic volumes increase, the LOS decreases with LOS E indicating a facility near capacity and with LOS F indicating a facility that is over capacity. If only the developments that are approved or in the development process are built, undesirable levels of service will occur on US Route 15 in Lewisburg, most segments of US Routes 11/15, and all of the study area intersections in Northumberland Borough. Please refer to Figure I-7 (page I-20, 21) for the definitions of desirable and undesirable LOS. By the year 2020, 90% of the Needs Study Area roadways and intersections will operate at undesirable levels of service for most of the afternoon including the evening peak hour (see Figure I-7).

Currently, 35.73 lane-kilometers (22.2 lane-miles) of the 123.44 lane-kilometers (76.7 lane-miles) in the Needs Study Area operate at undesirable levels of service. This is expected to increase to 111.37 lane-kilometers (69.2 lane-miles) operating at undesirable levels of service by the year 2020.

The conclusion of the CSVT Needs Analysis indicates there is a need to reduce congestion, provide for future growth, and improve safety for the users of the roadway system through better accommodation of all traffic, with particular attention to trucks and through traffic, because of the following.

- Nearly all of the primary traffic routes in the Needs Study Area will be congested by the year 2020
- 9.66 kilometers (6 miles) of the Needs Study Area primary roadways currently exceed the statewide average crash rate
- 12.87 kilometers (8 miles) of the Needs Study Area primary roadways currently exceed the statewide average fatal crash rate
- 46% of the 981 crashes involved a truck
- High truck volumes and through traffic cause conflicts on study area roadways

D. PROJECT PURPOSE

Given the historical growth and development in this major transportation corridor in central Pennsylvania, PENNDOT is undertaking this project to accomplish the following.

1. Reduce current congestion on study area roadways.
2. Improve safety for the users of the roadway system through better accommodation of all traffic, with particular attention to trucks and through traffic.

3. Ensure sufficient capacity for the growth in population and employment that is expected for the study area.

E. CURRENT PROJECT STUDIES

As discussed in Section I.B, Project Background and History, the CSVT Project received authorization to proceed with an investigation of improvements to the roadway network in the Central Susquehanna Valley in 1994. In late 1994, a team of consultants was selected to perform traffic, engineering, and environmental studies. In late 1995 and 1996, a Needs Study was performed, including an Origin and Destination Survey. The documentation and conclusions of the Needs Study are presented in the PENNDOT report, Central Susquehanna Valley Transportation Project, S.R. 0015 Section 088, Needs Analysis, June 1996. The results of this study are summarized in Section I.C, Project Need.

In July of 1996 the project was presented at an Agency Coordination Meeting (ACM). These meetings are sponsored by PENNDOT, and they are held monthly with Federal and state environmental regulatory and review agencies, including the following.

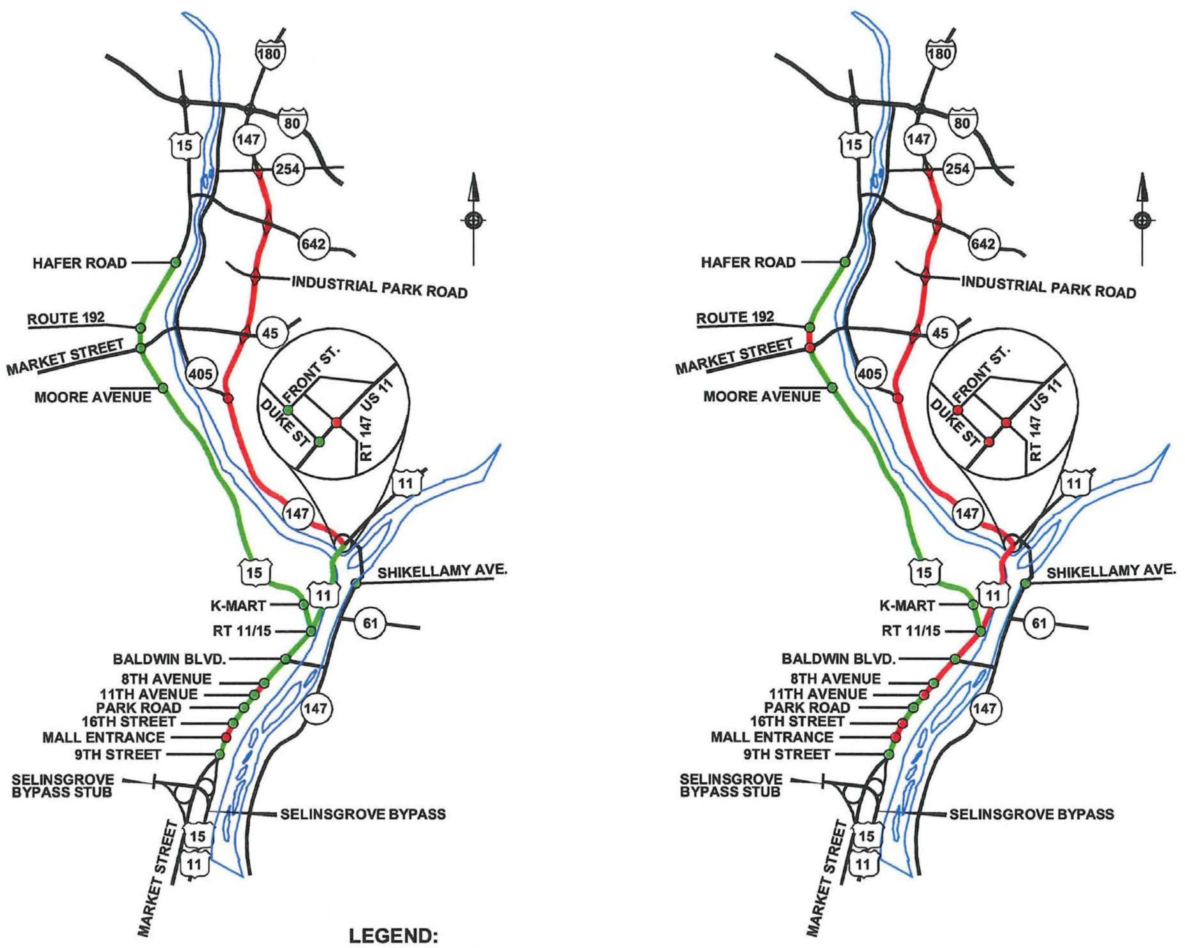
- Pennsylvania Department of Agriculture
- Pennsylvania Department of Environmental Protection
- Pennsylvania Fish and Boat Commission
- Pennsylvania Game Commission
- Pennsylvania Historical and Museum Commission
- Pennsylvania Department of Community and Economic Development
- US Army Corps of Engineers
- US Environmental Protection Agency
- US Fish and Wildlife Service

These meetings are a vehicle for interagency communication and cooperation. They provide a means to provide transportation project information and receive input on the project studies from the resource agencies through discussions and workshops.

Following the July 1996 ACM, the agencies concurred that there are existing transportation problems that need to be addressed for US Routes 11/15, US Route 15, US Route 11, and PA Route 147 from the Selinsgrove Bypass to I-80.

The current studies also include an extensive, ongoing public participation program to provide for continuous public input. The participation process has evolved around a series of meetings with the general public, local government officials, and special interest groups. Two special committees have also been formed as part of this public participation effort. A Citizens Advisory Committee (CAC)

EXISTING | **FUTURE (1996) WITH DEFINED DEVELOPMENT***



LEGEND:

- ROADWAY LINK
- o SIGNALIZED INTERSECTION
- DESIRABLE LEVELS OF SERVICE (LOS A-D***) RURAL AREAS = A-C; URBAN AREAS = A-D
- UNDESIRABLE LEVELS OF SERVICE (LOS E-F)

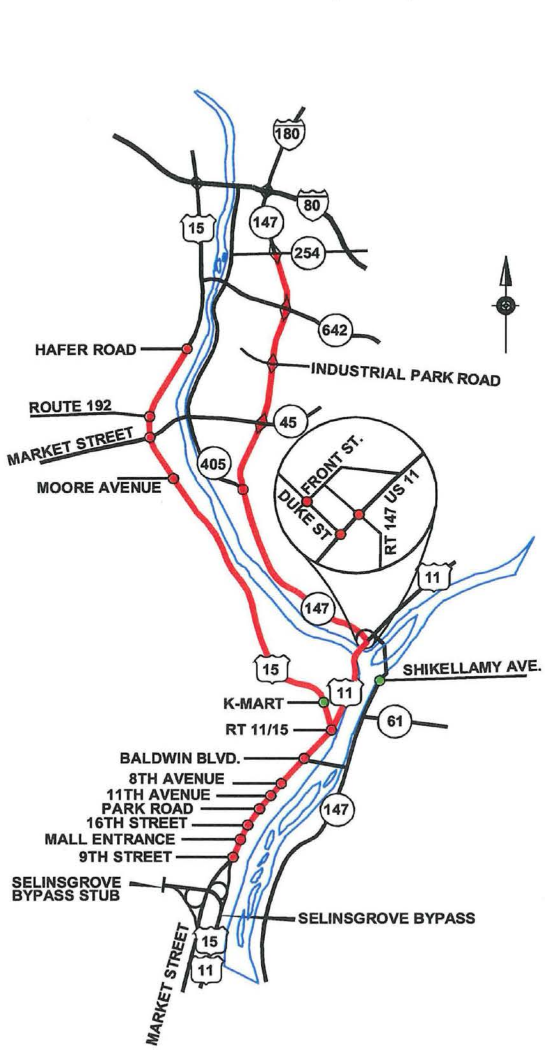
Level of Service 'A':**(*****)**
Represents free flow. Individual motorists are unaffected by the presence of other vehicles on the roadway. The individual can select speed and maneuver (pass a slower vehicle) without interference from other vehicles. At signalized and unsignalized intersections, average vehicle delays of between 0 and 5 seconds (0 and 10 seconds) are expected.

Level of Service 'B':**(*****)**
Represents slightly less freedom to maneuver. The presence of other motorists in the traffic stream is now noticeable, but desired speeds can still be selected freely and maneuverability is now impeded occasionally. At signalized intersections, delays of 5 to 15 seconds (10 to 20 seconds) are expected. At unsignalized intersections, average vehicle delays of 5 to 10 seconds (10 to 15 seconds) are expected.

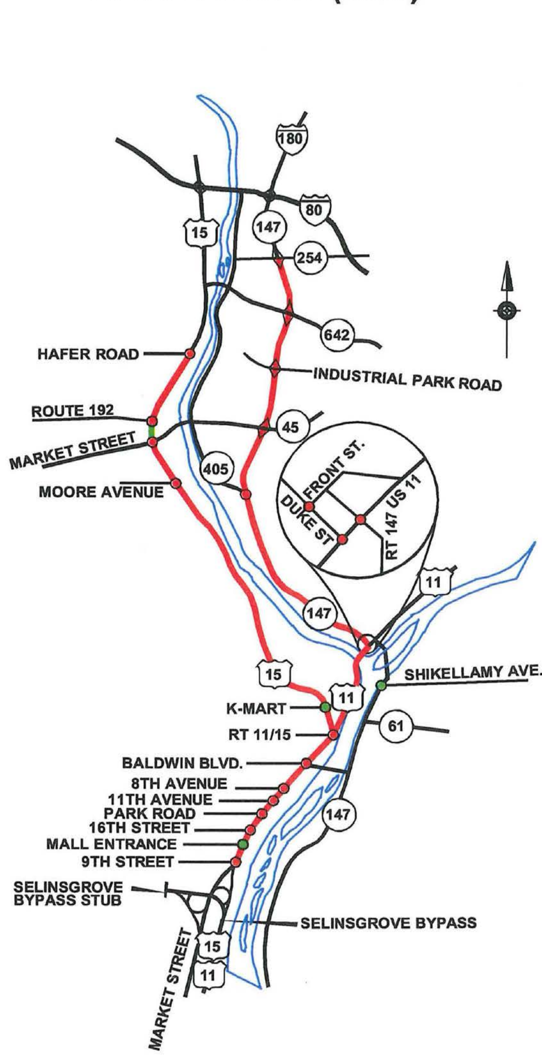
Level of Service 'C': **(*****)**
Represents stable flow. Motorists now become significantly affected by interactions with others in the traffic stream. The selection of speed is influenced by others and maneuverability is achieved through careful decisions. However, overall traffic flow is still relatively smooth. At signalized intersections, delays of 15 to 25 seconds (20 to 35 seconds) are expected, and at unsignalized intersections, average vehicle delays of 10 to 20 seconds (15 to 25 seconds) are expected.

Level of Service 'D': **(*****)**
Represents occasional unstable flow. Speed and freedom to maneuver are restricted. Any additional traffic causes operational problems at this level. Delays at signalized intersections range from 25 to 40 seconds (35 to 55 seconds). At unsignalized intersections, average vehicle delays of 20 to 30 seconds (25 to 35 seconds) are expected.

TOTAL FUTURE (2020)**



TOTAL FUTURE (2030)**



* Defined Development - development already under construction, approved or planned
Undefined Development - remainder of development needed to accommodate the projected growth in population and employment
** Defined and Undefined development included
*** Note level of service 'D' is undesirable in rural areas
**** Level of Service Defined In Transportation Research Board, 1994 Highway Capacity Manual (2020 Analysis)
***** Level of Service Defined In Transportation Research Board, 2000 Highway Capacity Manual (2030 Analysis)

Level of Service 'E': **(*****)**
Represents unstable flow. Breakdowns occur with increasing frequency. Operating conditions are at or near full capacity level. Speeds are typically reduced. Passing opportunities and gaps in traffic are infrequent. At signalized intersections, delays ranging from 40 to 60 seconds (55 to 80 seconds) are encountered. Delays at unsignalized intersections range from 30 to 45 seconds (35 to 50 seconds).

Level of Service 'F': **(*****)**
Also represents unstable flow. Traffic flow is normally forced or broken down. This condition exists when the amount of traffic approaching a section along the roadway exceeds the amount which can pass through it. Long queues form at such locations. Stop and go waves also form within the queue. In many cases, however, traffic downstream from the point of congestion operates adequately, but backups or delays occur for other upstream vehicles. At signalized intersections, delays in excess of 60 seconds (80 seconds) are encountered. At unsignalized intersections, average delays in excess of 45 seconds (50 seconds) can be expected.

Central Susquehanna Valley Transportation Project

Figure I-7

Current and Future Traffic Conditions
Level of Service (LOS) Comparison

0 2 4 6
Scale in Kilometers

0 1 2 3 4
Scale in Miles

and a Public Officials Work Group (POWG) were formed and include representatives from affected municipalities, planning organizations, economic development groups, Chambers of Commerce, and other citizens groups. Additionally, two special focus groups were formed as the project progressed. The CAC and POWG meetings, special focus group meetings, and Public Meetings serve as forums for direct exchange of information and to ensure the public's involvement in the project development process. This public involvement effort is described in more detail in Section V, Comments and Coordination. In addition, a chronological summary of events, including milestones and important meetings for the CSVT Project, is presented in Appendix K.

The Project Needs were presented publicly to the Public Officials and CAC in July 1996 and at a Public Meeting in November 1996.

The completion of the Needs Study in November of 1996 served as a springboard to begin the next phase of the project development process, the identification of preliminary (Phase I) alternatives to meet the Project Needs. This next phase of the process is discussed in detail in Section III, Alternatives.

1. Project Logical Termini

The completion of the Needs Analysis also served to define the logical termini for the CSVT Project. Logical termini are the rational end points for a proposed transportation improvement project and are the basis for the study area boundaries established for this EIS, discussed in Section I.A, Project Description. Logical termini can be identified through the concurrent assessment of the project needs and of known features (population centers, cross route locations, land uses, etc.) in the transportation corridor under study. Logical termini have been identified.

The southern terminus is the end of the existing Selinsgrove Bypass, where the existing US Routes 11/15 roadway changes from a four-lane, limited access expressway to a five-lane (four lanes with center turn lane) free access facility (see Figure I-2).

The northern project terminus was initially identified as the interchange between PA Route 147 and I-80 north of Milton (see Figure I-2). In this location, PA Route 147 widens from a two-lane, limited access facility on a four-lane right-of-way, to a four-lane, limited access roadway once it crosses I-80. In this location, north of I-80, PA Route 147 becomes I-180 and serves the Williamsport metropolitan area.

As a result of the Phase I (preliminary alternatives) analysis, the northern project terminus was revised to just south of the PA Route 147 and PA Route 45 Interchange (see Figure I-2). This subsequent revision to the northern project terminus occurred in October of 1997, because the Two on Four

Section of the project in the northern part of the study area was advanced as an independent project on its own merits as discussed in more detail in Section III, Alternatives. The Two on Four Section received environmental clearance in March of 1999. The Two on Four Section is currently under construction. Construction of the build out of the Two on Four Section from 2 to 4 lanes is scheduled to be completed in 2004.

2. Project Status

At this time, the CSVT Project is in the Final EIS stage of development. Project Scoping, Project Needs, Phase I, and Phase II studies have been completed. Detailed engineering and environmental studies have been completed, and extensive public and agency reviews have been conducted. A Draft EIS was circulated in February 2001 for public review and comment and a Public Hearing was held on March 12, 2001. Substantive comments received on the Draft EIS are considered and documented in this Final EIS.

The Draft EIS for this project presented a Recommended Preferred Alternative (DAMA in Section 1, RC5 in Section 2). At this time the FHWA is recommending a Preferred Alternative in this Final EIS. The Preferred Alternative is DAMA in Section 1 and RC5 in Section 2. This is a <u>recommendation</u> and should not be confused with the final <u>decision</u>. This recommendation is presented for public and agency consideration and review.

The public and the review agencies are afforded another opportunity to review this recommendation, and all aspects of the study, during the 30 day review period for the Final EIS. The project study team will consider all substantive comments received on this Final EIS. Once the FHWA is satisfied that all substantive comments on the Final EIS have been adequately considered, the FHWA will issue a Record of Decision (ROD). The ROD will determine the Selected Alternative. The Selected Alternative is advanced to final design and, eventually, to construction.

A Public Hearing was held on March 12, 2001, to allow members of the public to present testimony related to the CSVT Project. Individuals were afforded the opportunity to present public oral testimony, private oral testimony, and/or written testimony. Written comments were also solicited from agencies and the public during the Draft EIS comment period which lasted from February 9, 2001, to March 26, 2001. All testimony and comments are contained in Section V of this Final EIS. Responses to comments are documented adjacent to copies of testimony and comment letters.

3. Updated Traffic Studies

To address comments received on the Draft EIS and to determine when a third lane was needed (in each direction), additional traffic studies were conducted in 2001 for the entire CSVT study area. In addition, to be consistent with FHWA policy to design projects based on a 20-year traffic projection from the time of construction, traffic volumes were developed for year 2030.

New traffic counts were taken in July 2001. The 2001 existing traffic volumes for the system are on average 20 percent greater than the traffic volumes that were counted in 1995. This equates to a 3 percent annual increase. Between the years of 1995 and 2020, the traffic volumes were projected to increase at a much greater rate. The previous traffic projections for design year 2020 showed that the traffic volumes were expected to grow 133 percent over the 25 years (1995-2020). This equates to a 5% annual increase. The year 2000 census data showed that the population and the resulting development did not increase as greatly as originally anticipated.

Population growth and traffic volume increases are not directly proportional. Even though population growth slowed, traffic continued to increase at a slightly slower rate because employment continued to increase as projected in the Draft EIS, and through traffic increased faster than projected in the Draft EIS (1.5% per year as opposed to 1% per year). As a result, traffic is now expected to grow at approximately a 4% annual rate between 1995 and 2030. This means that the 2030 projected traffic volumes are approximately 13% higher than those projected for 2020, resulting in traffic volumes approximately 120% greater than they were in 2001. Thus, the need for the separation of through and local traffic, especially truck traffic, and the need for improvements to the current transportation network still exists.

The change in the design year and the 2030 traffic projections are discussed in detail in Section IV.M - Traffic and Transportation Network.

II. Affected Environment

II. AFFECTED ENVIRONMENT

> More detailed information pertaining to the Affected Environment can be found in the Technical Support Data. An index of the Technical Support Data can be found in Section IX, Appendix A.

The affected environment section of the Final EIS provides a concise overview of the existing environmental conditions within the project study area and the study methods used to identify critical environmental features. Detailed information concerning environmental features within the project study area is contained within the Technical Files and Memoranda associated with each individual environmental topic area. An index of the Technical Files and Memoranda is contained in Section IX, Appendix A. The Technical Files and Memoranda are available for public review during the comment period.

A. GENERAL DESCRIPTION OF THE PROJECT STUDY AREA

The Central Susquehanna Valley is situated in the central part of Pennsylvania where the West Branch and North Branch of the Susquehanna River merge to form the main stem Susquehanna River. The study area for the Central Susquehanna Valley Transportation project extends from Selinsgrove northward for approximately 16 kilometers (10 miles) to West Chillisquaque Township in Northumberland County. The study area is composed of parts of Snyder, Union, and Northumberland Counties, Pennsylvania (see Figure I-1).

The study area lies within the Appalachian Mountain Section of the Ridge and Valley physiographic province, which is characterized by long, continuous, high-crested ridges separated by narrow, intervening valleys. The Central Susquehanna Valley is located in the heart of the widest portion of the Ridge and Valley Province, an expanse of approximately 128.75 kilometers (80 miles) along the Susquehanna River Basin between Williamsport and Harrisburg, in central Pennsylvania. Within the study area the linear ridges and valleys generally trend west to east and are cross-cut by the north-south path of the Susquehanna and West Branch Susquehanna Rivers. The major stream tributaries to the rivers gather the waters from the flanks of the ridges and wind through the linear east-west valley bottoms to join the Susquehanna River on its way southward. Differential erosion of the resistant sandstones and dolomites versus the less resistant limestones and shales has created a topography of rolling (sometimes karstic) valley floors and high, steep-sided and knife-edged mountains. More gently sloping terrain is found in the low lying areas associated with the river floodplain and terraces, or along the major tributary streams.

The Susquehanna Valley region exhibits an active prehistoric record spanning the last ten thousand years, from Paleoindian to European Contact. Throughout the Paleoindian Period (12,000-8,000 B.C.) and the Archaic Period (8,000-1,000 B.C.), inhabitants survived exclusively through hunting and gathering of wild resources. Within the study area, these hunter/gatherers would typically set up base camps in the floodplain and terrace areas along the Susquehanna River, where they would dwell temporarily. A shift in activities toward agricultural subsistence occurred during the Woodland Period (1,000 B.C.-A.D. 1700). Evidence connected to settlement patterns indicates that inhabitants eventually began to occupy areas in more concentrated population groups for longer periods of time. Villages began developing near or within areas of high fertility soils in lowlands during the Late Woodland Period (A.D. 1000-1700).

Although Europeans began arriving in the Susquehanna Valley in the early to mid-1700's, conflicts with area Indian tribes kept European habitation sparse until well after the American Revolution. After the war the atmosphere of the region became more stable, and soldiers claiming land grants followed by others seeking property began to settle in the area. Population growth was steady into the 1800's, and the transition from a subsistence agriculture based existence to a cash and trade based economy spurred the development of a primitive transportation system which allowed merchants to obtain supplies needed by pioneers. Development of early roads and ferries encouraged the establishment of local inns and taverns in the areas near stores and trading posts, thereby forming the nucleus around which the towns of Lewisburg, Northumberland, Selinsgrove, and Sunbury developed.

Growth flourished in the Central Susquehanna Valley during the mid-1800's with the advent of the canals, used for transporting goods on a national scale by way of major rivers. Urban development in the study area was concentrated along the river, and the cash based economy was in full swing. Although agriculture remained important, farming activities mainly focused on export for profit rather than subsistence. The late-1800's saw the construction and development of the railroads, which spawned erratic growth patterns in the area. Urban development along the river was reinforced at major railroad junctions, because tracks were often laid along or near the old canal beds. Remnants of the canal system and railroads remain as distinctive features of the study area even today.

The introduction of the automobile in the early 1900's preceded a major shift in the character of the study area. Major population centers began to disperse as people began relying heavily on automotive transportation in the second half of the twentieth century. By the early 1970's over half of the residents in the region of Northumberland, Union, Snyder, Columbia, and Montour Counties lived in rural areas. Modern suburban residential developments continue to be constructed throughout the once predominantly rural hillsides and valleys to the east and west of the river floodplains. Through the 1970's, the section of US Routes 11/15 through the Shamokin Dam area developed into a heavily traveled commercial area, with businesses lining both sides of the highway. With the opening of the

Susquehanna Valley Mall in 1978 serving as an additional catalyst for further development, the so-called "Golden Strip" was born. The "Golden Strip" now serves as the new Main Street of the Central Susquehanna Valley. Many of the local roadways are lined with single family homes and businesses.

Residential and commercial growth within the communities in and surrounding the project study area has been inseparably linked to the development of the transportation system throughout the area. Together these factors have contributed significantly to shaping the landscape patterns which exist in the project study area today. Currently, the Central Susquehanna Valley Transportation project area is a mosaic of vast expanses of farmland intermixed with patches of forest land, old fields, residential, commercial, and industrial developed areas, wetlands, streams, and rivers. Figures II-1 and II-2 graphically illustrate the current land use and landscape patterns of the project study area.

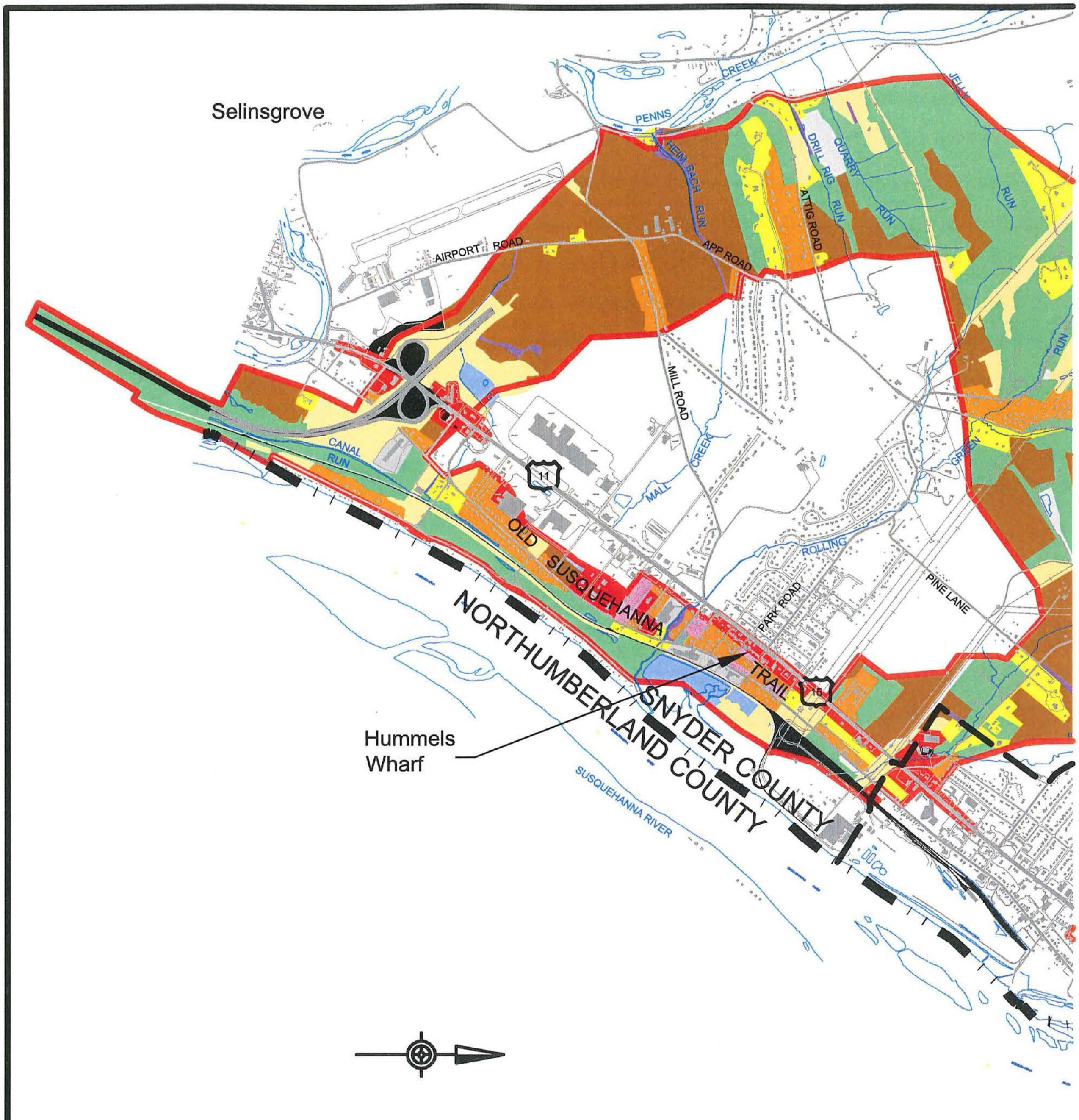
B. OVERVIEW OF THE ENVIRONMENTAL STUDY PROCESS

Under guidelines established by numerous state and Federal laws [including the National Environmental Policy Act (NEPA) and PA Act 120], environmental studies conducted for transportation projects are generally completed in two distinct phases. These two phases are referred to as Phase I and Phase II. The alternatives are narrowed during Phase I, and those alternatives that are carried forward into Phase II are studied in detail.

Phase I Study - is an evaluation of preliminary alternatives based primarily on existing or secondary environmental data. The purpose of this evaluation is to narrow the field of preliminary alternatives to a reasonable range of feasible alternatives for detailed study in Phase II. The results of the Phase I studies are documented in the "Phase I Alternatives Analysis" (October 1997) .

Phase II Study - is an evaluation of the feasible alternatives identified during the Phase I studies based on detailed environmental data collected through field surveys. The purpose of this evaluation is to examine, in detail, the most reasonable preliminary alternatives and to recommend a "preferred" alternative, if one clearly exists. The "preferred" alternative is the alternative that PENNDOT is initially recommending to the FHWA to be built. This recommendation is not "final" until after the Final Environmental Impact Statement (FEIS) and the FHWA Record of Decision (ROD). The results of the Phase II Studies are documented in the Draft EIS and Final EIS.

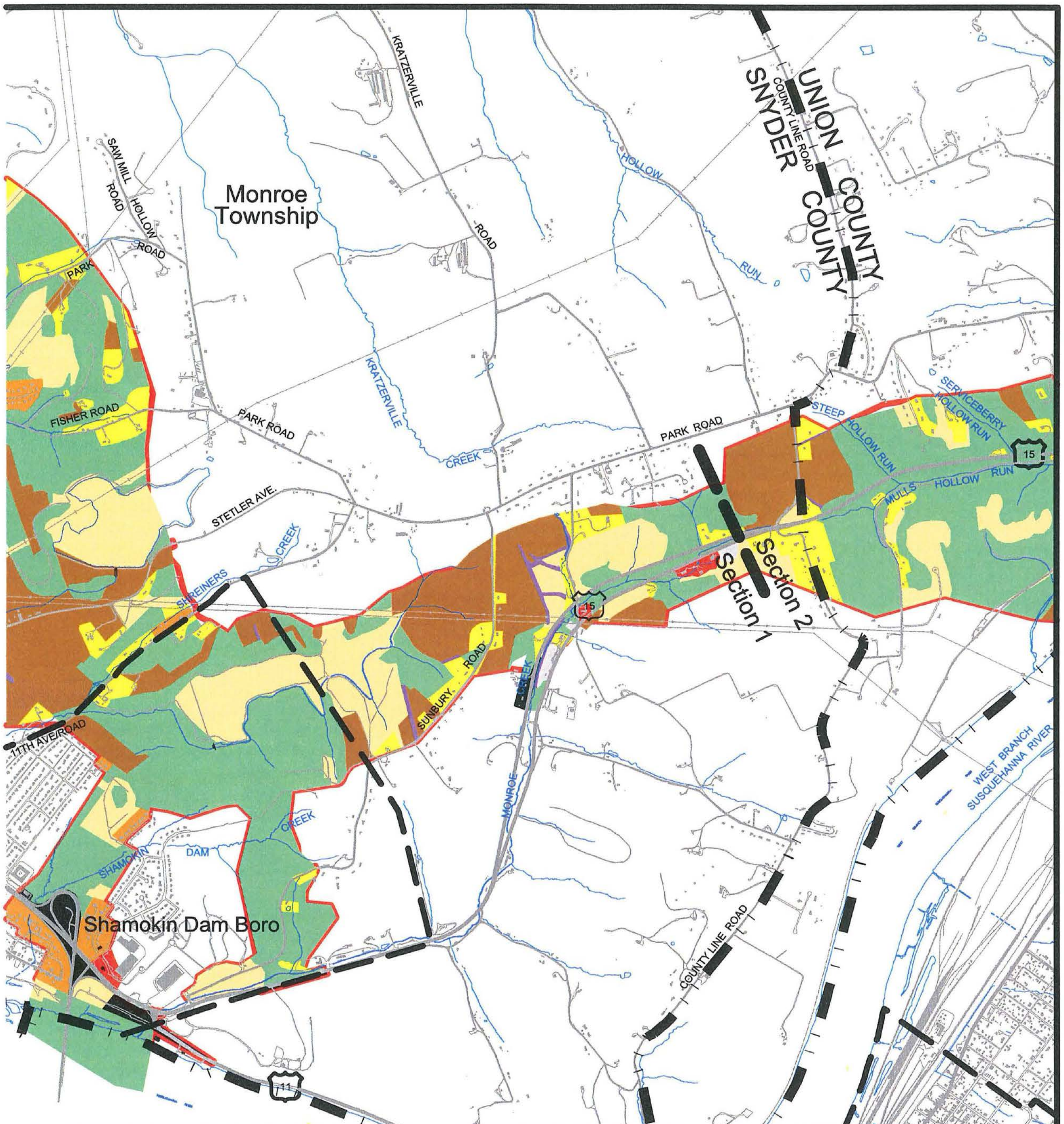
The environmental studies conducted as part of the Transportation Planning Process include a wide range of social, economic, cultural, and natural resource topic areas. The following specific environmental topic areas were investigated as part of the environmental studies associated with the Central Susquehanna Valley Transportation Project.



Note: White areas are outside the defined Study Corridor Boundaries

Legend

Agriculture	Hedgerow
Forested Land	Wetland
Old Field	Industrial
Low Density Residential	Barren (primarily unvegetated)
Medium Density Residential	Other
High Density Residential	Study Corridor Boundary
Commercial	



Central Susquehanna Valley Transportation Project

Figure II-1

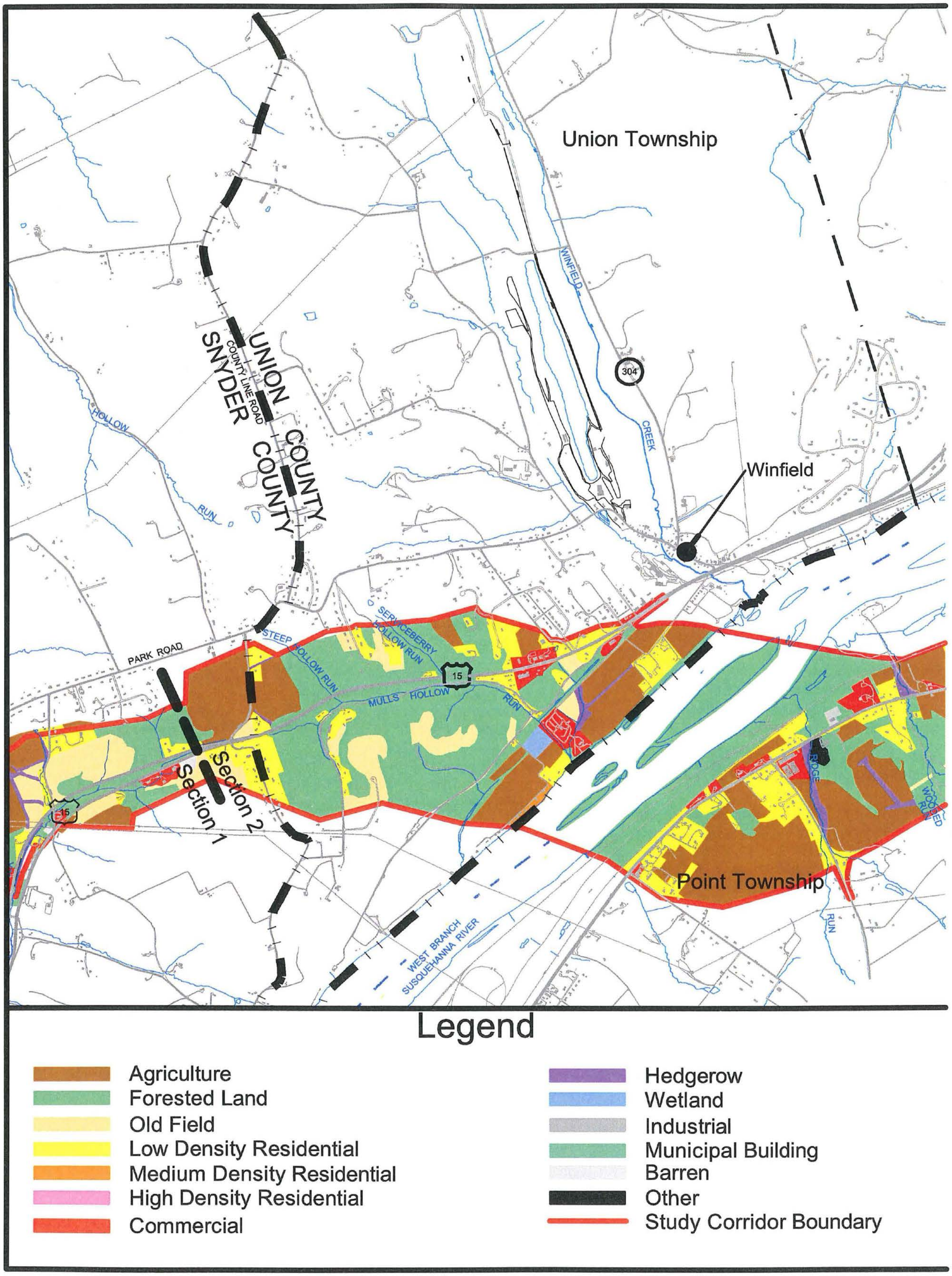
Phase II Study Area
Section 1-Land Use

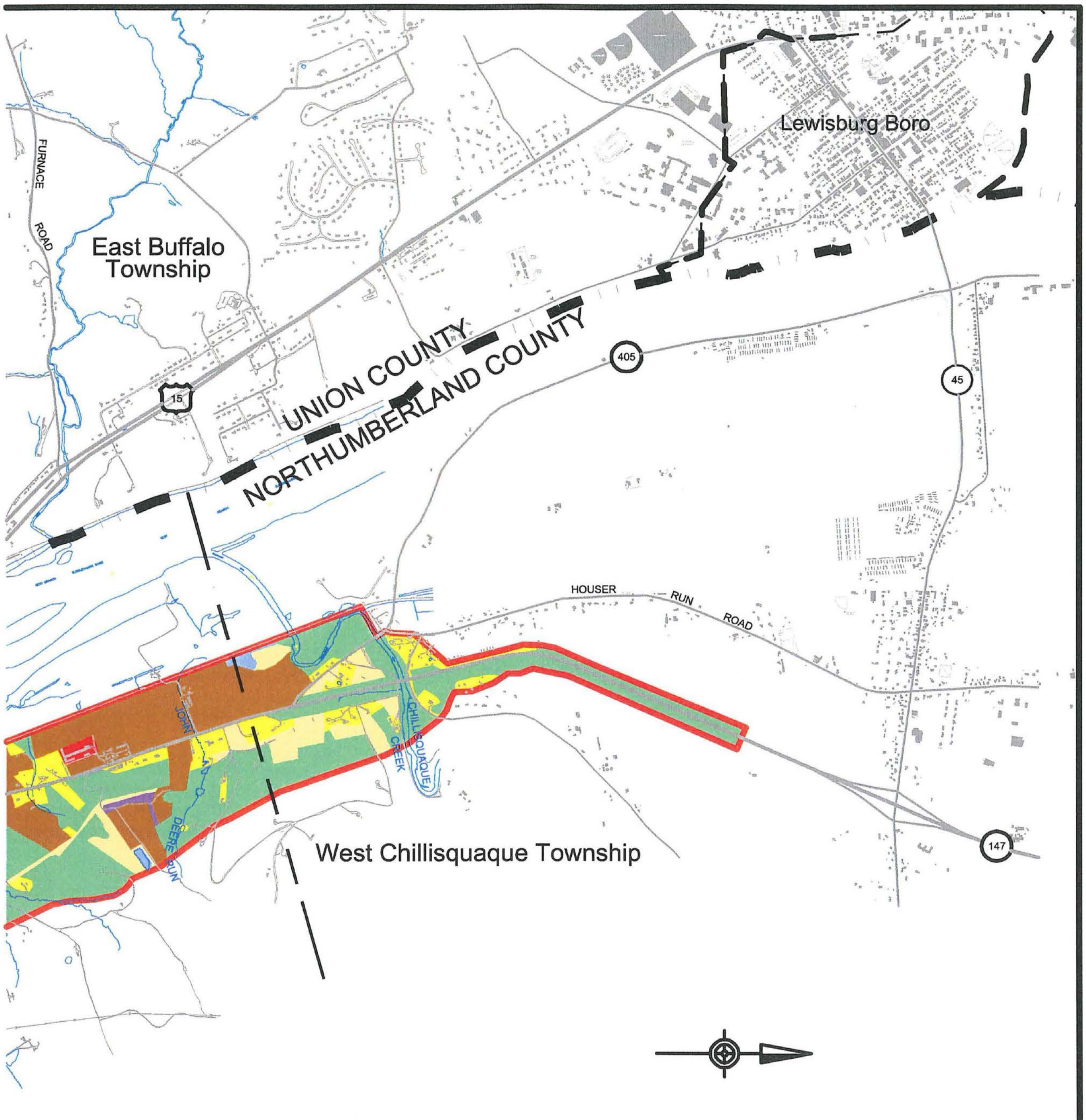
0	300	600	900

Scale in Meters

0	1250	2500	3750

Scale in Feet


Union Township
UNION COUNTY
SNYDER COUNTY
COUNTY LINE ROAD
Winfield
304
WINFIELD
CREEK
HOLLOW
RUN
PARK ROAD
STEEP HOLLOW RUN
SERVICEBERRY HOLLOW RUN
MULLS HOLLOW
RUN
15
Section 1
Section 2
RIDGE
WOODED RUN
Point Township
RUN
WEST BRANCH SUSQUEHANNA RIVER
Legend
Agriculture
Forested Land
Old Field
Low Density Residential
Medium Density Residential
High Density Residential
Commercial
Hedgerow
Wetland
Industrial
Municipal Building
Barren
Other
Study Corridor Boundary



Note: White areas are outside the defined Study Corridor Boundaries

Central Susquehanna Valley Transportation Project

Figure II-2

Phase II Study Area
Section 2-Land Use

0 300 600 900 Scale in Meters

0 1250 2500 3750 Scale in Feet

1. Land Use Patterns
2. Community and Social Resources
3. Economic Resources
4. Noise
5. Air Quality
6. Vegetation and Wildlife Habitat
7. Threatened and Endangered Species
8. Visual Resources
9. Wetlands (Swamps, Marshes, Meadows)
10. Surface Waters and Aquatic Resources (Rivers, Streams, Ponds, Lakes)
11. Public and Private Water Supplies
12. Floodplains and Potential Flood Hazards
13. Hazardous and Sensitive Waste Sites (Dumps, Salvage Yards, Asbestos, Underground Storage Tanks)
14. Farmlands and Agribusiness
15. Energy Analysis
16. Parks, State Forest, Game Lands, Wildlife Management Areas, and Wildlife Refuges
17. Geologic Formations and Soils
18. Cultural Resources (Historic Sites and Archaeological Areas)
19. Secondary and Cumulative Impacts

The study methods of the environmental investigation associated with each of these areas are overviewed in Table II-1 and discussed in detail in the appropriate Technical File and Summary Memorandum. An index of these files and memoranda is contained within Section IX, Appendix A.

TABLE II-1
CENTRAL SUSQUEHANNA VALLEY TRANSPORTATION PROJECT
OVERVIEW OF PHASE I AND PHASE II
ENVIRONMENTAL STUDIES

AREA OF STUDY		LEVEL OF STUDY	
		PHASE I METHODOLOGY	PHASE II METHODOLOGY
Land Use Patterns		Land use was documented through tax records and aerial photographs. Preliminary land cover map created.	Maps and information were updated from field surveys and interviews with community officials and business persons.
Community and Social Resources			
a)	Population and Housing	Review of U.S. Census data was conducted to determine population statistics.	Population projections were calculated by consultants using long-term historic growth trends and modified based on presence of changing industrial and commercial projects. Displacements were determined for houses within the cut / fill lines of alternatives.
b)	Community Cohesion	Review of tax maps, and limited field reconnaissance were conducted to locate community resources.	Field views and interviews with community leaders and local residents were conducted to determine the locations and boundaries of distinct communities and neighborhoods in the project study area.
c)	Community Facilities and Services	Review of tax maps, and limited field reconnaissance were conducted to locate community resources.	Field views, and interviews with community leaders were conducted to identify all community facilities and services.
d)	Environmental Justice	Review of U.S. Census data was conducted to determine presence of low income and minority populations in the study area.	Review of more detailed census data and field reconnaissance was completed to more accurately identify low income concentrations in the project area. Extensive coordination was held in areas with concentrated displacements.
Economic Resources			
a)	Business Resources	Economic conditions for the region were evaluated from employment data obtained from local planning commissions and chambers of commerce. Local employment data was extrapolated from tax records. Employment projections were calculated and reviewed with local agencies. Businesses located in project study area were identified through field views.	Business displacements were identified through detailed field views. Inventory of businesses was compiled for a mail survey (December 1998). Impacts to existing businesses resulting from bypass were analyzed.
b)	Tax Base Resources	Property tax rates and area property values were obtained from local taxing bodies.	Property tax losses were calculated for each alternative using actual tax rates and percent take of each affected parcel. Projected tax losses were compared to annual property tax revenues.
Noise		Sensitive Receptors were identified through field investigation.	Monitoring was conducted for existing conditions. Modeling of alignments and existing roadway network was conducted using FHWA STAMINA 2.0 / OPTIMA Traffic Noise Model. Impacts were calculated by alternative.
Air Quality		Sensitive Receptors were identified through field investigation.	Modeling of alignments and existing roadway network was conducted using CAL3QHC and Mobile 5a computer programs.

TABLE II-1
(CONTINUED)

AREA OF STUDY	LEVEL OF STUDY	
	PHASE I METHODOLOGY	PHASE II METHODOLOGY
Vegetation and Wildlife Habitat	A review was conducted of existing documents related to land cover/land use, ecological communities, and habitat distribution and classification. Aerial photographs were reviewed to identify main habitat types and preliminary maps were created.	Detailed field investigations were conducted (May -October 1998). Descriptive information related to vegetative cover, vegetative and wildlife species, and human disturbance were recorded, and the extent of the communities was verified to update the mapping. Data forms were completed for all compartments. Terrestrial community mapping was completed and used to identify landscape features important for wildlife habitat. Terrestrial community and landscape feature information was evaluated by biologists to assign areas to wildlife habitat classification categories. Impacts to terrestrial communities, landscape features, and wildlife habitat classification categories were assessed for the alternatives using Geographic Information Systems (GIS). Agency coordination was ongoing throughout the process.
Threatened and Endangered Species	The potential presence of threatened and endangered species was determined through coordination with state and federal agencies. A review of the Pennsylvania Natural Diversity Index (PNDI) database was conducted and correspondence was filed with the PGC, PFBC, and US FWS. Initial correspondence began in December 1995, and agencies were contacted yearly for updates until May 1999.	Preferred habitat characteristics for species of concern were researched and confirmed with resource agencies and biologists knowledgeable about the particular species. Field surveys were conducted through 1998 and 1999 by qualified biologists for wildlife and vegetative species habitat. Detailed information was recorded for areas with potential for preferred habitat. Selected areas throughout the project area will be revisited in 2000.
Visual Resources	The general visual character of the project study area was observed through field investigations.	Visual resources and viewer groups were identified, and viewscapes were evaluated for each alternative. A detailed assessment of the potential impacts to residents and travelers within the project study area was conducted. The assessment included simulated views of affected areas which show the alternatives and possible mitigation options.
Wetlands	Review of aerial photographs, US NRCS soil surveys, US FWS National Wetlands Inventory (NWI) maps was conducted to determine known wetland areas. Limited field investigation was conducted.	Detailed field investigation was conducted to identify and delineate wetlands within the study corridors of the alternatives. Field investigation was completed in accordance with the procedures detailed in the US ACOE 1987 manual. Wetlands were surveyed using Global Positioning Systems (GPS) and wetland locations were mapped. Potential impacts were analyzed using GIS.
Surface Waters and Aquatic Resources	USGS maps, US FWS NWI maps, US ACOE List of Navigable Waterways, US DOI Nationwide Rivers Inventory, and historic Susquehanna River Basin Commission resource reports, and documentation were made available by state agencies. PFBC, PA DEP Bureau of Water Quality Management (water quality data and protected water use regulations), PA DCNR (Scenic Rivers Program information).	Field investigations were conducted in 1998 and 1999 to assess water chemistry, physical habitat conditions, and fish and macroinvertebrate communities for streams not documented in existing reports. Classification system was developed based on flow, quality of macroinvertebrate habitat, and drainage area. Impacts to surface water resources were calculated for alternatives.

TABLE II-1
(CONTINUED)

AREA OF STUDY	LEVEL OF STUDY	
	PHASE I METHODOLOGY	PHASE II METHODOLOGY
Public and Private Water Supplies	Groundwater patterns for the project study area were researched from existing literature. Consultation of secondary source data was conducted. Data was collected from the PA DEP and PA DCNR files, and from municipality officials and utility companies.	GIS techniques were used to graphically present the areal distribution of private and public water supplies. Impacts were calculated for alternatives.
Floodplains and Potential Flood Hazards	Copies of Federal Emergency Management Agency (FEMA) Flood Insurance Studies, Flood Insurance Rate Maps, and Flood Hazard Boundary Maps were obtained for all municipalities in the project study area. The maps were used to locate floodplains and floodways along the waterways in the study area.	Technical backup data for the FEMA studies was purchased for available waterways to more accurately estimate the effect of potential floodplain encroachments. Backup data, which is in the HEC-2 format was imported into HEC-RAS, analyzed, and used to estimate the effects on the floodplain.
Hazardous and Sensitive Waste Sites	A Preliminary Area Reconnaissance (PAR) was conducted in 1995 and early 1996 to evaluate the potential presence of hazardous or other environmentally sensitive materials in the project area. The PAR included background research of state and federal environmental files, aerial photographs, and correspondence with state and local agencies. A windshield survey was conducted to identify potential areas of concern. Areas which warranted further study were recorded.	An Initial Site Assessment (ISA) was conducted in 1998. The ISA included a more detailed review of existing files, maps, and photographs. Detailed field reconnaissance was conducted for possible areas of concern, and a report was prepared (January 1999). A Preliminary Site Investigation (PSI) was conducted in early 1999 for sites requiring further characterization. The PSI included groundwater sampling and a geophysical investigation, in addition to more detailed investigation of historic site data.
Farmlands and Agribusiness	Farmlands in the project study area were identified using aerial photographs and limited field investigation. Secondary sources were consulted including Union, Snyder, and Northumberland County soil surveys and Farm Services Agency Crop Reports.	Tax records were consulted to verify parcel boundaries, property owners names and addresses. Meetings with property owners were held to verify agricultural uses and extent of farmland on properties within the alternatives. Farmers / property owners were interviewed to compile information related to protection status. Mapping was created to reflect Federal Farmland Protection Policy Act (FPPA) farmland and Productive Agricultural Land, and impacts were calculated using GIS.
Energy Analysis	N/A	Energy usage estimates were calculated for the entire roadway system using CORSIM, a micro-simulation software package developed by the FHWA. CORSIM generated measures of effectiveness; one of the things measured was fuel consumption. Fuel consumption was calculated for all individual vehicles (autos and trucks) in the system and summed for each roadway segment.
Parks, State Forest, Gamelands, Wildlife Management Areas, and Wildlife Refuges	Review of US Geological Survey (USGS) maps, aerial photographs, tax maps, and limited field reconnaissance was conducted to locate public parks, gamelands, and wildlife areas. Background information was obtained from PA DCNR regarding forest lands in state or federal programs as well as habitats designated for the protection of wildlife.	Coordination with municipal officials was completed to more accurately identify the locations and boundaries of public parks. The locations of these parks were then analyzed in comparison to all project alternatives.

TABLE II-1
(CONTINUED)

AREA OF STUDY		LEVEL OF STUDY	
		PHASE I METHODOLOGY	**PHASE II METHODOLOGY**
Geologic Formations and Soils		Soil surveys for Union, Snyder, and Northumberland Counties were reviewed to identify soil types and major soil associations. Information was compiled on the underlying geology of the project study area from the USGS, PA DCNR, PA Topographic and Geologic Survey, PA DEP, and US Department of Agriculture, NRCS. Aerial photographs were reviewed.	Problematic geological areas , including potential sinkhole areas, were identified within the alternatives. Sinkhole formation information was obtained from the PA Topographic and Geologic Survey, Eastern Industries, Inc., and the Point Township Municipal Authority. Limited field investigations were conducted to locate sinkhole features. Recommendations were made regarding possible construction in these areas.
Cultural Resources			
a)	Historic Resources	As part of a historic resource survey performed in accordance with Pennsylvania Historical and Museum Commission (PHMC), acting as the State Historic Preservation Officer (SHPO), published guidelines, background information regarding historic structures was compiled from previously filed Pennsylvania Historic Resource Survey forms, PHMC files, local survey files maintained by the county planning commissions, archived material and maps from public, university, and government libraries. Researched information was used to develop historic themes which would be used as a basis for presentation of historic information. A windshield survey of the project study area was conducted to verify the identification of potentially historic resources (February, March 1996). During this survey resources were photographed. Results of windshield surveys were tabulated and evaluated for correspondence with established historic themes. Individual resources were analyzed. A Historic Contexts and Summary Report was prepared and circulated (January 1997). Recommendations were made regarding eligibility for the National Register of Historic Places (NRHP).	An historic resources survey was undertaken and circulated that evaluated the historical and architectural significance of 258 properties according to National Register (NR) criteria. The results were presented in a Historic Resources Survey and Determination of Eligibility Report (September 1998) and Addendums (June, August 1999). Through report review and ongoing coordination with the PHMC, the project team determined there are 24 resources in the study area determined eligible for the NRHP.
b)	Archeological Resources	Background research was conducted on the cultural history of the area. Secondary source data was researched at the PHMC (Harrisburg). A computer generated database for archaeological sites on the PA quads was provided by the PHMC. PASS forms were reviewed for selected sites. A literature search of published information pertaining to prehistoric cultural remains was conducted.	A more detailed review of PASS forms was conducted, as related to areas in the alternatives. A predictive model for the project study area was created using GIS. A draft report discussing the predictive model was prepared and circulated in November 1998 (finalized August 1999). The model utilizes a combination of inductive (known site data) and deductive (archaeological theory) methods, including statistical analyses, and maps the potential for prehistoric site locations within the project study area. In addition, preliminary geomorphological investigations were undertaken from July of 1998 through October 1999. These investigations focused on the floodplain settings of the Susquehanna River at Hummels Wharf, Snyder County and at the crossings from the Winfield area, Union County across the West Branch of the Susquehanna River to SR 147 north of Northumberland in Northumberland County. The investigations included the excavation of backhoe trenches, reconnaissance studies, the archaeological excavation of test units and shovel test pits, and the drilling of sediment cores. The results are documented in a Geomorphological Studies document dated November 1999.

TABLE II-1
(CONTINUED)

AREA OF STUDY		LEVEL OF STUDY	
		PHASE I METHODOLOGY	PHASE II METHODOLOGY
Secondary and Cumulative Impacts			
a)	Secondary Development	General land use patterns were identified at preliminary interchanges and project termini.	Plans for proposed interchanges were examined, and areas determined to be prone to increased growth potential were analyzed with respect to environmental constraints, zoning, and infrastructure availability. Potential impacts to key resources were identified by comparing unconstrained land areas close to interchanges to projected development demand.
b)	Cumulative Impacts	Current patterns in land use, zoning, and water and sewer service throughout the project area were studied.	Following the secondary impact methodology, cumulative impacts were assessed by identifying areas where actions by others were necessary to facilitate development.

III. Alternatives

III. ALTERNATIVES

More detailed information pertaining to Alternatives can be found in the Technical Support Data. The Technical Support Data index can be found in Section IX, Appendix A.

This section of the Final EIS documents the development of alternatives for the CSVT Project. This section is divided into several subsections that trace the major evolutionary events that resulted in the set of alternatives that were evaluated in both the Draft EIS and Final EIS. Detailed engineering and environmental information and analysis is contained within the project Technical Files (Appendix A).

The National Environmental Policy Act (NEPA) requires the development and evaluation of all reasonable alternatives as part of the environmental impact statement process for a major transportation project. In accordance with NEPA, PENNDOT's Transportation Project Development Process includes a systematic, two-phased approach to implement this regulatory requirement and develop alternatives. In Phase I, a wide range of preliminary alternatives are examined, some of which may be dismissed from further study while others are recommended for additional study. In Phase II, a smaller set of alternatives is further evaluated in detail. During both phases, alternatives are evaluated for effectiveness in satisfying the project needs, engineering feasibility, and sensitivity to the environment.

The following sections overview the alternatives development process for the CSVT Project, which began in the Fall of 1996 and extended through June of 2002. The alternatives development process involved an extensive level of public and agency involvement. The affected public and regulatory agencies were involved in the development of preliminary alternatives, the identification of preliminary alternatives for detailed analysis, the identification of alternatives for examination in the Draft EIS, proposed modifications to the Draft EIS Alternatives, and the identification of the set of alternatives examined in this Final EIS. Table III-1 overviews the alternatives development process and graphically illustrates major activities associated with the alternatives development.

A. DEVELOPMENT OF PRELIMINARY ALTERNATIVES

The preliminary alternatives development process generally consists of the following steps.

- Identify objectives to meet needs
- Establish the limits of the project study area
- Identify environmental and engineering constraints within the project study area

TABLE III-1
ALTERNATIVES DEVELOPMENT AND EVALUATION

Identified project needs based on the existence of problems in the CSVT study area

Project Needs Identified

ASSESS ENVIRONMENT

Established project area boundaries. Conducted Engineering and Environmental Overview to define important features and resources

Identified Environmental Constraints

- Compiled information from existing sources, field investigations and data analyses

DEVELOP ALTERNATIVES

Considered a range of reasonable alternatives

NO-BUILD ALTERNATIVE

TSM/UPGRADE ALTERNATIVES

New Alignment Alternatives

- A
- B
- C
- D
- E
- F
- G
- BA
- BE
- DA

- 61 Connector
- 15 Connector

- River Crossing (RC) 1
- RC2
- RC3
- RCD

2 on 4 Section

- Build out of PA Route 147 from 2 to 4 lanes from PA Route 147/PA Route 45 Interchange to I-80

PUBLIC AND AGENCY INVOLVEMENT

7/16/96 - PO*
7/22/96 - CAC*
7/24/96 - ACM*

10/28/96 - CAC
10/29/96 - POWG*
11/7/96 - PM #1*
12/4/96 - ACM

1/28/97 - POWG
1/30/97 - CAC
3/24/97 - CAC
3/25/97 - POWG
4/15/97 and 5/14/97 - ACM (Field Views)
5/19/97 - CAC/POWG*
6/5/97 - PM #2

TABLE III-1
ALTERNATIVES DEVELOPMENT AND EVALUATION (CONTINUED)

REVIEW AND EVALUATE ALTERNATIVES

Dismissed alternatives that would not meet the need, would be environmentally harmful, or would have insurmountable engineering concerns

NO-BUILD ALTERNATIVE

TSM/UPGRADE - DISMISSED

New Alignment Alternatives

- A
- B - Dismissed
- C - *
- D - Dismissed
- E - Dismissed
- F
- G - Dismissed
- BA
- BE - Dismissed
- DA

- 61 Connector
- 15 Connector - Dismissed

- RC1
- RC2
- RC3
- RCD - Dismissed

* Portions Dismissed

2 on 4 Section

- Separated from CSVT and advanced as an independent project

Presented alternatives to Public and Resource Agencies

Alternatives for Additional Analysis Identified

(Continued on next page)

Section 1

A-A Hybrid Corridor
- A
- BA
- DA
- 61 Connector

Old Trail Corridor
- C (portions)
- F
- 61 Connector

Section 2
- RC1
- RC2
- RC3

KEY

PO - Public Officials Meeting
CAC - Citizens Advisory Committee Meeting
ACM - Agency Coordination Meeting
POWG - Public Officials Work Group Meeting
PM - Public Meeting
CAC/POWG - Joint Meeting of Citizens Advisory Committee and Public Officials Work Group
SPM - Special Purpose Meeting
UPFG - Union Township/Point Township Focus Group
MSFG - Monroe Township/Shamokin Dam Borough Focus Group

SPM[a] - Meeting with Orchard Hills/Gunter Development Residents
SPM[b] - Meeting with Colonial Acres Residents
SPM[c] - Meeting with Old Trail Residents
SPM[d] - Meeting with Monroe Township Officials and Residents
SPM[e] - Meeting with Point Township Officials
SPM[f] - Meeting with Monroe Township Officials
SPM[g] - Meeting with Hummels Wharf Residents
SPM[h] - Meeting with West Chillisquaque Officials and Residents
SPM[i] - Meeting with Hummels Wharf Residents
SPM[j] - Meeting with Monroe Township Planning Commission
SPM[k] - Meeting with Point Township Officials and Residents
SPM[l] - Meeting with Stonebridge Residents
SPM[m] - Meeting with Colonial Acres Residents
SPM[n] - Meeting with Stonebridge and Colonial Acres Residents
SPM[o] - Meeting with Monroe Township Planning Commission, Supervisors and Residents
SPM[p] - Meeting with Stonebridge Residents and Colonial Acres Residents
SPM[q] - Meeting with Colonial Acres Residents
SPM[r] - Meeting with Colonial Acres Residents
SPM[s] - Field View with Colonial Acres Residents
SPM[t] - Meeting with Union Township Supervisors and Residents
SPM[u] - Meeting with Susquehanna Valley Mall Developers
SPM[v] - Meeting with Union Township Officials

PUBLIC AND AGENCY INVOLVEMENT

7/23/97 - ACM
8/25/97 - CAC/POWG
8/27/97 - ACM
9/24/97 - ACM
10/2/97 - ACM (Field View)
10/22/97 - ACM
10/27/97 - CAC/POWG
11/12/97 - PM #3

TABLE III-1
ALTERNATIVES DEVELOPMENT AND EVALUATION (CONTINUED)

REFINE AND EVALUATE ALTERNATIVES

Refined alternatives to be more sensitive to environmental concerns using findings from detailed site investigations, data analysis and public/agency input. Compared impacts of each alternative.

NO-BUILD ALTERNATIVE

New Alignment Alternatives

Section 1

A-A Hybrid Corridor

- DA West - Composite of Alts. A, BA, DA. Includes 61 Connector.
- DA West Avoidance - Same as above but avoids historic App Property.

Old Trail Corridor

- OT1A - Composite of Alts. C and F. Includes 61 Connector.
- OT1A Avoidance - Same as OT1A but avoids PP&L Ash Basin 1.
- OT1B - Composite of Alts. C and F. Includes Stetler Ave. Interchange and 15 Connector
- OT1B Avoidance - Same as OT1B but avoids PP&L Ash Basin 1

Section 2

- RC1-E (modification of RC1)
- RC1-W (modification of RC1)
- RC2 - Dismissed
- RC3 - modified (renamed RC5)
- RC4 - New river crossing to north of RC1. Modified and renamed RC6.
- RC5 (modification of RC3)
- RC6 (modification of RC4)

FURTHER REFINEMENTS TO ALTERNATIVES

Continued modifications to minimize impact

NO-BUILD ALTERNATIVE

New Alignment Alternatives

Section 1

A-A Hybrid Corridor

- DA West - Dismissed
- DA West Avoidance - Dismissed
- DA West Modified - Dismissed
- DA West Modified Avoidance - Dismissed
- DA - Dismissed
- DA Avoidance - Dismissed
- DA Modified - Dismissed
- DA Modified Avoidance

Old Trail Corridor

- OT2A (61 Connector) - Hybrid Alt. of OT1A and OT1A Avoidance
- OT2B (Stetler Ave. Interchange/15 Connector) - Hybrid Alt. of OT1B and OT1B Avoidance

Section 2

- **RC1-E**
- **RC1-W**
- **RC5**
- **RC6**

PUBLIC AND AGENCY INVOLVEMENT

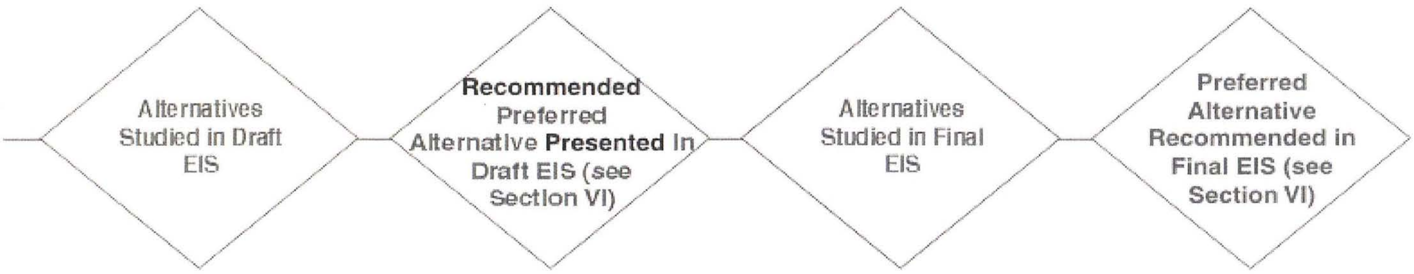
12/2/97 - SPM[a*]
12/3/97 - ACM
12/9/97 - SPM[b]
1/20/98 - SPM[c]
1/28/98 - ACM
2/10/98 - SPM[d]
3/2/98 - CAC/POWG
3/25/98 - ACM
3/30/98 - UPFG[*]
3/30/98 - CAC/POWG
5/6/98 - MSFG[*]
6/29/98 - CAC/POWG
6/29/98 - UPFG
6/30/98 - SPM[e]
7/1/98 - MSFG
7/6/98 - SPM[f]
7/22/98 - ACM
7/22/98 - SPM[g]
8/26/98 - ACM
9/23/98 - ACM
9/28/98 - CAC/POWG
9/28/98 - UPFG
9/29/98 - MSFG
9/29, 30/98 - ACM (Field View)
10/7/98 - SPM[h]
10/28/98 - ACM
11/5/98 - MSFG
11/12/98 - PM #4
11/18/98 - SMP[i]

1/25/99 - CAC/POWG
1/25/99 - UPFG
1/25/99 - SPM[j]
1/26/99 - MSFG
3/2/99 - SPM[k]
3/22/99 - CAC/POWG
3/23/99 - SPM[l]
3/29/99 - MSFG
3/31/99 - ACM
5/10/99 - SPM[m]
5/17/99 - MSFG
5/18/99 - SPM[n]
5/24/99 - CAC/POWG
6/21, 22/99 - SPM[o]
6/22/99 - ACM
7/19/99 - CAC/POWG
7/20/99 - MSFG
7/21/99 - ACM
8/10/99 - SPM[p]
8/25/99 - ACM
9/27/99 - CAC/POWG
9/28/99 - MSFG
10/27/99 - ACM

TABLE III-1
ALTERNATIVES DEVELOPMENT AND EVALUATION (CONTINUED)

IDENTIFY ALTERNATIVE FOR DESIGN AND CONSTRUCTION

Identify alternative that will provide the maximum benefit to the majority of people combined with the least adverse impacts at the lowest possible cost



No-Build Alternative

Section 1

A-A Hybrid Corridor
- DA Modified Avoidance

Old Trail Corridor
- OT2A (61 Connector)
- OT2B (Stetler Ave. Interchange/15 Connector)

Section 2
- RC1-E
- RC1-W
- RC5
- RC6

Section 1
- DA Modified Avoidance

Section 2
- RC5

No-Build Alternative

Section 1

A-A Hybrid Corridor
- DA Modified Avoidance

Old Trail Corridor
- OT2A (61 Connector)
- OT2B (Stetler Ave. Interchange/15 Connector)

Section 2
- RC1-E
- RC1-W
- RC5
- RC6

Section 1
- DA Modified Avoidance

Section 2
- RC5

2/23/00 - ACM
2/28/00 - CAC/POWG
2/29/00 - MSFG
4/6/00 - SPM[q]
5/22/00 - CAC/POWG/MSFG
5/25/00 - SPM[r]
7/11/00 - SPM[s]
8/23/00 - ACM
9/19/00 - SPM[t]
12/6/00 - PM #5
3/12/01 - Public Hearing

7/25/01 - ACM
11/19/01 - SPM[u]
1/23/02 - ACM
2/11/02 - SPM[v]
2/26/03 - ACM

- Develop a range of preliminary alternatives that satisfy the transportation requirements of the project area and are sensitive to the environmental constraints
- Evaluate the preliminary alternatives based on ability to meet the transportation objectives of the project, engineering feasibility and practicality, and probability to impact important environmental resources

1. Identify Objectives to Meet Project Need

The conclusions of the CSVT Needs Analysis indicate there is a need to reduce congestion, improve safety, and ensure capacity for the expected future growth. As a result of these needs, the following transportation objectives must be met by the alternatives under consideration.

- The alternative must reduce congestion on study area roadways.
- The alternative must improve safety for users of the roadway system through better accommodation of all traffic, especially trucks and through traffic. This was taken a step further in the Alternative Development step in the process, where the decision was made that the safest way to accommodate through traffic and trucks was to separate them from the regional and local traffic. The rationale for this decision follows.

  The origin/destination (O/D) survey undertaken as part of the Needs Analysis (1996) indicates that traffic through the entire study area, without an origin or destination in the study area, ("through" traffic) represents 17% of the suveyed autos. Additionally, auto trips that either began or ended in the study area account for 35% of the surveyed autos ("regional" traffic). The remaining 48% of the auto trips began and ended in the study area ("local" traffic).

  Almost 58% of the trucks had neither an origin nor a destination in the study area ("through" traffic). Trucks having only one trip end in the study area account for another 34% of the trucks surveyed ("regional" traffic). The remaining 8% of the trucks had origins and destinations within the study area ("local" traffic).

  The two distinct types of users (through trips and local trips) on US Routes 11/15 expect different access control. Local traffic desires unrestricted access to facilities and services, while through traffic desires uninterrupted, high speed traffic flow, with little or no cross traffic. Regional and through traffic often does not expect traffic traveling in front of other vehicles to slow down to turn off the roadway.

  In order to determine if the vehicle mix of through and local traffic contributes to the crash rate in the area, crash frequency and types were evaluated. The conclusions of the review of crash data indicates that a number of the crash types occurring are rear-end, angle, and sideswipe types of collisions. These types of crashes are often associated with conflicts between through, regional, and local traffic.

Additionally, nearly half of the total number of crashes in the study area involve a truck. Trucks generally take longer to stop than automobiles. Therefore, trucks do not respond as well to the free access situation on the roadways in the study area.

Due to the high percentages of "through" traffic, both autos and trucks, the high percentage of heavy trucks in the traffic mix, and the free access nature of the roadways in the study area, it has been determined that the best way to improve safety is to separate through and local traffic, especially through truck traffic, and to design the new roadway as a limited access facility.

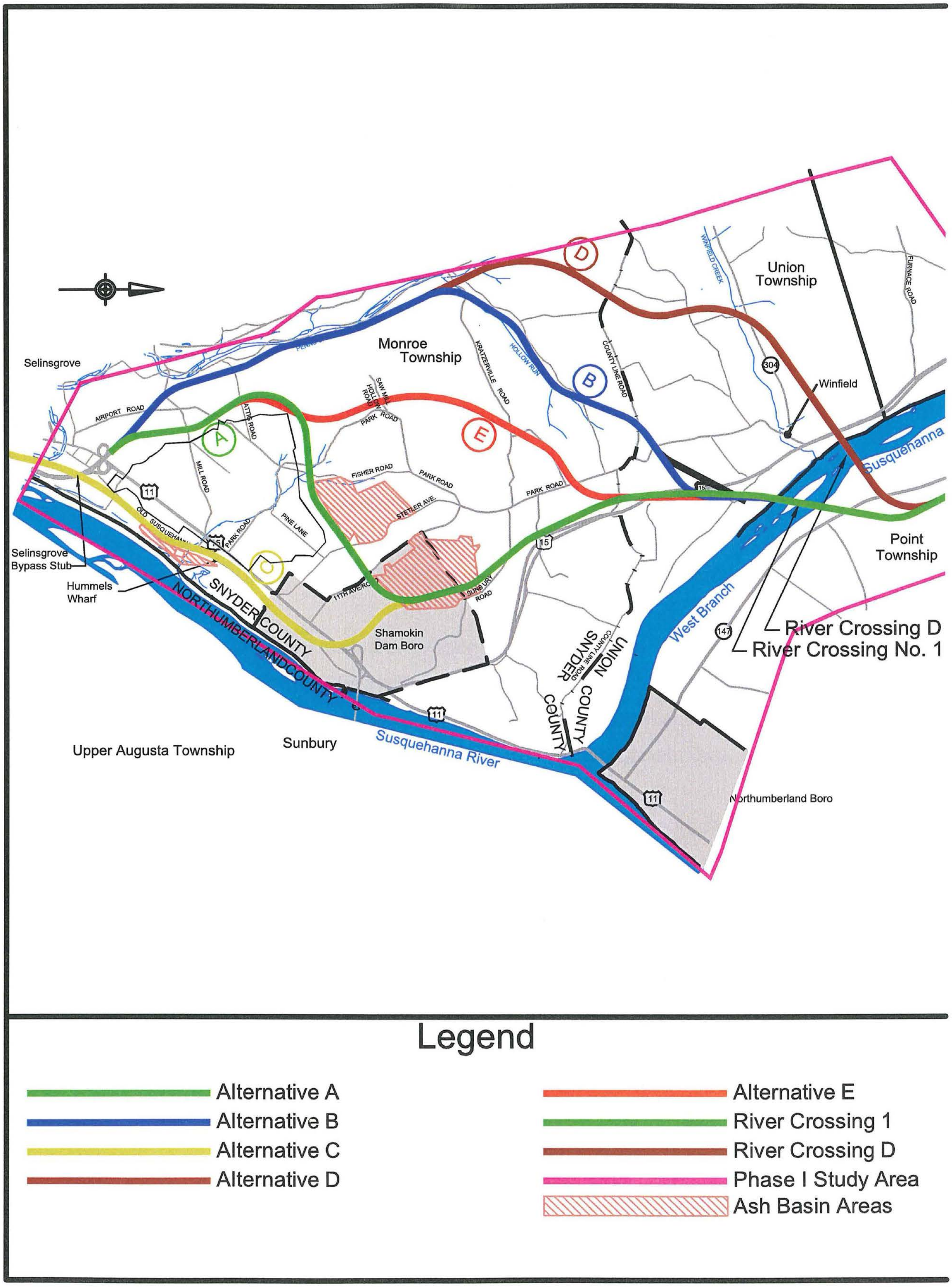
- The alternative must ensure sufficient capacity for the expected growth in population and employment. A Level of Service (LOS) C in the Design Year (2020) is the minimum desirable design year Level of Service for this limited access, rural arterial roadway.

2. Delineation of Project Study Area

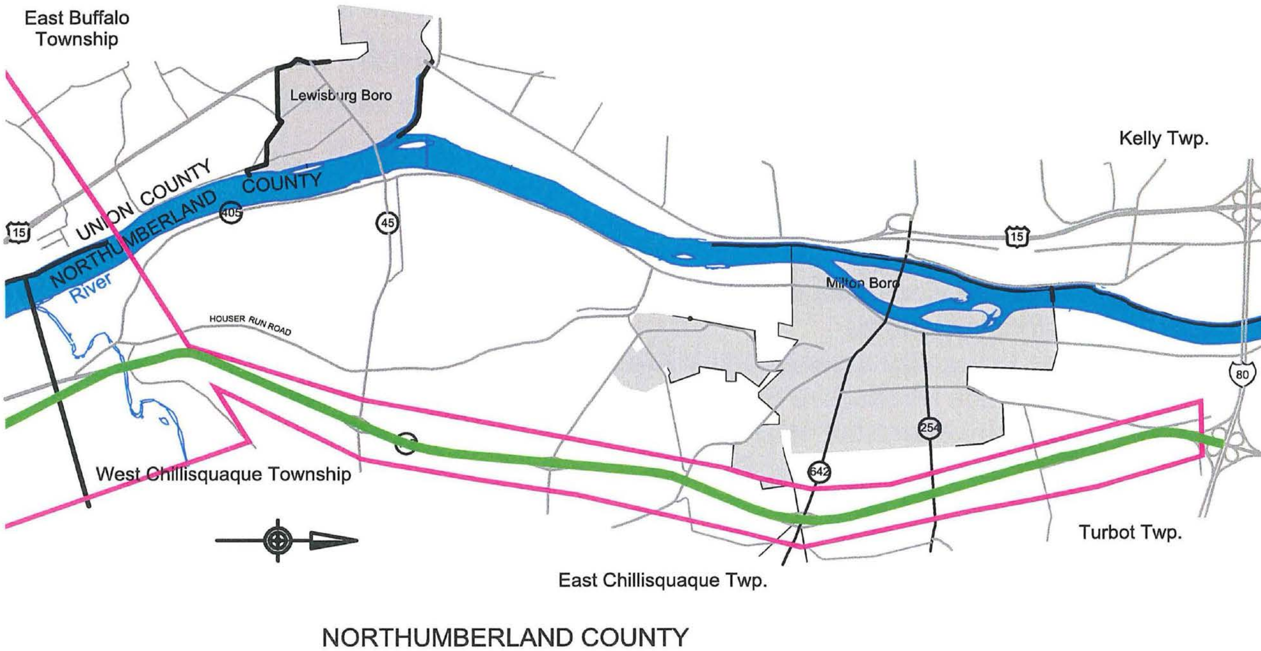
Early in the study, the boundaries of the project study area were delineated. The study area is the area in which the project engineers could develop transportation improvement alternatives. Using the knowledge of the project needs and other physiographic features of the project region, the boundaries were established.

The study area length is influenced by the locations of the logical termini as described in the project Purpose and Need (Section I). These termini are: in the south, the end of the existing Selinsgrove Bypass (US Routes 11/15 Expressway) just north of Selinsgrove; and in the north, the interchange between PA Route 147 and Interstate 80 (I-80). This is a distance of approximately 32 kilometers (20 miles).

The width of the study area varies and is mostly defined by physiographic features that would affect the technical and economic reasonableness of an alternative. In addition, the width of the study area is dependent on the travel desires and patterns that are a component of the project need. The width of the study area, in comparison to its length, should not be so wide, that it fosters the development of circuitous alternatives that do not service the traffic desires in the area. In general, the width of the CSVT study area is guided by the main stem Susquehanna River to the east and Penns Creek to the west. At its widest, the study area is roughly 8.05 kilometers (5 miles) wide. In the northern section of the study area, after crossing over the West Branch Susquehanna River, the study area narrows to an area directly adjacent to PA Route 147. The study area is shown on Figure III-1.



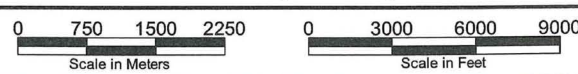
Selinsgrove
Monroe Township
Union Township
Winfield
Point Township
River Crossing D
River Crossing No. 1
Susquehanna
West Branch
Northumberland Boro
Susquehanna River
Sunbury
Upper Augusta Township
Shamokin Dam Boro
SNYDER COUNTY
NORTHUMBERLAND COUNTY
UNION COUNTY
SNYDER COUNTY
Selinsgrove Bypass Stub
Hummels Wharf
AIRPORT ROAD
MILL ROAD
PINE LANE
FISHER ROAD
PARK ROAD
STETLER AVE.
KRATZERVILLE ROAD
HOLLOW RUN
COUNTY LINE ROAD
WINFIELD CREEK
FURNACE ROAD
Legend
Alternative A
Alternative B
Alternative C
Alternative D
Alternative E
River Crossing 1
River Crossing D
Phase I Study Area
Ash Basin Areas



Central Susquehanna Valley Transportation Project

Figure III-1

Preliminary (Phase I) Alternatives (January 1997)



3. Environmental and Engineering Overview

In accordance with State and Federal laws and regulations, a broad range of environmental factors must be considered in the planning of a transportation project. Studies of the "environment" include not only natural resources, such as wetlands and forests, but also community and cultural resources such as homes, historic buildings, churches, and water supply wells. The specific environmental factors considered and mapped for the CSVT Project include the following.

- Land Use and Development Patterns
- Community Facilities
- Parks and Recreational Facilities
- Historic Structures
- High Probability Archaeological Areas
- Farmlands (Productive Farmlands/Agricultural Security Areas)
- Hazardous/Sensitive Waste Areas
- Public and Private Water Supplies
- Geological Formations
- Noise Sensitive Areas
- Floodplains and Potential Flood Hazard Areas
- Surface Water Resources
- Wetlands
- Vegetation and Wildlife Habitat
- Threatened and Endangered Plant/Animal Species
- Title VI/Environmental Justice
- Air Quality
- Cumulative and Secondary Impact Areas

Each of these areas was investigated to develop a cumulative and comprehensive overview of the environmental conditions and resources in the study area. These investigations were primarily limited to the use of existing and secondary data sources, with limited field verification. These areas were investigated and mapped between July 1996 and November 1996. This mapping represents environmental, social, and cultural features within the study area that may be impacted by the construction and operation of the transportation solutions.

From an engineering standpoint, other "features", such as terrain and floodplain areas, were overviewed. The steep terrain of the ridges and valleys in the study area played a significant role in the development of the preliminary alternatives. Likewise, the design criteria for speed, roadway width, median width, and grades are primary considerations for the development of safe roads.

4. Preliminary Alternatives Considered

In general, the goal of the study team is to develop possible routes or "preliminary alternatives" that meet the engineering design criteria (AASHTO and PENNDOT Design Manual criteria for a four-lane, limited access, rural arterial highway) for safety and solve the transportation problems in the region (meet the project need) while avoiding as many sensitive "features" as possible. When it is impossible to avoid an impact to a "feature", the study team attempted to minimize the impact as much as possible.

During the preliminary alternatives development, the broadest possible spectrum of improvements is examined. The concept is to narrow the field of preliminary alternatives to a few reasonable alternatives for detailed examination. Thus, reasonable alternatives must meet the following requirements.

- Does the alternative meet the project need?
- Does the alternative have reasonable environmental impacts in comparison to the other alternatives being considered?
- Does the alternative represent a reasonable engineering solution in light of the established design standards and construction costs?

Any potential preliminary alternative that did not meet these requirements was dismissed at the preliminary level.

Two major groups of alternatives are examined during the Project Development Process:

- On-Line Alternatives - alternatives that use the existing roadways in the study area; and
- New Alignment Alternatives - alternatives in new locations.

In addition, the No-Build Alternative is also considered.

a. No-Build Alternative

The No-Build Alternative assumes no action is taken other than minor repairs to the existing roadway, such as resurfacing. It is considered in both the preliminary and detailed evaluation of alternatives. The No-Build Alternative also serves as a basis for comparison - does the public benefit of highway improvements outweigh the probable environmental impacts.

b. Mass Transit Alternative

Typically, the mass transit alternative provides an option to the use of single occupancy vehicles for travel and the construction of and/or improvements to highways. Mass transit alternatives include the implementation or expansion of bus and/or light rail systems.

Currently, there is no light rail transit operating in the study area. Therefore, the creation and maintenance of a light rail option was not considered a reasonable alternative to the construction of and/or improvements to the highway system.

Coordination with the project area municipalities indicated that the Rohrer Bus Company (a private bus company) is the only public transportation service provider in the study area. Presently, Rohrer operates one route from Selinsgrove to Sunbury. The service operates daily and buses run hourly from 8 AM until 6 PM. The Rohrer Bus Company has no plans to expand its service into other parts of the study area or add more buses to the route.

Improvements to the existing transit system were not considered a reasonable option since such a small part of the study area is currently served. To adequately provide improved access to the study area, many more buses would need to be added to the system. This was not considered a prudent option. In addition, a mass transit option would not serve all the project needs, since it only provides potential congestion relief to local traffic, not the through traffic. The mix of through and local traffic, through truck traffic in particular, is one of the major problems on the study area roadways. The mass transit option would not address this issue.

c. On-Line Alternatives

Early in the transportation project development process the study team first considered whether any actions, such as improvements to existing intersections or upgrades of the existing transportation network, would meet the project needs. The strategy employed by the study team was to maximize the use of the established transportation corridors and existing facilities without the construction of a major new highway.

i. Transportation Systems Management (TSM)/Upgrade Alternative

This alternative initially involved the evaluation of TSM strategies, such as minor roadway and intersection improvements, for the existing roadway network including US Routes 11/15, US Route 11, and PA Route 147 from US Route 11 to I-80. Evaluated TSM strategies would include the addition of turning lanes and through lanes at specific intersections to accommodate future traffic volumes. In order to handle the future traffic volumes, additional lanes would be needed well beyond the individual intersection locations. As a result, the TSM Alternative essentially became an Upgrade Alternative. In order to provide the necessary capacity for the design year traffic volumes, the following general TSM/ Upgrade construction activities would be necessary.

- Widen critical intersections along US Routes 11/15, US Route 15 in Lewisburg, and PA Route 147 in Northumberland Borough. Double left turn lanes would be needed to accommodate future traffic volumes at all intersections on US Routes 11/15 along the Golden Strip and at the US Route 15/PA Route 45 Interchange in Lewisburg. Single left turning lanes would be necessary at all other intersections on US Route 15, US Route 11, and PA Route 147.

- Add travel lanes between intersections along US Routes 11/15, US Route 15 in Lewisburg, and PA Route 147 from Northumberland Borough to PA Route 405. Along US Routes 11/15 in the area of the Golden Strip, the existing roadway would need to be widened to three and four lanes in each direction to accommodate future traffic volumes. Along US Route 11 and US Route 15 two lanes in each direction would be sufficient. On PA Route 147 widening to two lanes in each direction would be necessary to accommodate future traffic volumes.

- Build-out the existing section of PA Route 147 from just north of the Chillisquaque Creek in West Chillisquaque Township to I-80 in Turbot Township from 2 lanes to 4 lanes.

ii. Upgrade with Minor Relocations Alternative

This alternative would involve the upgrade of limited sections of the existing roadway system and minor relocations to avoid social, cultural, and natural resources. In order to avoid significant social resources along US Routes 11/15, 11, 15, and PA Route 147, the relocated portions of the alternatives would become significant and, for all practical purposes, render a new alternative not located on-line.

d. New Alignment Alternatives

The New Alignment Alternatives for the CSVT Project would include the construction of an entirely new roadway system apart from the existing system. The New Alignment Alternatives may also contain some Transportation Systems Management (TSM) measures (such as intersection improvements, etc.) if the TSM improvements are needed to improve the existing transportation network. The transportation objectives outlined early on were further defined to develop a "concept" for an Off-Line or New Alignment Alternative as follows.

- In order to substantially reduce congestion, the problem areas (high congestion) in Monroe Township, Shamokin Dam Borough, Northumberland Borough, and Lewisburg Borough should be bypassed to remove the high volumes of through traffic from the existing roadway system. This would also separate through and local traffic, particularly through truck traffic, and significantly improve safety.
- The existing roadway system in the bypassed areas should be retained and improved, if necessary, to better serve the local and regional traffic since traffic volumes will be reduced on the existing roadway network.
- The New Alignment Alternatives should connect with existing roadways in a manner that would safely facilitate traffic flow in the study area.
- A review of the number and types of crashes on the existing roadway system indicates a number of the crash types occurring are rear-end collisions, angle collisions or sideswipes. The multiple points of conflict on this free access portion of highway has been a major contributor to the historical high crash rate. Thus, the new facility should be designed as limited access. In addition, the noted types of crashes also indicate conflicts between through and local traffic. Thus, the separation of through and local traffic would be imperative not only to reduce congestion, but to improve safety.
- The section of PA Route 147 from the Chillisquaque Creek north to I-80, which is currently limited access and consists of 2 lanes of roadway on a 4-lane right-of-way, should be "built out" from two to four lanes to increase capacity and improve safety.

In consideration of the project goals as outlined above and in light of the study area limits, a concept was developed for the New Alignment Alternatives. Any New Alignment Alternative will begin at the northern end of the Selinsgrove Bypass (US Routes 11/15 Expressway), bypass the developed areas of Monroe Township and Shamokin Dam Borough, cross the West Branch Susquehanna River on a new structure, bypass the Northumberland Borough, and end at the southern end of the PA Route 147 "two on four" corridor. The "two on four" section of PA Route 147 should be built out to four lanes (two lanes in each direction) to complete the main movement of this north-south corridor. Also, the New Alignment Alternatives should connect to the existing network in strategic locations in a manner that facilitates traffic flow.

The New Alignment Alternatives would be constructed as four-lane, limited access (expressway type) roadways to service through and regional traffic. The existing roadway network (US Routes 11/15, 11, 15, PA 147) would be maintained as local business routes to service local traffic needs. All proposed New Alignment Alternatives would have at least two interchanges: 1) at the Selinsgrove Bypass just north of Selinsgrove; 2) one at existing US Route 15 just south of Winfield.

All New Alignment Alternatives were designed to the following criteria.

- Limited Access Freeway (both Rural/Urban designations)
- 120 km/h (75 mi/h) design speed
- 4% maximum grades
- 4 lanes, 2 each direction, 3.6 m (approximately 12 ft) each
- 3.6 m (approximately 12 ft) outside shoulders
- 27 m (89 ft) median width for rural conditions and 16 m (53 ft) median width for urban conditions
- Level of Service C (minimum desirable for Design Year)

The rationale for the above criteria follows.

- A Limited Access Freeway design on new location would provide uninterrupted and safe high speed flow. The American Association of State Highways and Transportation Officials (AASHTO) "Green Book", entitled Policy on Geometric Design of Highways and Streets is the recognized definitive volume on highway design in the US. It recognizes that the full control of access afforded by limited access highway design is the "most important single safety factor that may be designed into new highways". In addition, a review of crash statistics for Pennsylvania indicate that limited roadways provide the highest safety level. Improving safety for users of the roadway system is a defined project need.

  In addition, in combination with other projects planned or in progress, completion of a limited access new alignment alternative would provide a continuous north-south limited access freeway from south of Selinsgrove to the New York State border. Consistency of design, from segment to segment of highway, sometimes referred to as "system continuity", is very important with respect to driver expectation; drivers tend to make fewer errors when characteristics of a highway are consistent from segment to segment.

- The design speed is correlated with various geometric aspects of a highway; it helps to assure that design parameters, which vary due to vehicle speed, are in balance.

- The highway grade has an effect on vehicle operation. Steep grades have a pronounced effect on vehicle operation, especially trucks. Moderate grades allow all vehicles to maintain the design speed, resulting in increased safety, efficiency, capacity, convenience, and desirability of the facility.

- Traffic analyses indicate that a four-lane limited access freeway will be adequate to accommodate traffic anticipated in the year 2020. However, it is important to note that, although the current design is for a four-lane facility, all New Alignment Alternatives will provide a footprint (proposed right-of-way area plus buffer) large enough to eventually accommodate a third travel lane in each direction, from Selinsgrove to the two on four section. This was done to ensure capacity for future growth, one of the needs of the project. The proposed river bridges will also accommodate a third lane in each direction.

- The median width selected for use in rural areas is within PENNDOT's desirable criteria. Using desirable criteria results in increased safety. The median width selected for use in urban areas is slightly less than desirable and is used to minimize impacts. However, since one of the project needs is to ensure capacity for future growth, median widths were selected for both rural and urban areas that would permit the construction of additional lanes.

- A Level of Service C in the Design Year (2020) is considered the minimum desirable for the New Alignment Alternatives. Level of Service is a measure of the roadways ability to provide adequate capacity for the traffic volume; it is measured from LOS A to LOS F, with A being the best (least congested) and F being the worst.

Throughout the study, information and comments were continuously sought from the public and resource agencies. This coordination effort is documented in Section V - Comments and Coordination. A major outcome of this effort was recommendations for refinements of alternatives, as well as proposals for completely different alternatives in different areas. Many of these recommendations were incorporated into the Phase I (preliminary) and Phase II (detailed) studies and resulted in modifications to the alternatives under study and additions to the range of alternatives to be studied. Some of the suggested modifications or proposed alternatives were not developed as part of the range of alternatives because it was determined by the study team that they would either not fully meet the project needs and goals, or they would not be reasonable alternatives (in light of technical and economic considerations). A list of the suggested alternatives that were not included in the range of reasonable alternatives developed and evaluated is provided in the Alternatives Technical Support Data.

Initially, five (5) New Alignment Alternatives (Alternatives A, B, C, D, and E) were developed between Selinsgrove and Winfield, and two crossings were developed over the West Branch Susquehanna River (River Crossings 1 and D). All of the preliminary New Alignment Alternatives were developed in an attempt to meet the project needs and goals, meet the noted design criteria, and minimize impacts to environmental features. The locations of these preliminary alternatives are shown on Figure III-1. Just north of the River Crossing options, all New Alignment Alternatives include the build-out of the two on four section of PA Route 147.

These five New Alignment Alternatives and two River Crossing locations were presented to the Citizens Advisory Committee (CAC) and Public Officials Work Group (POWG) in January 1997, March 1997, and May 1997 in an effort to develop local input on the alternatives. The group discussion generated at those meetings lead to the following modifications to the preliminary New Alignment Alternatives (see Figure III-2).

<u>January 1997</u>

- Develop a connection to PA Route 61. PA Route 61 is a major east-west corridor in the study area that carries traffic to/from Sunbury and points east to US Routes 11/15 in Shamokin Dam. Currently, PA Route 61 crosses the river from Sunbury eastbound via the Veterans Memorial Bridge and terminates at US Routes 11/15. The concept suggested locally was to extend PA Route 61 to provide additional access to the New Alignment Alternatives, where practicable. This suggestion was the origin for the 61 Connector.

- Look into the possibility of designing the highway parallel to the Susquehanna River along the old canal bed, then head north following the powerline or through a portion of the PPL Plant using existing rail line. These suggestions were the basis for Alternatives F and G.

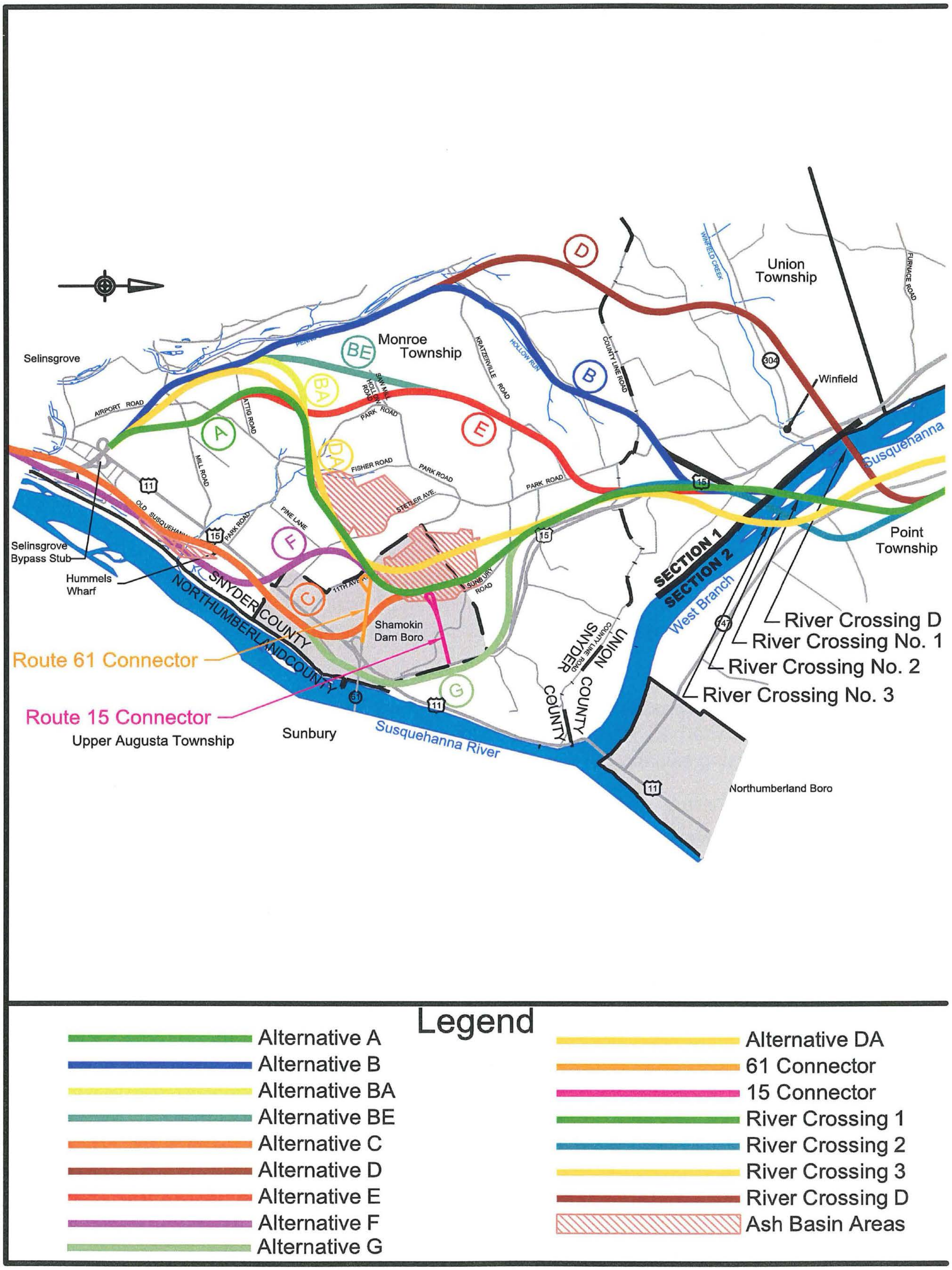
- Design a river crossing further south to cross the river on a more perpendicular crossing. This suggestion was the basis for River Crossing 2.

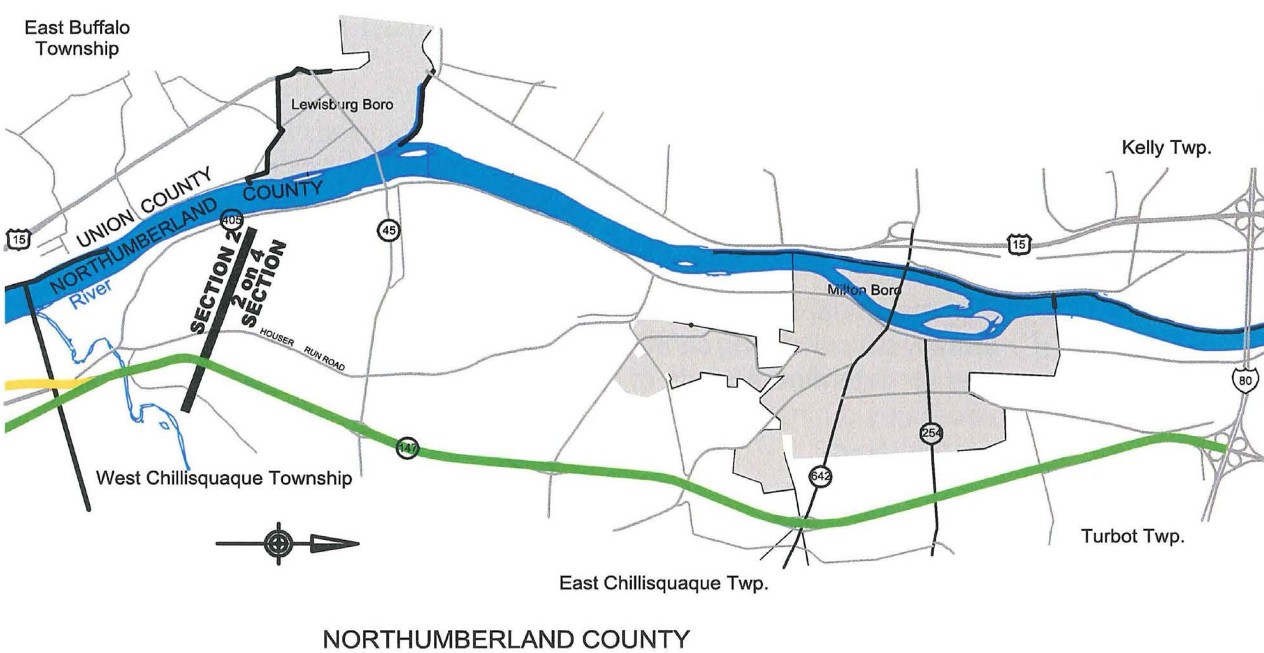
- Develop a full-movement interchange between the New Alignment Alternatives and PA Route 147 east of the river just south of the two on four section, instead of just a connection to the two on four section by way of PA Route 405.

- Investigate the potential for another interchange some place along US Routes 11/15 between the two interchanges currently designed (one with 11/15 at Selinsgrove Bypass, one with US Route 15 in Winfield area).

- Investigate use of an elevated highway system in the "Golden Strip" area.

  The potential for an "elevated" or double highway system was discussed, but it was not carried forward into detailed study for the following reasons.


Selinsgrove
Monroe Township
Union Township
Winfield
Point Township
Selinsgrove Bypass Stub
Hummels Wharf
Shamokin Dam Boro
Sunbury
Upper Augusta Township
Northumberland Boro
Route 61 Connector
Route 15 Connector
SNYDER COUNTY
NORTHUMBERLAND COUNTY
UNION COUNTY
SNYDER COUNTY
SECTION 1
SECTION 2
Susquehanna River
West Branch
Susquehanna
River Crossing D
River Crossing No. 1
River Crossing No. 2
River Crossing No. 3
A
B
BA
BE
C
D
DA
E
F
G
AIRPORT ROAD
MILL ROAD
PARK ROAD
PINE LANE
FISHER ROAD
STETLER AVE.
11TH AVE.
SUNBURY ROAD
KRATZERVILLE ROAD
HOLLOW RUN
COUNTY LINE ROAD
WINFIELD CREEK
FURNACE ROAD
Legend
Alternative A
Alternative B
Alternative BA
Alternative BE
Alternative C
Alternative D
Alternative E
Alternative F
Alternative G
Alternative DA
61 Connector
15 Connector
River Crossing 1
River Crossing 2
River Crossing 3
River Crossing D
Ash Basin Areas



Central Susquehanna Valley Transportation Project

Figure III-2

Modified Preliminary (Phase I) Alternatives (July 1997)

0 750 1500 2250 Scale in Meters
0 3000 6000 9000 Scale in Feet

- Due to their extremely high initial and long term maintenance costs, elevated highways are considered only where more cost-effective, conventional alternatives are not available. An elevated roadway system will incur construction costs from three to six times (or even higher) than conventional roadway systems. Routine maintenance operations become more difficult and expensive due to the need to maintain and protect traffic on the lower levels. For example, snow cannot be plowed over the edge of an elevated roadway where it could damage property or injure someone; snow must be collected, removed, and dumped at another location.

- The level of safety on an elevated roadway is lower than for a conventional roadway. Columns can obstruct vision and are a collision hazard. Clear zones beyond the shoulders are not provided. Minimum roadway criteria is often used instead of desirable criteria.

- The maintenance and protection of traffic on US Routes 11/15 would be extremely difficult during construction of an elevated roadway. Closure of the highway for extended periods of time would be likely. Periodic detours would be necessary during the construction; interrupted traffic patterns would exist for a year or more.

- Future expansion and the provision of additional access points to an elevated roadway would be difficult and very expensive.

- There would be more potential for impacts such as elevated noise levels.

- The relocation of numerous utilities would be required.

March 1997

- Minimize impacts to developments by suggesting "hybrids" of alternatives that connect one portion of a mainline alternative to another mainline alternative (combinations of alternatives, Alternative B to Alternative A becomes Alternative BA, for example).

- Investigate use of alternative that follows the old canal, uses portions of PPL's property, continues north along river to US Routes 11/15 junction, follows US 11 Corridor, crosses West Branch and then uses Conrail (now Norfolk Southern) right-of-way to PA Route 147.

  The possibility of the use of this concept for a New Alignment Alternative was also evaluated, but it was not carried forward into detailed study because of the following reasons.

  - This alignment would have substantial impact to the PPL Facility. Early coordination with PPL indicated that PPL was opposed to any alternative that infringed on the Sunbury Plant property, including Ash Basin No. 1 (the Ash Basin just south of the plant).

- This alignment would have an impact on Fabridam Park, a recreation facility owned by Shamokin Dam Borough. Publicly owned recreational properties are protected by Section 4(f) of the US Department of Transportation Act of 1966 (amended 1968) which indicates parks cannot be impacted if there is a "prudent and feasible" alternative that avoids the impact. In this particular case, it is possible to avoid Fabridam Park with other New Alignment Alternatives.

- An interchange between the New Alignment and existing US Routes 11/15 in the vicinity of the split would be impractical due to the topography, existing roadway configuration, proximity of the river, and existing commercial development. Multiple ramps would be required to maintain connections between the mainline, US 11/15 to the south, US 11 North, US 15 North, and PA Route 61 while maintaining the current local network.

- The existing "bench" between the river and high cliffs where US Route 11 is presently located is not wide enough to support a limited access facility. The "bench" narrows north of the existing Blue Hill (US Route 11) Bridge and is not wide enough to support any type of highway facility.

- Widening the "bench" would require either constructing embankment or a structure in the river, or cutting into the hillside. Widening the bench into the river is not feasible from an environmental standpoint and would have implications to the regulatory floodway and 100-year floodplain of the main stem of the Susquehanna River. Widening the bench into the hillside is not reasonable due to the height and steepness of the cliff. In addition, the Shikellamy State Park would be impacted by any cut into the cliff in this area. This hillside cliff environment is also potential habitat for an endangered species of plant.

- The active Conrail (now Norfolk Southern) facility east of the river and north of Northumberland Borough would be impacted.

May 1997

- Develop an option to the 61 Connector as a means of providing access to and from existing US Routes 11/15 and PA Route 61. An area north of the junction of US Routes 11 and 15 (north of K-Mart near Gilbert's Nursery) was discussed. This suggestion was the origin for the 15 Connector.

As a result of the above discussions, by June of 1997 the following set of preliminary alternatives was under investigation.

- No-Build Alternative
- TSM/Upgrade Alternative
- New Alignment Alternatives (southern section) - A, B, C, D, E, F, G, BA, BE

- New Alignment Alternatives (northern section) - River Crossing (RC) 1, RC2, RCD
- New Alignment Alternatives (connectors to existing system) - Route 61 Connector, Route 15 Connector

All alternatives in the southern section could be combined with either River Crossing (RC1 or RC2) except Alternative D. Due to the location of RCD to the north of Winfield, the only southern alternative that would use RCD is Alternative D. In addition, not all of the New Alignment Alternatives would be afforded access back to the existing network by way of a connector roadway. For example, due to their proximity to the existing network, Alternatives A, BA, C, and G could tie in to either the 61 Connector or 15 Connector. However, this connection would not be feasible due to the distance of the alternative with Alternatives B, D, E, and BE. In addition, it was initially determined that this connection back to the existing network would not be necessary with Alternative F, which would provide an interchange with US Routes 11/15 in the vicinity of Park Road (just south of Shamokin Dam Borough).

In all, 23 New Alignment Alternative combinations were under consideration by June of 1997. At the northern end of these improvements, all New Alignment Alternatives would tie in to PA Route 147 and include the "build out" of PA Route 147 from 2 to 4 lanes from just north of the Chillisquaque Creek to I-80.

The alternatives under consideration by June 1997 are shown in Figure III-2 and are discussed in detail in the following.

i. Alternative A

- **Description** - Alternative A would begin as a continuation of the Selinsgrove Bypass, head northwest, then northeast and skirt the dense development in Monroe Township and Shamokin Dam. Alternative A would head north to negotiate a pass between two hills south of the village of Winfield, which is located between Shamokin Dam and Lewisburg. Following the interchange with US Route 15 in the Winfield area, Alternative A would connect to the river crossing options.

- **Rationale** - Avoid the dense development of the Monroe Township and Shamokin Dam area while staying close enough to aid meeting project needs.

- **Connector Roadways** - Staying close to the developed areas affords the opportunity to connect to the existing highway system in the Shamokin Dam area by way of the 61 or 15 Connector.

- **Interchanges** -
  1. At the Selinsgrove Bypass (US 11/15) stub (southern terminus)
  2. At the 61 Connector or 15 Connector

3. At US 15 south of Winfield and west of the river

ii. Alternative B

- **Description** - Alternative B would begin as a continuation of the Selinsgrove Bypass, head to the west of Alternative A in order to take advantage of the terrain along Penns Creek, turn to the northeast to take advantage of the terrain along a hollow that empties into Penns Creek, then proceed to join Alternative A at the pass south of Winfield. Following the interchange with US Route 15 in the Winfield area, Alternative A would connect to the river crossing options.

- **Rationale** - The objectives of this alternative are to take advantage of natural terrain while traversing the project study area, and to avoid the impacts associated with alternatives in more developed areas and river floodplain.

- **Connector Roadways** - A roadway connecting Alternative B to the existing highway network would not be reasonable due to the length of a connector roadway and the environmental impacts associated with a long connector roadway.

- **Interchanges** -
  1. At the Selinsgrove Bypass (US 11/15) stub (southern terminus)
  2. At US 15 south of Winfield and west of the river

iii. Alternative C

- **Description** - Alternative C would begin near the end of the Selinsgrove Bypass, proceed north along the Old Trail, alternating sides to minimize environmental and social impacts. (The Old Trail was the original north-south route prior to the construction of US Routes 11/15). Alternative C would turn west near PA Route 61 to connect to the Alternative A alignment. Alternative C would be coincident with Alternative A to the interchange with US 15 in the Winfield area. Alternative C then would connect to the river crossing options.

- **Rationale** - The objective of Alternative C is to minimize impacts to farmland and developable land, and to use the densely developed, more urban Old Trail area.

- **Connector Roadways** - Staying close to the developed areas affords the opportunity to connect to the existing highway system by way of either the 61 or 15 Connector.

- **Interchanges** -
  1. At the Selinsgrove Bypass (southern terminus)
  2. At the 61 Connector or 15 Connector
  3. At US 15 south of Winfield and west of the river

iv. Alternative D

- **Description** - Alternative D would begin at the end of the Selinsgrove Bypass, travel along Penns Creek on the same alignment as Alternative B, but it would continue further along Penns Creek before turning to the northeast to interchange with US Route 15 north of Winfield. The alternative would then connect to River Crossing D.

- **Rationale** - This alternative was developed to have an additional river crossing included in the study. A potential crossing site was identified and with terrain and environmental features considered, an alternative was developed.

- **Connector Roadways** - A connector roadway would not be reasonable. Due to the location of Alternative D on the far western portion of the valley, a connector roadway would be too long and encounter many environmental considerations.

- **Interchanges** -
  1. At the Selinsgrove Bypass (US 11/15) stub (southern terminus)
  2. At US 15 north of Winfield and west of the river

v. Alternative E

- **Description** - Alternative E would begin at the end of the Selinsgrove Bypass along the Alternative A alignment, but it would follow a more direct route to rejoin Alternative A to the south of Winfield.

- **Rationale** - The objective of this alternative is to study an alignment through the middle of the study area.

- **Connector Roadways** - A roadway connecting Alternative E to the existing highway network would not be reasonable due to the length of the connector roadway and the environmental impacts associated with a long connector roadway.

- **Interchanges** -
  1. At the Selinsgrove Bypass (US 11/15) stub (southern terminus)
  2. At US 15 south of Winfield and west of the river

vi. Alternative F

- **Description** - The alignment of Alternative F is similar to that of Alternative C, except it would start somewhat closer to the Susquehanna River before joining Alternative C for a short distance, then it would turn west around Shamokin Dam to join Alternative A.

Alternative F would require reconstructing the end of the Selinsgrove Bypass, including the interchange.

- **Rationale** - Early input from the public and citizens groups such as the Citizens Advisory Committee (CAC) and Public Officials Work Group (POWG) led to the development of additional alternatives using the area between the Old Trail and the Susquehanna River.

  Alternative F is similar to Alternative C, but attempts to cause fewer residential displacements by moving closer to the river.

- **Connector Roadways** - Alternative F would have a direct interchange with US Routes 11/15 in the Shamokin Dam area; therefore, no roadways connecting Alternative F with the existing system would be needed.

- **Interchanges** -
  1. At the Selinsgrove Bypass (US Routes 11/15)
  2. At US 11/15 in the vicinity of Park Road
  3. At US 15 south of Winfield and west of the river

vii. Alternative G

- **Description** - Alternative G would follow the Alternative C alignment, but it would continue along the Old Trail, pass under the end of the PA Route 61 river bridge, then run along US Route 15 to Alternative A.

- **Rationale** - Alternative G is an Old Trail variation that would avoid developable land in Shamokin Dam.

- **Connector Roadways** - Alternative G would have a direct interchange with PA Route 61 in the Shamokin Dam area or with US Route 15. Therefore, no connecting roadways would be necessary with this alternative.

- **Interchanges** -
  1. At the Selinsgrove Bypass (southern terminus)
  2. At PA Route 61
  3. At US 15 south of Winfield and west of the river

viii. Alternative BA

- **Description** - This alternative would begin along the Alternative B alignment, then cross to follow the remainder of Alternative A.

- **Rationale** - Alternative BA was developed based on citizen group input to reduce development impacts.

- **Connector Roadways** - Staying close to the developed areas would afford the opportunity to connect to the existing highway system in the Shamokin Dam area by way of the 61 or 15 Connector.

- **Interchanges** -
  1. At the Selinsgrove Bypass (US 11/15) stub (southern terminus)
  2. At 61 Connector or 15 Connector
  3. At US 15 south of Winfield and west of the river

ix. Alternative BE

- **Description** - Alternative BE would combine two alternatives starting on the Alternative B alignment, then crossing to Alternative E.

- **Rationale** - Alternative BE was developed due to citizen group input to reduce development impacts.

- **Connecting Roadways** - A connector roadway from this alternative to the existing roadway network would not be reasonable due to its length and associated impacts to the environment.

- **Interchanges** -
  1. At the Selinsgrove Bypass (US 11/15) stub (southern terminus)
  2. At US 15 south of Winfield and west of the river

x. Route 61 Connector

- **Description** - The Route 61 Connector is a roadway that connects the proposed expressway (Alternatives A, BA, and C) to the existing roadway network. The 61 Connector would be approximately one mile long and it would pass through an undeveloped portion of Shamokin Dam Borough between the Gunter Development to the south and Orchard Hills Development to the north. The 61 Connector would provide a direct connection to the western end of the Veterans Memorial Bridge (the PA Route 61 Bridge into Sunbury) and other points east.

- **Rationale** - The Route 61 Connector would provide a direct connection to the Veterans Memorial Bridge and thereby eliminate the need for traffic bound for Sunbury and other destinations to the east to use existing US Routes 11/15, 11, and 15.

- **Interchanges** - 1. At the CSVT mainline

  2. At US Routes 11/15 at the Veterans Memorial Bridge

xi. Route 15 Connector

- **Description** - The Route 15 Connector is a roadway that would connect the proposed expressway (Alternatives A, BA, and C) to the existing roadway network. The 15 Connector would be approximately one mile long and pass through an undeveloped portion of Shamokin Dam Borough north and west of the US Routes 11/15 split. The new roadway would connect the proposed facility with existing US Route 15, just north of the split. Access to Route 61, Sunbury, and other points east would be indirectly provided from the Route 15 Connector by using US 15 south to US Routes 11/15 south to the existing interchange between PA Route 61 and US Routes 11/15.

- **Rationale** - This connector roadway was developed in response to public input, primarily from Shamokin Dam residents and officials. It was developed to minimize impacts to Shamokin Dam residents and developable land remaining in the Borough.

- **Interchanges** - 1. At the CSVT mainline

- **Signalized Intersections** - 1. At US Route 15

xii. River Crossing 1 (RC1)

- **Description** - RC1 was designed to provide a direct connection between the Winfield area and the end of the Two on Four section of PA Route 147. It would include a new river crossing and an alignment location east of PA Route 147 in Point Township.

- **Rationale** - RC1 would provide a direct connection with a desirable approach geometry to a skewed bridge crossing of the Susquehanna River.

- **Interchanges** - At PA Route 147 near PA 405 east of river.

- **Notes** - RC1 can connect with any southern project alternative except Alternative D.

xiii. River Crossing 2 (RC2)

- **Description** - RC2 was developed in response to public input and would include a nearly perpendicular crossing of the river, with an otherwise direct connection to the Two on Four section of PA Routes 147. It would include an alignment location east of PA Route 147 in Point Township.

- **Rationale** - RC2 was developed in response to public input. It was designed to minimize impacts to wetlands and the Susquehanna River.
- **Interchanges** - At PA Route 147 near PA 405 east of river.
- **Notes** - RC2 can connect with any southern project alternative except Alternative D.

xiv. River Crossing D (RCD)

- **Description** - RCD was designed to provide a direct connection from Alternative D to the Two on Four section of PA Route 147. It would include a perpendicular river crossing and an alignment location east of PA Route 147 in Point Township.
- **Rationale** - RCD would provide a direct connection with Alternative D, a perpendicular river crossing, and acceptable approach and alignment geometrics.
- **Interchanges** - At PA Route 147 near PA 405 east of river.
- **Notes** - RCD could only be used in conjunction with Alternative D to the south.

xv. Two on Four Improvements

This alternative would involve widening PA Route 147 from two lanes to four lanes for approximately six miles, from just south of the interchange between PA Route 147 and PA Route 45 north to I-80. PA Route 147 in the immediate vicinity of I-80 is presently four lanes. This alternative would connect with that existing four lane roadway.

PA Route 147 was constructed (1968-70) as a two lane roadway. However, PENNDOT acquired right-of-way large enough to accommodate a four lane facility. As a result, the majority of the disturbance caused by this widening will occur on right-of-way already owned by PENNDOT. The proposed widening will occur to the east of existing PA Route 147. The existing two lanes will become the two southbound lanes and the two lanes to be added will become the two northbound lanes of PA Route 147. The stretch of roadway to be widened includes four interchanges.

- PA Route 147/PA Route 45
- PA Route 147/Industrial Park Road
- PA Route 147/PA Route 642
- PA Route 147/PA Route 254

The widening will also involve reconstructing those interchanges.

5. Modifications to Preliminary Alternatives

In June of 1997, these 23 new Alignment Alternative combinations and the TSM/Upgrade Alternative were presented at a Public Meeting. Maps of the alignments were displayed and Draft Environmental Impact Summary Tables were distributed. Environmental impacts were assessed for each southern alternative in conjunction with River Crossing (RC) 1 (A1, B1, BA1, BE1, C1, E1, F1, G1) and RC2 (A2, B2, BA2, BE2, C2, E2, F2, G2) and Alternative D in conjunction with RCD. In addition, preliminary environmental impacts were presented for the TSM/Upgrade Alternative, the Route 61 Connector, the Route 15 Connector, and the "two on four" section of PA Route 147. These Draft Environmental Impact Summary Tables are shown in Appendix F.

Based on comments from this meeting, the study team developed a new alternative and a new river crossing option. This new alternative is a modification of Alternatives D, A, and BA. Known as Alternative DA, this new alternative attempts to keep the best qualities of Alternatives D, A, and BA, while shifting to avoid impacts which the community indicated are significant. In addition, a new river crossing, RC3, was developed.

a. Alternative DA

- **Description** - The southern half of Alternative DA is similar to Alternatives D and BA in that it would extend from the Selinsgrove Bypass northward past the Penn Valley Airport, it would head toward Penns Creek, but then it would curve to the east to join the Alternative A corridor. The alternative would continue east past PPL Ash Basin No. 2 to the northwest corner of Shamokin Dam Borough. It would then depart from the Alternative A corridor by curving to the north along an alignment that would take it over the center of PPL Ash Basin No. 3, which is closed and has been capped with soil. Alternative DA would continue northward to rejoin the Alternative A corridor, alongside existing US Route 15, to the pass south of Winfield.

  At this point, Alternative DA would cross the West Branch Susquehanna River using one of the three river crossing options (RC1, RC2 or RC3 - see below). The location of Alternative DA is shown on Figure III-2.

- **Rationale** - Alternative DA was added to the list of alternatives near the end of the Preliminary Alternatives Phase of study. This alternative attempts to collectively address comments and suggestions from the public and resource agencies. Alternative DA attempts to further minimize environmental and social impacts by using PPL's Ash Basin No. 3 to decrease residential and habitat impacts.

- **Connector Roadways** - Alternative DA provides the opportunity to connect to the existing highway system through use of either the 61 or 15 Connector.
- **Interchanges** -
  1. At the Selinsgrove Bypass (southern terminus)
  2. At the 61 Connector or 15 Connector
  3. At US 15 south of Winfield and west of the river

b. River Crossing 3 (RC3)

- **Description** - RC3 would leave the southern alternatives on a curve somewhat sharper than the curves used for RC1 and RC2. This would result in a crossing located south of RC1, RC2, and RCD. Once on the east side of the West Branch Susquehanna River, the alignment would curve north and run along the west side of the railroad tracks and PA Route 147. This alignment would then connect to PA Route 147 at the end of the "two on four" section near Chillisquaque Creek. RC3 is shown on Figure III-2.
- **Rationale** - RC3 was designed to minimize impacts to the residential communities south of Winfield and east of PA Route 147 in Point Township.
- **Interchanges** - At PA Route 147 near PA 405 east of river.
- **Notes** - RC3 could connect with any southern project alternative except Alternative D.

B. EVALUATION OF PRELIMINARY ALTERNATIVES (PHASE I STUDIES)

This section describes the evaluation and screening of the preliminary alternatives. This initial evaluation effort is completed to narrow the wide range of alternatives to a smaller, more manageable number of alternatives that best meet the project need, achieve the desired engineering criteria, and minimize environmental impact.

The evaluation and screening process involves input from the study team, resource agencies, the Citizens Advisory Committee (CAC), Public Officials Work Group (POWG), and the public.

The alternatives have been evaluated based on their ability to meet the transportation needs of the project, their environmental impact, and their engineering feasibility and practicality.

The Transportation Objectives category includes an evaluation of alternatives based on the specific components of the project need. The Environmental category includes an evaluation of alternatives based on the findings of the environmental overview. The Engineering category is based on issues concerning the design of a proposed facility.

1. Separation of Study Area into Sections

To facilitate the evaluation of preliminary alternatives, the study area was divided into three (3) sections. The section limits are defined as follows and are shown in Figure III-2.

a. **Section 1** - The end of the Selinsgrove Bypass (southern terminus) to just west of the new interchange with US Route 15 near Winfield. The following New Alignment Alternatives are located in Section 1: A, B, C, D, E, F, G, BA, BE, DA, Route 61 Connector, and Route 15 Connector. The Route 61 Connector and Route 15 Connector are alternatives to connect existing roadways in the study area to the new alignment alternatives.

b. **Section 2** - Just west of the Winfield area interchange with US Route 15 to PA Route 147, just south of the PA Route 147/PA Route 45 Interchange. The following New Alignment Alternatives are located in Section 2: RC1, RC2, RC3, and RCD.

c. **Two on Four Section** - The existing two on four section of PA Route 147 from just south of the PA Route 147/PA Route 45 Interchange north to I-80.

The possible combinations of alternatives can be summarized as follows.

- The Build-Out of the two on four section is used with <u>all</u> CSVT New Alignment Alternative and the TSM/Upgrade Alternative.
- Alternatives RC1, RC2, and RC3 in Section 2 can be "paired" with any Section 1 alternative, except Alternative D.
- Alternative D in Section 1 must be "paired" with Alternative RCD in Section 2.
- The Connector Alternatives can be used with Alternatives A, BA, C, and DA in Section 1.

2. Evaluation of Transportation Objectives

In order to achieve the transportation objectives of the project, the following criteria must be met.

- The alternative must reduce congestion on study area roadways.

- The alternative must improve safety by providing a limited access facility and by separating through and local traffic.

- The alternative must accommodate future traffic growth by providing a desirable level of service. For this project, a desirable level of service is LOS C or better.

a. Traffic Analysis

A traffic analysis was completed to compare the traffic impacts of each alternative. The purpose of the comparison was to determine how well each alternative addressed the transportation objective to reduce congestion.

i. Alternative "Families"

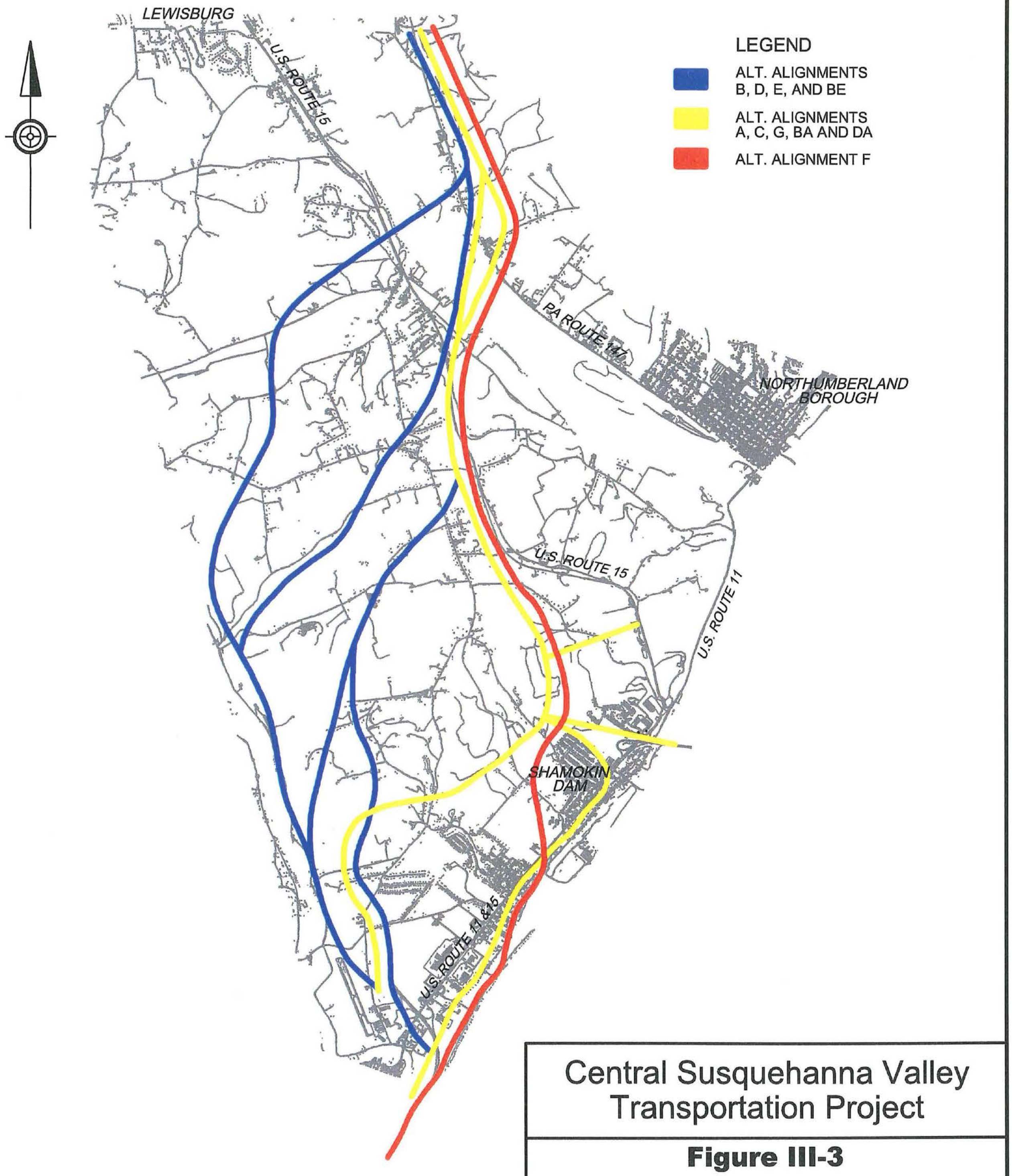
Thirty-four (34) New Alignment Alternative combinations and the TSM/Upgrade Alternative were analyzed. However, many of the alternatives would provide similar traffic flow characteristics and they would connect to the existing roadway network in the same manner. Accordingly, four "families" of alternatives were identified as representative of the 35 project alternatives and are shown on Figure III-3.

- No-Build or "Do Nothing" - This family assumes no new roadways would be constructed in the study area. These volumes were used to determine the improvements needed in the TSM/Upgrade Alternative.

- The "Blue Family Alternatives" - The Blue Family would include interchanges with US Routes 11/15 just north of Selinsgrove, with US Route 15 in the vicinity of Winfield, and with PA Route 147 south of its intersection with PA Route 405. These three access points are common in Alternatives B, BE, D, and E.

- The "Yellow Family Alternatives" - The Yellow Family would provide all of the connections to the existing roadway network of the Blue Alternative, plus a direct connection to the Veterans Memorial Bridge (PA Route 61) and US Routes 11/15 in Shamokin Dam Borough via the Route 61 Connector. The alternatives in the Yellow Family include: A, BA, C, DA, and G.

- The "Red Family Alternative" - The Red Family differs from the Yellow Family in that it would provide a direct connection to US Routes 11/15 on the Shamokin Dam Borough and Monroe Township border just north of Park Road. It would not include the Route 61 Connector. The only alternative in the Red Family is Alternative F.



Central Susquehanna Valley Transportation Project

Figure III-3

ALTERNATIVE FAMILIES

NOT TO SCALE

A 15 Connector was also analyzed. Unlike the 61 Connector, this connector would provide a direct connection to US Route 15 and an indirect connection to the Veterans Memorial Bridge and PA Route 61. This comparison was studied as a modification to the Yellow Family Alternative.

ii. Future Traffic Volumes

The projected future traffic volumes were calculated using a type of traffic model known as a "gravity based" model. This model incorporates the following three elements (summed together) into the future traffic prediction.

- Existing volumes
- Projected increases in traffic originating beyond the study area (through traffic). Through traffic is growing at a rate of approximately 1% per year.
- Estimated traffic generated within the study area by proposed land use activity (population plus employment growth). Expected growth shows an additional 14,000 residents, 5,700 houses, and 9,300 jobs (approximately) by the year 2020. This equates to 90,000 daily trips added to the network, with 44% of those trips wanting to cross the Susquehanna River.

Future (2020) traffic volumes were predicted for both the Build and No-Build Families of Alternatives.

The addition of an expressway to an existing roadway network would change existing traffic volumes within the study area depending on the origin and destination of each trip. The results of the Shamokin Dam and Lewisburg origin/destination surveys were combined and assigned to the existing roadway network. This data was factored to account for existing traffic volumes and to verify current travel routings. The travel routes of each of the origin/destination pairs were modified to reflect the alternative under study. The change in traffic volume in each traffic movement in the study area, for each alignment alternative, was quantified, and these changes were included in the traffic model.

Future projected (2020) traffic volumes, due to project study area growth, were also assigned to the roadway network reflecting the most direct routing and the decreased travel time benefit of each alternative alignment. The trip distribution and assignment for growth in the traffic analysis zones were based on the combined results of the population and employment based gravity models, and the results of the Shamokin Dam and Lewisburg origin/destination surveys. The traffic model was validated by the CAC/POWG meeting through a workshop exercise.

Projected future traffic volumes were calculated for the existing roadway network and each proposed new alignment alternative. All comparisons are based on a comparison to the No-Build Alternative. Figures III-4 and III-5 illustrate the total traffic and truck traffic as a result of each alternative, respectively.

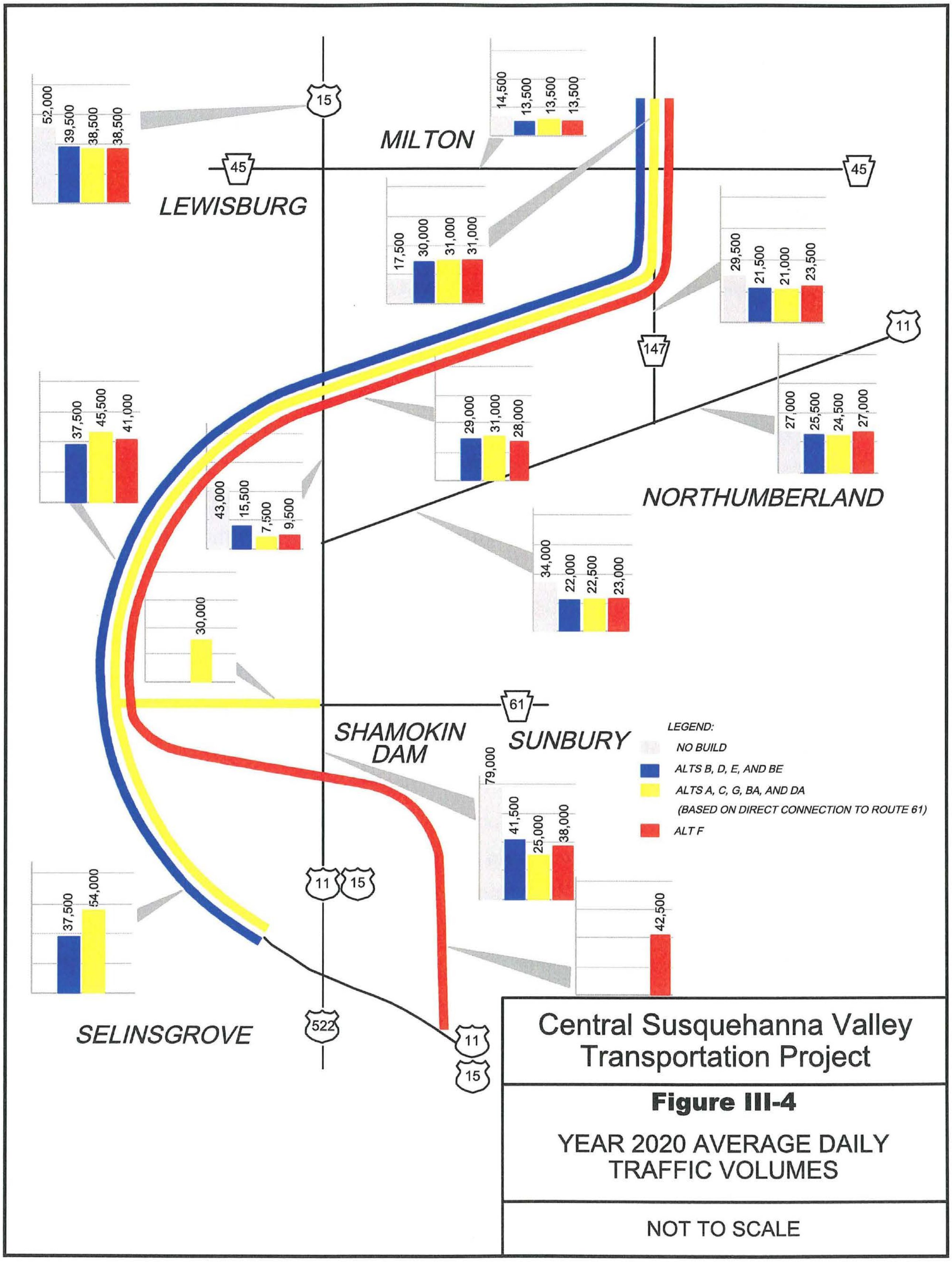
By the design year of 2020, under No-Build conditions, projected average daily traffic volume in the study area will more than double. Volume on US Routes 11/15 is projected to be 79,000 in the design year. US Route 15 volumes will vary from 43,000 vehicles in Monroe Township to 52,000 in Lewisburg Borough. PA Route 147 will also double to 29,500 in Northumberland Borough.

All of the new alignment alternatives and the TSM/Upgrade Alternative would reduce congestion on existing study area roadways to some degree. The Yellow Family Alternative would reduce traffic on US Routes 11/15 at the southern end of the study area by 62%, the largest decrease of any alternative. The Blue Family Alternative would result in the least decrease, 44%, because trips destined to/from US Routes 11/15 to the Sunbury area on the east side of the Veterans Memorial Bridge are not directly served by this alternative. Therefore, these trips would continue to use the existing roadway network. The Red Family Alternative would serve about 5% more traffic than the Blue Family Alternative (49%), due to its additional access point to the existing network in the vicinity of Park Road.

The projected volume of trucks under the No-Build Alternative is 8,350 trucks per day on US Routes 11/15. On US Routes 11/15, an 85% reduction or 7,200 trucks is projected with the Yellow Family Alternative. The Yellow Family Alternative would remove 1,500 more trucks from US Routes 11/15 than the Blue or Red Family Alternative. With the Blue or Red Family Alternative, the reduction is 68% or about 5,700 trucks.

With the incorporation of any relocation scenario, traffic on US Route 15 in Lewisburg is expected to be reduced by 24%, and on PA Route 147 in Northumberland Borough by 20%. The Blue Hill Bridge, or US Route 11, would experience a reduction of 12,000 vehicles per day or about 35% of the total volume. Similarly, truck traffic in Lewisburg would be reduced by 45% or 2,650 trucks. Traffic volumes on PA Route 147 in Northumberland Borough would decrease to 1,800 or 2,000 trucks, and the Blue Hill Bridge would experience a reduction (about 56%) of its truck traffic.

The incorporation of the 15 Connector as an option to the 61 Connector was also evaluated. The use of the 15 Connector would not reduce traffic volumes on the existing roadway network as well as the 61 Connector, because it would not provide direct access to the Veterans Memorial Bridge and PA Route 61. Sunbury and Route 61 traffic headed south would continue to use existing US Routes 11/15, increasing volumes, since no direct connection is provided from PA Route 61 to the new facility. In addition, Sunbury and Route 61 traffic headed north would continue to use existing US Routes 11/15 and existing US 15 (past the 11/15 split) to access the 15 Connector and, ultimately, the new facility. With the 15 Connector, future (2020) ADT on US Route 15 would be 22,500 vehicles. This would be 15,000 more vehicles per day than projected with the 61 Connector. Figure III-6 provides a compari-



Central Susquehanna Valley Transportation Project

Figure III-4

YEAR 2020 AVERAGE DAILY TRAFFIC VOLUMES

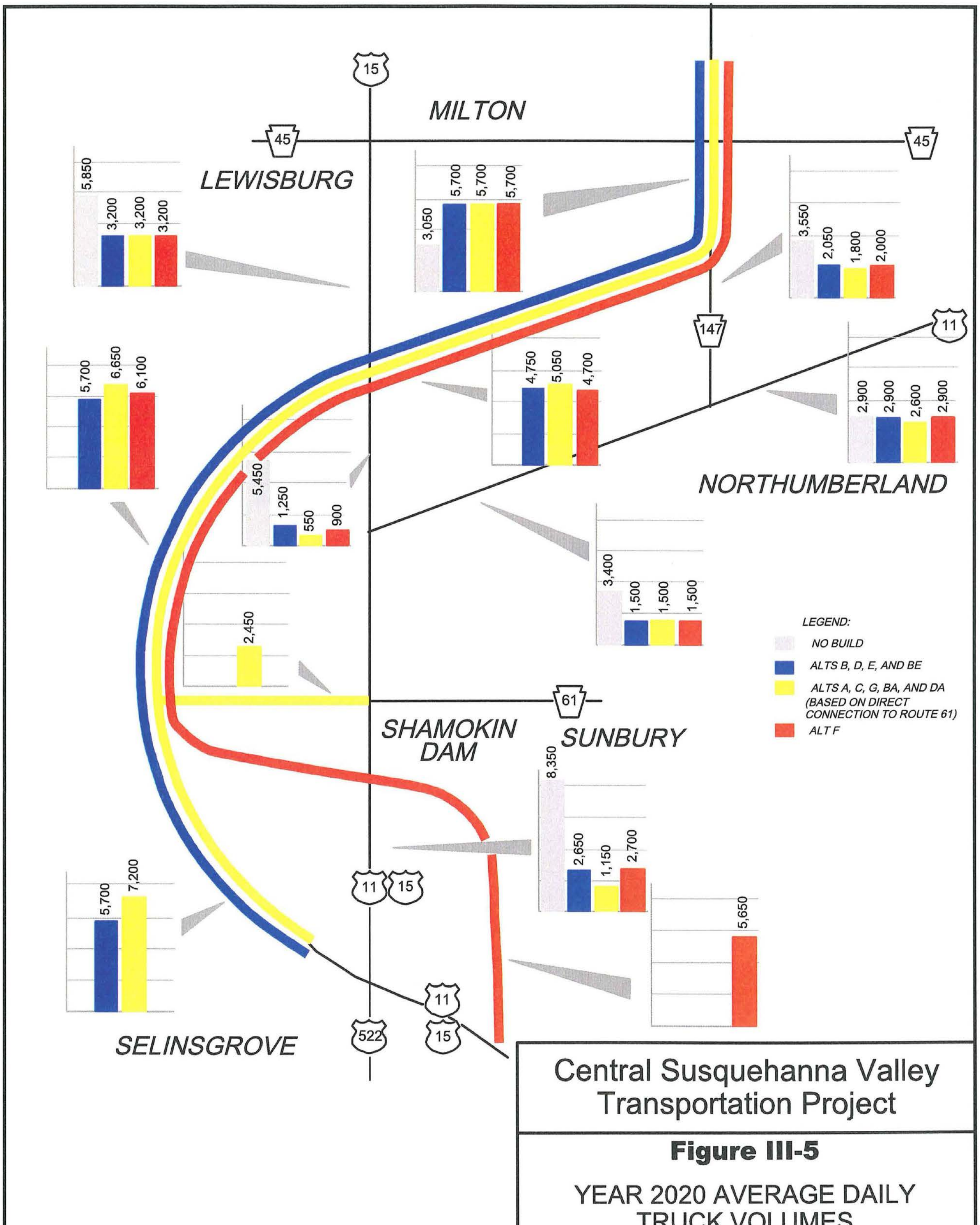


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Figure III-5

YEAR 2020 AVERAGE DAILY TRUCK VOLUMES

NOT TO SCALE

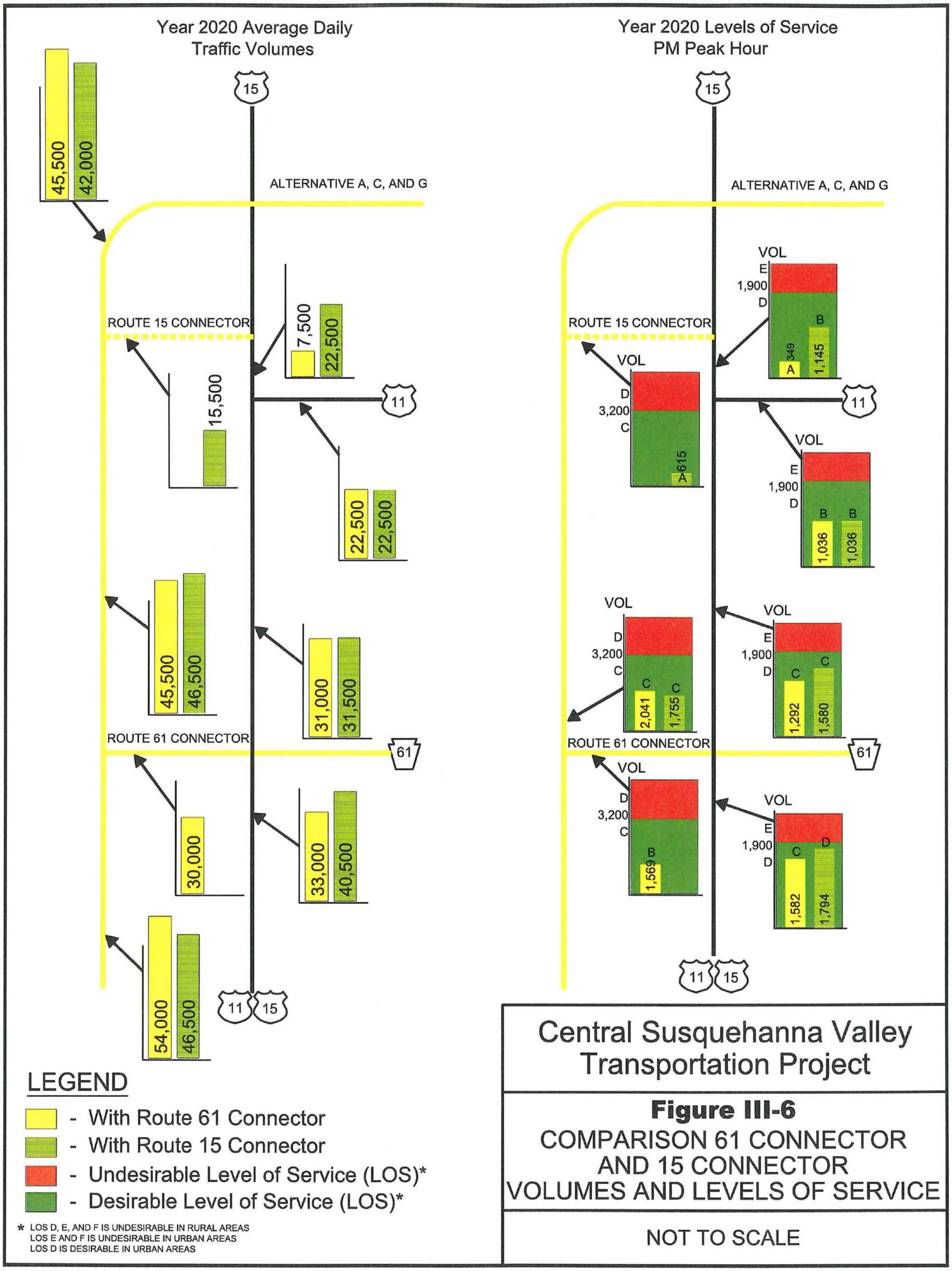

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Figure III-6
COMPARISON 61 CONNECTOR AND 15 CONNECTOR VOLUMES AND LEVELS OF SERVICE

NOT TO SCALE

son of future volumes on the traffic links affected by the potential change in the location of the connecting roadway.

b. Safety

Improving the safety of the roadway users hinges on the design of a limited access facility and the separation of through and local traffic, especially through truck traffic. All New Alignment Alternatives would achieve the transportation objective of improving safety, because they all separate through and local traffic. The TSM/Upgrade Alternative would not be designed as a limited access facility nor would it separate through and local trips. Therefore, the TSM/Upgrade Alternative would not adequately address the safety issues related to access control and the conflict of through and local traffic.

c. Future Conditions/Capacity

Future capacity of roadways is measured as a Level of Service (LOS). LOS is a qualitative measure describing operational conditions within a traffic stream and the perception of the condition by motorists. Six levels of service (A through F) exist for certain types of facilities. The definitions of these different LOS can be found in Figure I-7 and in the Highway Capacity Manual. Generally, as the actual volumes increase, the LOS decreases. As discussed in Section I, Purpose and Need for Action, by the design year (2020), 90% of the study area roadways and intersections will operate at undesirable levels of service (LOS F). Therefore, a project need is to ensure sufficient capacity by providing a LOS C or better in the design year for any new roadway facility, and a LOS C (in rural areas) and LOS D (in urban areas) on the existing network.

The CSVT Project cannot solve every capacity related deficiency in the study area. Of the 19 intersections identified in the 2020 No Build Scenario that are projected to operate at undesirable levels of service during either the morning or evening peak hour, or both, the CSVT Project alleviates many of the congestion related problems along US Routes 11/15 in the Shamokin Dam area, and along sections of US Route 15 south of Winfield. Along those roadway segments where poor levels of service are still projected, congestion levels are projected to decrease, but not enough to totally alleviate the poor levels of service. Travel time delays along US Routes 11/15 between the end of the existing expressway section in Selinsgrove and the split in Shamokin Dam are estimated to decrease by approximately 78 to 83 percent as a result of the CSVT, while an 89 to 93 percent decrease in travel time delays are projected for US Route 15 between the US Routes 11/15 split and Winfield.

Generally, the locations where poor levels of service are projected for 2020, even with the CSVT roadway in place, are related to side street traffic volumes along the major study area roadways that were not (and could not be) benefitted by the CSVT roadway. Travel time delays on US Route 11 between the US Routes 11/15 split and Northumberland are projected to decrease 54 to 59 percent with a 15 to 25 percent reduction in travel time delays along PA Route 147 between US Route 11 and the proposed interchange with the CSVT roadway in Chillisquaque. For the entire study area, the reduction in travel time delays is projected to be between 58 and 62 percent overall. As noted, the CSVT Project cannot provide relief to every congested location within the study area, but the project provides a tremendous benefit overall.

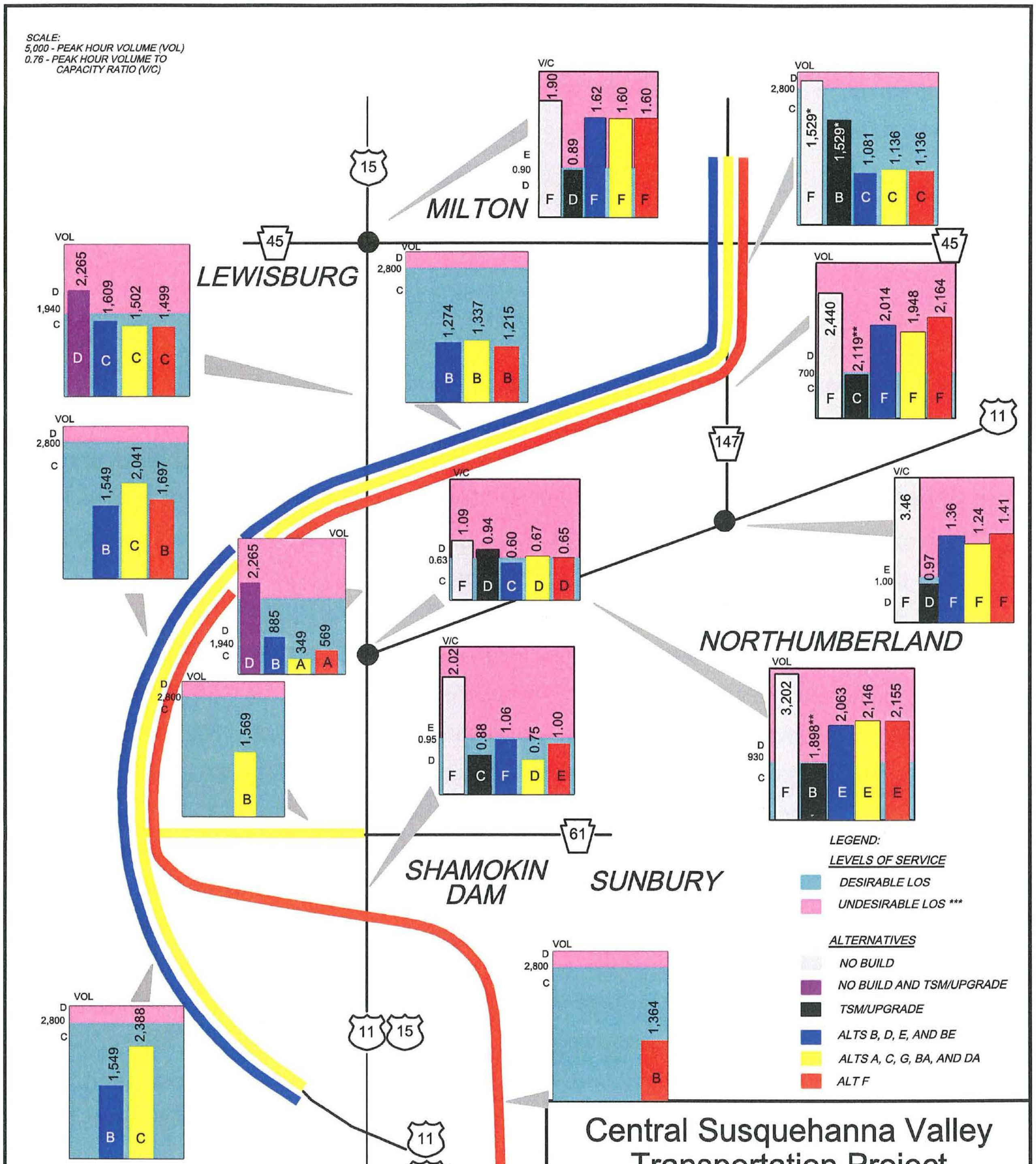
Additionally, there are minor differences in the ways the different Familes of Alternatives improve capacity. Figure III-7 illustrates the differences in traffic operations within the study area for each family of alternatives.

The goal of the TSM/Upgrade Alternative is to increase the capacity on the existing network to desirable levels of service on all study area roadways. On US Routes 11/15 in Shamokin Dam Borough, the LOS would improve from "F" to "C". The intersection of US Route 11 and US Route 15 in Shamokin Dam and the intersection of PA Route 147 and US Route 11 in Northumberland Borough would both improve from LOS "F" to "D". PA Route 147 in Northumberland Borough would also improve from LOS "F" to "C". There would be no change in LOS on US Route 15 between US Route 11 and PA Route 45. However, the signalized intersection between US Route 15 and PA Route 45 would improve from LOS "F" to "C".

Operations on US Routes 11/15 in Shamokin Dam Borough would be expected to improve from a LOS "F" to LOS "D" in the Yellow Family Alternatives, and a LOS "E" with the Red Alternative. The Blue Family Alternatives would not decrease volumes on US Routes 11/15 enough to warrant a change in its Level of Service "F"; however, the volume to capacity (v/c) ratio would improve to 1.06 from 2.02. The v/c ratio is the ratio of demand flow rate (traffic volume) to capacity for a traffic facility. Lower values of v/c ratio (0.0 to 0.6) generally relate to smoother traffic flow, while higher values (0.6 or greater) indicate potentially congested conditions. Therefore, only the Yellow Family Alternative would improve the operations to a desirable LOS on US Routes 11/15.

For all Build Alternatives, the Blue Hill Bridge (US Route 11) in Northumberland Borough would improve by one letter grade from a LOS "F" to LOS "E". PA Route 147 in Northumberland Borough would remain at Level of Service "F" due to the congestion remaining at the intersection of PA Route 147 and US Route 11. However, the volume to capacity (v/c) ratio at this intersection would decrease by more than 50%.

The Lewisburg Borough intersection of PA Route 45 and US Route 15 would also improve from a v/c ratio of 1.92 to 1.6, but not enough to warrant an improved Level of Service letter grade. In both Lewisburg and Northumberland Boroughs, the reduction in truck traffic would improve operations greatly.



* THE THRESHOLD VOLUME FOR THIS SEGMENT IS FOR THE PROPOSED EXPRESSWAY. ALTHOUGH THE NO BUILD VOLUME DOES NOT EXCEED THE THRESHOLD, IT DOES CAUSE A LEVEL OF SERVICE 'F' UNDER NO BUILD CONDITIONS (2-LANE HIGHWAY) THE SEGMENT OPERATES AT LEVEL OF SERVICE 'B' UNDER TSM/UPGRADE CONDITIONS (MULTILANE HIGHWAY).

** THE THRESHOLD VOLUME FOR THIS SEGMENT IS FOR A TWO LANE HIGHWAY. ALTHOUGH THE TSM/UPGRADE VOL. EXCEEDS THIS THRESHOLD, WITH THE UPGRADE TO FOUR LANES, THE SEGMENT OPERATES WITH A DESIRABLE LEVEL OF SERVICE.

*** LOS D, E, AND F IS UNDESIRABLE IN RURAL AREAS; LOS E AND F IS UNDESIRABLE IN URBAN AREAS; LOS D IS DESIRABLE IN URBAN AREAS

Central Susquehanna Valley Transportation Project

Figure III-7

YEAR 2020
PEAK HOUR
LEVELS OF SERVICE (LOS)

NOT TO SCALE

However, levels of service do not improve to a desirable range due to traffic patterns not affected by the CSVT Project.

Operations on the CSVT New Alignment Alternatives would be Level of Service "C" or better for all of the alternatives.

d. Conclusions of Transportation Objectives Analysis

The purpose of the project is to reduce congestion on study area roadways, to improve safety for the users of the roadway system through better accommodation of all traffic with particular attention to trucks and through traffic, and to ensure sufficient capacity for the growth in population and employment that is expected for the study area. The alternatives are evaluated in terms of these purposes.

All of the new alignment alternatives and the TSM/Upgrade Alternative would reduce congestion. However, the Yellow Family (Alternatives A, BA, C, DA, and G) would reduce traffic on US Routes 11/15 at the southern end of the study area by 62%, the largest decrease in traffic. The Blue Family would result in the least decrease in traffic on US Routes 11/15 at the southern end of the study area, 44%. The Yellow Family of Alternatives allows for a connection back to US Routes 11/15 in the Shamokin Dam area, and, more notably, to PA Route 61. This connection allows for the CSVT roadway to serve additional traffic that would otherwise stay on the existing roadway system. The reason the Yellow Family reduces traffic more than the Blue Family is because trips destined to/from US Routes 11/15 to the Sunbury area on the east side of the Veterans Memorial Bridge are served by the alignments, whereas trips to the Sunbury area and other points east from the Blue Family of Alternatives would need to continue to use the existing roadway network to do so. Therefore, the Yellow Family of Alternatives meets the need of reducing congestion better than the Blue Family of Alternatives.

In other heavy-congestion locations, such as Northumberland Borough, the Lewisburg area, and US Route 11 heading into Northumberland Borough (over the Blue Hill Bridge), traffic congestion reduction is similar for all new alignment alternatives.

The use of the 15 Connector as an option to the 61 Connector was also evaluated. The 15 Connector would not reduce traffic volumes on the existing roadway network as well as the 61 Connector, because it does not provide direct access to the Veterans Memorial Bridge and PA Route 61. Sunbury and Route 61 traffic headed east would have to continue to use US Route 15 and US Routes 11/15, thereby increasing traffic volumes in this heavily congested stretch of roadway. The indirect connection afforded by the 15 Connector would leave 7,500 more vehicles per day on US Routes 11/15 south of PA Route 61, and 500 more vehicles per day between PA Route 61 and the 11/15 split. North of the 11/15 split, the traffic increase is the most pronounced, with 15,000 more vehicles per day on US 15. Therefore, the 15 Connector does not meet the need of reducing congestion as well as the 61 Connector.

Improving the safety of the users hinges on the separation of through and local traffic and the provision of a limited access facility. The TSM/Upgrade Alternative, though reducing congestion, would not separate the through and local traffic, and would not provide a limited access facility. Therefore, the TSM/Upgrade Alternative by itself would not address the safety issues related to access control and the conflict of through and local traffic, and it would not meet the needs of the project. All of the new alignment alternatives would improve the safety for roadway users by providing a limited access facility and by separating through and local traffic.

The new alignment alternatives would all provide a new roadway that achieves a Level of Service (LOS) C. However, the new alignment alternatives differ slightly in how they improve the capacity on the existing study area roadways. The difference between the families in the accommodation of future traffic depends on how much traffic the new alignment alternatives divert from an existing roadway to the new facility. For example, operations on US Routes 11/15 in the Shamokin Dam Borough area would be expected to improve from a LOS F to a LOS D with the Yellow Family of Alternatives. Since US Routes 11/15 in the Shamokin Dan area is considered an "urban" area, the LOS improvement on the existing network to D would be desirable. However, operations on this same stretch of roadway would not improve to an acceptable LOS with the Blue or Red Family of Alternatives. Therefore, operations on this section of roadway would be undesirable with the Blue or Red Family of Alternatives. The Yellow Family of Alternatives would provide adequate capacity for future traffic on the existing roadway network.

The CSVT project cannot solve every capacity related deficiency in the study area. Of the 19 intersections identified in the 2020 No Build Scenario that are projected to operate at undesirable levels of services during either the morning or evening peak hour, or both, the CSVT Project alleviates many of the congestion related problems along US Routes 11/15 in the Shamokin Dam area and along sections of US Route 15 south of Winfield. Along those roadway segments where poor levels of service are still projected, congestion levels are projected to decrease, but not enough to totally alleviate the poor levels of service. Travel time delays along US Routes 11/15 between the end of the existing expressway section in Selinsgrove and the split in Shamokin Dam are estimated to decrease by approximately 78 to 83 percent as a result of the CSVT, while an 89 to 93 percent decrease in travel time delays are projected for US Route 15 between the US Routes 11/15 split and Winfield.

Generally, the locations where poor levels of service are projected for 2020 even with the CSVT roadway in place are related to side street traffic volumes along the major study area roadways that were not (and could not be) benefitted by the CSVT roadway. Travel time delays on US Route 11 between the US Routes 11/15 split and Northumberland are projected to decrease 54 to 59 percent with a 15 to 25 percent reduction in travel time delays along PA Route 147 between US Route 11 and the proposed interchange with the CSVT roadway in Chillisquaque. For the entire study area, the reduction in travel time delays is projected to be between 58 and 62 percent overall. As noted above, the CSVT roadway cannot provide relief to every congested location within the study area significantly enough to mitigate it, but it provides a benefit overall that could be improved by independent TSM/ upgrade improvements at appropriate locations.

Table III-2 provides a tabular summary of the traffic analysis in terms of the ability of each alternative to address the specific elements of the project purpose and need.

The Yellow Family Alternatives with the direct connection to PA Route 61 would best satisfy the Project Needs.

TABLE III-2
TRANSPORTATION OBJECTIVES SUMMARY*

Alternative	Reduces Congestion?	Improves Safety?**	Provides for Future Growth?***
No Build	no	no	no
TSM/Upgrade	somewhat	no	no
A	yes	yes	yes
B	somewhat	yes	somewhat
BA	yes	yes	yes
C	yes	somewhat	yes
D	somewhat	yes	somewhat
DA	yes	yes	yes
E	somewhat	yes	somewhat
BE	somewhat	yes	somewhat
F	yes	somewhat	yes
G	yes	somewhat	yes
Route 61 Connector	yes	N/A	N/A
Route 15 Connector	somewhat	N/A	N/A

* River crossings included with mainline alternatives, not analyzed separately.
** To improve safety, alignment must separate through and local traffic.
*** To provide for future growth, alignment must improve level of service (LOS).

3. Environmental Analysis

An environmental analysis was completed for each of the preliminary alternatives. This analysis was conducted for the No-Build, the TSM/Upgrade, and each of the New Alignment Alternatives. The analysis included the identification of probable impacts to environmental, socioeconomic, and cultural resources within the study area as delineated through secondary sources and limited field verification. Impacts to environmental resources for each of the preliminary alternatives are discussed in the following sections.

a. No-Build Alternative

The No-Build Alternative would result in no direct environmental impacts. However, the selection of the No-Build Alternative would result in indirect secondary impacts to the socioeconomic environment of the project area. The No-Build would not meet the project need/purpose of providing for future growth potential. If left unimproved, the local roadway network could not provide the transportation services necessary to support the anticipated future economic growth in the project area.

b. TSM/Upgrade Alternative

The TSM Alternative does not meet the project needs. However, environmental impacts were still calculated as part of the Environmental Analysis.

The TSM/Upgrade Alternative would result in significant impacts to environmental resources within the project area, especially socioeconomic resources. Impacts of the TSM/Upgrade Alternative can be summarized as follows.

As noted in Table III-3, the TSM/Upgrade Alternative would have a significant impact on the residential and economic communities within the project area.

c. New Alignment Alternatives

Environmental impacts associated with each new alignment alternative were evaluated for each section within the project area (Section 1 - the Southern Alternatives, Section 2 - the River

TABLE III-3
IMPACT SUMMARY
TSM/UPGRADE ALTERNATIVE

Resource	Impact
Impact Area (Hectares/Acres)	113/279
Number of Stream/River Crossings	21
Predictive Wetlands (Hectares/Acres)	4/10
Productive Agricultural Land (Hectares/Acres)	5/12
Agricultural Security Area (Hectares/Acres)	5/12
Prime/Statewide Important Farmland Soils (Hectares/Acres)	77/190
Number of Possibly Eligible National Register Historic Sites	18
Forested Land (Hectares/Acres)	47/116
Herbaceous Land/Shrub Land (Hectares/Acres)	49/121
Number of Potential Waste Sites	64
Number of Sites with Threatened or Endangered Species Habitats (Hectares/Acres)	2/5
Number of Wellhead Protection Area (Hectares/Acres) ● Zone 1 ● Zone 2	 3/2 6/25
Number of Displaced Residential Dwellings	250
Number of Displaced Commercial Establishments	106
Potential Number of Category "B" Receptors Impacted by Elevated Noise Levels	Not Evaluated
High/Very High Potential Archaeology Site (Hectares/Acres)	15/37

Crossings, and the 2 on 4 section). The new alignment alternatives Impact Summary Table provides a comparative analysis of environmental resource impacts by alternative within each section (see Table III-4). A comparative summary analysis of four key environmental constraints is evaluated for each section, as follows. Key environmental features within the study area for diagnostic purposes include the following.

- Residential and Commercial Displacements
- Wetlands
- Productive Agricultural Land
- Historic Resources

i. Section 1

Figure III-8 graphically illustrates wetland, productive agricultural land, historic resources, and residential and commercial displacement impacts in ascending order, by Alternative, within Section 1. Wetland impacts represent the areal extent of predictive wetland habitat impacted by the preliminary engineering design footprint for each alternative. Wetland impacts would range from 3 to 13 hectares (7 to 32 acres). Four subsets of wetland impact data are apparent from Figure III-8. Alternative D would impact the least area of wetland habitat and Alternative F would impact the most wetland area. Alternatives B, BE, C, DA, E, and G would have comparable impacts. Likewise, Alternatives A and BA would have comparable wetland impacts. Productive farmland impacts would range between 51 hectares/126 acres (Alternative G) and 128 hectares/315 acres (Alternative D). Alternatives C and F would fall at the lower end of the impact range, followed by Alternatives BE, B, DA, and E. Alternatives A and BA would fall at the higher end of the impact range. Impacts to historic sites would range between 1 and 7 sites. Residential displacements would account for the majority of displacements for each alternative. Alternatives D and DA would have the lowest numbers of residential displacements (31 and 49, respectively) while the alternatives that are located between the Old Trail Road and the Susquehanna River (Alternatives C, F, and G) would have the highest numbers of residential displacements (Alt. C = 192, Alt. F = 129, and Alt. G = 184). The remaining alternatives located west of the heavily developed portions of the valley (Alts. B, BA, BE, and E) would have comparable residential displacements, ranging from 71 to 83.

A comparative assessment of environmental impacts for each alternative within Section 1 resulted in the determination that there are no alternatives that would avoid impacts to environmental resources. A side-by-side, graphical comparison of the impacts by alternative for each of the four key environmental constraints illustrates that low impacts to one resource by an alternative are offset by high impacts to another resource. For example, Alternative F has lower impacts to productive agricultural land and higher impacts to wetlands, and Alternative C would have lower impacts to agricultural lands, but would require more residential displacements. This impact trade-off scenario is evident for each of the alternatives and demonstrates there are no alternatives that would result in the least impacts to each of the key environmental features within Section 1.

ii. Section 2

Section 2 Alternatives consist of four alternative river crossings (i.e., RC1, RC2, RC3, and RCD). Figure III-9 graphically illustrates impacts in ascending order for each of the four alternative

TABLE III-4***
CENTRAL SUSQUEHANNA VALLEY TRANSPORTATION PROJECT
NEW ALIGNMENT ALTERNATIVES
IMPACT SUMMARY*

RESOURCE	PRELIMINARY ALTERNATIVES SECTION 1				
	A	B	BA	BE	C
Impact Area (Acres)	826	655	846	671	722
Number of Stream/River Crossings	33	20	33	30	25
Predictive Wetlands (Acres)	17	12	18	13	14
Productive Agricultural Land (Acres)	250	214	254	205	146
Agricultural Security Areas (Acres)	105	83	68	106	15
Prime/Statewide Important Farmland Soils (Acres)	449	247	451	337	351
Number of Possibly Eligible National Register Historic Sites	2	4	4	4	6
Forested Land (Acres)	184	317	420	302	346
Herbaceous Land/Shrub Land (Acres)	51	53	56	57	55
Number of Potential Waste Sites	15	8	18	12	28
Number of Sites with Threatened or Endangered Species Habitats (Acres)	2 (20)	1 (16)	2 (20)	1 (15)	1 (11)
Number of Wellhead Protection Areas (Acres) • Zone 1 • Zone 2	1(1) 6 (261)	0 4 (124)	0 6 (236)	1 (1) 5 (234)	0 7 (331)
Other Concerns • Community Cohesion*	A, B, C, D, E	E, I, V	C, D, E	E, J, K, L, M, V	D, E, N, O
Number of Displaced Residential Dwellings	83	71	77	74	192
Number of Displaced Commercial Establishments	9	7	9	1	27
Potential Number of Category "B" Receptors Impacted by Elevated Noise Levels †	337	76	258	87	409
High/Very High Potential Archaeology Site (Acres)	43	46	50	42	77
Number of Potential 4(f) Uses Impacted	2	4	4	4	6
Number of Communities Impacted with Environmental Justice Issues	0	0	0	0	1

* Note: Impact numbers on this table include PA Route 61 Connector where applicable (Alternatives A, BA, C, and DA).
** = 2 on 4 is within the existing ROW.
*** Note: A metric version of this table appears in Appendix M.
† = Impacts are based on FHWA/PennDOT's Absolute (≥66 dBA) Criteria and PennDOT's substantial increase above existing criteria.
†† = The majority of the 2 on 4 area has been previously disturbed; however, an archaeological investigation will be conducted.

* COMMUNITY COHESION KEY

A dissects Mill Rd. subdivision (Monroe Twp)
B dissects Attig and Kingswood Road subdivisions (Monroe Twp)
C dissects Colonial Drive/Fisher Road subdivisions (Monroe Twp)
D impacts existing and planned subdivisions (O5) along Old Sunbury Road (Monroe Twp)
E impacts numerous small subdivisions (many along existing 15 and 147) until joining 147 ROW
F impacts entry area of planned subdivision along 147 (P1) (Point Twp)
G dissects Ridge Road West subdivision (Point Township)
H dissects planned subdivision along 147 (P1) (Point Twp)
I dissects subdivision along County Line Road (Monroe &Union Twps)
J dissects Stonebridge Drive subdivision (Monroe Township)
K impacts Peachtree Drive subdivision (Monroe Township)

TABLE III-4***
CENTRAL SUSQUEHANNA VALLEY TRANSPORTATION PROJECT
NEW ALIGNMENT ALTERNATIVES
IMPACT SUMMARY*

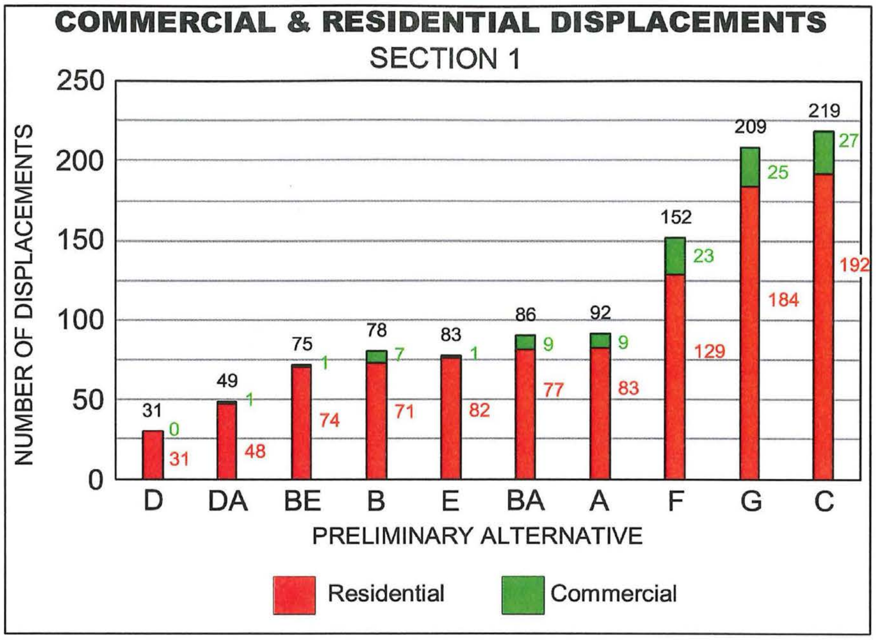
PRELIMINARY ALTERNATIVES									
SECTION 1					SECTION 2				2 ON 4
D	DA	E	F	G	RC1	RC2	RC3	RCD	SECTION**
605	717	678	712	711	244	235	196	203	156
25	34	28	27	31	9	8	6	9	7
6	12	12	32	13	10	6	8	9	8
316	217	225	182	127	61	83	93	50	0
78	89	153	22	13	13	39	62	32	0
330	328	346	445	312	95	97	116	85	111
3	1	2	4	7	3	2	3	2	0
205	322	297	332	330	128	94	56	74	43
31	70	48	46	59	49	49	26	64	90
5	18	10	18	29	2	1	5	1	0
0	2 (33)	1 (15)	1 (11)	2 (15)	0	0	1 (9)	1 (2)	0
0 3 (74)	0 6 (159)	1 (2) 5 (258)	0 7 (365)	0 7 (313)	0 1 (21)	0 1 (17)	0 1 (12)	0 0	0 0
E, P, V	W	A, B, E, K, L, M, S, V	D, E, U	D, E, N, T	E, F, R	E, G, H, R	E, R	Q, R	
31	48	82	129	184	19	21	13	19	0
0	1	1	23	25	1	1	6	1	0
75	268	141	294	357	11	24	20	20	Not Evaluated Yet
44	34	36	97	68	4	3	8	8	††
3	1	2	4	8	4	3	4	3	0
0	0	0	1	1	0	0	0	0	0

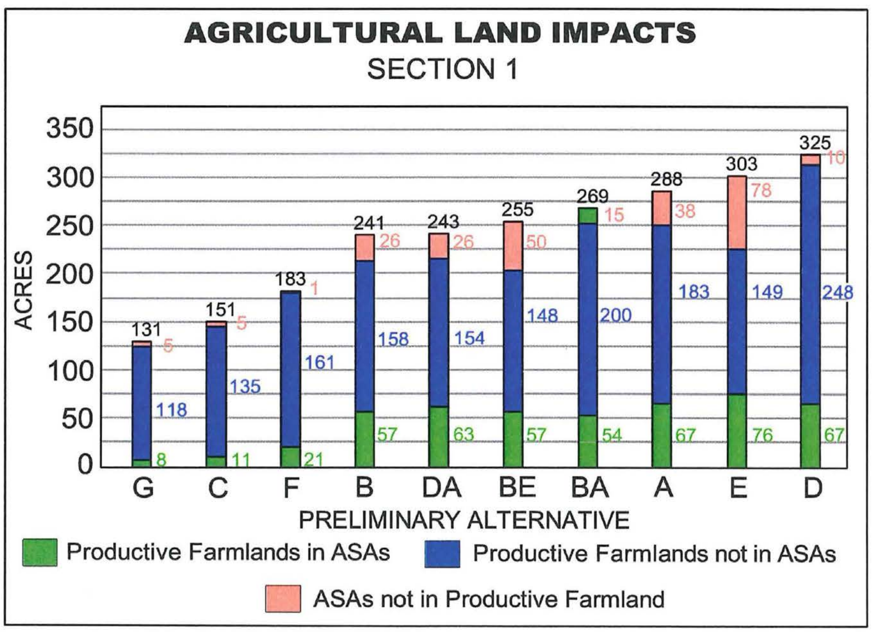
* Note: Impact numbers on this table include PA Route 61 Connector where applicable (Alternatives A, BA, C, and DA).
** = 2 on 4 is within the existing ROW.
*** Note: A metric version of this table appears in Appendix M.
† = Impacts are based on FHWA/PennDOT's Absolute (≥66 dBA) Criteria and PennDOT's substantial increase above existing criteria.
†† = The majority of the 2 on 4 area has been previously disturbed; however, an archaeological investigation will be conducted.

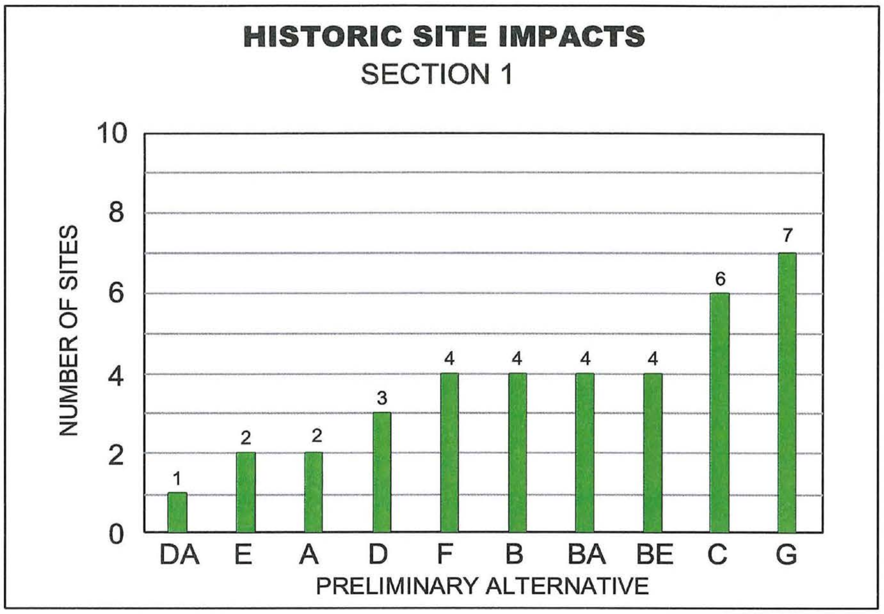
* COMMUNITY COHESION KEY

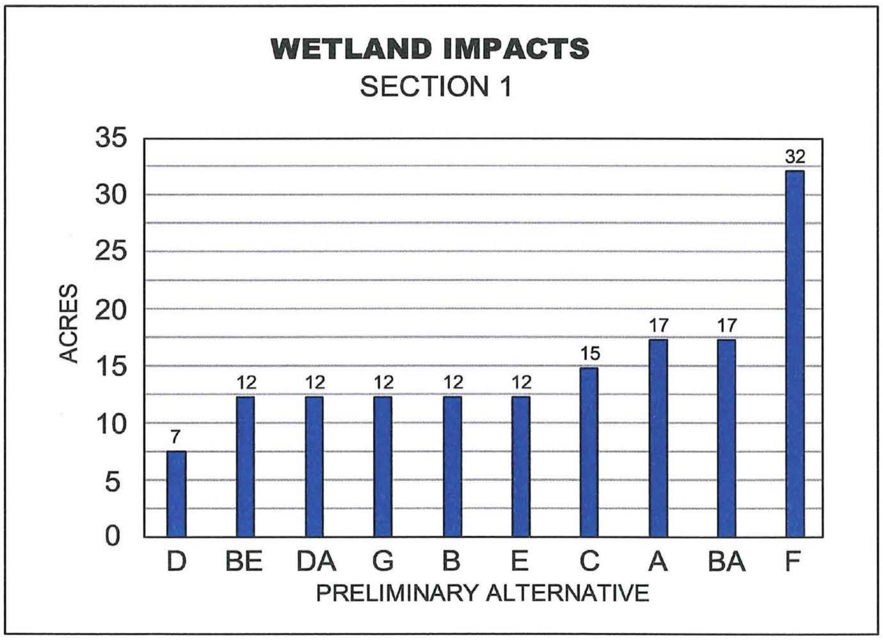
L nearly eliminates residential subdivision south of Kratzerville Road (Monroe Township)
M nearly eliminates residential subdivision north of Shaffer Lane (Monroe Township)
N substantial impact to Old Susquehanna Trail corridor (businesses & homes) (Monroe Township and Shamokin Dam Borough)
O forces relocation of Shamokin Dam Fire Company
P impacts 2 subdivisions on Union - East Buffalo Township line
Q impacts subdivision along 147 at bridge crossing (Point Twp)
R impacts a number of small subdivisions along 147 north before joining 147 ROW
S impacts entry area and homes in Stonebridge Drive subdivision (Monroe Twp)
T impacts Fabridam Park (federally funded regional recreation facility) (Shamokin Dam)
U moderate impact to Old Susquehanna Trail corridor (businesses & homes) (Monroe Township and Shamokin Dam Borough)
V limited access to regional commercial center
W dissects Market Street subdivision in Union Township, Union County

Date: October 1997


COMMERCIAL & RESIDENTIAL DISPLACEMENTS
SECTION 1
NUMBER OF DISPLACEMENTS
250
200
150
100
50
0
31
0
31
49
1
48
75
1
74
78
7
71
83
1
82
86
9
77
92
9
83
152
23
129
209
25
184
219
27
192
D
DA
BE
B
E
BA
A
F
G
C
PRELIMINARY ALTERNATIVE
Residential
Commercial


AGRICULTURAL LAND IMPACTS
SECTION 1
ACRES
350
300
250
200
150
100
50
0
131
5
118
8
151
5
135
11
183
1
161
21
241
26
158
57
243
26
154
63
255
50
148
57
269
15
200
54
288
38
183
67
303
78
149
76
325
10
248
67
G
C
F
B
DA
BE
BA
A
E
D
PRELIMINARY ALTERNATIVE
Productive Farmlands in ASAs
Productive Farmlands not in ASAs
ASAs not in Productive Farmland



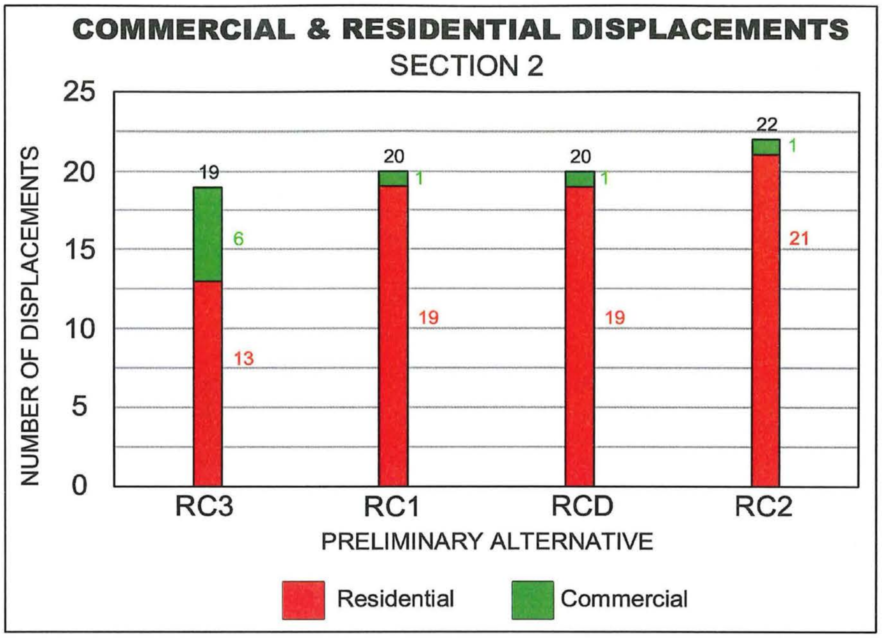


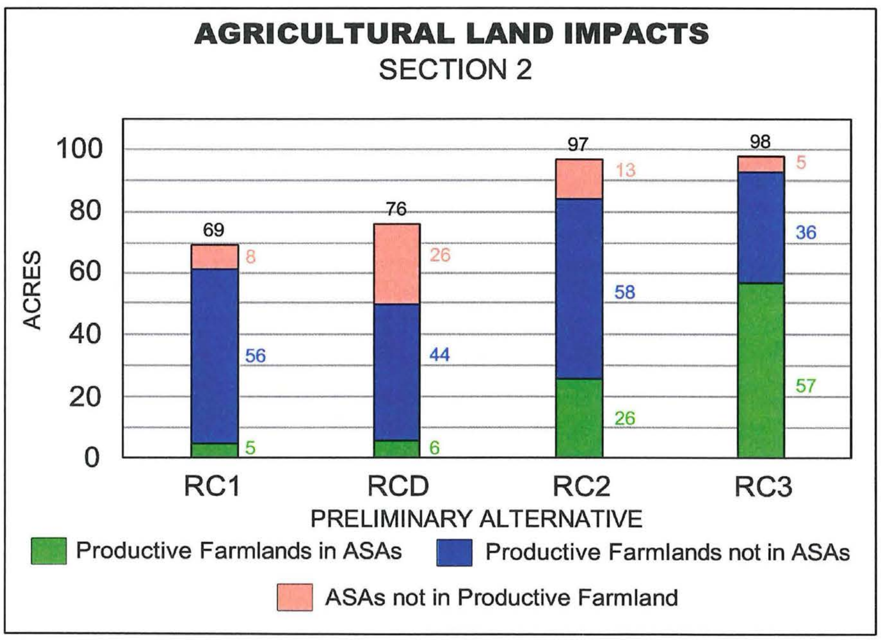
Central Susquehanna Valley Transportation Project

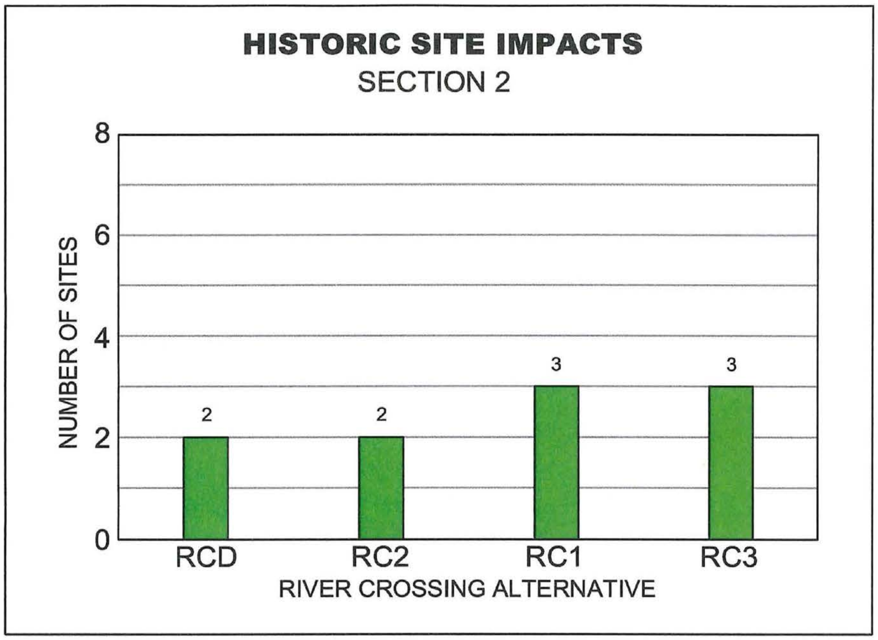
Figure III-8

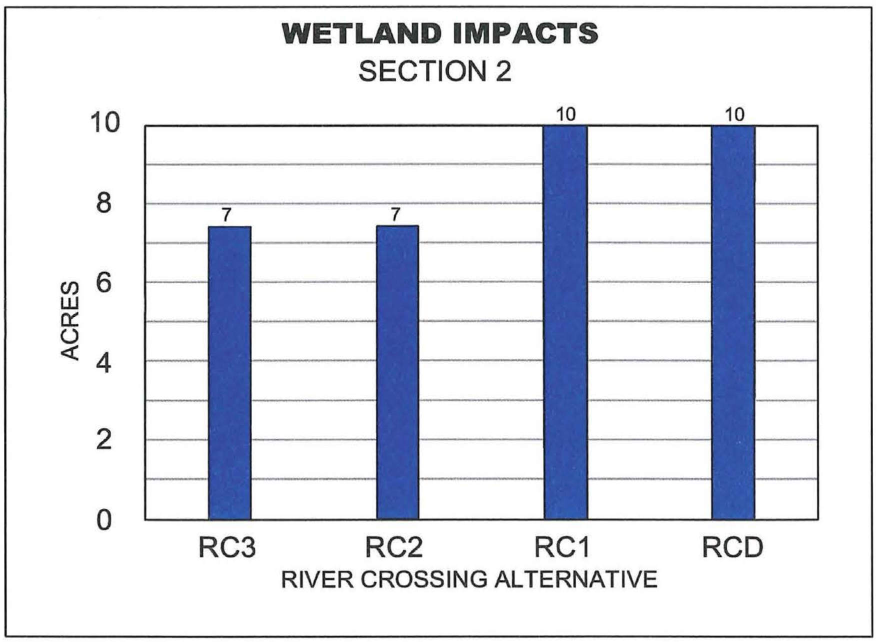
Section 1 - Environmental Impacts

No Scale


COMMERCIAL & RESIDENTIAL DISPLACEMENTS
SECTION 2
NUMBER OF DISPLACEMENTS
0
5
10
15
20
25
19
6
13
20
1
19
20
1
19
22
1
21
RC3
RC1
RCD
RC2
PRELIMINARY ALTERNATIVE
Residential
Commercial


AGRICULTURAL LAND IMPACTS
SECTION 2
ACRES
0
20
40
60
80
100
69
8
56
5
76
26
44
6
97
13
58
26
98
5
36
57
RC1
RCD
RC2
RC3
PRELIMINARY ALTERNATIVE
Productive Farmlands in ASAs
Productive Farmlands not in ASAs
ASAs not in Productive Farmland





Central Susquehanna Valley Transportation Project

Figure III-9

Section 2 - Environmental Impacts

No Scale

river crossings for the key environmental features. The side-by-side graphical illustration demonstrates that there are no alternative river crossings that would result in the least impacts to each of the key environmental features within Section 2.

iii. Two on Four Section

Impacts associated with the build-out of the Two on Four Section of the PA Route 147 are provided in the Impact Summary Table (Table III-4). Build-out of the Two on Four Section would be included with any of the Build Alternatives in Sections 1 and 2 of the CSVT Project.

iv. Connector Roadways

The environmental impacts for the 61 Connector and 15 Connector were calculated and are shown in Appendix E. Because the 61 Connector met the project needs better than the 15 Connector, the impacts of the 61 Connector have been added to the impacts of the mainline alternatives where applicable (Alternatives A, BA, C, and DA) (see Table III-4). To get the total impact associated with the mainline alternatives and the 15 Connector, subtract the 61 Connector numbers from the "Connector Alternatives" Table in Appendix E and add in the 15 Connector numbers.

The impacts of the 61 and 15 Connectors are comparable for a number of environmental issues, including wetlands, and agricultural security areas. However, the connectors are different in that the 15 Connector impacts more forested areas, whereas the 61 Connector impacts more herbaceous lands and productive farmlands. Because the 61 Connector traverses a more urban area, the original alignment of the 61 Connector affected 9 structures, 5 of which were residences. [Subsequent revisions to the 61 Connector in the Phase II (detailed) studies completely eliminated any displacements associated with the 61 Connector.]

4. Engineering Analysis

Each of the preliminary alternatives developed was evaluated for compliance with engineering standards of the Pennsylvania Department of Transportation and the FHWA.

This evaluation was not applicable to the No-Build Alternative.

The TSM/Upgrade Alternative was determined to be minimally desirable with regard to some engineering criteria; others, such as the provision of a limited access facility, it did not meet.

The New Alignment Alternatives were evaluated to determine their compliance with the established engineering criteria. This evaluation can be summarized as follows.

Section 1	Section 2	2 on 4 Section
Alternative: A - Desirable	Alternative: RC1 - Desirable	Desirable
B - Desirable	RC2 - Minimal	
C - Minimal	RC3 - Desirable	
D - Desirable	RCD - Desirable	
E - Desirable		
F - Minimal		
G - Unacceptable		
BA - Desirable		
BE - Desirable		
DA - Desirable		

In Section 1, Alternative C was determined to have minimal compliance with engineering criteria due to difficult geometrics needed to connect to a 61 Connector roadway in such a heavily urbanized area. Alternative F was also determined to have minimal compliance with engineering criteria due to the complex geometrics needed to provide a fully directional interchange between the new facility and US Routes 11/15 in the Shamokin Dam area, near Park Road. Alternative G was determined to be undesirable based on the fact that a desirable interchange, even one meeting minimum engineering standards, could not be designed at the connection with PA Route 61 due to substantially high costs and significant environmental issues. The new interchange, even designed to minimum standards, would require substantial modifications to the existing Veterans Memorial Bridge (PA Route 61), in effect, causing the bridge to be entirely rebuilt. In addition, the new interchange would have an impact on the regulatory floodway and floodplain of the main stem Susquehanna River. The new interchange would also impact the Fabridam Park, owned by Shamokin Dam Borough. Publicly owned parks are afforded additional protection from impact by Section 4(f) of the US Department of Transportation Act of 1966 (amended in 1968) which only allows the impact to a protected resource if no "prudent or feasible" alternative exists to the action requiring the impact. In this case, prudent and feasible alternatives exist to this impact.

In Section 2, Alternative RC2 was determined to have minimal compliance with engineering criteria based on the geometrics of the bridge approaches.

5. Summary of Public Involvement

A variety of public involvement activities were conducted as part of the preliminary (Phase I) evaluations for the CSVT Project. The primary goals of these public involvement activities can be summarized as follows.

- To introduce the public to the CSVT Project and the transportation project development process.
- To gather input concerning local and regional transportation problems to define and refine the Project Need statements.
- To gather input concerning important social, economic, natural, and cultural resources in the study area.
- To gather input concerning the various transportation improvement alternatives which address the elements of project need.
- To gather input concerning what alternatives should be carried forward for detailed study in Phase II.

The public coordination process was conducted through a series of four primary activities. These activities included the following.

- Meetings with the Public Officials and Public Officials Work Group (POWG)
- Meeting with the Citizens Advisory Committee (CAC)
- Two major public meetings (November 1996 and June 1997)
- A series of Special Purpose Meetings

These committees and meetings are discussed in more detail in Section V, Comments and Coordination.

Specifically, with regard to public input on what alternatives should be carried forward for detailed consideration, each of the groups outlined above was asked to identify alternatives in each section that should be considered in Phase II. This solicitation was done primarily in the form of a questionnaire which was distributed at the June 5, 1997, Public Meeting and at subsequent Special Purpose Meetings.

A total of 190 questionnaires were returned to the study team, which contained a total of 564 recommendations for alternatives to be studied in Phase II. Figure III-10 graphically illustrates the results of this component of the public coordination process. Although not statistically significant, these responses to the public meeting questionnaires were the primary source of information on the public's preferences and suggested the following general conclusions.

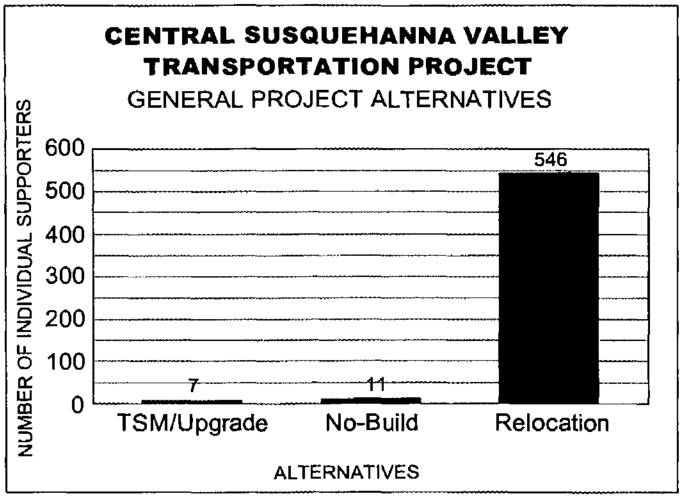
- There is substantial public support for a new alignment alternative.
- In Section 1, a majority of those responding favor a grouping of alternatives that are located relatively close to the developed areas, either just to the west of the developed areas (Alternatives A and BA) or between US Routes 11/15 and the Susquehanna River (Alternatives C, F, and G). There appears to be limited support for a more Western Alternative (Alternatives B, D, E, and BE).
- There is no defined public consensus concerning an alternative in Section 2.
- A majority of those responding supported a direct connection to PA Route 61 in Shamokin Dam via the Route 61 Connector.

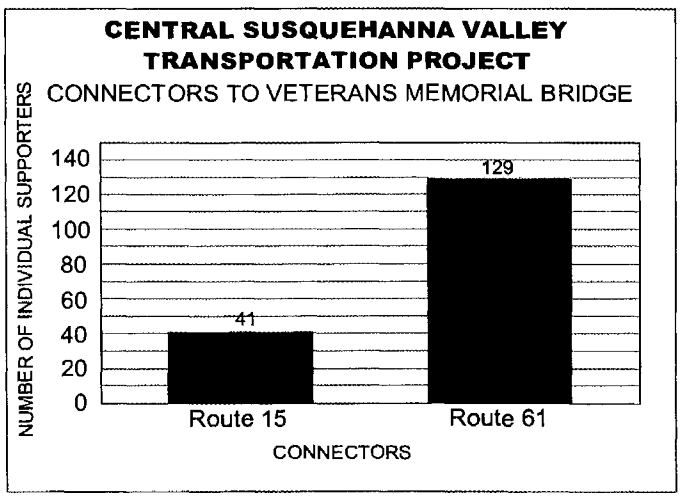
It is important to note that Alternatives DA and RC3 were developed as a response to public coordination; therefore, these alternatives were not included in the public questionnaire and are not included in the Figure III-10 graphic.

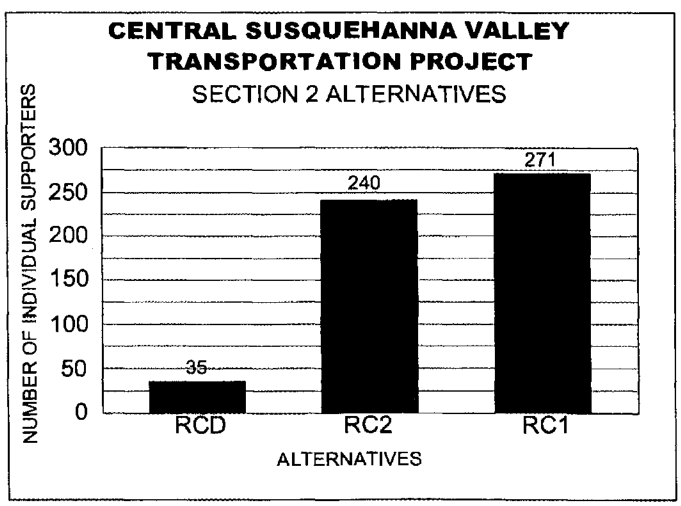
C. CONCLUSIONS AND RECOMMENDATIONS OF THE PRELIMINARY ALTERNATIVES ANALYSIS

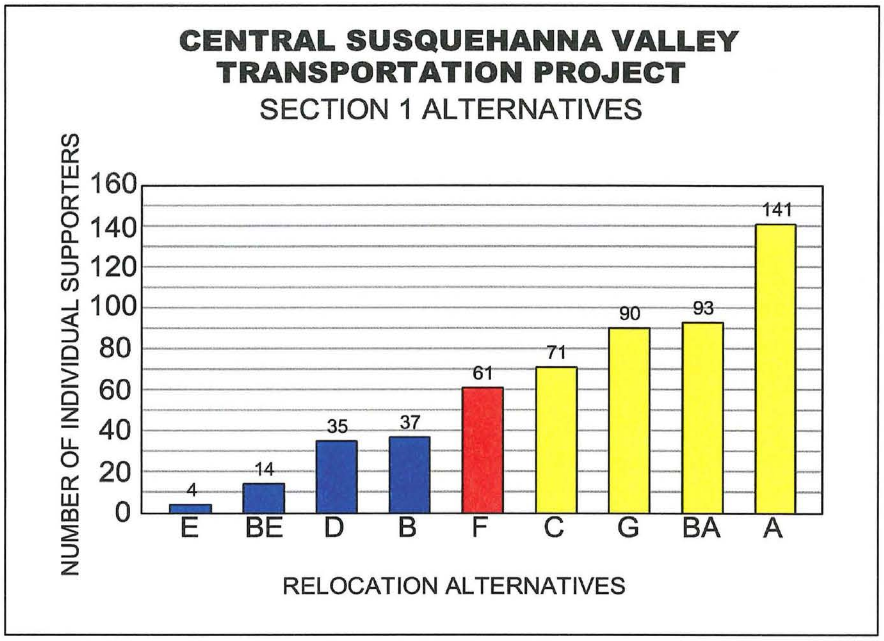
The development and evaluation of the preliminary alternatives were documented in the Phase I Alternatives Analysis Report dated October 1997. The following general points summarize the conclusions of the CSVT Preliminary (Phase I) Alternatives Analysis.

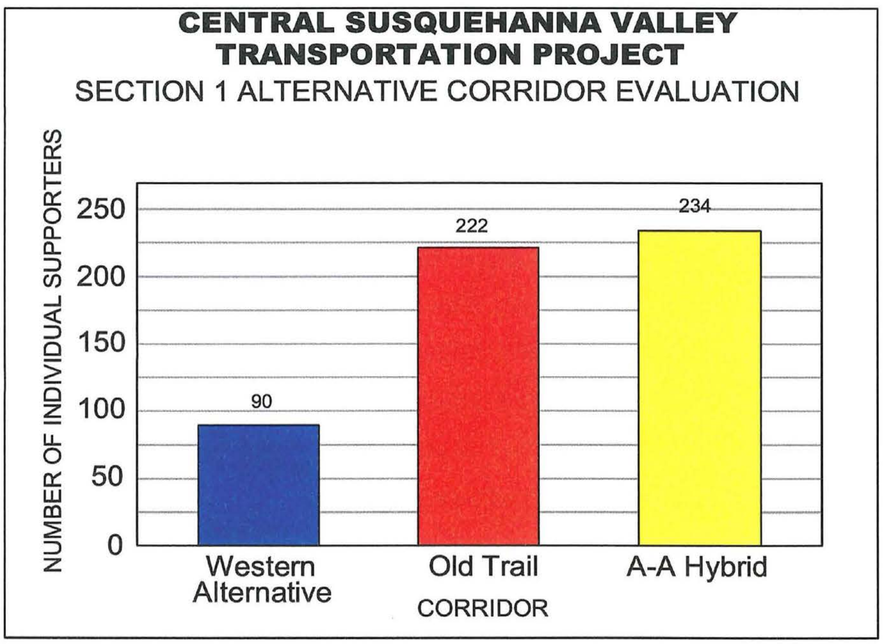
- The No-Build Alternative does not address the project need.
- The TSM/Upgrade Alternative does not fully address the project need and would result in a large amount of socioeconomic impacts that would adversely alter the social environment of the CSVT project area.
- A direct connection to PA Route 61 in Shamokin Dam is a critical element of any Section 1 Alternative to fully address the project needs.


CENTRAL SUSQUEHANNA VALLEY
TRANSPORTATION PROJECT
GENERAL PROJECT ALTERNATIVES
NUMBER OF INDIVIDUAL SUPPORTERS
600
500
400
300
200
100
0
7
11
546
TSM/Upgrade
No-Build
Relocation
ALTERNATIVES


CENTRAL SUSQUEHANNA VALLEY
TRANSPORTATION PROJECT
CONNECTORS TO VETERANS MEMORIAL BRIDGE
NUMBER OF INDIVIDUAL SUPPORTERS
140
120
100
80
60
40
20
0
41
129
Route 15
Route 61
CONNECTORS


CENTRAL SUSQUEHANNA VALLEY
TRANSPORTATION PROJECT
SECTION 2 ALTERNATIVES
NUMBER OF INDIVIDUAL SUPPORTERS
300
250
200
150
100
50
0
35
240
271
RCD
RC2
RC1
ALTERNATIVES





Central Susquehanna Valley Transportation Project

Figure III-10

Public Input Summary

No Scale

- All of the new alignment alternatives have the potential for environmental impacts to a variety of social, natural, and cultural resources. Impacts to individual resources vary by alternative and represent an environmental trade-off scenario (i.e., one alternative has high farmland impacts, but low residential impacts versus another alternative with low farmland impacts but high residential impacts). There is no minimum environmental impact alternative.

- The build-out of the Two on Four section of PA Route 147 represents the only practical and feasible alternative to connect Section 2 of the CSVT Alternatives to I-80.

The following sections outline the recommendations of the Preliminary Alternatives Analysis.

1. Separation of Two on Four Project and Refined Logical Termini

The Phase I Report recommends that the build-out of the Two on Four section of PA Route 147 (where a two lane facility exists on a four lane right-of-way just north of Section 2) should be advanced as an independent project, separate from the CSVT, and evaluated on its own merits.

On October 7, 1997, FHWA granted approval to separate the Two on Four Section from the CSVT Project and advance the widening of this section of PA Route 147 as an independent project. Widening of PA Route 147 is needed even if the CSVT is not constructed. Additionally, the widening of PA Route 147 from the PA Route 45 Interchange north to I-80 does not preclude consideration of any CSVT alternatives since all of the preliminary alternatives evaluated in the CSVT Phase I study (including all new alignment alternatives and the TSM/Upgrade Alternative) included the widening of PA Route 147 from 2 to 4 lanes. The regulatory agencies and the public were also in general agreement that the widening (or build-out) of Route 147 from 2 to 4 lanes represents the most practical and reasonable way to connect the CSVT Alternatives with I-80.

The widening of PA Route 147 has independent utility because it satisfies the following transportation needs:

The build-out of PA Route 147 from 2 to 4 lanes would improve the safety of PA Route 147. The two on four section of PA Route 147 currently carries between 7,000 - 8,000 vehicles per day including a very high percentage of heavy trucks (> 25% during peak hours). Peak hour traffic is expected to increase by 71% in the future. The CSVT Needs Analysis Report (June 1996) indicated that between 1990 and 1994, there were more than 120 crashes on PA Route 147 in the Two on Four Section, including 4 fatal crashes. All of the fatal crashes, and a high percentage of the non-fatal crashes, involved trucks. Of the four fatal crashes in this area, three were head-on collisions. The inadequate passing opportunities on this limited access, two-lane stretch of roadway are a factor leading motorists to take unnecessary chances to pass slower-moving vehicles.

In summary, the widening, or build-out, of PA Route 147 was separated from the CSVT Project in October of 1997, to improve safety and better accommodate existing and future traffic growth. Additionally, the build-out of the two on four section would not increase traffic problems in Northumberland Borough, because the widening would not be a "draw" to new traffic, but would simply better accommodate the traffic already using this section of PA Route 147.

As a result, the northern project terminus for the CSVT project has been officially changed to the existing interchange between PA Route 147/PA Route 45. The southern terminus remains as the end of the existing Selinsgrove Bypass. The potential for impacts beyond these termini were considered in this study.

The build-out of the Two on Four Section was evaluated on its own merits and received environmental clearance in March 1999. The Two on Four Section is currently under construction. Construction is anticipated to be completed by 2004.

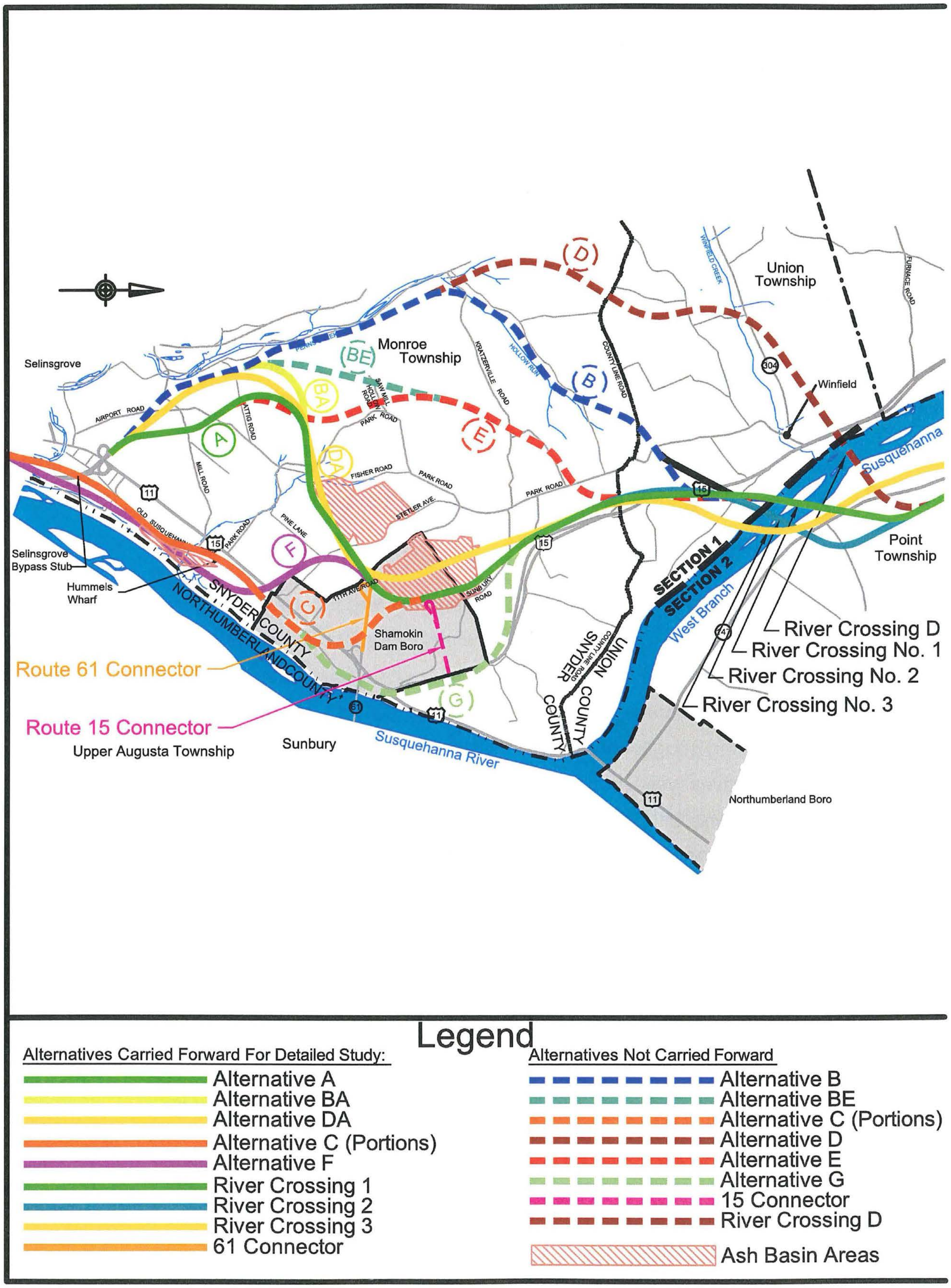
2. Alternatives Advanced for Further Study

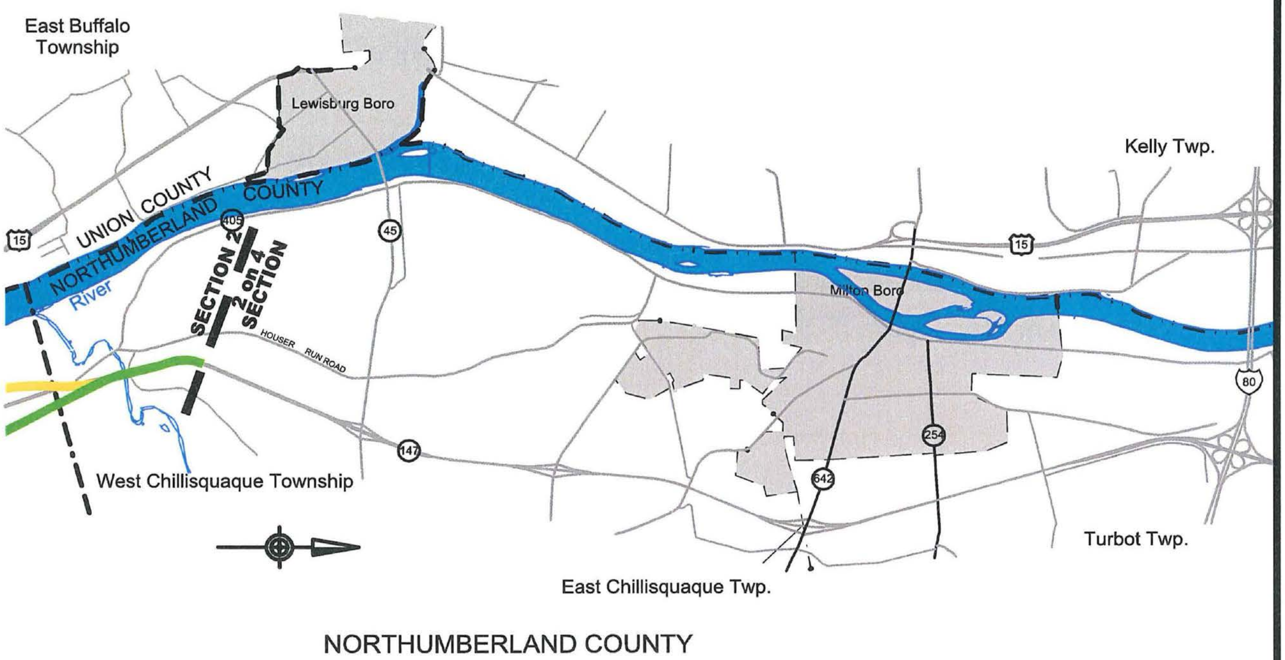
The environmental impact analysis and the engineering criteria analysis were not key factors in the selection of alternatives for further detailed study. All alternatives met the engineering criteria and there was no clear minimum environmental impact alternative. The selection of alternatives for further detailed study was primarily a result of the degree to which each family of alternatives met the project needs of reducing congestion, improving safety, and ensuring capacity for future growth. All three families of alternatives (yellow, blue, and red) met the project needs to some degree, although the yellow family of alternatives with the direct connection to PA Route 61 best satisfied the need.

The following alternatives/alternative corridors were advanced for further detailed evaluation in Phase II. These alternatives are shown on Figure III-11.

Section 1

- A-A Hybrid Corridor Alternatives - This is a corridor that combines Alternatives A, BA, and DA. The goal is to take the best features of these alternatives and develop a refined alternative that is a composite of the best features of A, BA, and DA.
- Old Trail Corridor Alternatives - This is a corridor combining portions of Alternatives C and F. The goal is to refine these alternatives to minimize impacts to Monroe Township and Shamokin Dam.

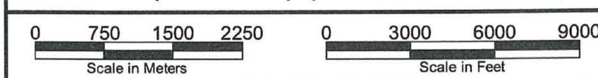

Selinsgrove
Monroe Township
Union Township
Winfield
Point Township
Shamokin Dam Boro
Sunbury
Upper Augusta Township
Northumberland Boro
Selinsgrove Bypass Stub
Hummels Wharf
SNYDER COUNTY
NORTHUMBERLAND COUNTY
UNION COUNTY
SNYDER COUNTY
SECTION 1
SECTION 2
Susquehanna River
West Branch
Susquehanna
Route 61 Connector
Route 15 Connector
River Crossing D
River Crossing No. 1
River Crossing No. 2
River Crossing No. 3
AIRPORT ROAD
MILL ROAD
FISHER ROAD
PARK ROAD
STETLER AVE.
PINE LANE
KRATZERVILLE ROAD
HOLLOW RUN
COUNTY LINE ROAD
SUNBURY ROAD
11TH AVE ROAD
WINFIELD CREEK
FURNACE ROAD
Legend
Alternatives Carried Forward For Detailed Study:
Alternative A
Alternative BA
Alternative DA
Alternative C (Portions)
Alternative F
River Crossing 1
River Crossing 2
River Crossing 3
61 Connector
Alternatives Not Carried Forward
Alternative B
Alternative BE
Alternative C (Portions)
Alternative D
Alternative E
Alternative G
15 Connector
River Crossing D
Ash Basin Areas



Central Susquehanna Valley Transportation Project

Figure III-11

Alternatives to be Studied in Detail (Phase II) (November 1997)



- The 61 Connector as a direct connection to PA Route 61 in Shamokin Dam was also advanced for further study. The 61 Connector can be used with alternatives in both the A-A Hybrid Corridor and the Old Trail Corridor.

Section 2

- River Crossings 1 (RC1), RC2, and RC3 were advanced for further detailed study.

3. Alternatives Not Considered for Further Study

The following alternatives were not considered for further study for the following reasons. These alternatives are shown on Figure III-11.

Section 1

- The TSM/Upgrade Alternative was not considered for further study, because it would not fully address the project need of reducing congestion, improving safety, and ensuring capacity for future traffic growth. It would also have substantial social and economic ramifications due to the numerous residences and businesses that would need to be relocated.

- The "Blue Family" of Alternatives (Alternatives B, D, E, and BE) was not considered for further study, because it would not fully address the project need of reducing congestion and would not serve future traffic volumes as well as the Yellow Family of Alternatives.

  The Yellow and Blue Families of Alternatives are similar in many of their traffic characteristics, with one exception. The Yellow Family of Alternatives allows for a connection back to US Routes 11/15 in the Shamokin Dam area, and, more notably, to PA Route 61. This connection allows for the CSVT roadway to serve a significant amount of additional traffic that would otherwise stay on the existing roadway system with the Blue Family. The Yellow Family reduces traffic volumes on the existing roadway system an average of 10 percent more than the Blue Family of Alternatives, and as much as 38 percent more in some areas, such as along US Routes 11/15 in Shamokin Dam.

  Because of the reduction in volumes, traffic congestion is also reduced. In terms of level of service, the reduction in volume does not necessarily equate to an improvement in overall level of service, or turning movement level of service. Many of the study area intersections are projected to operate at the same overall levels of service for both the Yellow and Blue Families of Alternatives. However, there are scattered locations within the study area (such as the intersection of US Route 15 and Hafer Road) where overall level of service is better with the Yellow Family of Alternatives than with the Blue Family of Alternatives, and instances where turning movement, or approach, levels of service are better with the Yellow Family of Alternatives than with the Blue Family of Alternatives such as the southbound through movement of US Routes 11/15 at the intersection of Eleventh Avenue in Shamokin Dam (LOS E for Blue, LOS C for Yellow, LOS D for Red).

- Alternative G (a member of the "Yellow Family") was not considered for further study, because it would not address the project need of reducing congestion.

- The Route 15 Connector was dismissed, because it would not address the project need of reducing congestion.

Section 2

- RCD was dismissed, because Alternative D was dismissed in Section 1. No other Section 1 Alternative used RCD.

4. Evaluation of Preliminary Alternatives Based on 2030 Traffic Projections

To address comments received on the Draft EIS and to confirm when a third lane was needed (in each direction), additional traffic studies were conducted in 2001 for the entire CSVT study area. In addition, to be consistent with FHWA policy to design projects based on a 20-year traffic projection from time of construction, traffic volumes were developed for the year 2030.

New traffic counts were taken in July 2001. The 2001 existing traffic volumes for the system are on average 20 percent greater than the traffic volumes that were counted in 1995. This equates to a 3 percent annual increase. Between the years of 1995 and 2020, the traffic volumes were projected to increase at a much greater rate. The previous traffic projections for design year 2020 showed that the traffic volumes were expected to grow 133 percent over the 25 years (1995 through 2020). This equates to a 5% annual increase. The year 2000 census data showed that the population and the resulting development did not increase as greatly as originally anticipated.

Population growth and traffic volume increases are not directly proportional. Even though population growth slowed, traffic continued to increase at a slightly slower rate because employment continued to increase as projected in the Draft EIS, and through traffic increased faster than projected in the Draft EIS (1.5% per year as opposed to 1% per year). As a result, the year 2030 projected traffic volumes are approximately 13 percent more than the year 2020 projected traffic volumes, and the year 2030 projected traffic volumes are approximately 120 percent greater than the 2001 existing traffic volumes, which equates to an approximate 4 percent annual increase. The traffic congestion and related safety problems are still projected to occur in the year 2030 on the existing roadways if a new roadway is not built. Thus, the separation of through and local traffic, especially truck traffic, and the need for improvements to the current transportation network are necessary.

The original Phase I analyses that were completed and documented in the October 1997Phase I Alternatives Analysis Report used the original projected design year 2020 traffic volumes as a basis for the analyses of the alternatives. The results of the Phase I analyses provided grounds for dismissal of several alternatives that do not meet the project purpose and need. The Phase I Alternatives Analysis conclusions do not change based on analyses of the 2030 data. The results of the original Phase I analyses showed that the No-Build Alternative, the Transportation Systems Management (TSM)/Upgrade Alternative, the Blue Family of Alternatives and the Red Family of Alternatives do not meet the project purpose statement.

For detailed information on the 2030 traffic projection update, please see Section IV.M, Traffic and Transportation Network in this Final EIS.

5. Measures of Effectiveness

The Phase I Alternatives Analysis Report (October 1997) evaluated a total of 35 preliminary alternatives, including 34 New Alignment Alternative combinations of Section 1/Section 2 Alternatives, and the TSM/Upgrapde Alternative. The Phase I study determined that the "Yellow Family" of alternatives, the family that would afford a direct connection to the existing roadway network at PA Route 61 (the Veterans Memorial Bridge) via either the 61 Connector (Alternatives A, BA, and DA) or a direct interchange with PA Route 61 (Alternative C) would best meet the Project Need. A supplemental analysis was performed on these alternative families to provide additional support for the Phase I Report recommendations.

To more clearly define the differences in traffic characteristics for the Phase I Alternatives, additional analyses were undertaken using the Synchro software package. Synchro is a signal system optimization program that also analyzes and reports a variety of measures of effectiveness about how individual links and intersections are operating as well as the entire roadway system. Several different "measures of effectiveness" were obtained for the Preliminary Alternative Traffic "Families" and were then compared to each other. The Synchro measures of effectiveness that were selected for comparing the overall utility of the different traffic families include average travel time, average delay, average speed, and fuel consumption. These measures of effectiveness are defined as follows.

- *Average Travel Time* is the time required to traverse a segment of roadway or complete a trip. Travel time is measured in seconds for this analysis and is expressed for discrete sections of study area roadways. Synchro records the time it takes each vehicle to traverse links in the system and provides a summary of total vehicles and travel time by link.

- *Average Delay* is the time loss associated with congested conditions. Delay time can be attributed to stopping at traffic signal(s) or heavy traffic volumes. It is measured as a weighted average delay, in seconds, for each vehicle. The Synchro program identifies delay time along each link as a function of the variation in desirable travel time (generally free-flow conditions) from actual recorded travel time.

- *Average Speed* relates directly to travel time and is the travel rate at which vehicles traverse specific roadway segments. Speed is measured as an average value for each vehicle in miles per hour and is calculated from the travel time and segment distance.

- *Fuel Consumption* is the total amount of gallons of fuel (gasoline and diesel) that vehicles utilize in traversing segments of roadway or in completing a trip. Synchro calculates fuel consumption for each roadway link based upon the travel time along each link, the delay associated with each link, the number of vehicle stops, and the speed along each link. The fuel consumption calculations do not directly distinguish between vehicle types, but are indirectly affected via the speed estimates.

- *Vehicle Hours of Travel* is the total amount of time vehicles spend in the specified transportation system. It includes the effects of delay at traffic signals and congested mid-block locations and provides a relative reference to the total system delay. It is calculated as the product of traffic volumes of roadway segments multiplied by the average travel time on that link (vehicle hours of travel = traffic volumes x average travel time).

Tables III-5 through III-9 summarize the Synchro measures of effectiveness for US Routes 11/15, US Route 15, US Route 11, PA Route 147, and the CSVT Roadway, respectively, for the Blue Family of alternatives, individual alternatives in the Yellow Family (depending on connection type) and the Red Family. Table III-10 summarizes the same information, but as a total of all study area roadways, which include all roadways noted. On each table, the percent difference between the No-Build (2020 conditions) measures of effectiveness and the measures of effectiveness for each New Alignment Alternative is shown. Since the measures of effectiveness are directly related to the traffic volumes, they were not updated with the 2030 volumes for the Phase I (Preliminary) Alternatives because the analysis would have resulted in the same conclusions on the dismissal of Phase I Alternatives.

These tables show that the Blue Family of Alternatives would not meet the needs as well as the Yellow and Red Families of Alternatives. In general, travel times, average delays, fuel consumption, and vehicle hours of travel would be higher for the Blue Family and travel speeds would be lower than the Yellow and Red Families. There are only marginal differences in the Synchro measures of effectiveness of the Red and Yellow Families.

Because level of service grades are defined as range of delays (A is zero to 5.0 seconds, D is 25.1 to 40.0 seconds, etc.), similar levels of service at study area intersections between the Yellow and

TABLE III-5
EVENING PEAK HOUR - YEAR 2020
MEASURE OF EFFECTIVENESS COMPARISON
US ROUTE 11/US ROUTE 15*

Alignment	Average Total Travel Time[1]		Average Speed[2]		Average Total Delay[3]		Fuel Consumption[4]		Vehicle Hours Traveled[5]	
	(sec)	Percent Diff. From No-Build	(mph)	Percent Diff. From No-Build	(sec)	Percent Diff. From No-Build	(gal)	Percent Diff. From No-Build	(veh-mi)	Percent Diff. From No-Build
Existing (1995)	404	N/A	34	N/A	50	N/A	519	N/A	308	N/A
No-Build	1,209	N/A	22	N/A	857	N/A	2,446	N/A	2,000	N/A
Blue	496	-59%	32	45%	143	-83%	638	-74%	403	-80%
Yellow – A	455	-62%	33	50%	122	-86%	447	-82%	268	-87%
Yellow – BA	467	-61%	33	50%	118	-86%	445	-82%	278	-86%
Yellow – C	487	-60%	31	41%	136	-84%	466	-81%	291	-85%
Yellow – DA	465	-62%	32	45%	111	-87%	438	-82%	278	-86%
Yellow – G	497	-59%	31	41%	147	-83%	644	-74%	406	-80%
Red – F	460	-62%	32	45%	110	-87%	517	-79%	319	-84%

* US Route 11/US Route 15 from the Selinsgrove Interchange to the split at Tedd's Landing

Notes:
1 Average total travel time is per vehicle
2 Average speed is per vehicle
3 Average total delay is per vehicle
4 Total fuel consumption is for all vehicles along the roadway segment for the entire hour
5 Vehicle hours traveled is for all vehicles along the roadway segment for the entire hour

TABLE III-6
EVENING PEAK HOUR - YEAR 2020
MEASURE OF EFFECTIVENESS COMPARISON
US ROUTE 15*

Alignment	Average Total Travel Time[1]		Average Speed[2]		Average Total Delay[3]		Fuel Consumption[4]		Vehicle Hours Traveled[5]	
	(sec)	Percent Diff. From No-Build	(mph)	Percent Diff. From No-Build	(sec)	Percent Diff. From No-Build	(gal)	Percent Diff. From No-Build	(veh-mi)	Percent Diff. From No-Build
Existing (1995)	312	N/A	38	N/A	7	N/A	190	N/A	121	N/A
No-Build	314	N/A	37	N/A	13	N/A	543	N/A	327	N/A
Blue	330	5%	37	0%	24	85%	237	-56%	138	-58%
Yellow - A	322	3%	40	8%	29	123%	120	-78%	75	-77%
Yellow - BA	318	1%	42	14%	23	77%	116	-79%	73	-78%
Yellow - C	312	-1%	40	8%	14	8%	77	-86%	96	-71%
Yellow - DA	311	-1%	43	16%	17	31%	122	-78%	71	-78%
Yellow - G	324	3%	40	8%	29	123%	143	-74%	139	-57%
Red - F	313	0%	41	11%	15	15%	144	-73%	97	-70%

* US Route 15 from the split at Tedd's Landing to Winfield

Notes:
1 Average total travel time is per vehicle
2 Average speed is per vehicle
3 Average total delay is per vehicle
4 Total fuel consumption is for all vehicles along the roadway segment for the entire hour
5 Vehicle hours traveled is for all vehicles along the roadway segment for the entire hour

TABLE III-7
EVENING PEAK HOUR - YEAR 2020
MEASURE OF EFFECTIVENESS COMPARISON
US ROUTE 11*

Alignment	Average Total Travel Time[1]		Average Speed[2]		Average Total Delay[3]		Fuel Consumption[4]		Vehicle Hours Traveled[5]	
	(sec)	Percent Diff. From No-Build	(mph)	Percent Diff. From No-Build	(sec)	Percent Diff. From No-Build	(gal)	Percent Diff. From No-Build	(veh-mi)	Percent Diff. From No-Build
Existing (1995)	263	N/A	26	N/A	46	N/A	128	N/A	88	N/A
No-Build	606	N/A	16	N/A	388	N/A	537	N/A	478	N/A
Blue	468	-23%	17	6%	250	-36%	306	-43%	278	-42%
Yellow - A	382	-37%	22	38%	164	-58%	266	-50%	228	-52%
Yellow - BA	381	-37%	22	38%	163	-58%	266	-50%	228	-52%
Yellow - C	378	-38%	22	38%	157	-60%	269	-50%	226	-53%
Yellow - DA	372	-39%	22	38%	154	-60%	266	-50%	222	-54%
Yellow - G	415	-32%	22	38%	197	-49%	310	-42%	247	-48%
Red - F	435	-28%	20	25%	218	-44%	296	-45%	269	-44%

* US Route 11 from the split at Tedd's Landing to Northumberland

Notes:
1 Average total travel time is per vehicle
2 Average speed is per vehicle
3 Average total delay is per vehicle
4 Total fuel consumption is for all vehicles along the roadway segment for the entire hour
5 Vehicle hours traveled is for all vehicles along the roadway segment for the entire hour

TABLE III-8
EVENING PEAK HOUR - YEAR 2020
MEASURE OF EFFECTIVENESS COMPARISON
PA ROUTE 147*

Alignment	Average Total Travel Time[1]		Average Speed[2]		Average Total Delay[3]		Fuel Consumption[4]		Vehicle Hours Traveled[5]	
	(sec)	Percent Diff. From No-Build	(mph)	Percent Diff. From No-Build	(sec)	Percent Diff. From No-Build	(gal)	Percent Diff. From No-Build	(veh-mi)	Percent Diff. From No-Build
Existing (1995)	283	N/A	37	N/A	12	N/A	130	N/A	94	N/A
No-Build	417	N/A	27	N/A	128	N/A	354	N/A	301	N/A
Blue	337	-19%	31	15%	61	-52%	206	-42%	158	-48%
Yellow - A	321	-23%	32	19%	45	-65%	206	-42%	158	-48%
Yellow - BA	321	-23%	32	19%	45	-65%	206	-42%	158	-48%
Yellow - C	321	-23%	33	22%	42	-67%	206	-42%	158	-48%
Yellow - DA	323	-23%	32	19%	46	-64%	206	-42%	159	-47%
Yellow - G	338	-19%	31	15%	61	-52%	201	-43%	159	-47%
Red - F	380	-9%	28	4%	104	-19%	222	-37%	188	-38%

* PA Route 147 from the intersection with US Route 11 to Chillisquaque

Notes:
1 Average total travel time is per vehicle
2 Average speed is per vehicle
3 Average total delay is per vehicle
4 Total fuel consumption is for all vehicles along the roadway segment for the entire hour
5 Vehicle hours traveled is for all vehicles along the roadway segment for the entire hour

TABLE III-9
EVENING PEAK HOUR - YEAR 2020
MEASURE OF EFFECTIVENESS COMPARISON
CSVT ROADWAY

Alignment	Average Total Travel Time[1]		Average Speed[2]		Average Total Delay[3]		Fuel Consumption[4]		Vehicle Hours Traveled[5]	
	(sec)	Percent Diff. From No-Build	(mph)	Percent Diff. From No-Build	(sec)	Percent Diff. From No-Build	(gal)	Percent Diff. From No-Build	(veh-mi)	Percent Diff. From No-Build
Existing (1995)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
No-Build	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Blue	571	N/A	65	N/A	0	N/A	926	N/A	425	N/A
Yellow - A	587	N/A	65	N/A	0	N/A	1,230	N/A	556	N/A
Yellow - BA	597	N/A	65	N/A	0	N/A	1,230	N/A	566	N/A
Yellow - C	545	N/A	65	N/A	0	N/A	1,162	N/A	472	N/A
Yellow - DA	618	N/A	65	N/A	0	N/A	1,338	N/A	584	N/A
Yellow - G	588	N/A	65	N/A	0	N/A	1,010	N/A	453	N/A
Red - F	565	N/A	65	N/A	0	N/A	1,048	N/A	475	N/A

* The CSVT Roadway from the Selinsgrove interchange to the interchange with PA Route 147

Notes:
1 Average total travel time is per vehicle
2 Average speed is per vehicle
3 Average total delay is per vehicle
4 Total fuel consumption is for all vehicles along the roadway segment for the entire hour
5 Vehicle hours traveled is for all vehicles along the roadway segment for the entire hour

TABLE III-10
EVENING PEAK HOUR - YEAR 2020
MEASURE OF EFFECTIVENESS COMPARISON
ALL STUDY AREA ROADWAYS

Alignment	Average Total Travel Time[1]		Average Speed[2]		Average Total Delay[3]		Fuel Consumption[4]		Vehicle Hours Traveled[5]	
	(sec)	Percent Diff. From No-Build	(mph)	Percent Diff. From No-Build	(sec)	Percent Diff. From No-Build	(gal)	Percent Diff. From No-Build	(veh-mi)	Percent Diff. From No-Build
Existing (1995)	1,262	N/A	35	N/A	115	N/A	967	N/A	611	N/A
No-Build	2,546	N/A	17	N/A	1,38 6	N/A	3,880	N/A	3,106	N/A
Blue	2,202	-14%	42	147%	478	-66%	2,313	-40%	1,402	-55%
Yellow - A	2,067	-19%	42	147%	360	-74%	2,269	-42%	1,285	-59%
Yellow - BA	2,084	-18%	42	147%	349	-75%	2,263	-42%	1,303	-58%
Yellow - C	2,043	-20%	42	147%	349	-75%	2,180	-44%	1,243	-60%
Yellow - DA	2,089	-18%	42	147%	328	-76%	2,370	-39%	1,314	-58%
Yellow - G	2,162	-15%	42	147%	434	-69%	2,308	-41%	1,404	-55%
Red - F	2,153	-15%	42	147%	447	-68%	2,227	-43%	1,348	-57%

* This table includes the cumulative totals for each measure of effectiveness for all of the study area roadways (US Route 11/15, US Route 15, US Route 11, PA Route 147 and the CSVT Roadway for each Alignment)

Notes:
1 Average total travel time is per vehicle
2 Average speed is per vehicle
3 Average total delay is per vehicle
4 Total fuel consumption is for all vehicles along the roadway segment for the entire hour
5 Vehicle hours traveled is for all vehicles along the roadway segment for the entire hour

Blue Families of Alternatives would not produce the same improvements on congestion, travel time, and traffic flow. The Phase I analysis shows that, although No Build travel time delays would be reduced by all of the alignment families, the Yellow Family of Alternatives would reduce travel time delays an additional 10 percent. This equates to approximately 100 additional hours in total vehicle hours of travel in the study area with the Blue Family of Alternatives. For the individual study area roadways, the Blue Family would produce an average of 3 to 24 percent less reduction than the Yellow Family of Alternatives, although it would reduce travel time delays.

In addition to the reduction in congestion, the safety situation on the existing roadways is a critical need of the project. Table III-11 summarizes the predicted overall crashes on the future roadway network for each of the Traffic Families. For each roadway in the family, the predicted crashes were calculated using the projected average daily traffic volumes in the year 2020, the roadway segment length, and the statewide average crash rates for that particular type of roadway. Table III-11 shows that, based upon projections of crashes in the study area, the Blue Family of Alternatives would reduce the number of crashes along study area roadways by approximately 43 percent. However, this reduction would still produce about 25 percent more crashes than the Yellow Family of Alternatives.

Of the three alternative families analyzed as Phase I Alternatives, the Blue Family would reduce volumes on the existing roadways the least, it would reduce congestion of the existing roadways the least, and it would reduce the potential number of crashes the least.

D. EVALUATION OF ALTERNATIVES STUDIED IN DETAIL (PHASE II STUDIES)

The Phase I investigations for the CSVT Project ended in October of 1997. Two alternative corridors in the southern project section (Section 1) and three river crossing options in the northern section (Section 2) were identified for further detailed study in Phase II as follows.

Section 1

- A-A Hybrid Corridor including 61 Connector
- Old Trail Corridor including 61 Connector

TABLE III-11
PREDICTED FUTURE TOTAL CRASHES IN YEAR 2020

	No Build		Yellow Alignments		Blue Alignments		Red Alignments	
Roadway Segment	Number of Crashes	Percent Diff. From No-Build	Number of Crashes	Percent Diff. From No-Build	Number of Crashes	Percent Diff. From No-Build	Number of Crashes	Percent Diff. From No-Build
US Route 11/15	160	N/A	58	-64%	83	-48%	71	-56%
US Route 15	92	N/A	15	-84%	29	-68%	19	-79%
US Route 11	64	N/A	45	-30%	43	-33%	46	-28%
PA Route 147	42	N/A	46	10%	48	14%	53	26%
CSVT Roadway	N/A	N/A	62	N/A	43	N/A	43	N/A
Total Crashes for the Entire Roadway Network	**358**	**N/A**	**226**	**-37%**	**246**	**-31%**	**232**	**-35%**
Total Crashes for the Entire Roadway Network excluding the CSVT Roadway	**358**	**N/A**	**164**	**-54%**	**203**	**-43%**	**189**	**-47%**

Section 2

- RC1
- RC2
- RC3

The concept employed in the Phase II studies is that the best solution to the transportation needs in the Central Susquehanna Valley is located within the above noted corridors. These corridors were studied in detail and engineering refinements were made to the alternatives studied in Phase I to develop an alternative that would best meet the Project Needs, while minimizing environmental impacts and achieving the noted engineering criteria.

The following are the key activities that occurred during the Phase II studies.

- Survey and Mapping of Study Corridor Limits
- Detailed Field Investigations and Mapping of Environmental Features in Corridors
- Public and Agency Involvement
- Develop Phase II Alternatives
- Detailed Impact Assessment

1. Survey and Mapping of Phase II Study Corridor Limits

The Phase I study area was refined to create the Phase II study corridor limits based on the drainage patterns and topography of the region. The Phase II study corridor limits were determined in an attempt to enclose all potential engineering alternatives and subsequent refinements. However, this was not always possible as environmental or engineering concerns often necessitated expansions to the study corridors. The study corridor limits were not intended to be inflexible limits to alternatives. The corridors were established merely to determine the area within which detailed environmental surveys were conducted. The study corridors were expanded approximately six times throughout the detailed alternatives development process. At the outset of the identification of the study corridor, and with each subsequent expansion of the study area corridor, property owners located within the study corridor (or study corridor expansion) were notified by an "Intent to Enter" letter that their property was within the study corridor limits and representatives of the study team might need to enter their property to perform various mapping or environmental survey efforts.

2. Detailed Field Investigations and Environmental Feature Mapping

The Phase I study followed an "overview" approach and primarily involved an assessment of environmental impact based on secondary data verified by limited field investigations. The Phase II studies, however, involved the evaluation of the alternatives carried forward in greater detail. Some of the critical environmental issues that were evaluated in detail for each alternative studied include the following.

- Community Issues - displacements, cohesion, and future accessibility to services were assessed
- Land Uses - residential, commercial, industrial, and recreational lands identified and impacts determined
- Noise Impacts and Opportunity for Abatement identified
- Farmland and Agribusiness - both direct and operational effects determined
- Wetland and Watershed Impacts
- Wildlife Habitat and Landscape Issues
- Endangered Species Implications
- Historic Property Impacts
- Archaeological Site Impacts
- Recreational Resource Impacts - Susquehanna River Access, Impacts to Publicly Owned Parkland
- Surface Water Resource Impact
- Implications of Geological Formations
- Floodplain Impacts
- Air Quality
- Visual Setting and "Quality of Life" Impacts
- Transportation Network Impacts
- Public/Private Water Supplies
- Secondary Impacts - what happens once the new highway is in place?
- Impacts to Tax Base

3. Public and Agency Involvement

In November of 1997, findings of the Phase I investigations and the approach to the Phase II studies were presented at the third Public Meeting held for the CSVT Project. Significant discussion was held at this meeting with regard to the level of citizen involvement and representation on the two standing committees that meet on a regular basis, the Citizens Advisory Committee (CAC), and Public Officials Work Group (POWG).

As a result of the request for more local citizens to be involved in the alternatives development and refinement process, the formation of Community Interest Focus Groups was announced in March of 1998. The goal of the Focus Groups is to facilitate constructive discussions about the Phase II Alternatives with the citizens in the municipalities that are most affected.

Section 1 (Southern Section)

- Monroe Township, Snyder County
- Shamokin Dam Borough, Snyder County

Section 2 (Northern Section)

- Union Township, Union County
- Point Township, Northumberland County

Two Focus Groups were formed as shown above, one Focus Group for each Project Section. The creation of the Focus Groups enabled stakeholders to meet on a regular basis to review Phase II study results and suggest refinements to minimize community and environmental impact.

The stakeholders were informed that they could request meetings at any time to discuss project developments. As a result, between November of 1997 and November of 1998, more than 28 meetings were held with the local groups, as well as the environmental review agencies, to discuss the development of and refinements to the Phase II Alternatives. These meetings were held on the dates shown below. Detailed minutes of each of these meetings are presented in the Technical Files (see Appendix A). In addition, the results of these meetings are summarized in Section V, Comments and Coordination.

Citizens Advisory Committee (CAC) and Public Officials Work Group Meetings (POWG)

- 3/2/98
- 3/30/98
- 6/29/98
- 9/28/98

Monroe Township/Shamokin Dam Focus Group

- 5/6/98
- 7/1/98

- 9/29/98
- 11/5/98

Point Township/Union Township Focus Group

- 3/30/98
- 6/29/98
- 9/28/98

Special Purpose Meetings

- 12/2/97 - Meeting with Orchard Hills/Gunter Development residents to discuss 61 Connector
- 12/9/97 - Meeting with Colonial Acres residents to discuss impacts of A-A Hybrid Alternatives
- 1/20/98 - Meeting with Old Trail residents to discuss impacts of Old Trail Corridor Alternatives
- 2/10/98 - Meeting with Monroe Township officials and residents to discuss impacts of both A-A Hybrid Corridor and Old Trail Corridor Alternatives
- 6/30/98 - Meeting with Point Township officials to discuss impacts of River Crossing Alternatives
- 7/6/98 - Meeting with Monroe Township officials to discuss impacts of A-A Hybrid and Old Trail Corridor Alternatives
- 7/22/98 - Meeting with Hummels Wharf residents to discuss impacts of Old Trail Corridor Alternatives
- 10/7/98 - Meeting with West Chillisquaque officials and residents to discuss impacts of River Crossing Alternatives

Agency Coordination Meetings

- 12/3/97
- 1/28/98
- 3/25/98
- 7/22/98
- 8/26/98
- 9/23/98
- 9/29, 30/98 (Field View)
- 10/28/98

4. Development of the Phase II Alternatives

The development of the Phase II Alternatives within the identified study corridors in Sections 1 and 2 began in January of 1998. Following the delineation and mapping of the study corridors and during the detailed environmental investigations, the process of evaluating possible alternatives in the study corridor and determining the alternative that would best meet the engineering criteria, while minimizing environmental impacts, was initiated. At the same time, the ongoing public and agency involvement process yielded numerous suggestions to alternatives within the corridors. The following issues were addressed in each section.

a. Section 1 - A-A Hybrid and Old Trail Corridors

i. Option to 61 Connector

Substantial opposition to the 61 Connector, specifically from the residents of the Shamokin Dam area, was noted early in 1998. Residents questioned the dismissal of the 15 Connector. When informed that the 15 Connector was dismissed from further study due to its inability to substantially reduce traffic on US Routes 11/15, study area residents questioned why the 15 Connector in conjunction with another option could not be used to reduce traffic on US Routes 11/15 in Shamokin Dam and Monroe Township, namely a new interchange.

As a result of this considerable public input, additional alternatives that incorporated the use of the 15 Connector were investigated, and a new alternative was developed. The alternative would consist of an Old Trail Corridor Alternative with a new interchange with US Routes 11/15 where the Old Trail Alternative crosses 11/15, and a connection to US Route 15 via the 15 Connector just north of Shamokin Dam Borough.

Based on preliminary traffic figures, the Old Trail Alternative with the 15 Connector and interchange in the vicinity of Stetler Avenue (near the Hampton Inn) would appear to meet the Project Needs nearly as well as the other alternatives that include the 61 Connector.

The detailed study of this additional alternative was approved by the Federal Highway Administration in May of 1998. This alternative was also presented publicly at the CAC/POWG, Focus Group Meetings, and Agency Coordination Meetings.

A second option to the use of the 61 Connector was evaluated. As suggested by local citizens, the study team examined an option that connected to Sunbury via Route 147 south of Sunbury.

From the Selinsgrove interchange, this alternative would branch in two directions. One piece would swing east and cross the Susquehanna River on a new bridge near the Selinsgrove interchange, and then it would swing to connect to Route 147 south of Sunbury. The other piece would swing west, the same as the A-A Hybrid Corridor alternatives, but would not use a 61 Connector.

Traffic studies on this suggested alternative were conducted and found that it would not meet the Project Needs as well as the A-A Hybrid or Old Trail Corridors. The Route 147 Connector, as this alternative was named, left 5,000 - 7,000 more vehicles on US Routes 11/15 than the other alternatives in the design year of 2020. As a result, this option was dismissed from further consideration.

ii. Local Connecting Roadway

Presently, there is only one road that would allow vehicles to enter and exit the Orchard Hills Development - via Baldwin Boulevard. Concern was expressed by Shamokin Dam residents that a local connecting roadway should be constructed over the 61 Connector to provide a second access point into and out of Orchard Hills. This connecting roadway, an extension of Courtland Drive, was designed to connect Orchard Hills to the Gunter Development. This roadway would be designed to bridge over the 61 Connector.

b. Section 1 - A-A Hybrid Corridor

i. Use of Ash Basins 2 and 3

Originally, Alternatives A, BA, and DA in the A-A Hybrid Corridor were designed to avoid impacting PPL's Ash Basin 2 and Ash Basin 3. These Ash Basins are owned by PPL and were used to store fly ash (a coal burning by-product that was mixed with water, treated with lime, and pumped as a slurry to the holding ponds). However, in multiple meetings held with PPL, PPL noted that Ash Basin 3 is no longer in use, is covered with 18 inches to 2 feet of soil, and is in the process of being reclaimed and revegetated. PPL also noted that Ash Basin 2 has not been used to store ash since 1998. During 1998 and 1999, PPL eliminated the use of Ash Basin 2 and covered it with 18 inches to 2 feet of soil.

As a result of this information and in an effort to minimize residential acquisitions and impacts to better quality habitat areas, the feasibility of using Ash Basins 2 and 3 in the alternatives development was investigated. Preliminary geotechnical investigations indicated that some additional design and mitigative measures would need to be implemented in order to make the Ash Basins stable, but that locating the highway alternatives on the Ash Basins would be a feasible concept.

As a result, the DA Alternative was redesigned in an area to the west of it's original location to make use of Ash Basin 2. The interchange between the 61 Connector and the new facility was also modified to make use of the land holdings surrounding Ash Basin 3.

The use of the Ash Basins in the A-A Hybrid Corridor provided the impetus for the creation of the DA West Alternative.

ii. Section 4(f) Compliance

Sites that are eligible for the National Register are afforded special protection under Section 4(f) of the US Department of Transportation Act of 1966 (amended 1968). This act requires that the project avoid publicly-owned public parks, publicly owned recreational lands, wildlife and waterfowl refuges, and publicly <u>or</u> privately-owned historic or archaeological resources that are listed on or eligible for listing on the National Register. Avoidance of these sites is mandatory unless: 1) there is no feasible and prudent alternative to the use of such land; and 2) all efforts have been made to minimize harm to these resources. As a result, whenever an alternative affects these protected resources, an alternative to avoid using them must also be designed and investigated. These avoidance alternatives are designated by the term "Avoidance" in their respective alternative name.

As part of the detailed environmental investigations, a survey of historic resources was prepared that evaluated the historical and architectural significance of 258 properties in the study area. These properties were evaluated using criteria established for the National Register of Historic Places. The results were presented in a Historic Resource Survey and Determination of Eligibility Report (September 1998) and Addendums (June and August 1999). Through report review and ongoing coordination with the PHMC, it was determined that, of the 258 inventoried structures, only 24 were determined eligible for the National Register. By law, feasible and prudent alternatives that avoid sites that are eligible for the National Register must be investigated.

Such is the case with the DA West Alternative in the A-A Hybrid Corridor. The DA West Alternative, as it was originally developed, impacted a historic farmstead, the App Farm, just north of its connection with the existing Selinsgrove Bypass stub. As a result, the DA West Modified Avoidance Alternative was developed to avoid impact to the historic App Property.

c. Section 1 - Old Trail Corridor

i. Use of Ash Basin 1

Once it was decided that some of the preliminary alternatives might affect part of the property owned by PPL in the vicinity of the Power Generating Plant located along the main stem Susquehanna River in Monroe Township, coordination with PPL was initiated. Numerous discussions were held with regard to the operations of the power plant, the use and closure of the accompanying Ash Basins, and the locations of transformers, sub-stations, and transmission lines.

As previously noted in Section III.D.4.b, PPL indicated Ash Basin 3 was closed and being reclaimed, and the closure of Ash Basin 2 was imminent. Both of these Ash Basins are located in the valley.

- Ash Basin 2 - In Monroe Township between Fisher Road and Stetler Road
- Ash Basin 3 - In Monroe Township and Shamokin Dam Borough, in the far western part of Shamokin Dam Borough

As noted, the alignment of the DA Alternative and the 61 Connector were modified to make use of both Ash Basins, because this would minimize residential impact and other impact to higher quality habitat.

However, as noted at these early coordination meetings with PPL, Ash Basin 1, which is located just south of and directly adjacent to the plant, will continue to be used by the Power Generating facility. In March of 1997, at the first coordination meeting with PPL, PPL requested for all alternatives to avoid impacting Ash Basin 1. The original alignments of the alternatives in the Old Trail area (preliminary alternatives C and F) would avoid Ash Basin 1. The impacts, as shown in Table III-4 for Alternative C and F, would avoid the Ash Basin. However, these alternatives would impact numerous residences and businesses.

At subsequent meetings in November 1997 and February 1998, PPL was informed that avoiding Ash Basin 1 caused greater displacements. Use of a portion of the Ash Basin was discussed. The alternatives in the Old Trail Corridor were then refined to use a portion of Ash Basin 1. The resultant alternatives were named OT1A (61 Connector) and OT1B (Stetler Ave./15 Connector).

To further complicate the situation, in May of 1998, the PPL Power Plant was determined to be a historical industrial site and potentially eligible for listing in the National Register of Historic Places. The original historical boundaries determined for the site included Ash Basin 1 in its entirety. As discussed in Section III.D.4.b.ii, once the plant and Ash Basin were determined eligible for the National Register, they were afforded additional protection from impact by Section 4(f) of the US Department of Transportation Act. As a result, feasible and prudent alternatives that would avoid impacts to Ash Basin 1 were investigated. The resultant alternatives were named OT1A (61 Connector) Avoidance and OT1B (Stetler Ave. Interchange/15 Connector) Avoidance.

d. Section 2

i. Study Crossing Further North

At the request of the Point Township/Union Township Focus Group, an additional river crossing, located to the north of RC1 was developed. Known as RC4, this river crossing was developed to minimize farmland and residential impacts in Union Township. A more northern crossing was also requested to avoid impact to the Winfield Rivers Edge campground. However, RC4 impacted two structures potentially eligible for the National Register. As a result, a more northerly crossing that would avoid historic properties was developed. The result of this evolution is River Crossing 6.

ii. Study Crossing Further South

A modification to River Crossing 3, the southernmost river crossing, was suggested in an effort to respond to Point Township's request to minimize impacts in the township. River Crossing 5 was developed to minimize residential impacts in both Point and Union Township. In addition, River Crossing 5 was developed to provide an optional interchange location for PA Route 147 in the Ridge Road area. All other River Crossings interchange with PA Route 147 in an area just south of PA Route 405 in the vicinity of PA Route 147. RC5 provides the opportunity for an interchange with PA Route 147 in the Ridge Road area.

iii. Study Alternatives West of PA Route 147

River Crossing 3 provided improvements to PA Route 147 between existing PA Route 147 and the river (west of PA Route 147). Point Township officials requested PENNDOT continue to explore an option on the west side of PA Route 147 with other river crossing locations. A new connection to River

Crossing 1 was devised that crossed the river, then ran west of Route 147. This modified River Crossing was known as River Crossing 1 West.

5. Phase II Alternatives

Between November of 1997 and November 1998, PENNDOT and the study team developed, refined, and continued refining various alternatives within the study corridors that were studied in detail. By November of 1998 the following alternatives were being studied in detail (see Figure III-12).

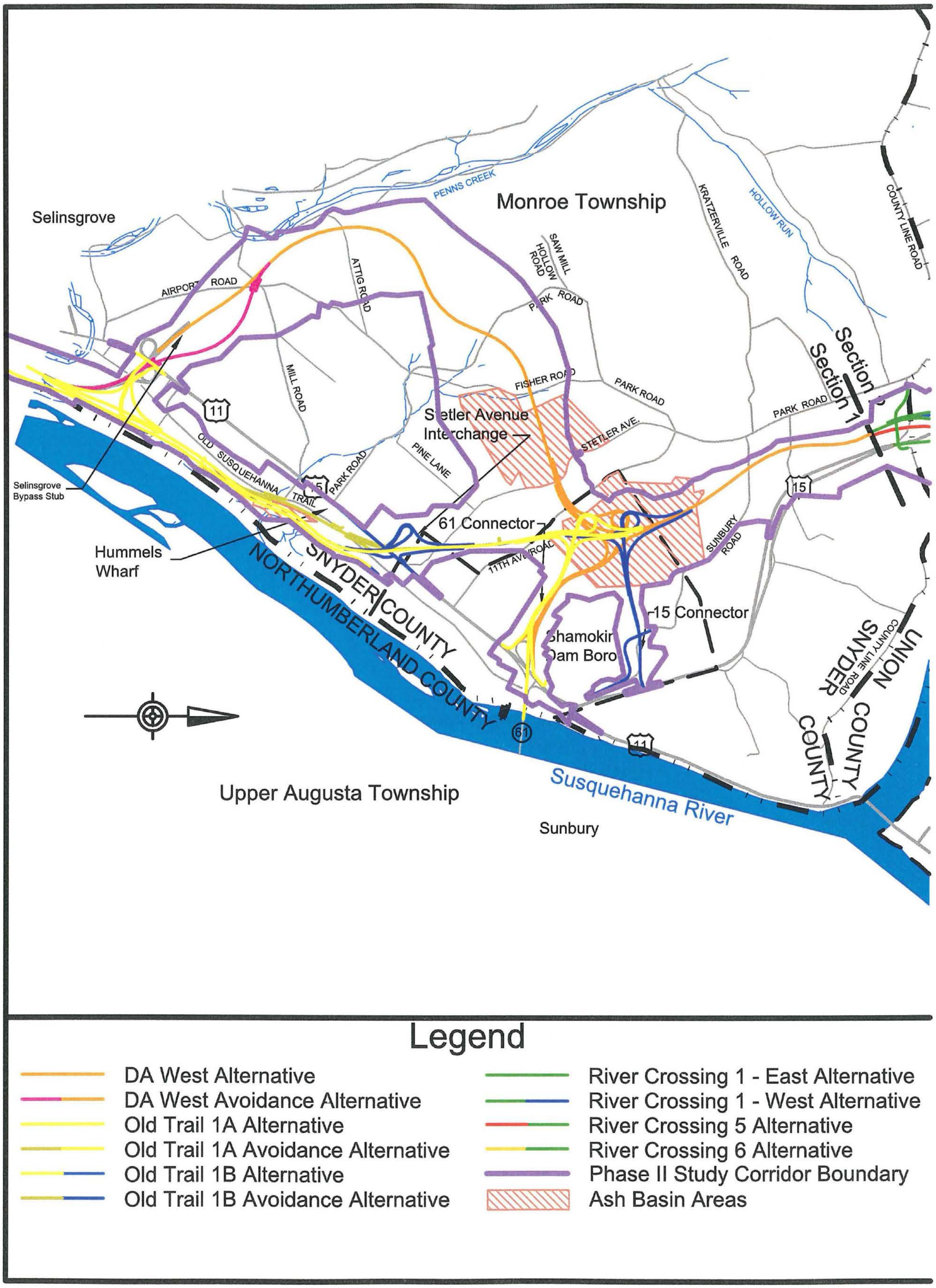
Section 1

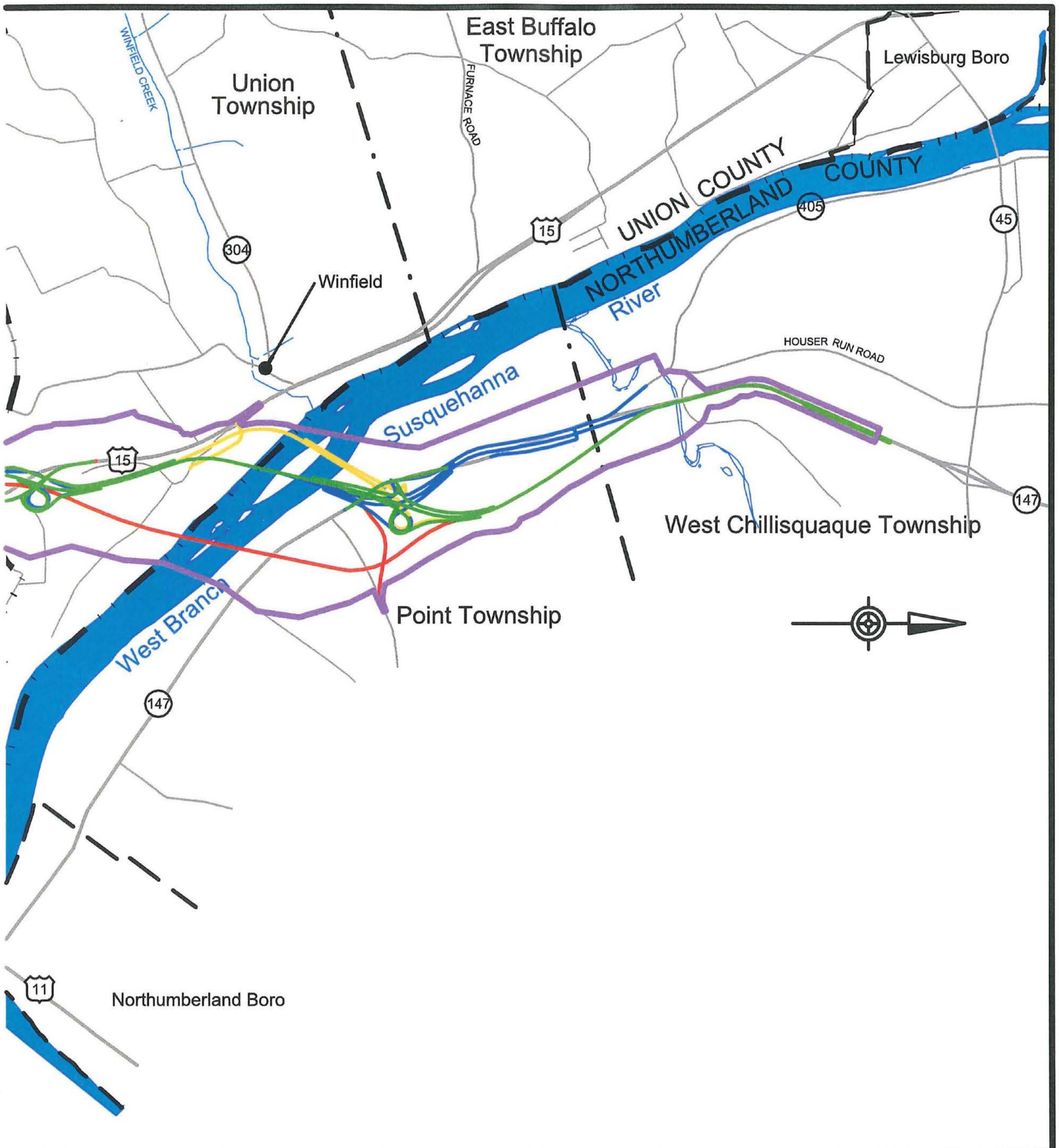
- A-A Hybrid Corridor
    - DA West (includes 61 Connector) - Composite of Alternatives A, BA, and DA
    - DA West Avoidance (includes 61 Connector and avoids historic farmstead)
- Old Trail Corridor
    - Old Trail 1A (includes 61 Connector) - Composite of Alternatives C and F
    - Old Trail 1A Avoidance (includes 61 Connector, avoids PPL Ash Basin 1)
    - Old Trail 1B (includes Stetler Avenue Interchange/15 Connector) - Composite of Alternatives C and F
    - Old Trail 1B Avoidance (includes Stetler Avenue Interchange/15 Connector, avoids PPL Ash Basin 1)

Section 2

- RC1-East - modification of RC1
- RC1-West - modification of RC1
- RC2 - dismissed
- RC3 - modified; renamed RC5
- RC4 - new river crossing to north of RC1. Modified and renamed RC6.
- RC5 - modification of RC3
- RC6 - modification of RC4

The engineering details and environmental impacts of these Phase II Alternatives were presented at the Fourth Public Meeting, in November of 1998. The impacts are summarized in Table III-12.


Selinsgrove
Monroe Township
PENNS CREEK
HOLLOW RUN
KRATZERVILLE ROAD
COUNTY LINE ROAD
SAW MILL HOLLOW ROAD
ATTIG ROAD
AIRPORT ROAD
PARK ROAD
MILL ROAD
FISHER ROAD
Section 2
Section 1
PARK ROAD
Stetler Avenue Interchange
STETLER AVE.
PINE LANE
OLD SUSQUEHANNA TRAIL
11
15
Selinsgrove Bypass Stub
61 Connector
Hummels Wharf
11TH AVE ROAD
SUNBURY ROAD
SNYDER COUNTY
NORTHUMBERLAND COUNTY
15 Connector
Shamokin Dam Boro
UNION COUNTY
SNYDER COUNTY
61
Upper Augusta Township
Susquehanna River
Sunbury
Legend
DA West Alternative
DA West Avoidance Alternative
Old Trail 1A Alternative
Old Trail 1A Avoidance Alternative
Old Trail 1B Alternative
Old Trail 1B Avoidance Alternative
River Crossing 1 - East Alternative
River Crossing 1 - West Alternative
River Crossing 5 Alternative
River Crossing 6 Alternative
Phase II Study Corridor Boundary
Ash Basin Areas



Central Susquehanna Valley Transportation Project

Figure III-12

Alternatives Studied in Detail (Phase II) (November 1998)

0 500 1000 1500
Scale in Meters

0 2000 4000 6000
Scale in Feet

TABLE III-12
CENTRAL SUSQUEHANNA VALLEY TRANSPORTATION PROJECT
IMPACT SUMMARY TABLE - PHASE II ALTERNATIVES

	Section 1 (Southern) Alternatives*			
	DA-WEST	DA-WEST Avoidance	OLD TRAIL 1A	OLD TRAIL 1A Avoidance
Total Area (Acres)	483.55	501.21	422.37	348.29
Agricultural Security Areas (Acres)	59.55	68.09	24.71	24.71
Productive Farmlands (Acres)	121.34	127.84	75.43	75.44
Agricultural Soils				
Prime (Acres)	130.62	124.24	184.93	181.82
Statewide Important (Acres)	185.21	178.42	103.96	107.35
Wetlands (Acres)	2.58	3.32	12.38	11.58
Forest Lands (Acres)	158.01	158.02	131.91	125.30
Hazardous Waste (No.)	2	3	12	12
Stream Crossings (No.)	28	28	16	16
Historic Sites (No.)	1	0	1	0
Structures				
Residential Homes (No.)	21	24	35	54
Residential Accessory Buildings (No.)	8	9	24	34
Commercial Establishments (No.)	1	4	6	4
Industrial (No.)	0	0	2	5
Churches (No.)	0	0	1	0
Recreational (No.)	0	0	0	0
Agricultural (No.)	0	0	0	0
TOTAL STRUCTURES	**30**	**37**	**68**	**97**
Preliminary Construction Costs**	77,600,000	80,200,000	71,700,000	81,700,000

* Any Section 1 Alternative can be combined with any Section 2 Alternative.

** Construction Cost Estimate does not include: Right-of-Way Acquisition Costs
Utility Relocation Costs
Mitigation Costs (i.e., noise barriers, remediation of waste sites, wetland replacement areas, etc.)

TABLE III-12
CENTRAL SUSQUEHANNA VALLEY TRANSPORTATION PROJECT
IMPACT SUMMARY TABLE - PHASE II ALTERNATIVES

Section 1 (Southern) Alternatives*		Section 2 (Northern) Alternatives*			
OLD TRAIL 1B	OLD TRAIL 1B Avoidance	RC1 WEST	RC1 EAST	RC5	RC6
469.49	462.48	383.07	403.14	408.08	408.07
24.71	24.71	28.87	13.91	69.68	14.91
74.67	86.58	108.85	114.56	144.16	120.03
172.24	183.32	51.29	61.61	63.50	63.15
124.55	127.30	111.67	122.81	120.64	125.63
12.79	11.70	2.58	3.27	3.34	4.31
174.38	168.87	171.48	216.55	194.94	217.33
12	13	1	0	0	2
18	19	19	17	15	17
1	0	0	0	0	0
35	55	53	35	32	36
25	36	24	14	7	17
9	11	4	3	0	6
2	5	1	1	0	1
1	1	0	0	0	0
0	0	0	0	0	0
0	0	11	6	5	0
72	**108**	**93**	**59**	**44**	**60**
78,500,000	87,100,000	152,000,000	157,700,000	160,100,000	140,300,000

November 1998

E. REFINEMENTS TO PHASE II ALTERNATIVES

Following the fourth Public Meeting in November of 1998, a series of issues arose that necessitated refinements to the Phase II Alternatives. These issues and the resultant engineering refinements are discussed in this section.

1. 61 Connector/US 11/15 Interchange

The 61 Connector continued to generate a substantial amount of interest in the study area. Of particular concern to local residents and business owners was how the interchange between existing US Routes 11/15 and the new 61 Connector interchange with 11/15 would affect traffic conditions on the existing network.

PENNDOT and the study team developed eight different options looking at how the proposed 61 Connector could interchange with US Routes 11/15. The roadway designs for these options and the traffic data from the evening rush hour were entered into a computer simulation program. The program allowed PENNDOT to examine each option's effectiveness at handling the traffic flow projected for the design year (2020).

Based on input from the CAC/POWG, Focus Groups, and businesses in the vicinity of the Orchard Hills Plaza, two of the eight options were studied in greater detail, Sketch 2 and Sketch 8 (see Figure III-13).

In Sketch 2, Baldwin Boulevard would be shifted slightly north to facilitate construction of the southbound ramp to the 61 Connector. This option would require the addition of two signals (one at the on-ramp from Routes 11/15 to the 61 Connector west, and one at the off-ramp from the 61 Connector east to US Routes 11/15). Route 11 is made into the primary through road by pulling existing Routes 11/15 slightly east.

Sketch 8 is based on a suggestion at a special purpose meeting with local businesses. It would keep Baldwin Boulevard in its present location and move the southbound access onto the 61 Connector to the intersection on the south side of the Connector. This option would add only one new signal to the interchange area.

At a business group meeting on April 12, 1999, the representatives present endorsed Sketch 8 as the option that would best address the interests of the businesses in the Orchard Hills Plaza area. Sketch 8 would also eliminate any displacements associated with the 61 Connector. This endorsement was also supported by the CAC/POWG and Focus Groups.

2. Old Trail Alternatives - Ash Basin Modifications

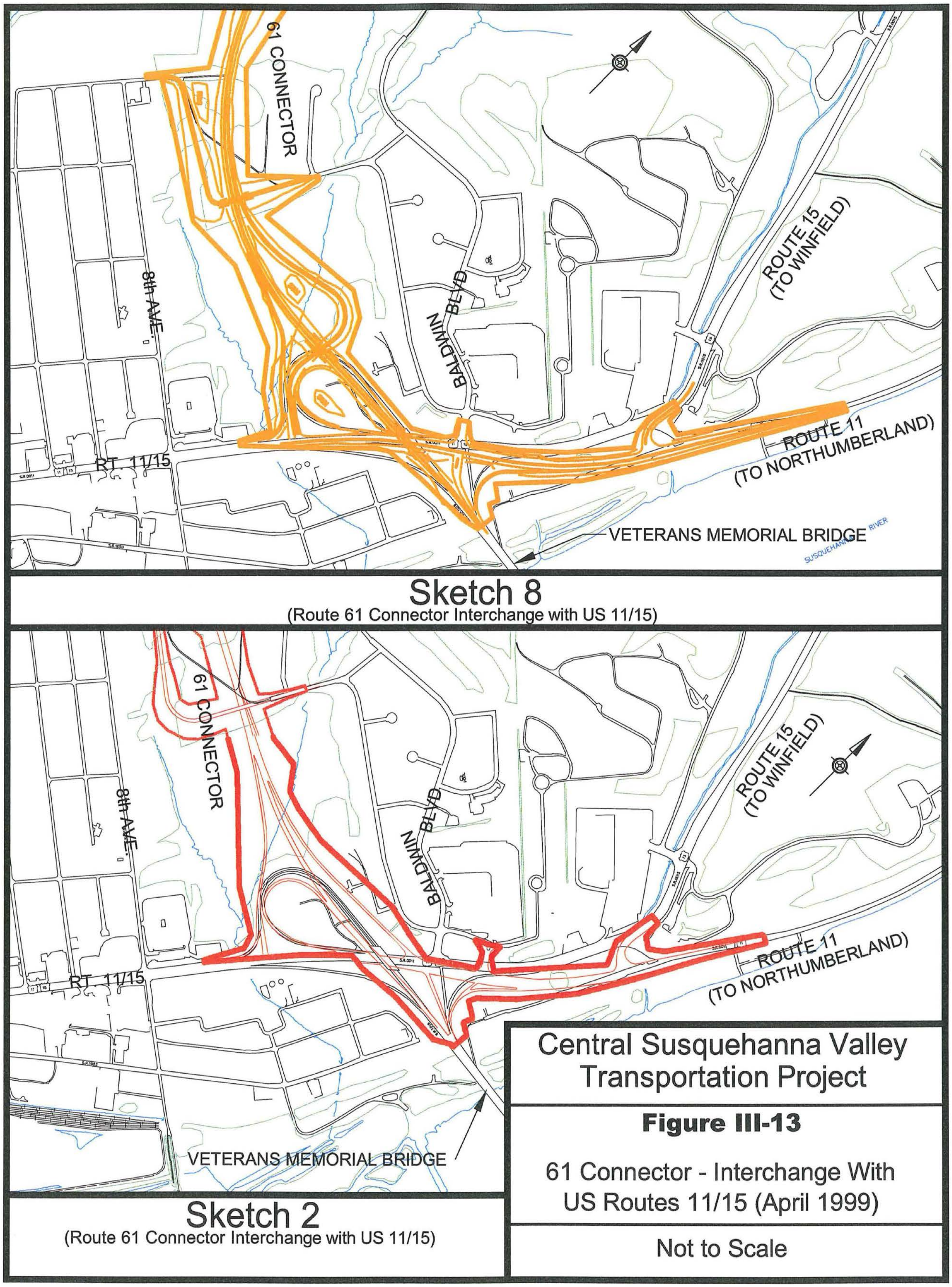
A letter to PENNDOT dated October 30, 1998, from the Pennsylvania Historic and Museum Commission (PHMC), the State Historic Preservation Officer (SHPO) in Pennsylvania, indicated that the SHPO had reevaluated the boundaries for the National Register eligible, PA Power and Light Steam Electric Station. The SHPO suggested that the boundaries at the PPL site should be revised to an area 2,000 feet north and 2,000 feet south (4,000 feet north to south) of the main generating facilities. The SHPO indicated that an area of this size would encompass all the eligible resources present at the site. A further investigation of the site followed, and in late November of 1998, the FHWA made the determination that the boundary of the PPL site would be revised to omit the coal storage yard to the north of the main generating facilities and the Ash Basin to the south of the main generating facilities. The SHPO examined this boundary modification and concurred with the FHWA's assessment on December 14, 1998 (see Appendix C).

As a result, a "hybrid" of the existing Old Trail Alternatives was developed that would completely avoid impact to the historic property. As a result, PENNDOT would be able to forego the study of any Ash Basin "Avoidance" Alternative. This adjustment to the historic property boundary provided the impetus for the development of the "second" version of the Old Trail Alternatives: Old Trail 2A including the 61 Connector (a hybrid of OT1A and 1A Avoidance) and Old Trail 2B including the Stetler Avenue Interchange and the 15 Connector (a hybrid of OT1B and 1B Avoidance). As a result of the creation of these "hybrid" options, OT1A, OT1A Avoidance, OT1B, and OT1B Avoidance were eliminated from further study. Figures III-14, III-15, and III-16 show the evolution of the OT2A and OT2B Alternatives.

Old Trail 2A and 2B, however, do have an impact to Ash Basin 1, although the impact is somewhat less than the impact to Ash Basin 1 required with Old Trail 1A and 1B.

Due to the potential impact to Ash Basin 1, PPL examined the plans for OT2A and 2B in detail. PPL estimated that reconfiguring and lining Ash Basin 1 is feasible and would cost approximately $3 - 3.5 million. As a result, the Old Trail Ash Basin Avoidance Alternatives were dismissed and the Old Trail Alternatives 2A and 2B were carried on for further evaluation.

In the summer of 1999, the PPL plant was sold to a Wisconsin-based power company. PENNDOT and the study team were informed that the new owners plan to continue using the site as a coal-fired, power generating facility. PENNDOT plans to continue coordination with the new owners with regard to the impact on Ash Basin 1 required by the Old Trail Alternatives.

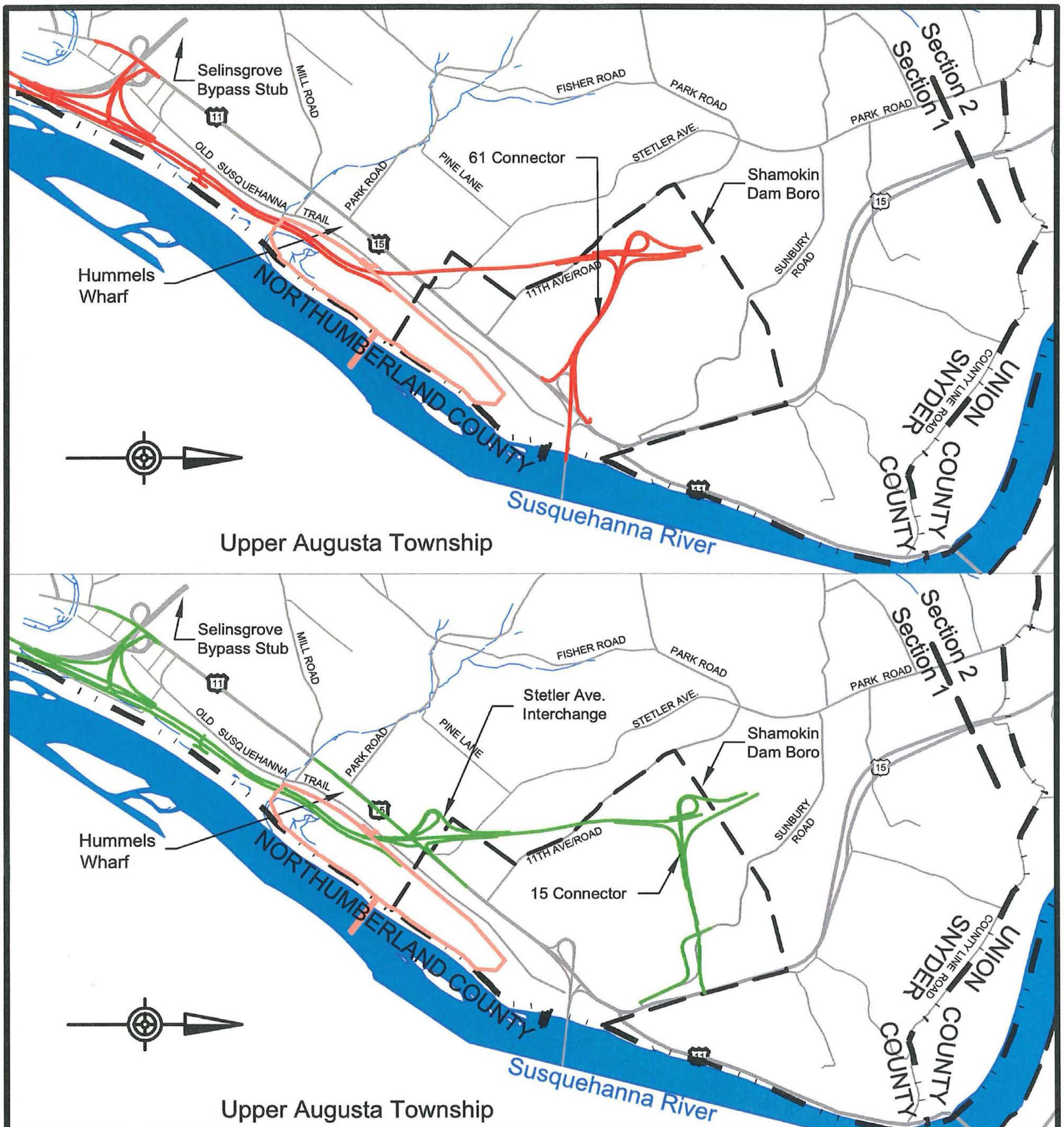


Central Susquehanna Valley Transportation Project

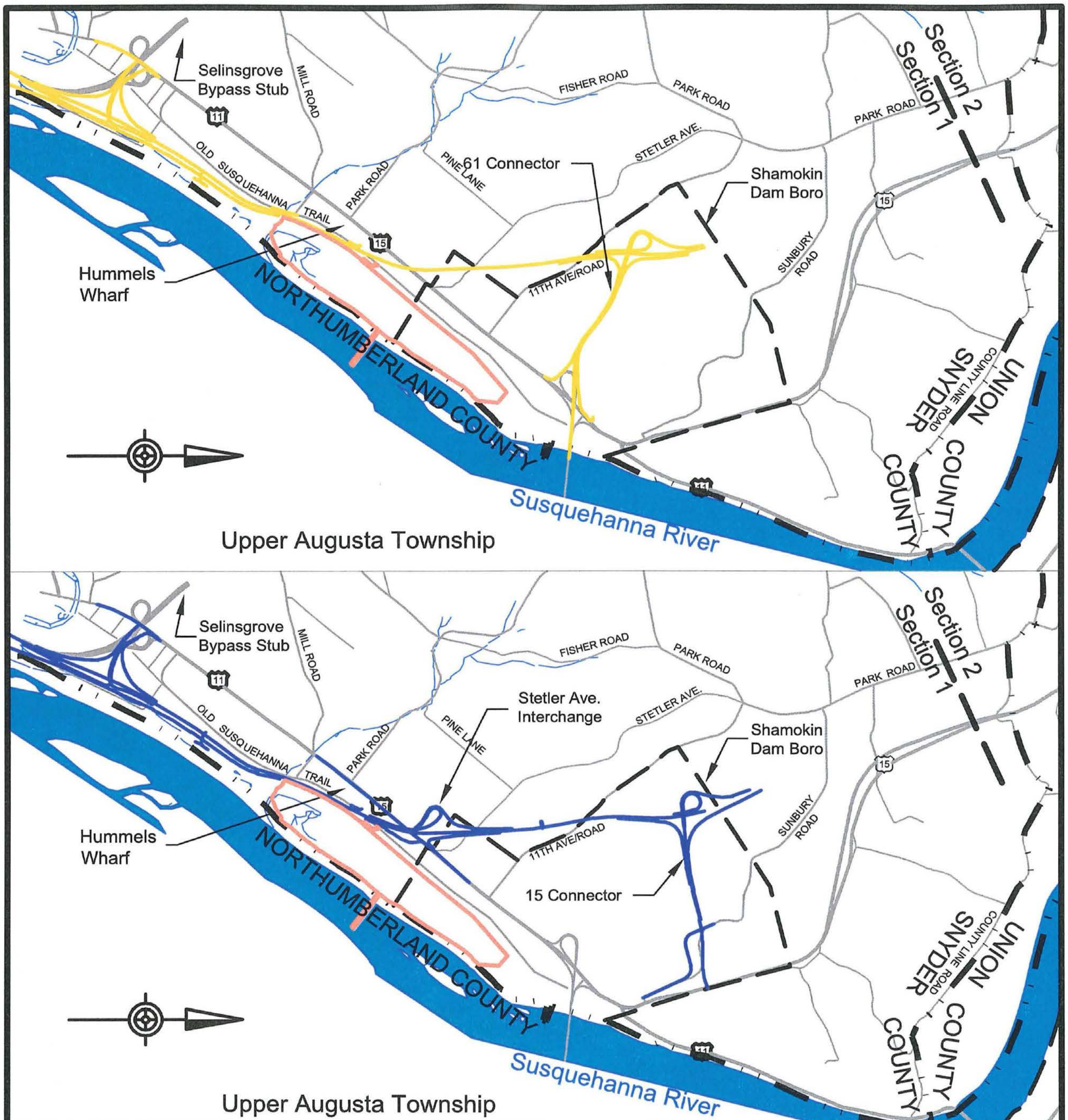
Figure III-13

61 Connector - Interchange With US Routes 11/15 (April 1999)

Not to Scale



Legend	Central Susquehanna Valley Transportation Project
Old Trail 1A Alternative *	**Figure III-14**
Old Trail 1B Alternative *	Old Trail Alternatives- Use of Ash Basin (Nov. 1998)
PP&L Historic Boundary	0 500 1000 1500 Scale in Meters
Shamokin Dam Borough Boundary	0 2000 4000 6000 Scale in Feet
* Alternatives Impact Historic Site	



Legend

- Old Trail 1A Avoidance Alternative *
- Old Trail 1B Avoidance Alternative *
- PP&L Historic Boundary
- Shamokin Dam Borough Boundary

* Alternatives Modified to Avoid Historic Site

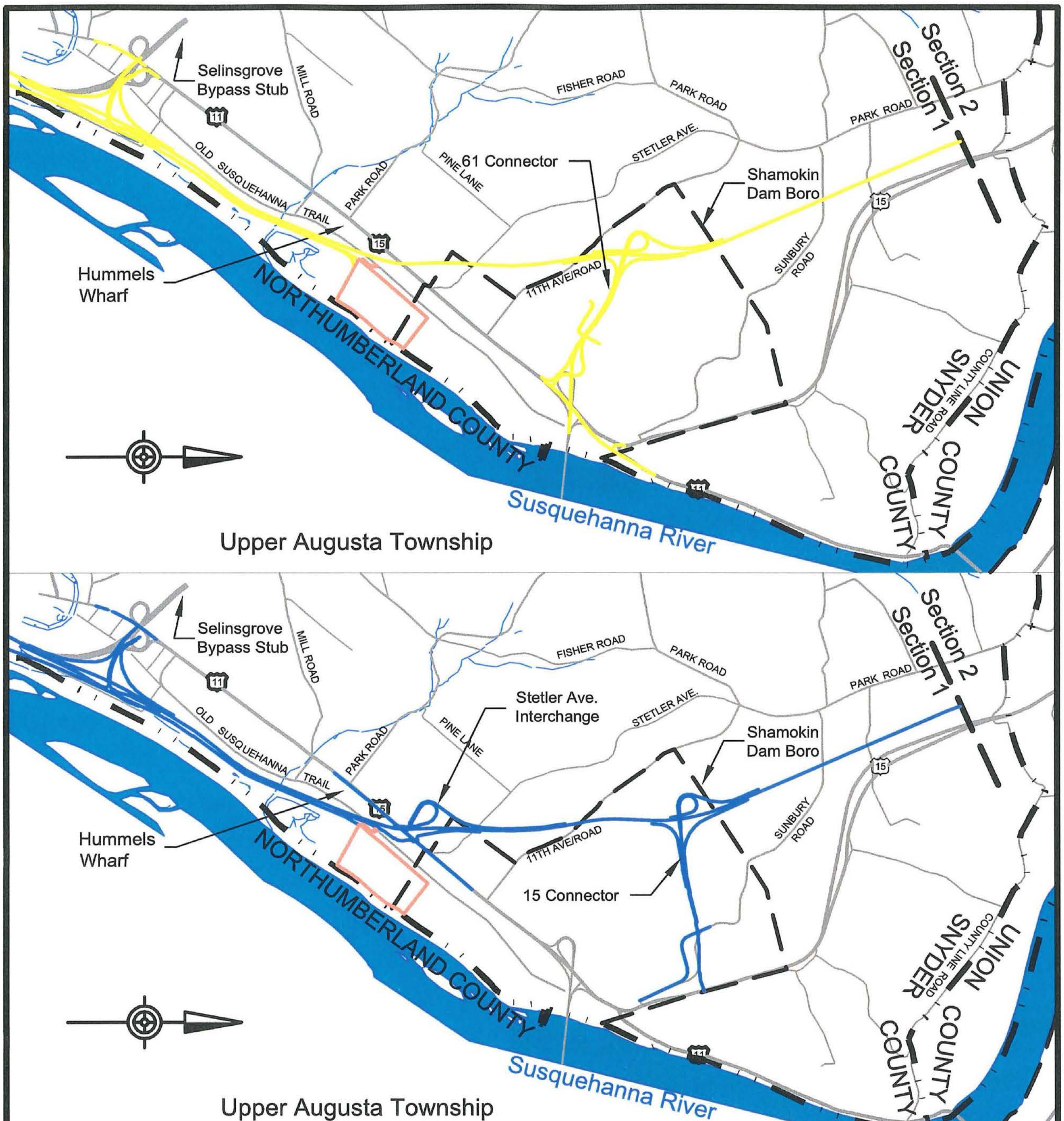
Central Susquehanna Valley Transportation Project

Figure III-15

Old Trail Alternatives- Ash Basin Avoidance (Nov. 1998)

0 500 1000 1500 Scale in Meters

0 2000 4000 6000 Scale in Feet



Legend

- Old Trail 2A Alternative (Hybrid of OT1A and OT1A Avd.)
- Old Trail 2B Alternative (Hybrid of OT1B and OT1B Avd.)
- PP&L Historic Boundary (Revised 1999)
- Shamokin Dam Borough Boundary

Central Susquehanna Valley Transportation Project

Figure III-16

Old Trail Alternatives-
Ash Basin Modifications (May 1999)

0 500 1000 1500
Scale in Meters

0 2000 4000 6000
Scale in Feet

3. Landfill Issues

In January of 1999, a closed municipal landfill was investigated to determine if it lies directly in the path of the DA West Alternative. The landfill is located where the DA West swings to the northwest to avoid the Colonial Acres development and to minimize impacts to productive farmland, agricultural security areas, and wetlands.

The landfill site was noted on preliminary constraint mapping; however, the landfill site boundaries were uncertain and the study team believed the DA West Alternative was far enough to the west to avoid impacting the site. In the early stages of project development, letters were sent to the local municipalities soliciting specific information with regard to waste sites. None of the municipalities responded with any concerns.

The site was reassessed after the November 12, 1998, Public Meeting when members of the public raised questions about how the project would impact the landfill.

Following up on these concerns, two tasks were completed. First, extensive testing and research was initiated on the site to determine the exact extent of the landfill contents to assess the consequences of building a roadway over or through it. Second, the study corridor was expanded an additional 200 acres (approximately) to the northwest. The study corridor expansion was done so that alternatives could be developed that avoid the landfill, if determined necessary through the detailed studies.

The testing performed at the landfill site used non-intrusive methods so that the landfill contents were not disturbed. The results of the additional studies indicated that the landfill covered roughly 35 acres and contains municipal, bulk, and demolition waste. Tests performed on residential wells in the area of the landfill showed that water passing through the landfill has not transferred any contaminants to surrounding residential wells.

Based on the results of the testing, it was estimated that it would cost $35 - 50 million to remove and properly dispose of the landfill contents to allow the DA West Alternative to be built. Due to this expense and the potential for future liability if PENNDOT were to become the owner of all or part of the site, the decision was made to dismiss the DA West Alternative from further analysis. Other options to avoid the landfill were then explored.

- The original DA Alternative was restudied. This alternative passed southeast of the landfill property. This alternative, however, had extensive impacts to productive farmland and agricultural security areas and also impacted numerous residences.

- DA Modified was developed as a modification to DA to minimize the farmland and residential acquisitions.

- A modification further to the north and west, known as the DA West Modified, was also developed to avoid the landfill site.

These four alternatives in the area of the landfill are shown on Figure III-17.

During the Spring and Summer of 1999, meetings were held with property owners affected by all of the alternatives in the area of the landfill. Meetings were held as follows.

- 3/23/99 - Meeting with Stonebridge residents to review impacts of DA West Alternative on landfill and to discuss 200-acre corridor expansion to the west to analyze landfill avoidance alternatives.

- 5/10/99 - Meeting with Colonial Acres residents to discuss results of landfill testing and present landfill avoidance alternatives under investigation.

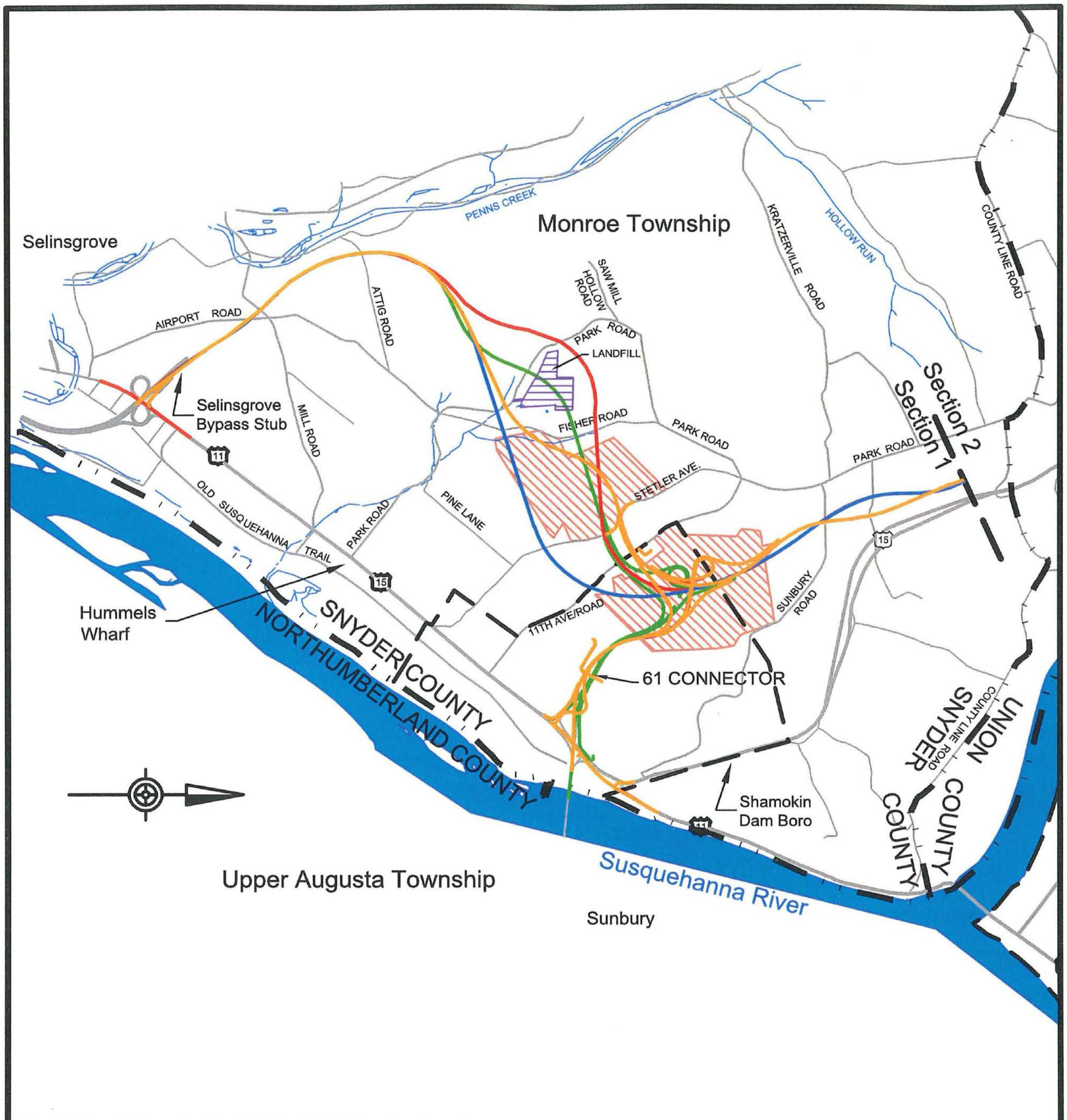
- 5/18/99 - Meeting with Stonebridge and Colonial Acres residents to announce decision to eliminate DA West from further consideration due to liability and cost issues. Discussed alternatives under investigation to avoid landfill.

- 8/10/99 - Meeting with Stonebridge and Colonial Acres residents to present the impacts of the landfill avoidance alternatives.

Concerns expressed by residents at these meetings focused on displacements, impacts to property values, and quality of life impacts (primarily due to roadway noise and visibility).

The DA Modified Alternative and the DA West Modified Alternative were both closely refined to minimize impacts to homes and surrounding farmlands and habitat as much as possible. A comparison of impacts for the various alternatives is shown in Table III-13. It is important to note that impact numbers shown on this table represent a portion of the overall A-A Hybrid Corridor Alternatives, focused on the landfill area.

In August of 1999, PENNDOT dismissed the DA West Modified Alternative because it would generate 3.3 million cubic yards of excess waste material (that could potentially cause additional impacts wherever PENNDOT decided they could dispose of this material), cross Ash Basin 2 in cut, and breach the Ash Basin's dam, potentially compromising its stability. For these engineering and safety reasons, PENNDOT chose to carry forward the DA Modified Alternative in Section 1 to avoid impacting the closed municipal landfill.



Legend

- DA Modified Alternative
- DA West Modified Alternative
- DA West Alternative
- DA Alternative
- Northeastern Snyder County Joint Authority Land Fill
- Ash Basin Areas
- Shamokin Dam Borough Boundary

Central Susquehanna Valley Transportation Project

Figure III-17

Landfill Avoidance Alternatives (August 1999)

0 500 1000 1500 Scale in Meters

0 2000 4000 6000 Scale in Feet

TABLE III-13
CENTRAL SUSQUEHANNA VALLEY TRANSPORTATION PROJECT
IMPACT SUMMARY TABLE
A-A HYBRID CORRIDOR - LANDFILL AVOIDANCE ALTERNATIVES

TOTAL (ACREAGE)	**289.71**	**271.48**	**286.36**
STRUCTURES (NO.)	**DA**	**DA MODIFIED**	**DA WEST MODIFIED**
Residential	26[a]	24[b]	18[c]
Residential/Agricultural Barn	0	0	1
Residential Accessory Building	5	17	13
Agricultural - Barns	3	0	0
Agricultural - Outbuildings	8	0	0
Agricultural - Silo, Corn, Crib, etc.	1	0	0
Commercial	0	0	3[d]
Total	43	41	32
[a] 8 impacted structures in Colonial Acres [b] 3 impacted structures in Colonial Acres [c] 2 impacted structures in Stonebridge [d] 3 businesses operated out of one property			
AGRICULTURE (ACRES)			
Agricultural Security Area	35.83	4.10	2.96
Productive Farmland	83.07	33.16	35.91
Agricultural Soils Prime Statewide Important	 39.30 85.78	 17.29 94.78	 28.74 105.86
HABITAT (ACRES)			
Wetlands	1.49	1.98	1.26
Forestland	120.15	126.37	131.58
Rangeland	59.69	81.84	82.82
WASTE SITES (NO.)	1	0	0
CULTURAL			
Historic Properties (No.)	0	0	0
Archaeological Probability (Acres) Low Moderate High	N/A[e]	 250.65 19.81 0.89	 254.15 31.25 0.89
[e] N/A = Not Analyzed			

TABLE III-13 (CONTINUED)
CENTRAL SUSQUEHANNA VALLEY TRANSPORTATION PROJECT
IMPACT SUMMARY TABLE
A-A HYBRID CORRIDOR - LANDFILL AVOIDANCE ALTERNATIVES

NOISE IMPACTS			
Noise Impacted Residences	N/A[f]	30	31
Residences with Reasonable Mitigation	N/A[f]	0	0

[f] N/A = Not Analyzed

EARTHWORK[g]	**DA MODIFIED**	**DA WEST MODIFIED**
Cut (CY)	5,524,750	7,236,850
Fill (CY)	4,604,000	3,897,700
Total (CY)	920,750	3,339,150

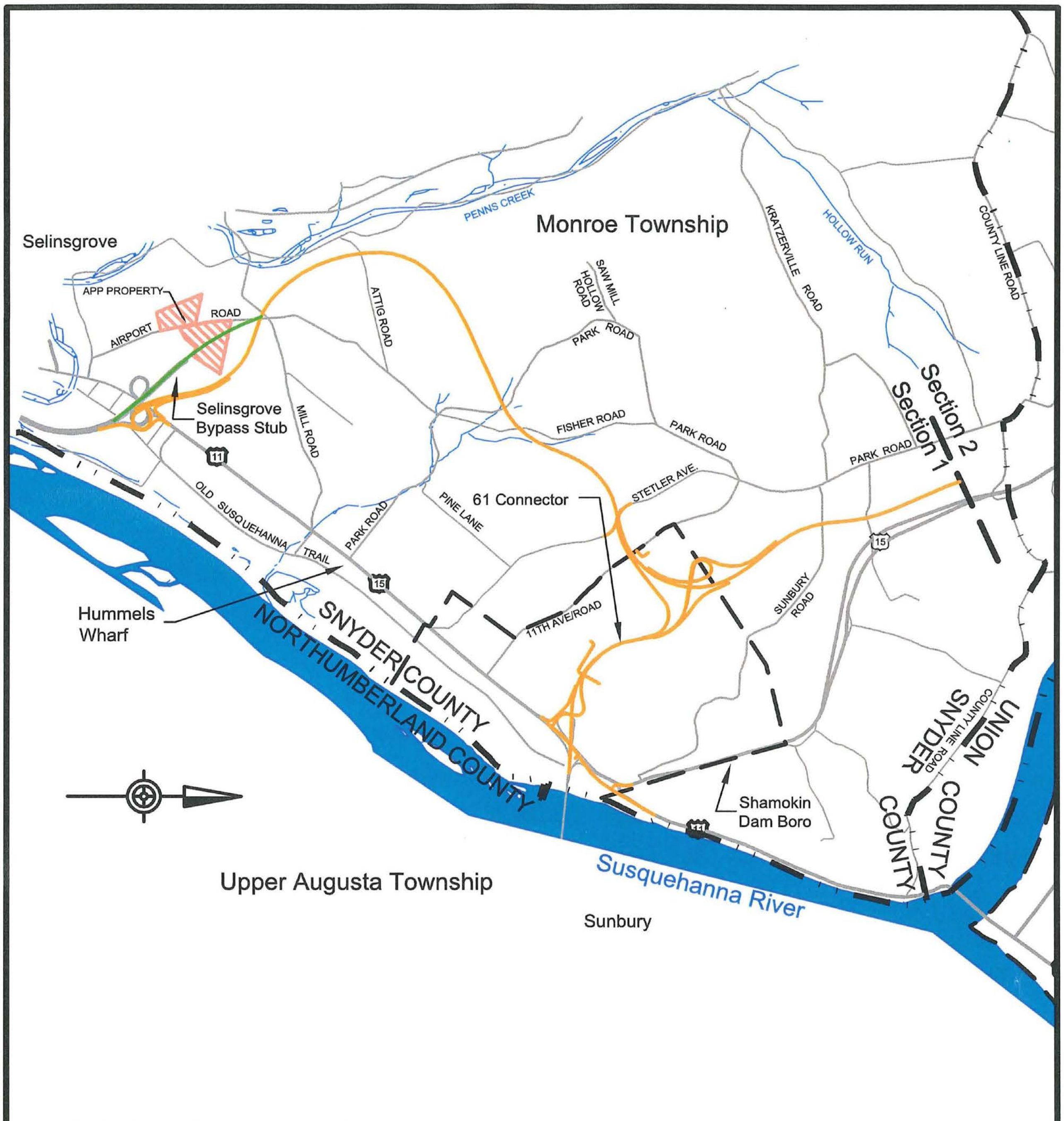
[g] The cut quantities are based on uniform 2:1 cut slope. Therefore, the cut can be reduced where it is going through rock.

LENGTH		
Segment Length (ft)	16,014	17,122
COSTS[h]		
Construction Costs ($)	66,966,561	76,420,833

[h] Construction cost estimate only. Does not include right-of-way acquisition costs, utility relocation costs, and mitigation costs.

4. Historic App Property

As discussed earlier, the DA Modified Alternative directly impacts a property, the Simon P. App Farm Property, that has been determined eligible for the National Register. The impact to this property occurs just north and west of the new facility's connection to the Selinsgrove Bypass stub (see Figure III-18). The DA Modified Alternative affects property (9 acres) from within the boundary of the historic site, but it does not require the displacement of any structures on the property. However, the DA Modified Alternative would bisect the farm property and be located approximately 155 feet from the farmstead. Sites determined eligible for the National Register must have alternatives investigated to



Legend

- DA Modified Avoidance Alternative
- DA Modified Alternative
- Historic App Properties
- Shamokin Dam Borough Boundary

Central Susquehanna Valley Transportation Project

Figure III-18

App Property - Avoidance Alternative (September 1999)

0 500 1000 1500 Scale in Meters

0 2000 4000 6000 Scale in Feet

avoid the impact. Avoidance is necessary unless there is no feasible and prudent alternative to the "use" (or acquisition) of a 4(f) protected resource.

Alternatives can be found not feasible only if they cannot be constructed using sound engineering principles. Alternatives can be found not prudent if they do not meet the established project needs, or if they would result in unique problems or environmental (natural and socioeconomic) impacts of an extraordinary magnitude.

The DA Modified Avoidance Alternative was developed to avoid the Simon P. App Farm Property. The DA Modified Avoidance Alternative is identical to the DA Modified Alternative except for a short section, approximately 1,000 feet long, from the interchange with U.S. Routes 11/15 to the intersection between Airport Road and Mill Road. The DA Modified Avoidance Alternative (see Figure III-18) completely avoids the historic property and passes approximately 766 feet away from the farmstead; however, the avoidance alternative (DAMA) does have increased impacts to the community since it impacts residences (2) and businesses (7), (including the Comfort Inn) that the DA Modified (Non-avoidance) does not. Most of these impacts are necessitated by the fact that the DA Modified Avoidance Alternative requires the reconstruction of the interchange between the DA Modified Alternative and existing US Routes 11/15. The existing interchange stub cannot be used with the DA Modified Avoidance Alternative.

Table III-14 compares the impacts of the DA Modified Alternative and the DA Modified Avoidance Alternative. It is important to note that impact numbers shown on this table only represent a portion of the overall A-A Hybrid Corridor Alternatives, focused on the area around the App Property. All project impacts other than those listed in the table are identical between the DA Modified Alternative and the DA Modified Avoidance Alternative.

A review of Table III-14 indicates that the DA Modified Avoidance Alternative (DAMA) has some areas where it has greater impact than the DA Modified (Non-Avoidance) Alternative (DAM). From a natural resources perspective, the alternatives are very similar; however, the DAMA affects 0.76 acre of wetland more than DAM. From a farmland perspective, the DAMA affects less productive farmland and less agricultural security areas. However, the DAMA would impact more prime soils (6 acres) and more statewide important soils (7 acres). The DAMA also impacts 2 potential waste sites while the DAM affects none.

It is in the area of social impacts where the differences are greatest between the DAMA and DAM. DAMA affects residences (2) and businesses (7) that the DAM does not. The DAMA also shows a greater impact to the tax base. However, this impact to the tax base must be clarified. Recent coordination with the Snyder County Tax Assessment Office has indicated that two parcels owned by the Susquehanna Valley Mall are impacted by the DAMA Alternative, Parcels 12-09-283A and 12-09-283B. Both are vacant parcels. Parcel 12-09-283A has an assessed value of $4,805,850 which is for the value of the stores in the mall, even through the mall is not physically located on this parcel.

TABLE III-14
CENTRAL SUSQUEHANNA VALLEY TRANSPORTATION PROJECT
IMPACT SUMMARY TABLE
A-A HYBRID CORRIDOR–APP PROPERTY ALTERNATIVES

	DA MODIFIED (NON-AVOIDANCE)	DA MODIFIED AVOIDANCE
TOTAL ACREAGE (Acres)	100.94	118.59
STRUCTURES (No.)		
Residential	0	2
Residential Accessory Building	2	3
Commercial	0	7[a]
AGRICULTURE (Acres)		
Agricultural Security Areas (ASA)	51.58	51.10
Productive Farmland	49.37	46.99
Agricultural Soils		
Prime	45.68	52.02
Statewide Important	41.32	48.10
HABITAT (Acres)		
Wetlands	1.23	1.99
Forest Land	1.90	1.90
Stream crossings	2	2
POTENTIAL WASTE SITES (No.)	0	2[b]
CULTURAL PROPERTIES		
Historic (No.)	1	0
High Probability Archaeology (Acres)	7.56	6.77
NOISE IMPACTS		
Noise Impacted Residences	12	14
Residences with Feasible and Reasonable Mitigation	0	0
TAX BASE LOSSES ($)		
Snyder County	1,460.07	15,778.74
Selinsgrove School District	6,179.74	66,783.52
Monroe Township	243.34	2,269.79

a Comfort Inn, Performance Computers/Digital Link (in one building), Class A Auto/Class A Carpet/Styles Unlimited Fitness Center (in one building), Styles Unlimited Beauty Salon
b Class A Auto, Auto Credit

Similarly, the $137,200 assessment associated with Parcel 12-09-283B is for the value of the movie theatre complex in the mall, even though the movie structures are not physically located on this parcel. As such, the DAMA tax base impact calculation for the parcels associated with the mall is more fiscally representative of an impact to the actual mall structure itself, whereas the construction of the DAMA would truly only impact undeveloped land owned by the mall owners.

The DA Modified Avoidance Alternative will cost approximately $2.5 million dollars more than the DA Modified in construction related costs and will also cost approximately $2.5 million dollars more than the DA Modified in terms of right-of-way acquisition costs. Thus, the DA Modified Avoidance Alternative costs approximately $5 million more overall than the DA Modified (non-Avoidance) Alternative.

The local community has expressed frustration concerning the elevated protection status of historic resources over the protection of homes, farmland, and businesses. However, PENNDOT, in conjunction with the FHWA (which has final authority on the matter), has determined that the DA Modified Avoidance Alternative is feasible and prudent since the additional impacts of the Avoidance Alternative do not appear to be of an "extraordinary magnitude".

As a result of these discussions, PENNDOT and the study team have advanced the DA Modified Avoidance Alternative for further study.

5. Colonial Acres Concerns/Sunbury Road Modification

The original alignment of the DA Modified Avoidance Alternative (DAMA) divided a cul-de-sac community, known as Colonial Acres, located on Colonial Drive just north of Fisher Road.

At the request of the Colonial Acres residents, several special purpose community meetings were convened to discuss the impacts of the DAMA Alternative and listen to community concerns. These meetings were held on April 6, 2000, May 25, 2000, and July 11, 2000. In response to requests received at these meetings, the DAMA alignment was modified to move the alternative further south on Colonial Drive, closer to the intersection of Colonial Drive and Fisher Road. This requires removing the lower portion of existing Colonial Drive and constructing a new access road connecting Colonial Drive to Park Road. Residents in the Colonial Acres development expressed a desire for this shift to minimize the impacts of bisecting the development and bridging over the only road into and out of the development (Colonial Drive). The height of the bridge and roadway embankment as it passes through the development and surrounding areas was also lowered. Additionally, the alignment was shifted from the western to the eastern side of the ridge just east of the development and Fisher Road. These modifications reduced the amount of excess waste material in Section 1, while still avoiding the breast of the PPL Ash Pond 2 dam. Although this shift increases the Colonial Acres residential impacts from four houses to seven, it does avoid impacting other homes in the area of 11th Avenue.

In addition, modifications were also made to the alignment of the DAMA, OT2A, and OT2B Alternatives in the vicinity of Sunbury Road. At the request of an affected local property owner and farmer, an alignment shift was evaluated. The modified alignment impacted 10.5 fewer acres of pastureland, but 2.5 acres more of cropland. Overall, the modification affected 8.0 acres less of productive farmland and 1.7 acres less farmland in an agricultural security area (ASA). However, this modification does require the acquisition of two residences along Sunbury Road. As a result of the appreciable difference this modification had on the future of local farming operations, this modification was incorporated into all studied alternatives.

These minor alignment modifications are shown on Figure III-19.

F. ALTERNATIVES STUDIED IN DETAIL IN THE DRAFT EIS

As a result of continual refinement to the Phase II Alternatives, the following set of alternatives were found to be reasonable and warrant further study. They were evaluated in the Draft EIS.

1. Section 1

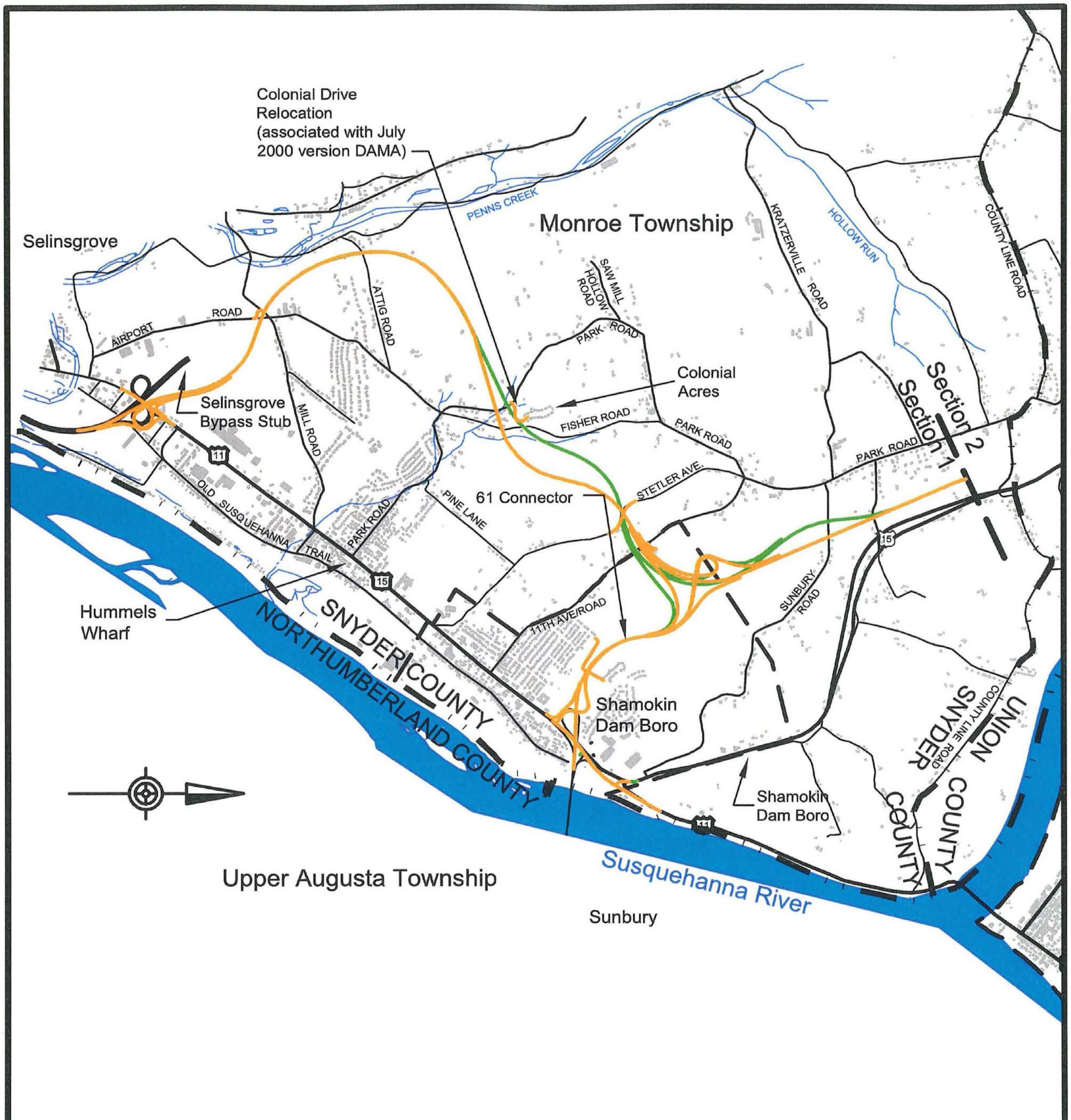
It is anticipated that Section 1 Alternatives would carry the designation of U.S. Route 15. It is likely that the section of US Route 15 that is bypassed will be designated Business Route 15 and US Route 11.

a. DA Modified Avoidance Alternative (DAMA)

The DAMA heads north and west from existing US Routes 11/15 in the area of the stub of the Selinsgrove Bypass. DAMA does not use the stub, instead it requires a reconfiguration of the connection to move north of the historic App Property. The alternative then swings to the north around the Kingswood Road subdivision, back to the east to avoid the closed municipal landfill where it impacts the Colonial Acres subdivision. The alternative continues north and east through Ash Basin 2 to an interchange with the 61 Connector on Ash Basin 3. DAMA continues northwest to its connection with the Section 2 Alternatives. DAMA is shown on Figure III-20.

b. Old Trail 2A (OT2A)

OT2A begins in the vicinity of the Selinsgrove Bypass stub. It proceeds due north between existing Old Trail Road and the Susquehanna River attempting to minimize residential acquisitions in the Old Trail area. In the vicinity of the existing power plant the alternative impacts a portion of Ash Basin 1, then moves to the northwest to cross over existing US Routes 11/15 in the power line clearing near the Hampton Inn. OT2A proceeds northwest, skirting the edge of densely developed Shamokin Dam Borough. OT2A interchanges with the 61 Connector in the area of Ash Basin 3. The alternative continues northwest to its connection with the Section 2 Alternatives (see Figure III-20).



Legend

- DA Modified Avoidance Alternative (March 2000 Version)
- DA Modified Avoidance Alternative (July 2000 Version)
- Shamokin Dam Borough Boundary

Central Susquehanna Valley Transportation Project

Figure III-19

DAMA Modifications - Colonial Acres/Sunbury Road

0 500 1000 1500 Scale in Meters

0 2000 4000 6000 Scale in Feet

c. Old Trail 2B (OT2B)

Essentially, OT2B is very similar to OT2A in its mainline characteristics. The differences between OT2B and OT2A occur in the way the alternatives reconnect to the existing system. OT2B does not use the 61 Connector to connect to the existing system. Rather, it connects by way of a fully directional interchange in the vicinity of Stetler Avenue and the Route 15 Connector, which is a new two-lane roadway through undeveloped land just north and west of the split between US Route 11 and US Route 15 (see Figure III-20).

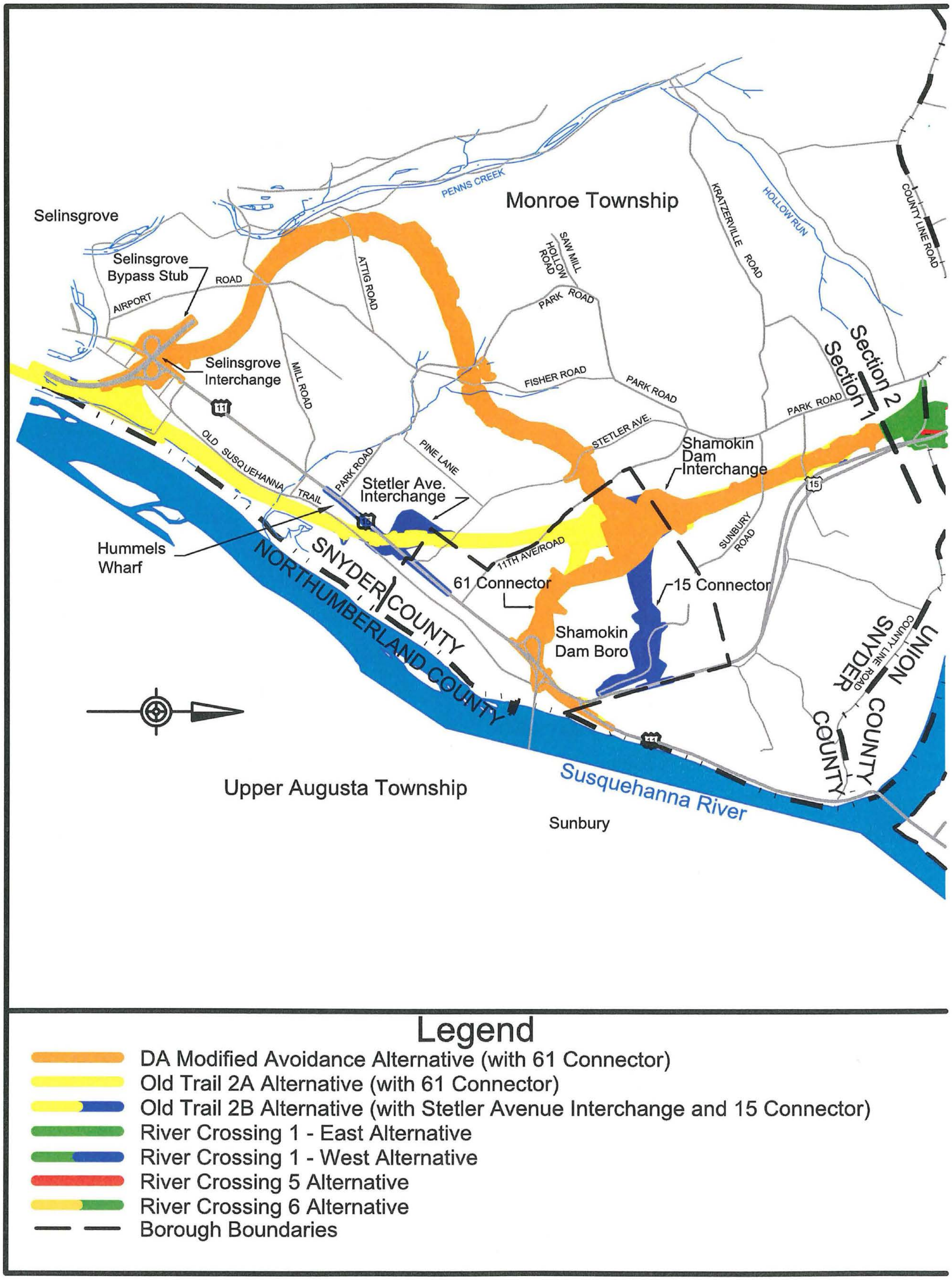
2. Section 2

a. River Crossing 1 East (RC1-E)

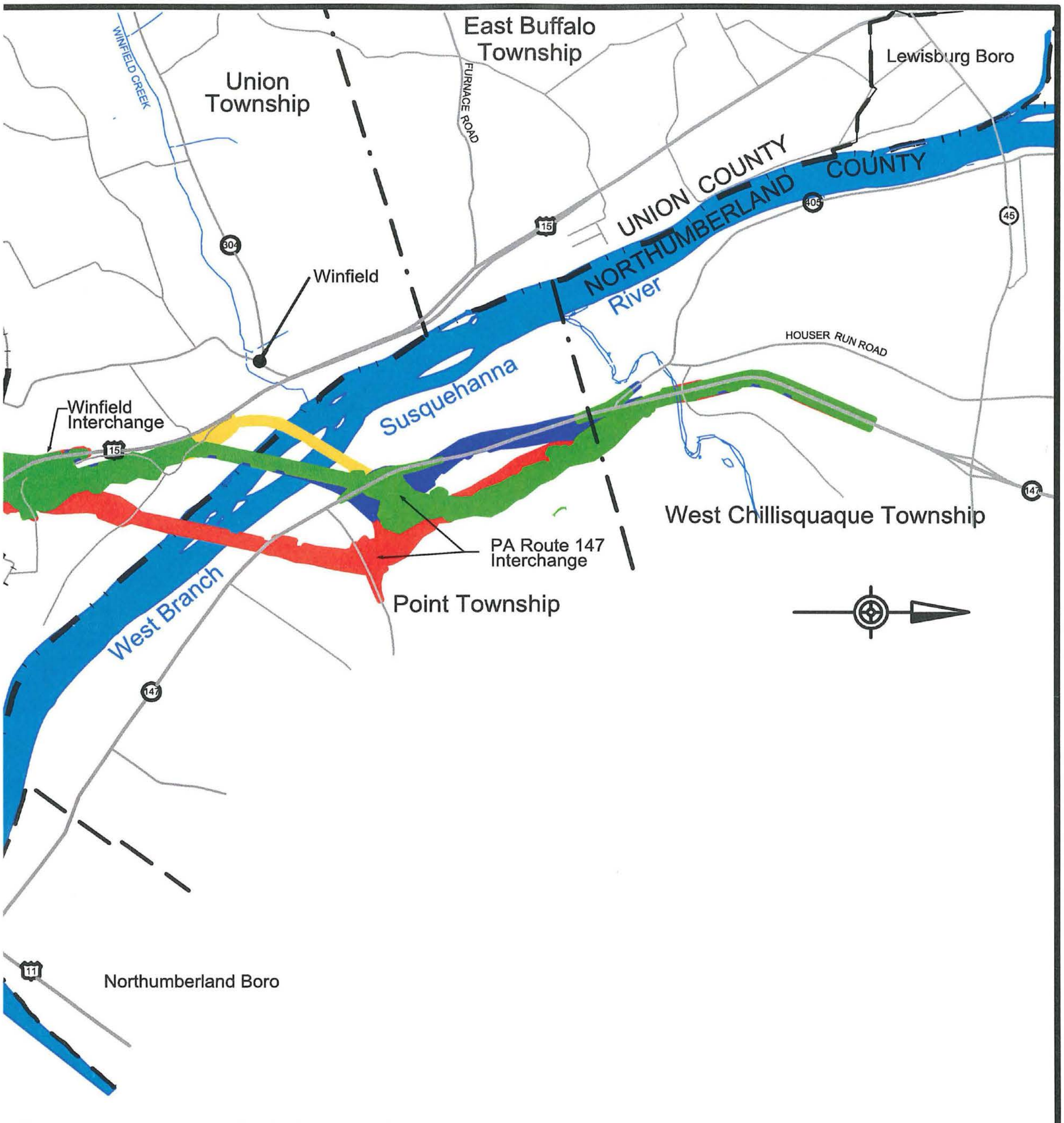
RC1-E heads north and east from its connection with the Section 1 Alternatives. A fully directional interchange is provided between RC1-E and US Route 15 in the Winfield area. RC1-E proceeds across the West Branch Susquehanna River on a structure that spans the floodway and floodplain on both sides of the West Branch of the Susquehanna River. The structure also spans the existing rail line and existing PA Route 147 on the east side of the river. Piers would be required on the large island in the West Branch Susquehanna River. RC1-E continues east to a new interchange with PA Route 147. It then runs north and east of existing PA Route 147 to its connection with the Build Out of the Two on Four Section near PA Route 45 (see Figure 20).

b. River Crossing 1 West (RC1-W)

RC1-W heads north and east from its connection with the Section 1 Alternatives and is essentially the same as RC1-E until it reaches the east side of the West Branch Susquehanna River. On the east side of the river RC1-W interchanges with PA Route 147, then proceeds north and slightly west of existing PA Route 147. Due to the need to retain access to properties along PA Route 147, a system of frontage roads will need to be constructed alongside RC1-W. As a result, the right-of-way area for RC1-W is somewhat enlarged (see Figure III-20). This alternative also connects to the Build Out of the Two on Four Section near PA Route 45.



Selinsgrove
Monroe Township
PENNS CREEK
Selinsgrove Bypass Stub
AIRPORT ROAD
ATTIG ROAD
SAW MILL HOLLOW ROAD
PARK ROAD
KRATZERVILLE ROAD
HOLLOW RUN
COUNTY LINE ROAD
Selinsgrove Interchange
MILL ROAD
FISHER ROAD
PARK ROAD
Section 2
Section 1
PARK ROAD
11
OLD SUSQUEHANNA TRAIL
PARK ROAD
PINE LANE
STETLER AVE.
Shamokin Dam Interchange
15
Stetler Ave. Interchange
Hummels Wharf
SNYDER COUNTY
NORTHUMBERLAND COUNTY
11TH AVE/ROAD
61 Connector
15 Connector
SUNBURY ROAD
Shamokin Dam Boro
UNION COUNTY
SNYDER COUNTY
COUNTY LINE ROAD
Upper Augusta Township
Susquehanna River
Sunbury
Legend
DA Modified Avoidance Alternative (with 61 Connector)
Old Trail 2A Alternative (with 61 Connector)
Old Trail 2B Alternative (with Stetler Avenue Interchange and 15 Connector)
River Crossing 1 - East Alternative
River Crossing 1 - West Alternative
River Crossing 5 Alternative
River Crossing 6 Alternative
Borough Boundaries



Central Susquehanna Valley Transportation Project

Figure III-20

DEIS Alternatives (November 2000)

0 500 1000 1500 Scale in Meters

0 2000 4000 6000 Scale in Feet

c. River Crossing 5 (RC5)

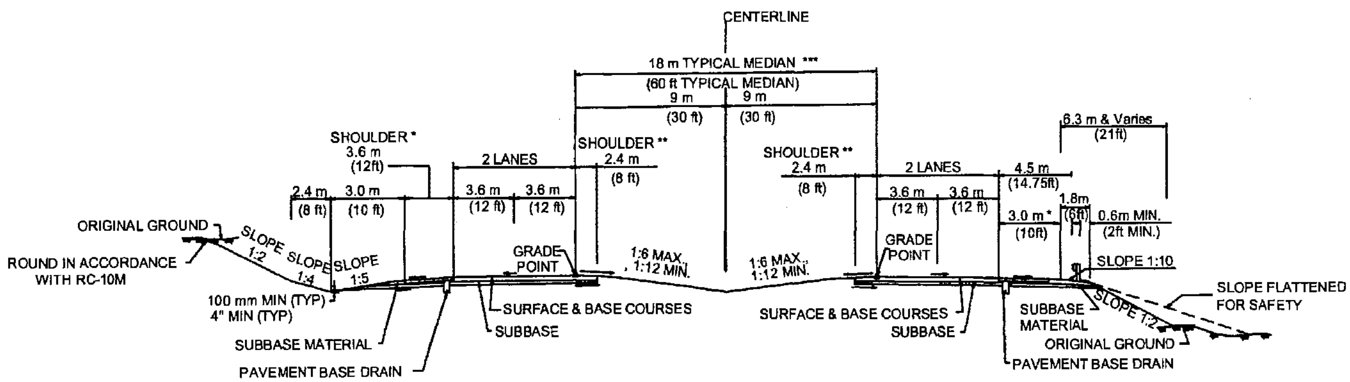
The southernmost of the river crossing options, RC5 heads north and east from its connection with the Section 1 Alternatives. A fully directional interchange is provided between RC5 and US Route 15 in the Winfield area. RC5 then proceeds east across the West Branch Susquehanna River on a structure that spans the floodway and floodplain on both sides of the West Branch Susquehanna River. The structure also spans the existing rail line and existing PA Route 147 on the east side of the river. The crossing makes use of the smaller island south of the large island in the West Branch Susquehanna River. RC5 continues north and east to an interchange with Ridge Road. This interchange provides direct access to PA Route 147 via relocated Ridge Road. Continuing north, RC5 is located east of PA Route 147, slightly downslope of RC1-E and RC6 (see Figure III-20). RC5 then connects to the Build Out of the Two on Four Section near PA Route 45.

d. River Crossing 6 (RC6)

The northernmost of the river crossing options, RC6 heads north and east from its connection with the Section 1 Alternatives. A fully directional interchange is provided between RC6 and US Route 15 in the Winfield area. RC6 then proceeds north to cross the river on a skewed structure. The bridge for RC6 crosses the West Branch Susquehanna River on the upstream end of the big island also crossed by RC1-E and RC1-W. RC6 also spans the floodway and floodplain on both sides of the river and the existing rail line and PA Route 147 east of the river. RC6 continues east to a new interchange with PA Route 147. From this location, RC6 runs east of existing PA Route 147 on the same alignment as RC1-E. It then connects to the Build Out of the Two on Four Section near PA Route 45 (see Figure III-20).

Public involvement will play a role in the further design of the proposed Susquehanna River Bridge. A public advisory committee composed of community members and local officials will be formed. This committee will be given the opportunity to review context sensitive design features and provide comments on various bridge design options.

All alternatives evaluated in this Draft EIS are four-lane, limited access alternatives. Typical sections are shown in Figures III-21 and III-22.



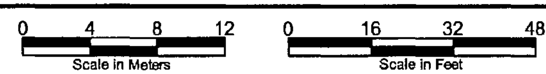
TYPICAL SECTION - DA MODIFIED AVOIDANCE

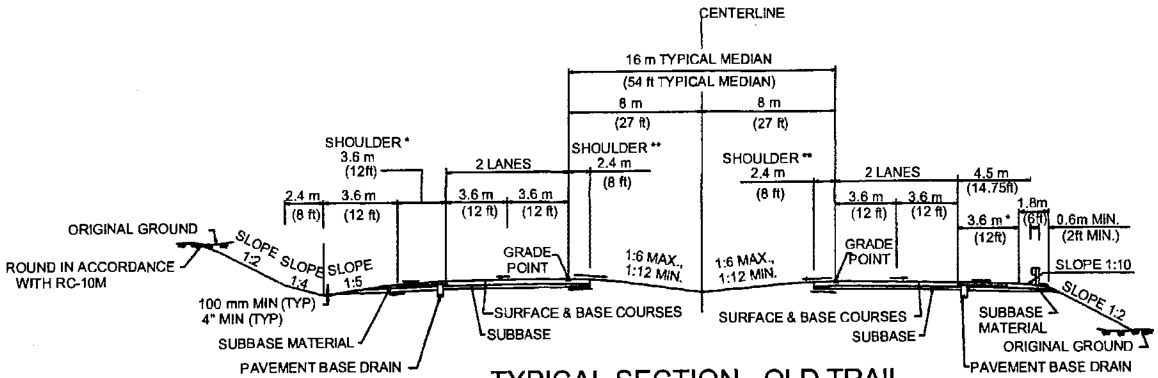
* 3.6 m (12ft) = 3.0 m (10ft) PAVED WITH 0.6 m (2ft) GRADED
** 2.4 m (8ft) = 1.2 m (4ft) PAVED WITH 1.2 m (4ft) GRADED
*** THE MEDIAN WIDTH HAS BEEN REVISED FROM 27 m (90 ft) TO 18 m (60 ft), THE ALTERNATE FILL SLOPE WILL NOW BE USED TO HELP BALANCE EARTHWORK, ALSO THE FILL LINES WILL BE THE SAME AS BEFORE AND IMPACT LINES WILL NOT BE ADJUSTED.

Central Susquehanna Valley Transportation Project

Figure III - 21

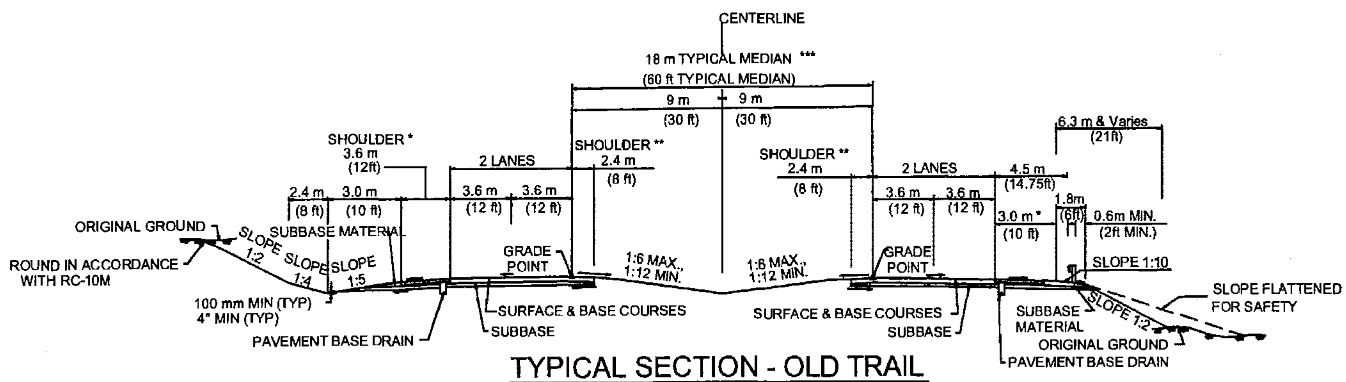
Typical Section
DAMA / All River Crossing Options





TYPICAL SECTION - OLD TRAIL

(from Selinsgrove Interchange to OT Crossing of 11th Avenue (Approximately)



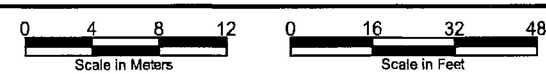
TYPICAL SECTION - OLD TRAIL

* 3.6 m (12ft) = 3.0 m (10ft) PAVED WITH 0.6 m (2ft) GRADED
** 2.4 m (8ft) = 1.2 m (4ft) PAVED WITH 1.2 m (4ft) GRADED
*** THE MEDIAN WIDTH HAS BEEN REVISED FROM 27 m (90 ft) TO 18 m (60 ft), THE ALTERNATE FILL SLOPE WILL NOW BE USED TO HELP BALANCE EARTHWORK, ALSO THE FILL LINES WILL BE THE SAME AS BEFORE AND IMPACT LINES WILL NOT BE ADJUSTED.

Central Susquehanna Valley Transportation Project

Figure III - 22

Typical Section
Old Trail 2A and Old Trail 2B



3. Transportation System Management (TSM) Measures to be Implemented in Conjunction with New Alignment Alternatives

Transportation System Management (TSM) measures were evaluated and will be implemented on the existing roadway network in conjunction with the new alignment alternatives evaluated in the Draft EIS.

a. Realignment of the Intersection at US Routes 11/15, US 15, and US 11

The current configuration at the intersection in Shamokin Dam, where US Routes 11/15 heading north splits into US Route 15 and US Route 11 (locally known as "the 11/15 split"), is that US Route 15 is the primary traffic movement, and US Route 11 joins this intersection at a "T". Once the CSVT Project is open to traffic, it is anticipated that the traffic volumes on US Route 15 will decrease. As a result of the change in traffic volumes, the decision was made to realign the intersection of "the split" as part of the CSVT Project. The intersection will be realigned such that US Route 11 becomes the primary through traffic movement and US Route 15 is "T'd" at this location.

b. Optimization and Sequencing of Signals

The change in the traffic volumes on the existing roadway network that would result from the construction of the CSVT also provides the impetus leading to the second TSM measure that would be implemented as part of the CSVT Project. Following construction, operations at any given signal where traffic volumes have changed as a result of the project will be optimized. This means that the timing sequence of the signal will be evaluated to provide timing, such that the delay is minimized. Then, once the timing at each individual signal has been optimized, the signals will be interconnected to best sequence the traffic flow.

G. ALTERNATIVES STUDIED IN DETAIL IN THE FINAL EIS

Comments regarding the alternatives studied in detail and evaluated in the Draft EIS were received through testimony at the Public Hearing and through comment letters received at the Hearing and throughout the Draft EIS comment period. Most of the comments received were related to the

Recommended Preferred Alternative indicated in the Draft EIS (DAMA in Section 1, RC5 in Section 2). Various minor modifications to these alternatives were suggested. All of these modifications were considered. The more substantial modifications were evaluated and dismissed because they caused more environmental impact than the Draft EIS Alternative or because they had engineering problems. Some of the more minor modifications will be considered in Final Design. All of the suggested modifications and the rationale for not carrying them into detailed study is presented in Section V.

The most opposition received related to the Draft EIS Alternatives was related to the selection of the DA Modified Avoidance (DAMA) Alternative over the DA Modified (Non-Avoidance) Alternative.

The opposition centers on the avoidance of the Simon P. App Farm Property, a property determined eligible for the National Register of Historic Places. As such, the property is afforded the protection of Section 4(f) of the U.S. Department of Transportation Act of 1966 (amended 1968). This means that an avoidance alternative must be selected unless the avoidance alternative is not prudent and feasible.

Due to the substantial controversy concerning the eligibility determination and boundaries of the App farm, FHWA elected to raise the questions of eligibility and boundaries with the Keeper of the National Register (Keeper), the individual delegated the authority by the U.S. Department of Interior, National Park Service to list properties and determine their eligibility for the National Register of Historic Places. The Keeper evaluated the information concerning the App farm and responded that the App farm and boundaries of the App farm meet the eligibility requirements.

The response, contained in Appendix C of the Final EIS, indicates that the "Simon P. App Farm meets National Register Criteria A and C for its local historic and architectural significance. The approximately 31-acre boundary established for the register-eligible property is appropriate and justified as being the historic (1866) boundary of the property."

The frustration regarding the eligibility and boundaries of the site and the subsequent development and recommendation of the Avoidance Alternative is acknowledged. However, given the regulatory requirements and legal precedents that exist regarding Section 4(f), the avoidance of the App Farm is necessary.

Should conditions change substantially from those currently present at any point prior to construction of the CSVT project, we have committed to reevaluating the area of impact. If conditions warrant, modifications of the alignment will be made to further minimize project impacts. This commitment includes the entire CSVT project area, as well as avoidance of the Simon P. App Farmstead.

As a result, no modifications have been made to the set of alternatives studied in the Draft EIS. The alternatives evaluated in this Final EIS are the same as the alternatives evaluated in the Draft EIS.

IV. Environmental Consequences and Mitigation

IV. ENVIRONMENTAL CONSEQUENCES AND MITIGATION

Potential impacts of alternatives studied in detail on the social, natural, and cultural environments are documented in this section. In addition, proposed measures to mitigate impacts to resources are discussed. The recommended mitigation measures are defined in as much detail as possible for this stage of project development. Generally, the purpose and expected performance of the mitigation measures are presented here. The alternatives evaluated in this section include the following (see Figure IV-1).

Section 1

- DA Modified Avoidance (DAMA)/includes 61 Connector
- Old Trail 2A (OT2A)/includes 61 Connector
- Old Trail 2B (OT2B)/includes Stetler Avenue Interchange and 15 Connector Combination

Two interchanges are proposed for the DAMA and OT2A Alternatives and include the following.

1) **Selinsgrove Interchange** - at the Selinsgrove Bypass (US Routes 11/15) stub. This is the southern terminus of the study area and is located just north of Selinsgrove Borough in the vicinity of the Susquehanna Valley Mall.

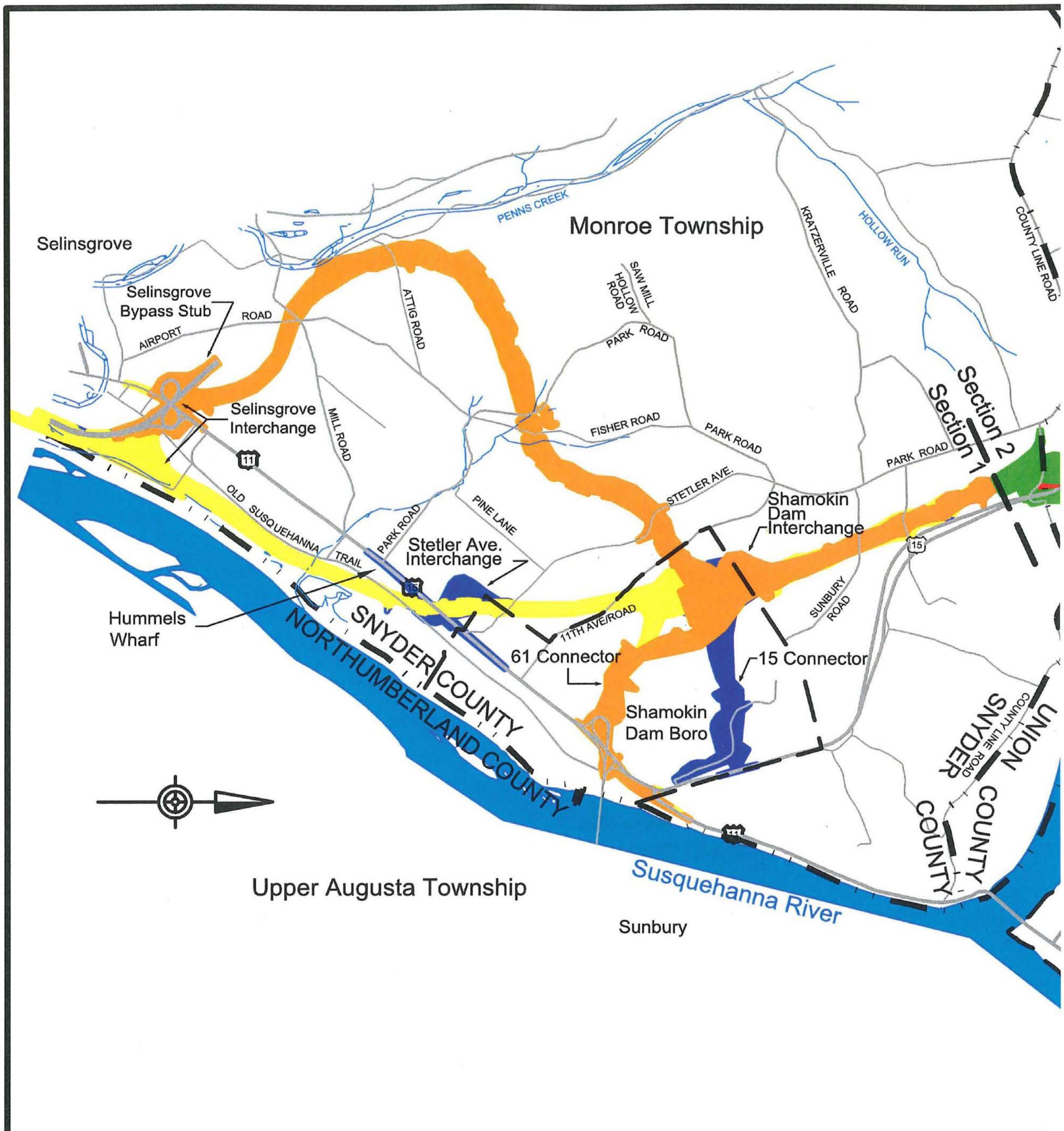
2) **Shamokin Dam Interchange** - DAMA and OT2A connect to existing US Routes 11/15 via the 61 Connector in Shamokin Dam. An interchange is provided between the mainline (DAMA or OT2A) and the 61 Connector.

Three interchanges are proposed for the OT2B Alternative and include the following.

1) **Selinsgrove Interchange** - at the Selinsgrove Bypass (US Routes 11/15) stub. This is the southern terminus of the study area and is located just north of Selinsgrove Borough in the vicinity of the Susquehanna Valley Mall.

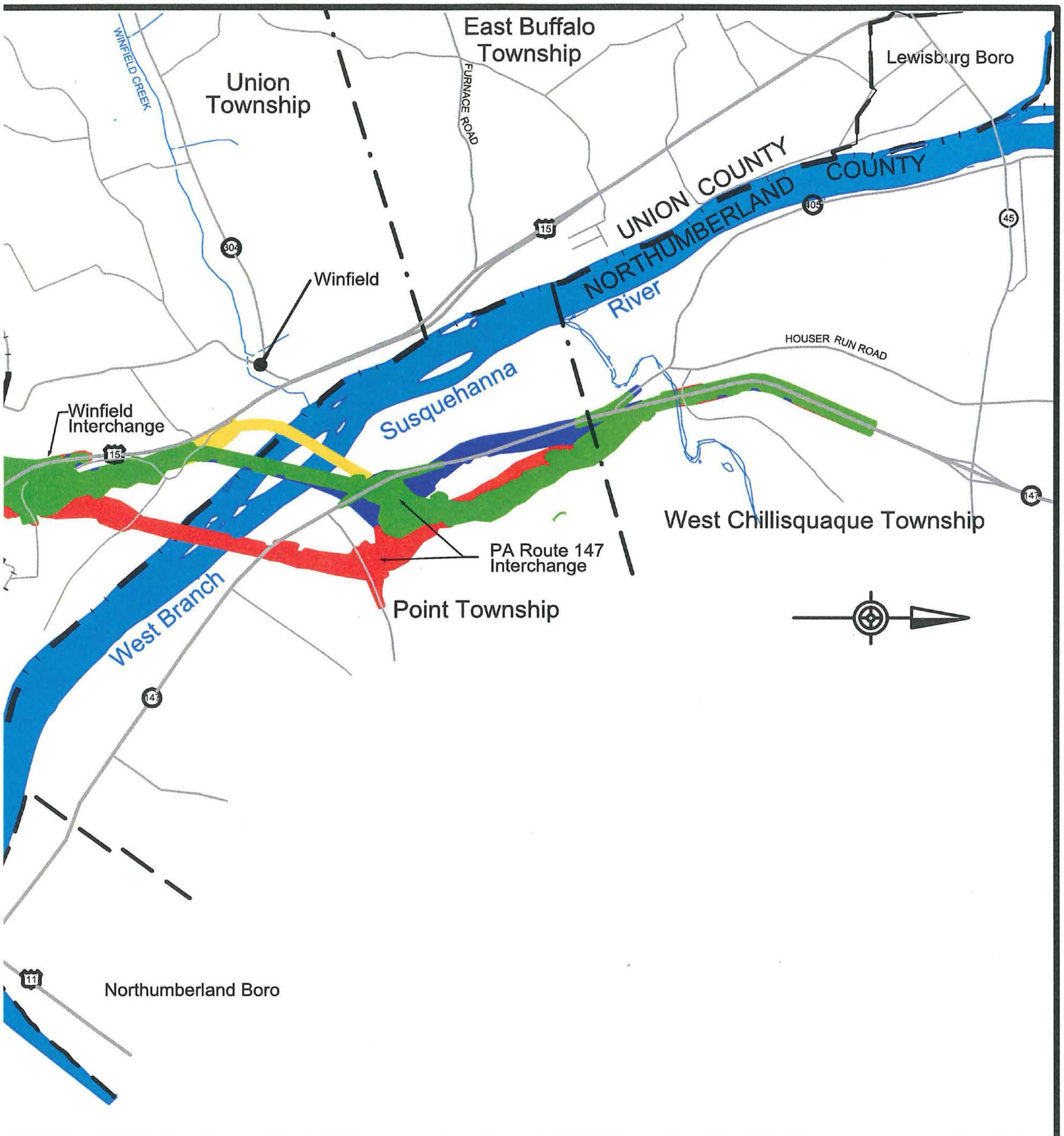
2) **Stetler Avenue Interchange** - OT2B connects to existing US Routes 11/15 via an interchange in the vicinity of Stetler Avenue.

3) **Shamokin Dam Interchange** - OT2B connects to existing US Routes 11/15 in the northern part of Shamokin Dam Borough via the 15 Connector. An interchange is provided between OT2B and the 15 Connector.



Legend

- DA Modified Avoidance Alternative (with 61 Connector)
- Old Trail 2A Alternative (with 61 Connector)
- Old Trail 2B Alternative (with Stetler Avenue Interchange and 15 Connector)
- River Crossing 1 - East Alternative
- River Crossing 1 - West Alternative
- River Crossing 5 Alternative
- River Crossing 6 Alternative
- Borough Boundaries



Central Susquehanna Valley Transportation Project

Figure IV-1

Impact Areas for FEIS Alternatives

0 500 1000 1500 Scale in Meters

0 2000 4000 6000 Scale in Feet

Section 2

- River Crossing 1 East (RC1-E)
- River Crossing 1 West (RC1-W)
- River Crossing 5 (RC5)
- River Crossing 6 (RC6)

Two interchanges are proposed for the Section 2 Alternatives and include the following.

1) **Winfield Interchange** - at US Route 15 south of Winfield and west of the West Branch Susquehanna River.

2) **At PA Route 147** - this interchange is located east of the river, north of Northumberland, and south of Milton in the area near existing Ridge Road.

Figure IV-1 illustrates the "footprint" for each of the alternatives studied in detail. The footprint is the area that may be physically required to construct the roadway. As shown in Figure IV-1, the footprint is obviously wider than just the width of the travel lanes, shoulders, and median area. To see the dimensions of the travel lanes, shoulders and median, please refer to the typical sections presented in Figures III-21 and III-22. The footprint represents the area necessary for the travel lanes, shoulders, median area, **and** the roadway outslopes and drainage. Due to the rolling terrain in the study area, all alternatives in both sections would involve some areas with large cuts and fills that widen the footprint. In addition, an area directly adjacent to the highway outslopes would also be impacted during construction. This area, the construction area "buffer", can be needed for construction access and stormwater management areas. Generally, the construction area buffer is approximately 50 feet on either side of the highway. All of this area (travel lanes, shoulders, median, outslopes, and construction buffer) is considered required right-of-way (ROW) and is included in the footprint. Thus, the impacts discussed in the following sections of this Final EIS are for the footprint of each alternative.

Section IV graphics identify communities and neighborhoods, community facilities, existing and proposed future land uses, noise impacted structures, productive farmland and farm operations, visual impacts, natural resources, water supplies, historic resources, floodplains, potential waste sites, and potential secondary and cumulative impact areas. More detailed project mapping is provided in Section X of Volume 2, the Constraint Maps.

The following environmental features do not exist in the CSVT study area: coastal zones, navigable waterways, national natural landmarks, natural and wild areas, and wildlife sanctuaries. These features are not discussed in this section.

It should be noted that proposed bridge lengths; number and location of piers; length, shape, and size of culverts; size and location of stormwater basins; and slopes of cuts and fills are all preliminary and approximate in nature and are subject to revisions and refinements during the subsequent stages of design. Coordination with the environmental regulatory and review agencies will continue through preliminary design, final design, and construction. It should also be noted that the median width will be reduced from 27 meters (90 feet) to 18 meters (60 feet) during the subsequent stages of design.

A. SOCIAL AND ECONOMIC CONSIDERATIONS

> More detailed information on the socioeconomic climate of the project study area is located in the Community and Social Issues, Economic Issues, and Land Use and Zoning Technical Support Data. An index of the technical support data is located in Section IX, Appendix A.

Information and statistical data on the social, economic, and land use aspects of the CSVT project study area have been collected, compiled, and analyzed, in order to formulate a comprehensive understanding of the overall project area. This socioeconomic and land use analysis was completed for the five municipalities that comprise the project study area, namely Monroe Township and Shamokin Dam Borough in Snyder County, Union Township in Union County, and Point and West Chillisquaque Townships in Northumberland County. The CSVT project build alternatives would have varying levels of impacts to social and economic resources in the project area. The No-Build Alternative would have no direct impacts to social and economic resources in the project area. All Phase II project alternatives have been evaluated for their potential impact on the population, housing, neighborhoods and community cohesion, community facilities and services, Title VI/environmental justice areas, economy, and general living conditions of the project area. The methodologies used to complete these analyses included literary review of various documents and statistics from the US Census Bureau, the Snyder County Planning Commission, the Union County Planning Commission, the Northumberland County Planning Commission, and the individual project area municipalities; coordination with the project area school districts, municipalities, emergency service providers, chambers of commerce, and residents; and numerous field views of the project area.

1. Community and Social Issues

a. Population and Housing

i. Impacts

Past, current, and projected population data for the project study area municipalities and counties are shown in Table IV-A-1. Analysis of this table indicates that both Snyder County and Union County experienced a moderate level of growth between 1970 and 2000. This moderate level of growth was evident in the three project area municipalities that are located in these two counties (i.e., Monroe Township, Shamokin Dam Borough, and Union Township). A review of the municipal comprehensive plans indicates that this population growth can be attributed to the land use trend of suburbanization. Shamokin Dam Borough and the surrounding Monroe Township function as suburbs of the City of Sunbury and Selinsgrove Borough. Union Township, Union County also perpetuates to this land use scenario, as it serves as a suburb of the more heavily developed Borough of Lewisburg, which is located to the north. Coordination with representatives of Shamokin Dam Borough indicates that the drop in the Borough's total population, as reported in the 2000 census, is most likely attributable to the aging population of the Borough.

Unlike Snyder and Union Counties, Northumberland County experienced a net decrease in population between 1970 and 2000. This trend is somewhat evident in the two project area municipalities that are located in Northumberland County (i.e., Point and West Chillisquaque Townships). Point Township experienced a net increase in population during this thirty year period, but between 1980 and 1990 the population increased by only 128 persons (3.84%). West Chillisquaque Township, however, actually decreased in population by 265 persons (7.83%) between 1980 and 1990. A review of the West Chillisquaque Township Comprehensive Plan (1992) indicated that the township's population has increased steadily since the turn of the century, excluding 1950 when part of the township was annexed by the Borough of Milton. No explanation was provided for the 1990 decrease. The 2000 census count shows West Chillisquaque Township continued its population decline by losing an additional 273 persons over the ten-year period.

Population projections to the year 2030 were generated for each project area municipality as part of the detailed studies undertaken for the Final EIS. These population projections are shown in Table IV-A-1 for comparison purposes.

Selected housing data for the project study area municipalities and counties are shown in Table IV-A-2. Analysis of this table indicates that most of the housing units in the project area municipalities are currently occupied, with the vast majority being owner occupied. This table also indicates that on

TABLE IV-A-1
PAST, CURRENT AND PROJECTED POPULATION DATA

GEOGRAPHICAL AREA	1970 CENSUS COUNT	1980 CENSUS COUNT	1990 CENSUS COUNT	2000 CENSUS COUNT	2030[1] POPULATION PROJECTION	2000-2030 % DIFFERENCE
Snyder County	29,269	33,584	36,680	37,546	N/D	N/D
Monroe Township	2,447	3,502	3,881	4,012	4,818	20.0%
Shamokin Dam Boro	1,562	1,622	1,690	1,502	1,365	-10.0%
Union County	28,603	32,870	36,176	41,624	N/D	N/D
Union Township	1,020	1,216	1,300	1,427	2,066	44.8%
Northumberland County	99,190	100,381	96,771	94,556	N/D	N/D
Point Township	2,308	3,338	3,466	3,722	4,358	17.1%
W. Chillisquaque Township	2,376	3,384	3,119	2,846	2,746	-3.6%

N/D = No Data Available
[1] Extracted from Population and Employment Projections Technical Memorandum, Orth-Rodgers & Associates, Inc.

TABLE IV-A-2
SELECTED HOUSING DATA

Geographical Area	2000 Total Housing Units	Occupied Housing Units	Percent Owner Occupied	Median Value of Owner Occupied Units (dollars)	Persons Per Unit	[1]2030 Total Housing Unit Projection
Snyder County	14,890	13,654	76%	87,900	2.7	N/D
Monroe Township	1,772	1,633	87%	96,200	2.5	2,101
Shamokin Dam Boro	726	688	69%	91,500	2.4	663
Union County	14,684	13,178	73%	97,800	2.7	N/D
Union Township	596	547	86%	97,100	2.7	841
Northumberland County	43,164	38,835	73%	69,300	2.5	N/D
Point Township	1,523	1,443	88%	95,800	2.5	1,783
W. Chillisquaque Township	1,284	1,211	84%	84,800	2.4	1,241

N/D = No Data Available
[1] Extracted from Orth-Rodgers & Associates, Inc. population and employment projections technical memorandum

average, the most expensive homes in the project area are located in Union Township in Union County, with a median assessed value of $97,100. Total housing unit projections to the year 2030 were generated for the detailed Needs Analysis using several different methods. These housing unit projections are shown in Table IV-A-2 for comparison purposes.

Project related impacts to the population and housing of the project area would consist of direct and indirect residential displacements. Direct residential displacements are those residential structures that are located entirely or partly within the footprint of any one project alternative and would require demolition in order to construct the proposed roadway. Indirect residential displacements are those residential structures that would be functionally impaired by the footprint of any project alternative. All project alternatives will require the displacement of residential structures.

The DAMA Alternative would displace approximately 1.7% of the current housing units and 1.5% of the projected 2030 housing units in Monroe Township and 0.3% of the current or projected housing units in Shamokin Dam Borough. The OT2A Alternative would displace approximately 2.1% of the current housing units and 1.8% of the projected 2030 housing units in Monroe Township and 0.7% of the current or projected housing units in Shamokin Dam Borough. The OT2B Alternative would displace 2.3% of the current housing units and 1.9% of the projected 2030 housing units in Monroe Township and 0.8% of the current housing units and 0.9% of the projected housing units in Shamokin Dam Borough.

The RC1-E Alternative would displace approximately 1.5% of the current housing units and 1.1% of the projected 2030 housing units in Union Township; 1.0% of the current and 0.9% of the projected 2030 housing units in Point Township; and 0.2% of the current or projected 2030 housing units in West Chillisquaque Township. The RC1-W Alternative would displace approximately 1.5% of the current housing units and 1.1% of the projected 2030 housing units in Union Township; 2.2% of the current and 1.9% of the future housing units in Point Township; and 0.2% of the current or projected 2030 housing units in West Chillisquaque Township. The RC5 Alternative would displace approximately 1.5% of the current housing units and 1.1% of the projected 2030 housing units in Union Township; 0.8% of the current and 0.7% of the 2030 housing units in Point Township; and 0.3% of the current or projected housing units in West Chillisquaque Township. The RC6 Alternative would displace approximately 1.7% of the current housing units and 1.2% of the projected 2030 housing units in Union Township; 0.8% of the current housing units and 0.7% of the projected 2030 housing units in Point Township; and 0.2% of the current or projected housing units in West Chillisquaque Township.

Tables IV-A-3 and IV-A-4 show the total number of displaced residences for each project alternative by both municipality and price range. These tables also show the total number of residential structures by both municipality and price range available for potential replacement housing. Analysis of these two tables indicates that, at the municipal level, there is a shortage of available replacement

TABLE IV-A-3
SECTION 1 DISPLACED/AVAILABLE HOUSING UNITS

	DAMA DISPLACED/AVAILABLE[1] HOUSING UNITS			OT2A DISPLACED/AVAILABLE[1] HOUSING UNITS			OT2B DISPLACED/AVAILABLE[1] HOUSING UNITS		
Price Range	Monroe Township	Shamokin Dam Boro.	Selinsgrove School District[2]	Monroe Township	Shamokin Dam Boro.	Selinsgrove School District[2]	Monroe Township	Shamokin Dam Boro.	Selinsgrove School District[2]
<$50,000	2/1	0/2	2/9	16/1	0/2	16/9	16/1	0/2	16/9
$50,000-$60,000	4/2	0/0	4/9	8/2	1/0	9/9	9/2	1/0	10/9
$60,000-$70,000	0/3	0/2	0/10	1/3	1/2	2/10	2/3	1/2	3/10
$70,000-$75,000	1/0	0/0	1/1	0/0	0/0	0/1	0/0	0/0	0/1
$75,000-$100,000	9/4	2/2	11/15	5/4	2/2	7/15	5/4	2/2	7/15
$100,000-$125,000	6/0	0/3	6/8	2/0	1/3	3/8	2/0	2/3	4/8
$125,000-$150,000	5/5	0/2	5/18	2/5	0/2	2/18	2/5	0/2	2/18
$150,000-$175,000	3/4	0/1	3/6	3/4	0/1	3/6	3/4	0/1	3/6
$175,000-$200,000	0/2	0/0	0/4	0/2	0/0	0/4	0/2	0/0	0/4
>$200,000	1/3	0/0	1/5	1/3	0/0	1/5	1/3	0/0	1/5
Total	31/24	2/12	33/85	38/24	5/12	43/85	40/24	6/12	46/85

1 Source: www.realtor.com - 7/2000
2 Selinsgrove School District includes Chapman, Jackson, Penn, Union, Washington, and Monroe Townships and the Boroughs of Freeburg, Selinsgrove, and Shamokin Dam

TABLE IV-A-4
SECTION 2 DISPLACED/AVAILABLE HOUSING UNITS

	RC1-E DISPLACED/AVAILABLE[1] HOUSING UNITS						RC1-W DISPLACED/AVAILABLE[1] HOUSING UNITS					
Price Range	**Union Twp.**	**Lewisburg School District[2]**	**Point Twp.**	**Shikellamy School District[3]**	**West Chilli. Twp.**	**Milton School District[4]**	**Union Twp.**	**Lewisburg School District[2]**	**Point Twp.**	**Shikellamy School District[3]**	**West Chilli. Twp.**	**Milton School District[4]**
< $50,000	4/1	4/3	5/0	5/17	1/2	1/11	4/1	4/3	12/0	12/17	2/2	2/11
$50,000-$60,000	1/0	1/4	1/0	1/6	1/0	1/7	1/0	1/4	3/0	3/6	0/0	0/7
$60,000-$70,000	2/1	2/4	2/3	2/11	0/0	0/4	2/1	2/4	6/3	6/11	0/0	0/4
$70,000-$75,000	0/0	0/5	3/1	3/5	0/0	0/3	0/0	0/5	3/1	3/5	0/0	0/3
$75,000-$100,000	1/1	1/23	1/3	1/12	1/2	1/17	1/1	1/23	3/3	3/12	1/2	1/17
$100,000-$125,000	1/2	1/22	2/1	2/4	0/2	0/8	1/2	1/22	3/1	3/4	0/2	0/8
$125,000-$150,000	0/0	0/14	2/1	2/6	0/1	0/9	0/0	0/14	2/1	2/6	0/1	0/9
$150,000-$175,000	0/0	0/13	0/0	0/1	0/2	0/2	0/0	0/13	1/0	1/1	0/2	0/2
$175,000-$200,000	0/0	0/13	0/0	0/0	0/0	0/3	0/0	0/13	1/0	1/0	0/0	0/3
>$200,000	0/6	0/23	0/0	0/2	0/2	0/2	0/6	0/23	0/0	0/2	0/2	0/2
Total	9/11	9/124	16/9	16/64	3/11	3/66	9/11	9/124	34/9	34/64	3/11	3/66

1. Source: www.realtor.com - 7/2000
2. Lewisburg Area School District includes Kelly, East Buffalo and Union Townships and Lewisburg Borough
3. Shikellamy School District includes Point and Upper Augusta Townships, Sunbury City, and Northumberland Borough
4. Milton Area School District includes E. Chilli., W. Chilli., White Deer, and Turbot Townships and Milton Borough

TABLE IV-A-4
(CONTINUED)

Price Range	RC5 DISPLACED/AVAILABLE[1] HOUSING UNITS						RC6 DISPLACED/AVAILABLE[1] HOUSING UNITS					
	Union Twp.	Lewisburg School District[2]	Point Twp.	Shikellamy School District[3]	West Chilli. Twp.	Milton School District[4]	Union Twp.	Lewisburg School District[2]	Point Twp.	Shikellamy School District[3]	West Chilli. Twp.	Milton School District[4]
< $50,000	5/1	5/3	2/0	2/17	2/2	2/11	3/1	3/3	3/0	3/17	1/2	1/11
$50,000-$60,000	2/0	2/4	0/0	0/6	1/0	1/7	2/0	2/4	1/0	1/6	1/0	1/7
$60,000-$70,000	0/1	0/4	2/3	2/11	0/0	0/4	2/1	2/4	2/3	2/11	0/0	0/4
$70,000-$75,000	1/0	1/5	1/1	1/5	0/0	0/3	0/0	0/5	2/1	2/5	0/0	0/3
$75,000-$100,000	1/1	1/23	4/3*	4/12	1/2	1/17	1/1	1/23	1/3	1/12	1/2	1/17
$100,000-$125,000	0/2	0/22	1/1	1/4	0/2	0/8	1/2	1/22	2/1	2/4	0/2	0/8
$125,000-$150,000	0/0	0/14	1/1	1/6	0/1	0/9	1/0	1/14	2/1	2/6	0/1	0/9
$150,000-$175,000	0/0	0/13	0/0	0/1	0/2	0/2	0/0	0/13	0/0	0/1	0/2	0/2
$175,000-$200,000	0/0	0/13	0/0	0/0	0/0	0/3	0/0	0/13	0/0	0/0	0/0	0/3
>$200,000	0/6	0/23	1/0	1/2	0/2	0/2	0/6	0/23	0/0	0/2	0/2	0/2
Total	9/11	9/124	12/9	12/64	4/11	4/66	10/11	10/124	13/9	13/64	3/11	3/66

1 Source: www.realtor.com - 7/2000
2 Lewisburg Area School District includes Kelly, East Buffalo and Union Townships and Lewisburg Borough
3 Shikellamy School District includes Point and Upper Augusta Townships, Sunbury City, and Northumberland Borough
4 Milton Area School District includes E. Chilli., W. Chilli., White Deer, and Turbot Townships and Milton Borough
* Known to include at least two home-based businesses

housing. When looking at the overall school district, however, there appears to be a general surplus in replacement housing availability.

One issue of potential concern is the lack of replacement housing available at lower price ranges. This concern is most critical for the OT2A and OT2B alternatives, each of which displaces 16 residences with a current market value (based on adjusted assessed values) of less than $50,000. Further analysis indicates that only nine (9) replacement residences are currently available in the entire school district at this price range. In order to address this concern, a review of housing available below $50,000 located beyond the affected school districts has been completed (see Table IV-A-5). This analysis indicates that ample replacement housing is available to accommodate the displacements in this price range if Sunbury is included as a relocation area or combinations of Middleburg, Mifflinburg, Lewisburg, Milton, and Northumberland. Therefore, adequate replacement housing in this market range is only available if some displaced persons are willing to relocate outside Snyder County.

Additionally, it should be noted that access to properties impacted by the project will be investigated during Final Design. FHWA and PENNDOT policy is that access will be provided or the owner will be compensated for the loss of access.

TABLE IV-A-5
REGIONAL HOUSING UNDER $50,000

	Available[1] Housing Units					
	Snyder County	**Union County**		**Northumberland County**		
	Midd-West S.D.[2]	Mifflinburg Area S.D.[2]	Lewisburg Area S.D.[2]	Milton Area S.D.[2]	Shikellamy S.D.[2]	
Price Range	Middleburg[3]	Mifflinburg[3]	Lewisburg[3]	Milton	Northumberland	Sunbury[3]
<$50,000	1	5	2	4	3	14

1 Source: www.realtor.com - 7/2000
2 S.D. = School District
3 Portions of available housing in surrounding Township

ii. Mitigation

All persons displaced by the selected alternative will be eligible for relocation assistance. The Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act (42 USC 4601) of 1970, as amended, and the Pennsylvania Eminent Domain Code Act of June 22, 1964, as amended, will apply to all project displacements. According to these regulations, mitigation for residential displacements shall include the following.

- Relocating residents into available houses within their municipality, school district, or county.
- Relocating residents into new homes where construction in vacant lots or subdivided lots is an option.

FHWA and PENNDOT policies regarding relocation include the following.

- All applicable state and federal relocation laws and regulations will be addressed. No person will be displaced unless and until decent, safe, and sanitary replacement housing has been made available regardless of the resident's race, religion, color, sex, or national origin.
- Both payments (fair market value) and services will be provided to all affected parties.
- A 90-day written notice must be provided prior to the date that a relocation is required.

If comparable decent, safe, and sanitary replacement housing is not available within the statutory payment limits or is not available at any price within the township or school district, PENNDOT will employ the provisions of Last Resort Housing. Under Last Resort Housing, PENNDOT may make relocation payments in excess of the statutory limit, rehabilitate existing houses to acceptable standards, provide new construction or develop other innovative approaches to accomplish the project relocations.

Through a combination of using available, comparable, decent, safe, and sanitary replacement housing and Last Resort Housing provisions, all proposed displaced residents will be relocated to decent, safe, sanitary housing.

After the proposed project has been finalized, PENNDOT will conduct a final relocation survey to determine, on a case-by-case basis, the total number of displaced residences and provide relocation assistance in accordance with all applicable regulations. Replacement property will be offered to all displaced persons regardless of race, color, religion, sex, or national origin and will be within fin ancial means and reasonably accessible to places of employment and public services. Monetary compensation (fair market value) will be provided to property owners in accordance with all applicable regulations, should portions of their property be required by the selected alternative.

b. Neighborhoods and Community Cohesion

i. Impacts

The CSVT project study area is located in five different municipalities in three different counties. From south to north, the project study area lies in Monroe Township and Shamokin Dam Borough, Snyder County; Union Township, Union County; and Point and West Chillisquaque Townships, Northumberland County. Each of these municipalities have been identified and delineated as larger communities of the project study area. As such, "community" was defined as a geographic land area encompassing an entire municipality or an established area (i.e., village) within a municipality that residents often refer to as their place of residence (i.e., I'm from Hummels Wharf). In addition to these five municipal communities, two other communities were identified in the project area. The village of Hummels Wharf, located in Monroe Township, Snyder County, and the village of Winfield, located in Union Township, Union County, have each been identified and delineated as communities within a larger municipal community.

A "neighborhood" was defined as an homogenous area within a larger community which typically exhibits similarities in housing type, style, and/or age and is recognized by area residents as having an associated feeling of place and identifiable boundaries. For example, the area delineated as Monroe Manor has been identified as a neighborhood within the larger Monroe Township community and the area delineated as Shady Nook has been identified as a neighborhood within the larger Hummels Wharf community. The locations of all identified project area neighborhoods and communities are shown in Figures IV-A-1 and IV-A-2. A listing of all identified communities and neighborhoods follows.

CSVT Project Area Communities and Neighborhoods

Monroe Township Community

- Monroe Manor Neighborhood
- Rolling Green Neighborhood
- Weaver Villa Neighborhood
- Colonial Acres Neighborhood
- Stonebridge Neighborhood

Hummels Wharf Community

- East Hummels Wharf Neighborhood
- West Hummels Wharf Neighborhood
- Shady Nook Neighborhood

Shamokin Dam Community

- Kessler Development Neighborhood
- Gunter Development Neighborhood
- Orchard Hills Neighborhood
- Old Trail Neighborhood

Union Township Community

- Lee's Lane Neighborhood

Winfield Community

- Cresswell Acres Neighborhood

Point Township Community

- Blossom Hill Neighborhood
- Stuck Farm Neighborhood

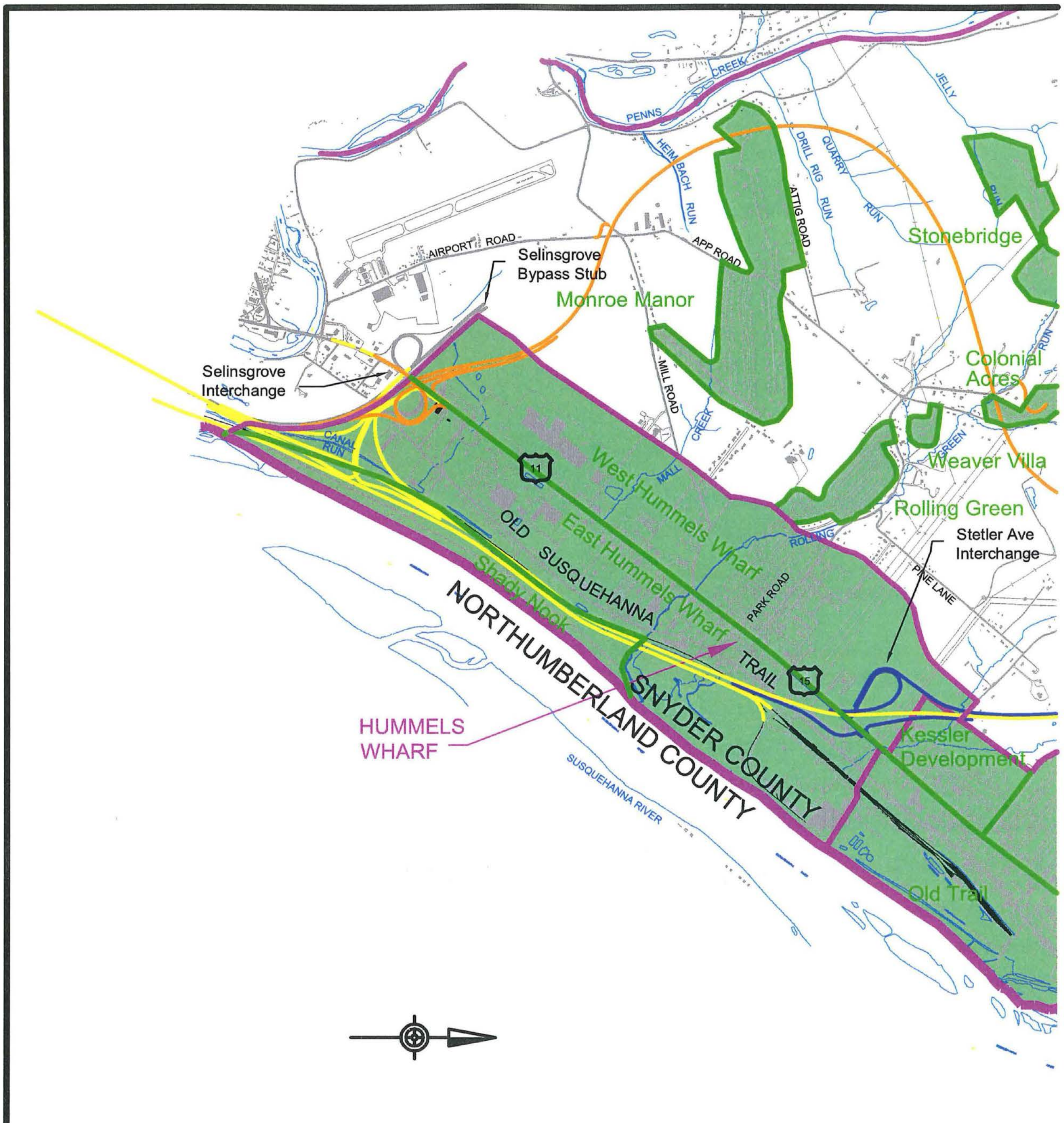
West Chillisquaque Township Community

- Chillisquaque Neighborhood
- Chillisquaque Court Neighborhood

Project implementation will require the displacement of residences from identified neighborhoods. These neighborhood impacts may or may not constitute community cohesion impacts depending on the nature and location of the displacements (see Figures IV-A-1 and IV-A-2).

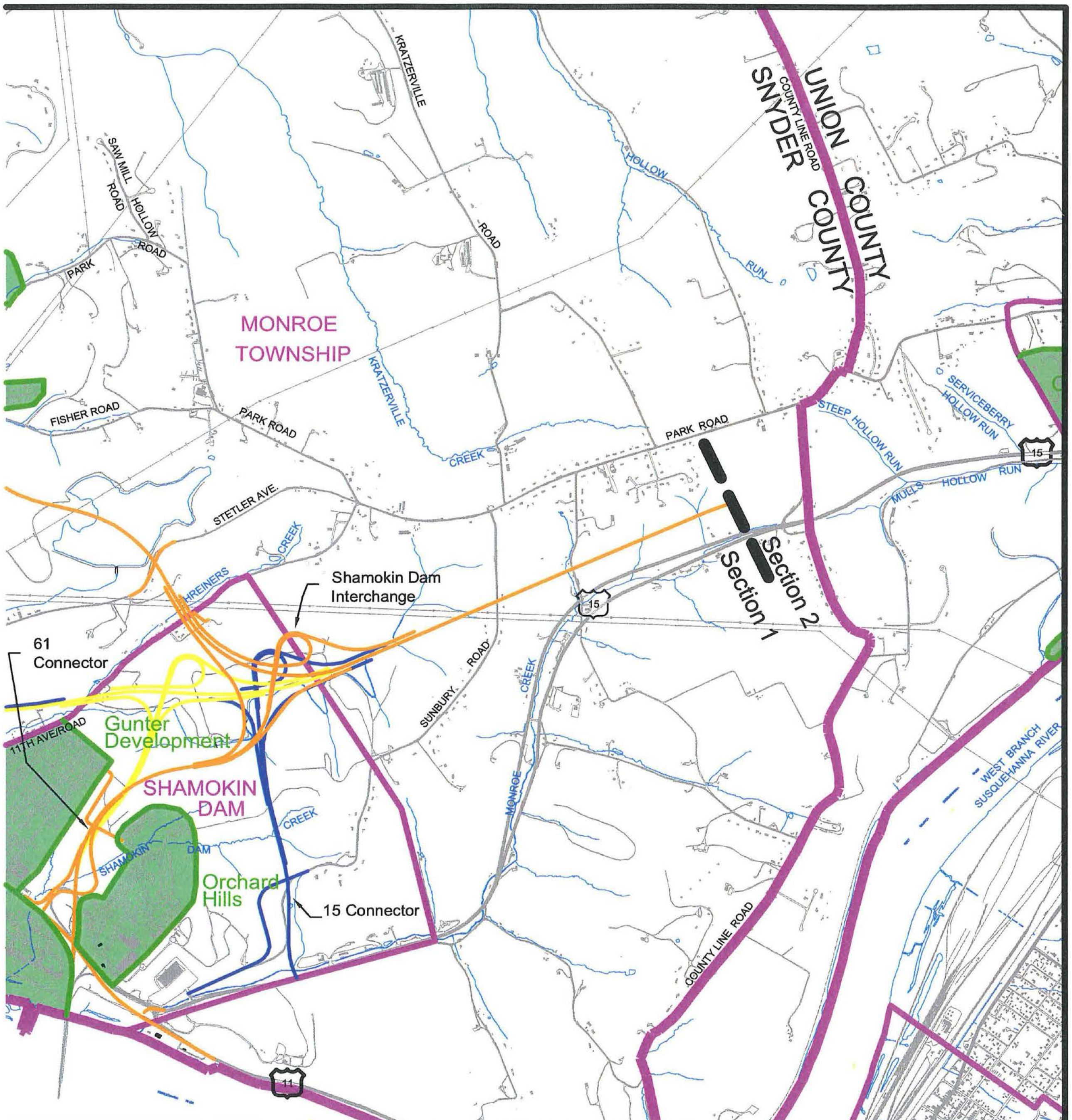
In Section 1, the DAMA will require the displacement of residences from the East Hummels Wharf and Monroe Manor neighborhoods. However, given the fringe location of these displacements and that facilities and services will be unaffected, they are not anticipated to have a significant impact on the overall community cohesion of the area. The DAMA will also require the displacement of residences from the Colonial Acres neighborhood. As presently exists, high tension power lines, which run through the neighborhood, separate Colonial Acres into northern and southern sections. The DAMA is located such that all of the residences in the southern part of the neighborhood will be displaced. A new access road (Colonial Drive relocated) will be built off Park Road, north of the DAMA, to service those remaining residences in the northern part of the neighborhood (see Figure 1). The northern part of the community, which consists of 17 homes, will remain intact. The DAMA will not result in any community cohesion impacts in Colonial Acres.

The Route 61 Connector, as is proposed with the DAMA, will create a separation between the Orchard Hills and Gunter Development neighborhoods in the greater Shamokin Dam community. No



Legend

- DA Modified Avoidance Alternative
- Old Trail 2A Alternative (61 Connector)
- Old Trail 2B Alternative (Stetler Ave. Interchange/15 Connector)
- Neighborhoods
- Communities



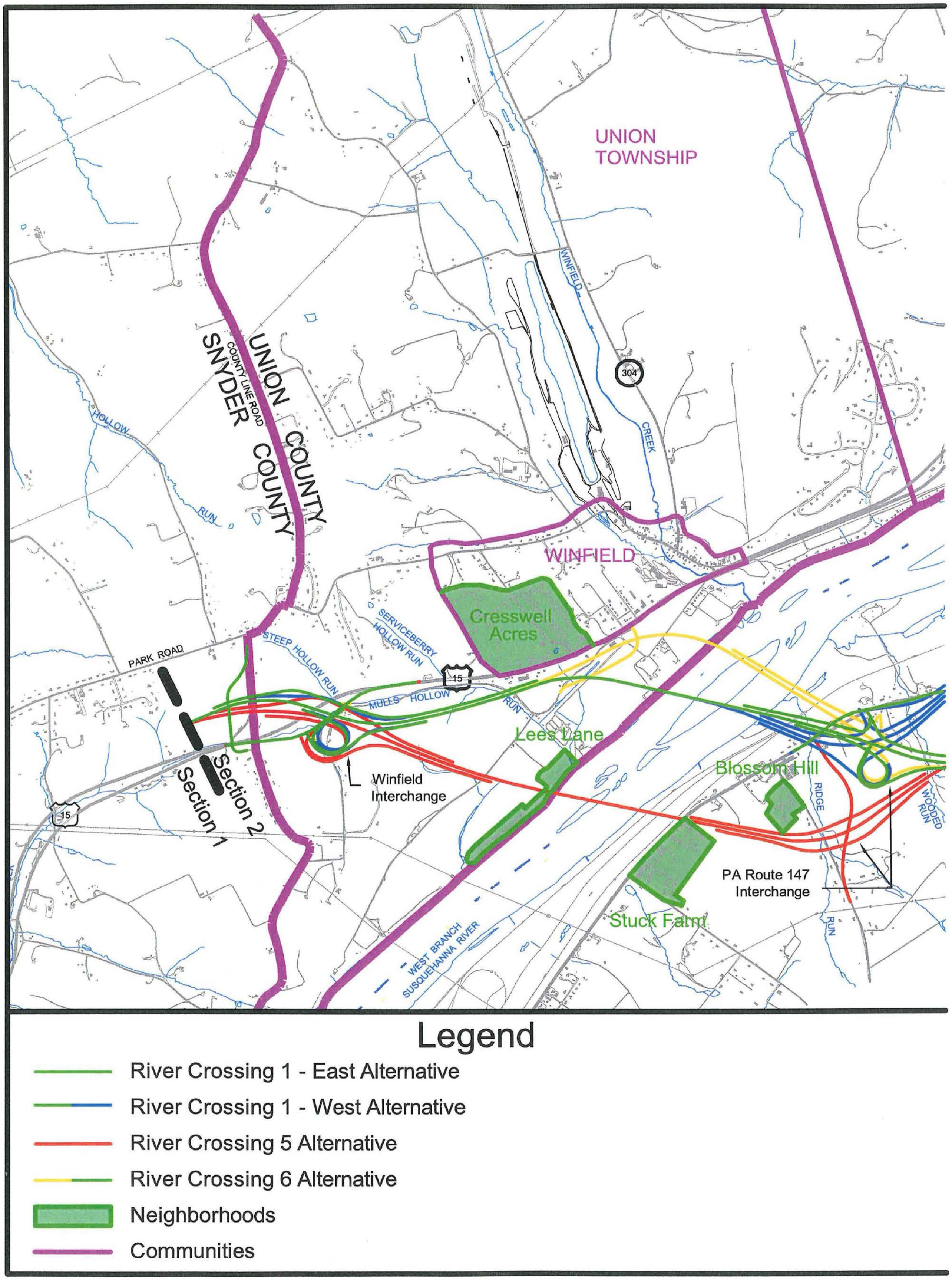
Central Susquehanna Valley Transportation Project

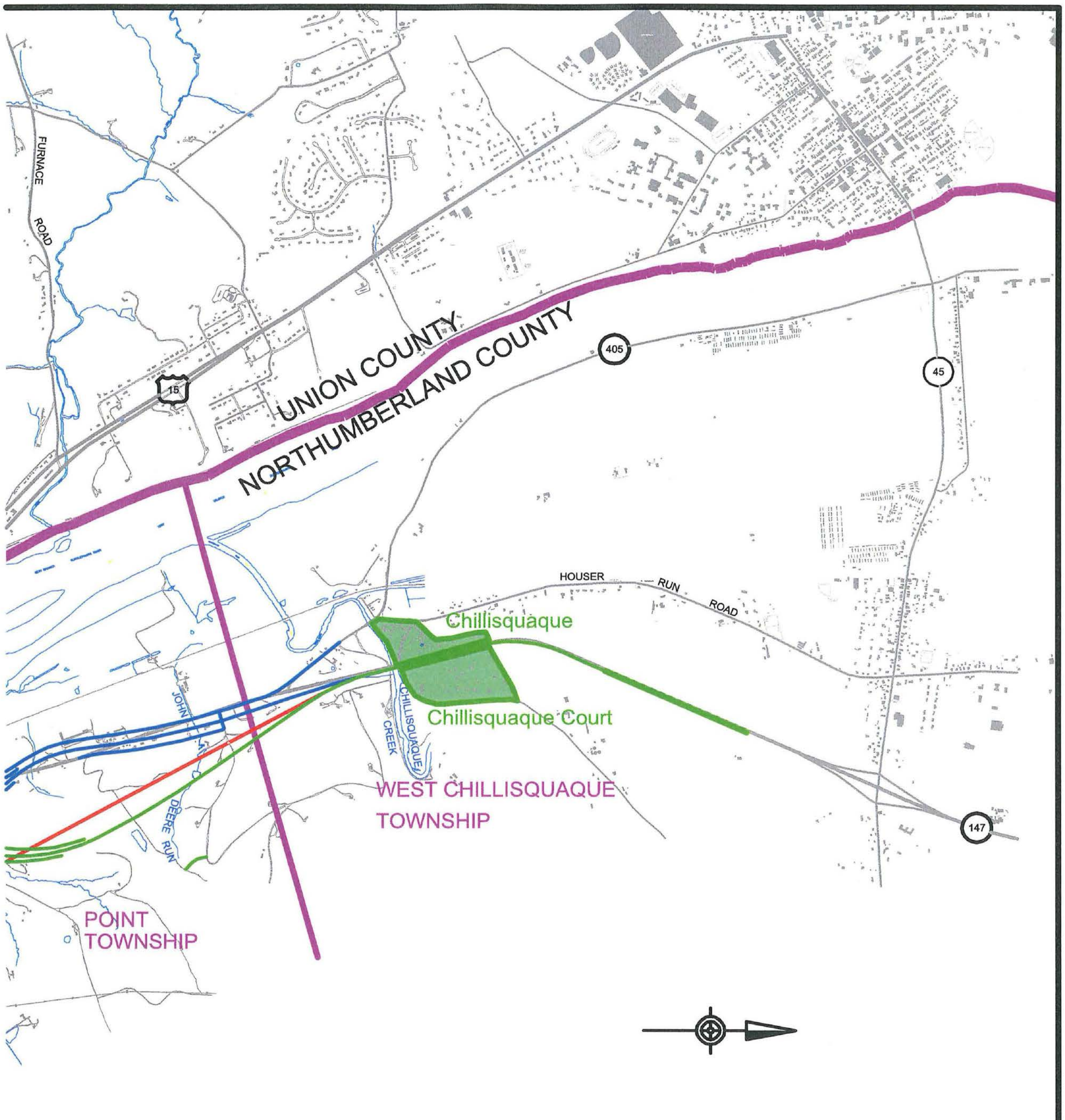
Figure IV-A-1

Section 1-Project Area Communities and Neighborhoods

0 300 600 900 Scale in Meters

0 1250 2500 3750 Scale in Feet


UNION TOWNSHIP
WINFIELD
UNION COUNTY
SNYDER COUNTY
COUNTY LINE ROAD
HOLLOW
RUN
PARK ROAD
STEEP HOLLOW RUN
SERVICEBERRY HOLLOW RUN
MULLS HOLLOW RUN
WINFIELD CREEK
304
15
Cresswell Acres
Lees Lane
Blossom Hill
Stuck Farm
Section 1
Section 2
Winfield Interchange
PA Route 147 Interchange
RIDGE RUN
WOODED RUN
WEST BRANCH SUSQUEHANNA RIVER
Legend
River Crossing 1 - East Alternative
River Crossing 1 - West Alternative
River Crossing 5 Alternative
River Crossing 6 Alternative
Neighborhoods
Communities



Central Susquehanna Valley Transportation Project

Figure IV-A-2

Section 2-Project Area Communities and Neighborhoods

0 300 600 900 Scale in Meters

0 1250 2500 3750 Scale in Feet

residences will be displaced from either of these two neighborhoods, but the Route 61 Connector will serve as a visual and structural obstacle between them. Presently, a walking trail exists through the undeveloped land between these two neighborhoods. The trail serves as the only direct access from the one neighborhood to the other, without getting on US Route 11/15. As part of the DAMA, a new connecting road will be built from the Orchard Hills neighborhood to the Gunter Development neighborhood. This connecting road will allow vehicular and pedestrian access across the Route 61 Connector between the two developments.

The OT2A Alternative will require the displacement of residences from identified neighborhoods. OT2A will displace residences from the Shady Nook and East Hummels Wharf neighborhoods, which are both located within the greater Hummels Wharf community. These two neighborhoods are presently separated by a railroad line, but the proposed roadway will increase this separation both visually and structurally. Access, however, is planned to be maintained to Shady Nook from East Hummels Wharf via 10th Street which will not be eliminated. As indicated earlier, the deficit in available replacement housing within the price range of these displacements is an issue of concern. Also, like DAMA, OT2A proposes construction of the Route 61 Connector, which may involve potential impacts to the community cohesion of the Orchard Hills and Gunter Development neighborhoods, which are located in the greater Shamokin Dam community. However, as stated previously, a connecting roadway between the Gunter Development and Orchard Hills neighborhoods is proposed with the Route 61 Connector.

Neighborhood and community cohesion impacts of the OT2B Alternative are very similar to those of OT2A. Residential displacements will still be required from the Shady Nook and East Hummels Wharf neighborhoods, while creating a greater visual and structural separation between the two. Unlike OT2A, OT2B does not propose the construction of the Route 61 Connector. Instead, this alternative proposes an interchange with existing US Route 11/15 at Stetler Avenue and a US Route 15 Connector. This proposed Stetler Avenue interchange will displace the Calvary Baptist Church, which is located in the East Hummels Wharf neighborhood. This displacement has the potential to cause community cohesion impacts through the loss of the associated spiritual and community facilities and services if the church is not able to relocate within the neighborhood or its immediate surroundings.

Of the Section 2 alignment alternatives, RC5 is the only alternative that would involve residential displacements from identified neighborhoods. RC5 will displace residences from the Lees Lane neighborhood, which is located in the greater Union Township community, the Stuck Farm neighborhood, which is located in the greater Point Township community, and the Chillisquaque neighborhood, which is located in the greater West Chillisquaque Township community. However, given the fringe location of these displacements and that facilities and services will be unaffected, they are not anticipated to have a significant impact on the overall community cohesion of the area.

ii. Mitigation

Mitigation for project related impacts to neighborhoods and community cohesion associated with the DAMA alternative, should consist of the following.

- Consider provision of visually aesthetic treatments (including, but not limited to, staining of any cast concrete structural feature with a neutral color that is compatible with the surrounding environment, applying the use of a formliner on any cast concrete structural feature to acquire a more visually pleasing surface, and landscaping all berm areas with a visually pleasing assemblage of vegetation) along that section of the proposed roadway that traverses the Colonial Acres neighborhood.

- A new connecting roadway (Courtland Avenue Extension) will be constructed to link the Orchard Hills neighborhood with the Gunter neighborhood. PENNDOT will incorporate bicycle/pedestrian accommodations on the proposed roadway.

Mitigation for project related impacts to neighborhoods and community cohesion associated with the OT2A and OT2B Alternatives should consist of the following.

- Consider provision of visually aesthetic treatments (including, but not limited to, staining of any cast concrete structural feature with a neutral color that is compatible with the surrounding environment, applying the use of a formliner on any cast concrete structural feature to acquire a more visually pleasing surface, and landscaping all berm areas with a visually pleasing assemblage of vegetation) along that section of the proposed roadway, which is located in the immediate area of the Shady Nook and East Hummels Wharf neighborhoods.

- A new connecting roadway (Courtland Avenue Extension) will be constructed to link the Orchard Hills neighborhood with the Gunter neighborhood (OT2A/61 Connector only). Bicycle/pedestrian accommodations will be incorporated on the proposed roadway.

- Relocate Calvary Baptist Church in close proximity of its existing location, if possible (OT2B only).

Only limited community cohesion impacts are anticipated to result from any Section 2 alignment alternatives, therefore no mitigation is proposed.

c. Community Facilities and Services

The locations of all community facilities identified in the CSVT project area are shown on Figures IV-A-3 and IV-A-4.

i. Public School Districts and Educational Facilities

a. Impacts

The CSVT project study area is geographically located within the designated boundaries of four separate school districts. Monroe Township and Shamokin Dam Borough, Snyder County, which comprise the southernmost portion of the project study area, are part of the Selinsgrove Area School District. All educational facilities (i.e., school buildings) associated with the Selinsgrove Area School District are located outside the project study area in the Borough of Selinsgrove. Union Township, Union County is a part of the Lewisburg Area School District, which has all of its educational facilities located immediately to the north of the project study area in the Borough of Lewisburg. Point Township, Northumberland County, located on the east side of the West Branch of the Susquehanna River, is part of the Shikellamy School District, which has all of its educational facilities located to the south of the project study area in the Borough of Northumberland and the City of Sunbury. West Chillisquaque Township, Northumberland County, in the northernmost portion of the project study area, is part of the Milton Area School District. All educational facilities associated with the Milton Area School District are located to the north of the project study area in the Boroughs of Milton and New Columbia.

No educational facilities will be displaced or directly impacted by any of the project alignment alternatives. Short-term, temporary impacts to student bussing operations may be experienced during project construction, but decreased traffic congestion on existing area roadways, after project completion, will serve to enhance and facilitate student bussing operations in the long-term. Milton Area School District has expressed a concern over the increased potential for a crash to occur on PA Route 147 involving hazardous chemicals and how such an event would impact their nearby school buildings.

However, the section of PA Route 147 passing near Milton Borough will be improved from a two lane facility to a four lane facility as part of the build out of the Two on Four Section. This improvement project will lead to less congestion and improved safety. This should decrease the likelihood of a crash involving vehicles carrying hazardous materials occurring on this part of the roadway network.

b. Mitigation

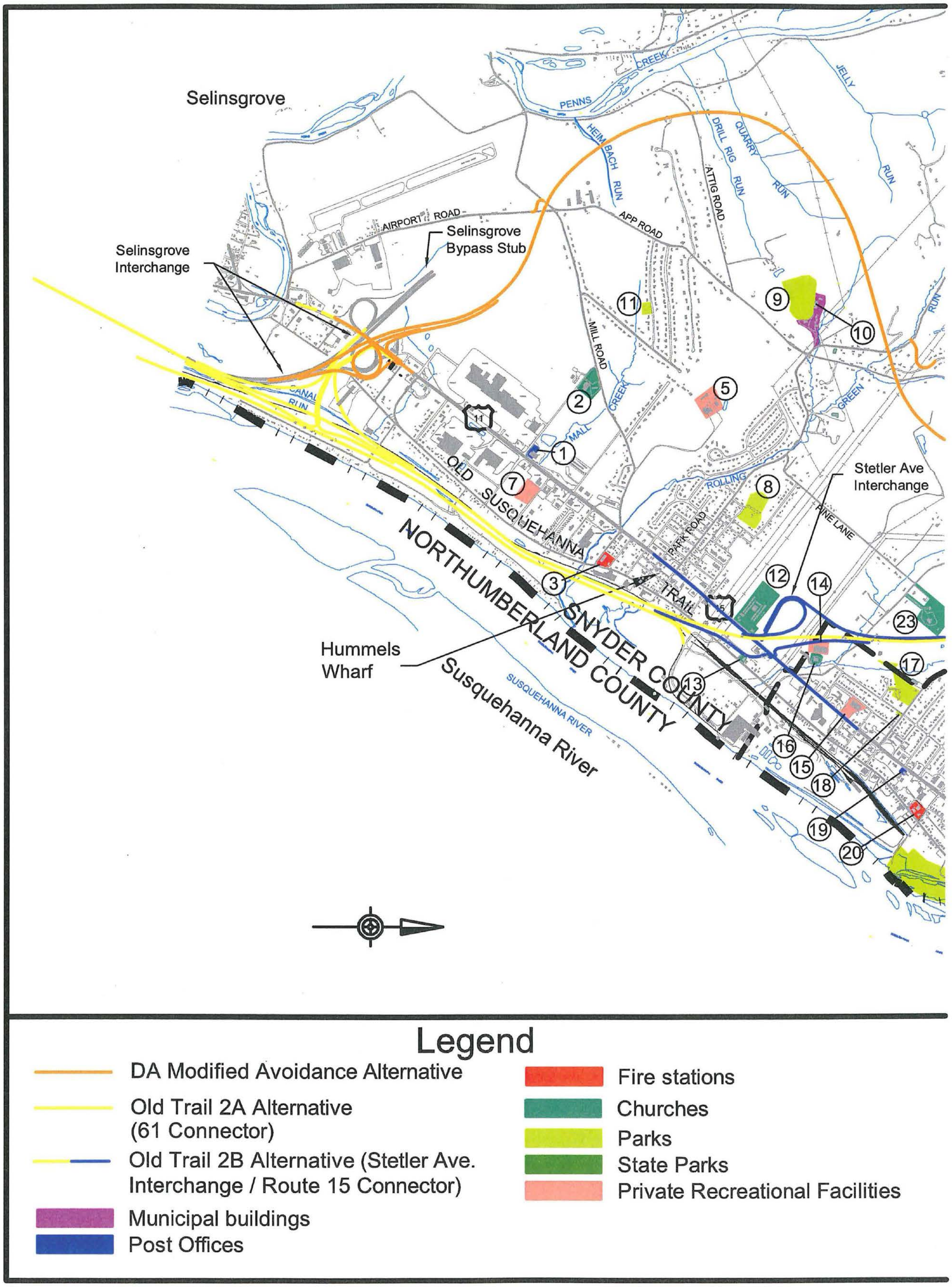
Mitigation for project construction impacts on area school districts and their associated student bussing operations should consist of an on-going coordination program to inform school district transportation directors of any construction activities which may adversely impact their daily bus runs. This would include, but is not limited to, such activities as local detours, road closures, and any other traffic altering activities. In regard to Milton Area School District's concern over the increased potential for crashes involving hazardous chemicals on PA Route 147, it has been decided that the minimal probability of such an incident actually occurring does not warrant the construction of any sort of roadside structural containment system. Additionally, the Department has a formalized Incident Command System in place to outline emergency procedures that are followed in coordinating with the appropriate organizations and agencies [i.e., local fire and police departments, the State Police, the regional emergency operations center, PA DEP, and the Pennsylvania Emergency Management Agency (PEMA)] in an emergency situation involving hazardous materials.

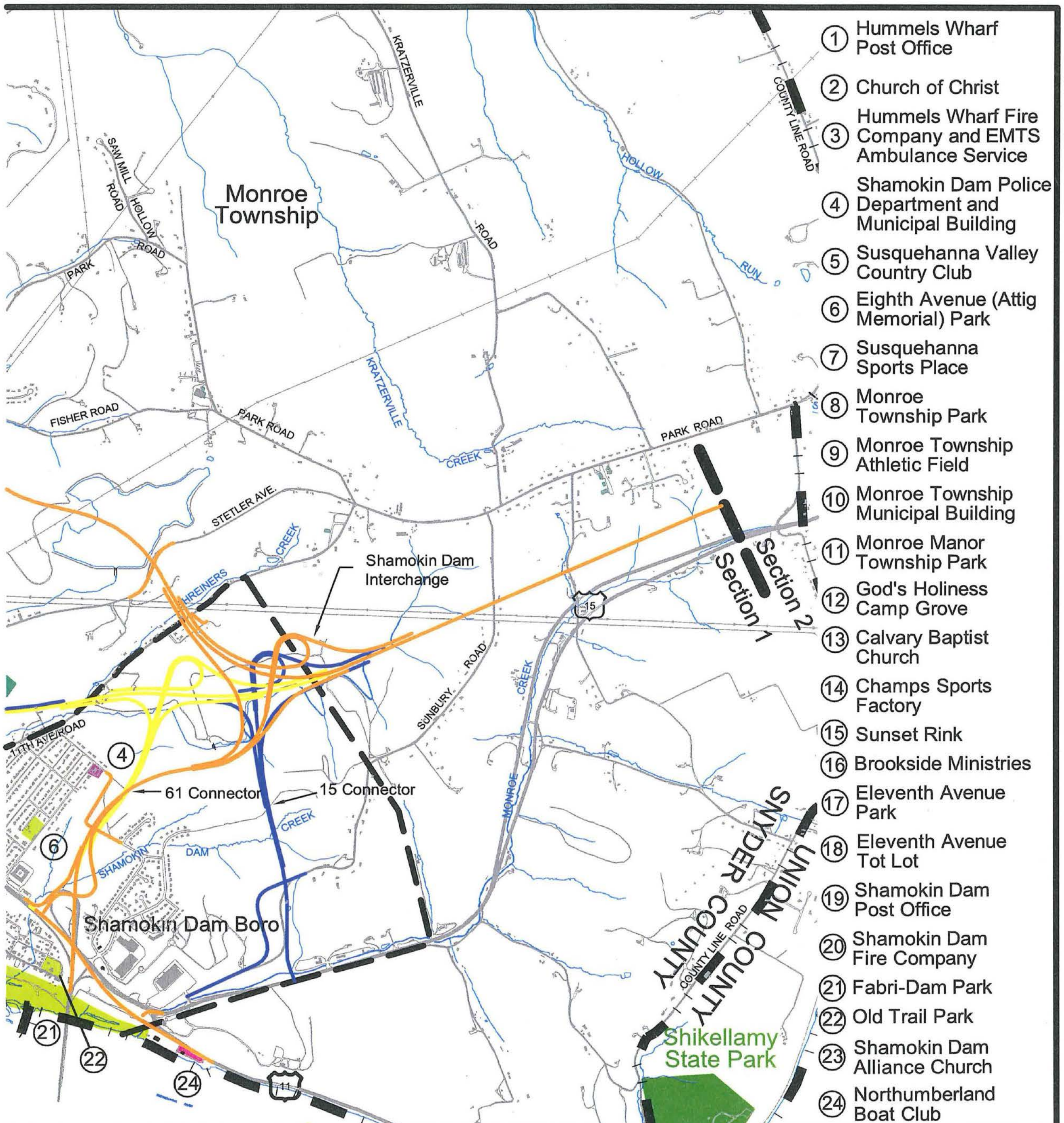
ii. Churches

a. Impacts

The DAMA Alternative will have no impact to structures or land associated with any church.

Numerous churches of varying denominations were identified throughout the project area. OT2A will require the displacement of a maintenance shed from the Shamokin Dam Alliance Church. Coordination with the pastor of this church has indicated that the displacement of this maintenance shed will not constitute a major impact to the greater church property. OT2B will require the displacement of Calvary Baptist Church, located on the east side of existing US Route 11/15 in Hummels Wharf, and the displacement of the same maintenance shed from the Shamokin Dam Alliance Church as mentioned under OT2A. RC1-E will not directly impact any project area churches, but given its close proximity to Ridgeview Evangelical Free Church, located along existing PA Route 147 just north of Ridge Road, there may be a potential for increased noise levels in this area. RC1-W, however, will require the displacement of Ridgeview Evangelical Free Church. RC5 involves the relocation of Ridge Road, which will require the acquisition of land from the Ridgeview Evangelical Free Church property. The relocation of Ridge Road to a location immediately adjacent to this church may prove to be an access improvement.


Selinsgrove
Selinsgrove Interchange
AIRPORT ROAD
Selinsgrove Bypass Stub
APP ROAD
ATTIG ROAD
PENNS
CREEK
HEIMBACH RUN
DRILL RIG RUN
QUARRY RUN
JELLY RUN
RUN
MILL ROAD
MALL CREEK
CANAL RUN
GREEN
ROLLING
PARK ROAD
PINE LANE
OLD SUSQUEHANNA TRAIL
Stetler Ave Interchange
NORTHUMBERLAND COUNTY
SNYDER COUNTY
Hummels Wharf
Susquehanna River
SUSQUEHANNA RIVER
11
15
1
2
3
5
7
8
9
10
11
12
13
14
15
16
17
18
19
20
23
Legend
DA Modified Avoidance Alternative
Old Trail 2A Alternative (61 Connector)
Old Trail 2B Alternative (Stetler Ave. Interchange / Route 15 Connector)
Municipal buildings
Post Offices
Fire stations
Churches
Parks
State Parks
Private Recreational Facilities



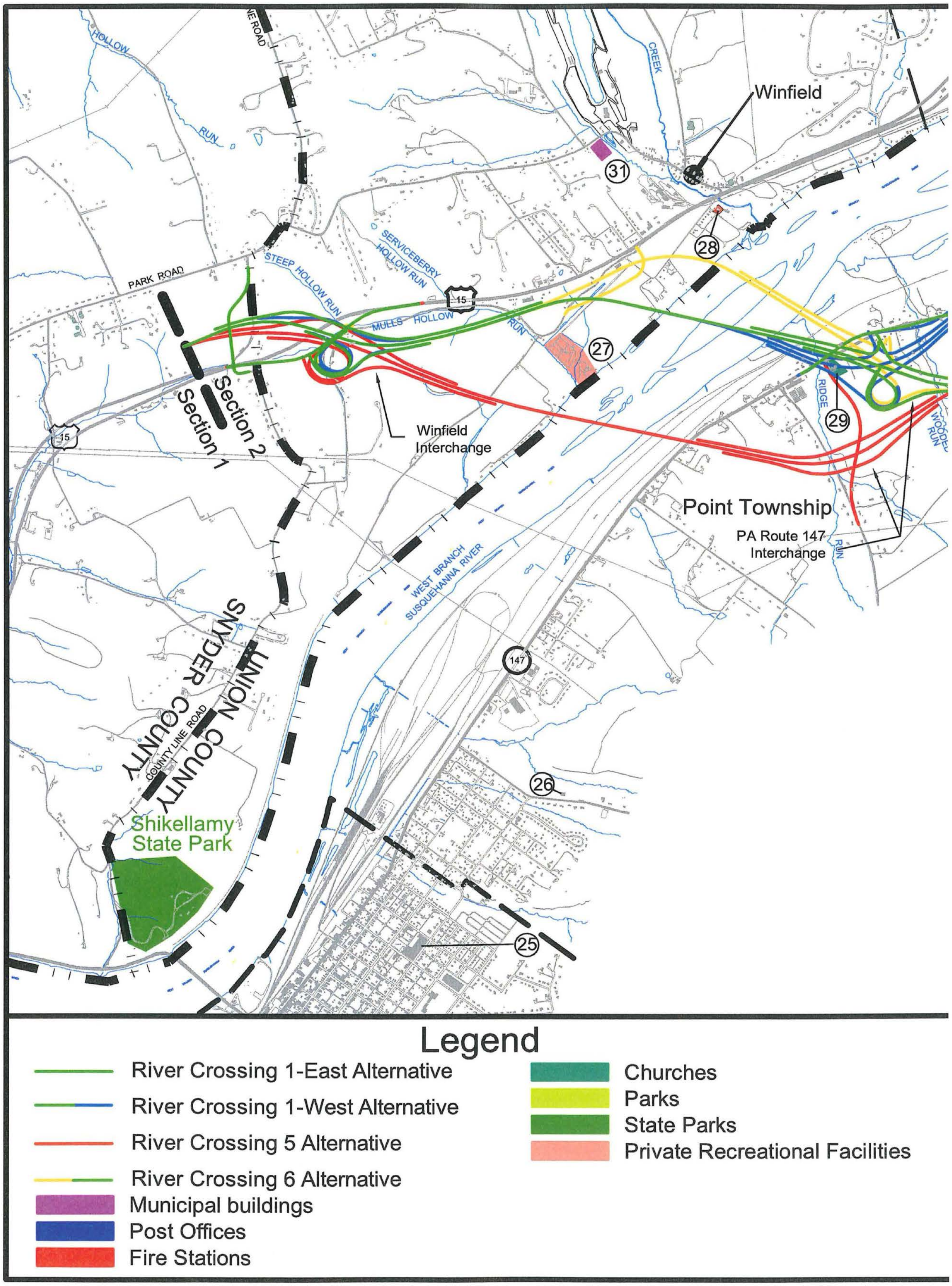
Central Susquehanna Valley Transportation Project

Figure IV-A-3

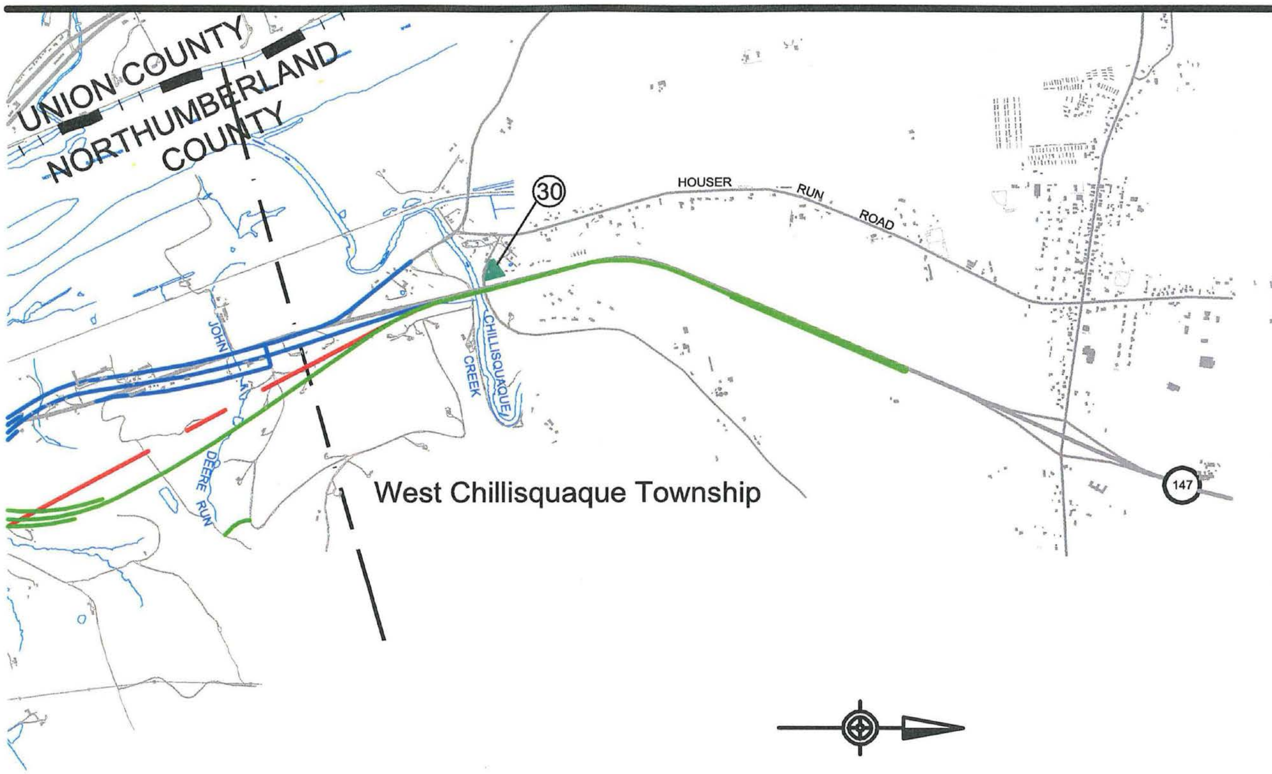
Section 1-Community Facilities and Services

0 300 600 900 Scale in Meters

0 1250 2500 3750 Scale in Feet



Winfield
CREEK
HOLLOW
RUN
PARK ROAD
STEEP HOLLOW RUN
SERVICEBERRY HOLLOW RUN
MULLS HOLLOW RUN
15
Section 2
Section 1
Winfield Interchange
RIDGE RUN
WOODED RUN
Point Township
PA Route 147 Interchange
WEST BRANCH SUSQUEHANNA RIVER
147
SNYDER COUNTY
UNION COUNTY
COUNTY LINE ROAD
Shikellamy State Park
25
26
27
28
29
31
Legend
River Crossing 1-East Alternative
River Crossing 1-West Alternative
River Crossing 5 Alternative
River Crossing 6 Alternative
Municipal buildings
Post Offices
Fire Stations
Churches
Parks
State Parks
Private Recreational Facilities



(25) C.W. Rice Elementary and Middle School
(26) Priestley Elementary School
(27) Winfield Campground
(28) Union Township Fire Company
(29) Ridgeview Evangelical Free Church
(30) Church
(31) Union Township Municipal Building

Central Susquehanna Valley Transportation Project

Figure IV-A-4

Section 2-Community Facilities and Services

0 300 600 900 Scale in Meters

0 1250 2500 3750 Scale in Feet

b. Mitigation

Mitigation for the displacement of the maintenance shed from the Shamokin Dam Alliance Church is limited to the payment of fair market value for the property acquisition and the replacement of this maintenance shed at a new location on the property. Mitigation for the displacement of Calvary Baptist Church and Ridgeview Evangelical Free Church, as required by OT2B and RC1-W respectively, should consist of the payment of fair market value for the property acquisitions and relocation assistance in accordance with all applicable rules and regulations. All reasonable efforts should be expended to relocate these churches to a site within close proximity of their existing locations. Mitigation for the acquisition of property from Ridgeview Evangelical Free Church, as required by RC5, is limited to the payment of fair market value for the said property acquisition.

iii. Public Parks and Recreational Facilities

a. Impacts

Residents of the project area have a number of publicly owned public parks and recreational facilities available in close proximity to engage in outdoor recreation. Most of these public facilities are owned and maintained by local municipalities, with the exception of Shikellamy State Park, which is maintained by the PA DCNR. None of the project alternatives impact any public park or other resources protected by Section 4(f) or Section 6(f) (See Appendix P).

One other public recreational resource located in the project area is the West Branch Susquehanna River and the main stem Susquehanna River. The river is used year long for recreational activities, however, the peak time for recreational use of the river would be when the fabridam, an inflatable dam stretching across the Susquehanna River from Shamokin Dam on the west, to Sunbury on the east, is inflated. The pool of water resulting from the inflation of the fabridam, locally referred to as Lake Augusta (which is generally inflated from Memorial Day through Labor Day, at a minimum, unless river conditions indicate otherwise), is used for boating, fishing, swimming, and water-skiing. This resultant pool of water includes portions of both the West and North Branches of the Susquehanna River. The West Branch Susquehanna River will be impacted by the proposed project because all of the Section 2 alignment alternatives involve the construction of a bridge across the river and the placement of piers in the water. Local residents and the PA Fish and Boat Commission have expressed concern over the placement of these piers and the impact that they may have on the recreational uses of the river.

b. Mitigation

Access to the West Branch Susquehanna River in the study area will not be altered and the river will still be navigable for recreational purposes. However, the PA Fish and Boat Commission has indicated a concern for the impact the new river bridge piers may have on the recreational use of the river. As a result, coordination with the PA Fish and Boat Commission continues to look into the feasibility of constructing a public access area on the west side of the West Branch Susquehanna River in the vicinity of the proposed bridge crossing since there is no public boat access to the river in all of Union County. A public boat access would enhance recreational opportunities on the river at this locality.

iv. Privately Owned Recreational Facilities

a. Impacts

Six privately owned recreational facilities were identified in the CSVT project area. From south to north, these facilities are Susquehanna Sports Place, the Susquehanna Valley Country Club, Champs Sports Factory, Sunset Rink, the Northumberland Boat Club, and Winfield Campground. The DAMA will have no impact on any of these privately owned recreational facilities. OT2A and OT2B will require the acquisition of approximately 75% of Champs Sports Factory's rear parking lot. No Section 2 Alternatives will directly impact the Winfield Campground. These alternatives, however, may have the potential to impact this facility via an increase in local noise levels associated with the construction and operation of the proposed roadway. Noise levels projected at a representative location, near RC5, indicate that noise levels will increase in the general area of the crossing, but the projected noise levels will not affect the use of the campground.

b. Mitigation

Mitigation for the acquisition of a large portion of Champs Sports Factory's rear parking area, as required by OT2A and OT2B, is limited to the payment of fair market value for the property acquisition. Mitigation measures for project related noise impacts in areas near the Winfield Campground are not considered feasible and reasonable primarily due to the sparsely developed nature of the area and the high cost per benefitted residence (see Section IV.B, Noise).

v. Pedestrian and Bicycle Facilities

a. Impacts

There are no specific bike paths existing in or planned for the CSVT study area. Additionally, there are no specific pedestrian facilities either in or planned for the study area. All of the children in the study area are bussed to school; therefore, there will be no impact to children walking to school. Pedestrian accessibility to the school bus stops will remain the same as the current conditions.

Presently, the existing Old Trail is heavily traveled, because it is used by local motorists as an alternate route to U.S. Routes 11/15. All of the Build Alternatives serve to reduce congestion and improve safety on U.S. Routes 11/15. Therefore, once an alternative is constructed and local traffic returns to using U.S. Routes 11/15, instead of bypassing it by using the Old Trail, traffic volumes should also be reduced on the Old Trail. This removal of traffic should serve to make pedestrian and bicycle access in the Old Trail neighborhoods safer.

One informal pedestrian/bike facility is located in the study area. Presently a walkway/bikeway exists through the undeveloped portion of Shamokin Dam Borough that separates the Gunter Development from the Orchard Hills Neighborhood. This dirt trail serves as the only direct access from one neighborhood to the other. This walking trail will be impacted by the DAMA and the OT2A alternatives due to the 61 Connector. The 61 Connector will occupy a portion of this previously undeveloped area and will disrupt the use of the unimproved trail for walkers or bicyclists.

All of the Build Alternatives will be constructed as a limited access facility. No provisions for a bikeway along the Build Alternatives have been incorporated into the preliminary design.

Unrelated to this project, several governmental agencies, municipalities, and non-profit organizations, including PENNDOT, are exploring the possibility of studying the area for the potential development of a greenway along the West Branch and main stem Susquehanna River. This endeavor, known as the Susquehanna River Greenway Project, is being spearheaded by the PA Department of

Conservation and Natural Resources (DCNR). PENNDOT is coordinating with the study team for this project by providing them with various data gathered through the CSVT environmental investigations, and other projects along the river corridor, to assist in the planning effort for the greenway.

In Section 2 of the CSVT Project, all Build Alternatives will not affect the potential development of any future greenway plan. All of the proposed river crossings span the floodplain with an elevated structure; therefore, access to the river will be maintained for the future development of recreational facilities.

In Section 1 of the CSVT Project, the DAMA will not affect the potential development of any future greenway plan. However, the OT Alternatives, due to their location between the Old Trail and the main stem of the Susquehanna River, could be within the area of the proposed greenway. Because the greenway plan is still in its infancy and no specific concepts currently exist, it is difficult to say if the OT Alternatives would be in conflict or consistent with the plans. However, access to the river is maintained with all Section 1 Build Alternatives.

b. Mitigation

To mitigate the impact to the pedestrian/bike path between the Gunter Development and Orchard Hills neighborhoods, PENNDOT has incorporated a "connecting roadway" into the preliminary design for the 61 Connector, used with the DAMA and OT2A. This connecting roadway (an extension of Courtland Avenue) will be constructed as part of the DAMA and OT2A alternatives to link the Orchard Hills neighborhood with the Gunter development. A sidewalk or wide road shoulders will be provided on the Courtland Avenue Extension in an effort to accommodate pedestrians and bicyclists.

Efforts were also made to improve existing pedestrian access, where appropriate. Representatives of Shamokin Dam Borough had requested that PENNDOT consider a number of options to improve pedestrian access through the Borough, specifically access from the west side of U.S. Routes 11/15 to the publicly owned Fabridam Park and the river.

A proposal for a grade separated structure for pedestrians and bicyclists over U.S. Route 11/15 in conjunction with the 61 Connector was evaluated. A grade separated structure was determined to not be reasonable in the area of the 61 Connector and the existing Veteran's Memorial Bridge. This decision was due to steep grades and safety hazards associated with constructing a pedestrian facility with retaining walls within the ramps of the subject interchange and in proximity to the existing bridge.

As a compromise, a pedestrian activated signal at U.S. Routes 11/15 and Eighth Avenue could be installed. In conjunction with the proposed extension of Courtland Avenue over the 61 Connector, this signal would provide a pedestrian link between the residential areas of Shamokin Dam Borough west of U.S. Routes 11/15 and the recreational facilities along the river east of U.S. Routes 11/15.

During Final Design, cooridination will continue regarding options to improve pedestrian movements.

vi. Health Care Facilities

a. Impacts

Residents of the CSVT project area have access to two hospitals to meet their health care needs. Sunbury Community Hospital is located across the river from Shamokin Dam in the City of Sunbury. Evangelical Hospital is located to the north of the project area in the Borough of Lewisburg.

b. Mitigation

None of the project alternatives will impact these health care facilities, hence no mitigation is necessary.

vii. Emergency Response Service Providers

a. Impacts

All emergency response service providers that are located in and/or service the CSVT project area were identified. Emergency response service providers include police stations, fire and rescue companies, and ambulance companies. No emergency response service providers will be directly impacted by the project. All project alternatives, however, have the potential to impact emergency response times during the construction process. These impacts will only be temporary in nature, and no long-term impacts to emergency response times are anticipated.

Without improvements, traffic volumes on the existing US Routes 11/15 corridor will continue to increase, leading to increased congestion and undesirable levels of service. Accessing local roads and driveways will become increasingly more difficult, which will impair the operations of local emergency response service providers.

The construction of any of the new alignment alternatives for the CSVT will reduce congestion and improve safety on the existing network. This should improve response times for emergency service providers and act as an overall benefit to the region as a whole. Additionally, the limited access nature and higher design speeds on the new facility may also serve to improve the accessibility of the region's hospitals, located in Sunbury and Lewisburg. Presently there is only one way into and out of the Orchard Hills neighborhood (via Baldwin Boulevard at US Routes 11/15). This has been a concern of the local residents from an emergency services standpoint. When a crash occurs at the intersection of existing US Routes 11/15 and Baldwin Boulevard that blocks the intersection, there is no other way to access Orchard Hills in the event of an emergency.

b. Mitigation

A Maintenance and Protection of Traffic (MPT) Plan will be developed during Final Design to minimize the disruption of traffic during construction as much as possible. Coordination will be undertaken with emergency service providers and agencies in the implementation of the MPT Plans during construction.

In regard to the access problem of the Orchard Hills neighborhood, the DAMA and OT2A have the potential to improve this situation because they will provide a second means of access into Orchard Hills via the Courtland Avenue Extension. Another positive impact on the operations of local emergency response service providers would be that all new alignment alternatives (four-lane, divided, limited access, constructed to modern design standards) would provide a safer facility for through traffic, resulting in fewer crashes, less congestion, and improved emergency response times.

viii. Public Transportation Services

a. Impacts

Coordination with the project area municipalities has indicated that the Rohrer Bus Company, which is located in Lewisburg, is the only public transportation service provider that services the CSVT project area. The Rohrer Bus Company has a daily route from Selinsgrove to Sunbury. Services are offered hourly from 8:00 AM until 6:00 PM. Some of the major roads used by the Rohrer Bus Company during their daily bus runs include Old Susquehanna Trail and US Route 11/15 in Shamokin Dam and Hummels Wharf, PA Route 522 in Selinsgrove, and PA Route 61 into and out of Sunbury.

OT2A and OT2B may have the potential to temporarily impact their daily bus runs on US Routes 11/15 in and around Shamokin Dam and Hummels Wharf during the construction process. DAMA may also affect the daily bus runs in and around Hummels Wharf on US Routes 11/15 during the construction of the Selinsgrove Interchange with US Routes 11/15. However, this impact will be temporary and of a shorter duration than the interruptions to traffic flow occurring on US Routes 11/15 with the construction of OT2A and OT2B. Project implementation and the subsequent decrease in traffic congestion on area roadways will enhance and facilitate their public transportation services.

b. Mitigation

Mitigation for project construction impacts will consist of an ongoing coordination program with the Rohrer Bus Company regarding any project construction activities that may impact their daily bus runs.

d. Title VI/Environmental Justice (EJ)

i. Impacts

Environmental Justice, as defined in Federal Executive Order 12898 of February 11, 1994, requires identification of minority and low-income populations that may be affected disproportionately by the proposed transportation improvements. Populations are defined in the US Department of Transportation Order on Environmental Justice as any readily identifiable group of low income or minority persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/ transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed program, policy, or activity.

Detailed census data at the block group level have been analyzed to identify potential EJ issues. Specifically, data on race, persons receiving public assistance income, and persons below the poverty line have been identified from the 1990 and 2000 census data. The data are summarized in memoranda to file, included in the Technical File.

The analysis in the above-referenced technical file memoranda seeks to identify minority or low-income populations by comparing the percentages of persons falling into these categories at the block group, census tract, municipal, county, and state levels. Higher percentages at the more localized levels were deemed populations within the category.

The 1990 census data was analyzed for inclusion in the Draft EIS and 2000 census data was used for the Final EIS. For the Final EIS, 2000 data has been used to update 1990 information. The analysis seeks to identify minority or low-income populations by comparing the percentages of persons falling into these categories at the block group, census tract, municipal, county, and state levels. Higher percentages at the block group and census tract were deemed populations within that category for the study area. However, when comparing 1990 and 2000 census data, some changes have occurred in information availability. Information at the block group level is no longer available for persons receiving public assistance income and persons below the poverty line. Therefore, in the Final EIS update, these categories were only analyzed down to the census tract level, being the smallest area for which these data are available. The Snyder County Planning Commission was contacted to ascertain if more detailed 2000 census information (to the census block group level) was available. The Director of the Planning Commission indicated that more detailed census information was not available through the county. The best information available is at the census tract level, which was available via the 2000 census web site. The information obtained from the 1990 data is still mentioned in the document and maintained in the Draft EIS Technical File.

It is recognized that low percentages of persons in minority groups or with low incomes within block groups or census tracts do not preclude the possibility of populations within these areas. However, this analysis provides the best means of identifying populations through secondary data and provides a good means of screening the data to concentrate on those areas where identifiable populations are most likely.

The methodology for the Final EIS summary reviewed above identified sparse minority populations in all project area municipalities for both 1990 and 2000. At the local level, the minority populations were relatively consistent in the 2000 data (1.4% to 2.9%) and well below the Pennsylvania minority populations percentage (14.6%). No evidence of disproportionate impacts to minority populations has been identified.

Similarly, a review of persons receiving public assistance income failed to result in the identification of low-income populations. Using the 2000 Census Data, the percentages were consistent on the local level (0.4% to 2.3%) and below state level (3.1%). However, data on the number of persons below poverty level in 2000 showed an anomaly in Shamokin Dam Borough. Although the percentage for the numbers of persons below the poverty level in Shamokin Dam was below Snyder County (9.9%), the Shamokin Dam percentage (8.3%) was significantly higher than other project area municipalities. Therefore, Shamokin Dam has been identified as having a potentially identifiable low-income population that may require special consideration consistent with the EJ Executive Order. However, the Recommended Preferred Alternative DAMA will only impact a small portion of Shamokin Dam, displacing 3 structures, while OT2A will displace 5 structures and OT2B will displace 6 structures in

Shamokin Dam, thereby failing to indicate a disproportionately high impact by the Recommended Preferred Alternative.

As discussed previously, year 2000 poverty and public assistance data are not available at the sub-census tract level through the Census Bureau. Therefore, a direct comparison of 1990 and 2000 poverty data is not possible. A review of the 2000 census tract data seems to indicate that a potential low-income population in the Hummels Wharf area (block group 9801.3) that was identified with the 1990 data for the Draft EIS no longer exists. However, due to the change in data availability, a brief summary of the Draft EIS findings is included here in the event that the apparent disappearance of this population results simply from the change in data availability. In summary, block group 9801.3 had a higher percentage of persons with incomes below the poverty level (12.7%) than Monroe Township (5.2%), Snyder County (11.0%) or Pennsylvania (11.1%). Income levels for individual residents within the block group were not available; therefore, the analysis in the Technical File includes a review of estimated housing values available through tax assessment data as an indicator of approximate income level. Using housing unit market values as an indicator of income levels, the displacements appeared to be fairly random through the various income levels, indicating no disproportionate impact across the range of homes in the block group. Therefore, no evidence of disproportionate impacts to low income populations has been identified.

Despite the lack of a disproportionate impact on minorities or low income individuals by either the DAMA or OT Alternatives, ample opportunities were provided for residents throughout the study area, and specifically including residents from the Hummels Wharf and Shamokin Dam areas, to review potential project impacts and provide input into preliminary alternative designs. A printout of all the local coordination meetings held on the project is included in the Technical File along with a summary of the meetings held that included participation of Monroe Township representatives and/or Hummels Wharf and Shamokin Dam residents. In addition, newsletters were mailed to anyone requesting them, and a project homepage (www.csvt.com) was maintained throughout most of the project.

The meetings that were held specifically for residents of the Hummels Wharf area included two meetings with the residents of the Old Trail (7/22/97 and 1/20/98) and three meetings with a Hummels Wharf Citizens Group (7/22/98, 10/15/98, and 11/18/98). Another 43 meetings were also held that provided opportunity for input from Hummels Wharf and Shamokin Dam residents and/or their elected officials. Among others, these meetings included seven meetings with Monroe Township officials; nine meetings with the Shamokin Dam/Hummels Wharf Focus Group; 18 meetings with the Citizens Advisory Committee, Public Officials Work Group (includes Monroe Township officials) or a combination of the two groups; and four public meetings. In total, there were 48 opportunities over a four-year period for direct input into the project development process for the residents of Hummels Wharf/Shamokin Dam or their elected officials. These meetings indicate that residents from all portions of the study area were provided an equal opportunity for input into the alternatives development and analysis process, thereby meeting the intent of the EJ Executive Order, even though no disproportionate impact has been identified.

In summary, a review of detailed 1990 and 2000 census data indicated a possible low income population in block group 9801.3 (Hummels Wharf area) and Shamokin Dam, but low percentages of minority populations in the study area. Disproportionate impacts to low income or minority populations were not identified. Regardless, an extensive public outreach effort was undertaken to ensure that all study area individuals had input into the alternatives development and analysis process.

ii. Mitigation

No disproportionate impacts to concentrations of low income or minority groups (environmental justice groups) were identified. Therefore, no mitigation specific to EJ is necessary. Relocation assistance for all displaced residents will be provided in accordance with the rules, regulations, and policies outlined in Section IV.A.1.a.ii. Opportunities for public input are to be maintained throughout the project design and construction phases, and discrimination will be avoided in conformance with Title VI of the 1964 Civil Rights Act.

2. Economic Issues

a. Economic Trends and Local Business Impacts

i. Impacts

Table IV-A-6 lists the 2000 and 2030 employment numbers for the municipalities in the detailed study area. The businesses that would be displaced by an alternative are also listed in the table by sector and in Table IV-A-7. This side-by-side comparison of existing and projected employment and business displacements by municipality provides for an analysis of potential impacts to projected employment trends for each municipality.

A comprehensive survey was mailed to over 250 business establishments in the project area to acquire an understanding of the overall business community's feeling on the proposed project. Nearly 60% of the respondents indicated that the proposed project will have a positive impact on the overall business climate of the project area through reduced traffic congestion. Similarly, 44% of the respondents indicated that project implementation would have permanent, positive impacts to their business, while only 25% predicted permanent, negative impacts and 19% predicted temporary, construction-

TABLE IV-A-6
EMPLOYMENT LEVELS AND IMPACTS

Category	Monroe Township			Shamokin Dam Borough			Union Township			Point Township			West Chillisquaque Township		
	2000	2030	Potential Business Impacts	2000	2030	Impacted Businesses	2000	2030	Impacted Businesses	2000	2030	Impacted Businesses	2000	2030	Impacted Businesses
Retail	2,106	3,494	Mulls Auto Sales (OT2B) Nextel (OT2B) Pulse: Fitness for Women (OT2B) Baileys Produce Patch (OT2B) Leading Electronic (OT2B) Rental Stop (OT2B) Sunbury Sewing (OT2B) Hummels Service Center (OT2B) Comfort Inn (DAMA) Performance Computer (DAMA) Digital Link (DAMA) Class A Auto (DAMA) Class A Carpet Outlet (DAMA) Styles Unlimited Fitness Center (DAMA) Styles Unlimited Beauty Salon (DAMA) Ulrich's Fruit Market (OT2B) Rex's Audio and Video (OT2A & OT2B)	547	718	McDonalds (OT2B)	25	71	Troutman's Automart (RC1E, 1W & RC6) US Cargo (RC1E, 1W, & RC6) Central Penn Carpet (RC1E, 1W & RC6) Duofast (RC1E, 1W & RC6) Mid Atlantic (RC1E, 1W & RC6) Pella Window (RC1E, 1W & RC6) PA Home Accents (RC1E, 1W & RC6) Winfield Auction (RC6)	417	567	Weathervane Boarding (RC1W) Lahrs Mini Storage (RC1W) Kohl's Market (RC1W)	73	113	None
Office	1,320	1,798	Skotedis Interior Design (OT2A & 2B)	487	656	None	55	98	None	490	738	None	85	185	None
Industrial	1,011	1,099	Wildland Floral Supply (OT2A & 2B) Rollins Leasing Corp. (OT2A & 2B)	363	363	None	150	192	None	509	409	PG Energy (RC1E, RC1W & RC6)	209	655	None
Other	450	457	None	95	106	None	70	84	None	91	97	None	0	0	None
Total	4,877	6,858		1,492	1,843		300	445		1,507	1,811		367	953	

TABLE IV-A-7
BUSINESS DISPLACEMENTS

Business Type	Section 1			Section 2			
	DAMA	OT2A	OT2B	RC1-E	RC1-W	RC5	RC6
Commercial	7[a]	2[b]	12[c]	7[d]	10[e]	0	8[f]
Industrial	0	2[g]	2[g]	1[h]	1[h]	0	1[h]

a. Comfort Inn, Performance Computers/Digital Link, Class A Auto/Class A Carpet Outlet/Styles Unlimited Fitness Center/Styles Unlimited Beauty Salon
b. Denise Skotedis Interior Design, Rex's Audio and Video
c. McDonalds, Mulls Auto Sales (2 structures), Nextel/Pulse: Fitness for Women, Leading Electronics, Sunbury Sewing/Rental Stop, Hummels Service, Bailey's Produce Patch (4 structures), Denise Skotedis Interior Design, Ulrich's Fruit Market, Rex's Audio and Video
d. Troutman's Automart (2 structures), US Cargo, Central Penn Carpet/Duofast/Mid Atlantic/Pella Window/PA Home Accents
e. US Cargo, Lahr's Mini-Storage (2 structures), Kohl's Market, Troutman's Automart (2 structures), Weathervane Boarding, Central Penn Carpet/Duofast/Mid Atlantic/Pella Window/PA Home Accents
f. Troutman's Automart (2 structures), US Cargo, Winfield Auction, Central Penn Carpet/Duofast/Mid Atlantic/Pella Window/PA Home Accents
g. Wildland Floral Supply/Rollins Leasing Corp.
h. PG Energy

related impacts. However, the survey and numerous meetings with business interests failed to produce a clear consensus on the selection of an alternative with least impact to business access. There is consensus on the design of the 61 Connector, if included in the preferred alternative. However, business owners have mixed opinions regarding Old Trail versus the DA Modified Avoidance Alternative and between the Old Trail 2A and 2B Alternatives. Based on the above coordination, the majority of business owners feel that the No-Build Alternative would negatively impact employment trends in the area through increasing congestion. They feel this congestion will discourage consumers from patronizing local businesses, instead purchasing goods and services elsewhere.

Using professional judgment to estimate the employment of displaced businesses, the DA Modified Avoidance Alternative business displacements should result in employment losses in the Township of less than five percent of the projected employment levels for the retail sector and the office or industrial employment would be unaffected.

The Old Trail 2A Alternative would have only a minor impact on retail and office sector employment. Industrial sector employment would likely be five to ten percent of the projected industrial employment level of Monroe Township.

The Old Trail 2B Alternative has the same impact to the office and industrial employment sectors as the Old Trail 2A Alternative. Its impact on retail employment may be slightly greater than the Old Trail 2A or DA Modified Avoidance Alternatives, but should still be limited to about five percent of the projected retail employment for Monroe Township or Shamokin Dam Borough.

The RC1-E Alternative would displace seven businesses. Since retail employment in Union Township is only projected to be 77 employees in 2020, these displacements represent a significant portion of the local employment base if not relocated in the municipality. RC6's impacts to businesses and economic trends are the same as the RC1-E Alternative.

The RC1-W Alternative would displace the same businesses as RC1-E and Weathervane Boarding, Lahr's Mini Storage, and Kohl's Market in Point Township. Therefore, while the overall economic trend impact of this alternative is greater than RC1-E, retail employment in Point Township is projected to be 707 employees in 2020, making the impact on the retail base in the Township less significant than the Union Township impact.

RC5 does not impact any businesses and would therefore have no impact on economic trends in the study area.

ii. Mitigation

The property acquisition process may provide adequate compensation for some business owners to relocate in the area, thereby mitigating for the impacts to local and regional economic trends. However, since only the RC5 alternative does not impact local businesses, the project will cause some losses to employment in the area. Therefore, some degree of managed secondary or cumulative impact providing for new employment opportunities is desirable. The Secondary and Cumulative Impact Technical File contains an analysis of the areas that may be subject to increased development potential and the resources that could be impacted by the development of these properties.

Negative impacts to the business climate foreseen by the majority of surveyed business owners as resulting from increased traffic congestion from the No-Build alternative would eventually have to be mitigated through improvements to the transportation system. These improvements would have to provide increased levels of service equivalent to or above those that would be provided through the proposed project in order to compensate for the time delay in congestion alleviation caused by selecting the No Build alternative at this time.

Regardless of the alternative selected, business owners have requested that off-site signage be incorporated into the alternative to identify the Business Route and identify specific businesses (restaurants, lodging, gasoline, etc.) available near the interchanges. This is projected to minimize impacts to business access related to channeling traffic from the existing business strip along Routes 11/15. The FHWA and PENNDOT will work with the business community, the local municipalities, and local tourism agencies to determine appropriate signage for the business district and individual businesses during Final Design.

b. Tax Base

i. Impacts

Project implementation will directly impact the real estate/property tax base of all project area municipalities, school districts, and counties. Construction of the selected alternative will require the conversion of privately owned, taxable land to publicly owned, non-taxable, highway right-of-way. This conversion will result in a decrease in the annual real estate/property tax revenues of the local taxing bodies. These lost revenues may warrant the restructuring of local budgets, cutbacks in local spending programs, and/or local tax increases.

Table IV-A-8 shows the anticipated impacts to the local property tax base, as a dollar figure and as a percentage of the current annual revenue, for each project alignment alternative. These tax base impacts were calculated for each individual tax parcel using GIS impact assessment in conjunction with assessed property values and local millage rates. Analysis of this table indicates that in Section 1 the DAMA will have the greatest impact to the local tax base in Monroe Township, followed by OT2B, with OT2A having the least impact. The calculated tax base impact of DAMA in Monroe Township is greater than that of OT2A and OT2B due to the high assessed value of the Susquehanna Valley Mall property, which is minimally impacted by this alternative. The DAMA Alternative does not impact any mall buildings or parking lots. The DAMA Alternative impacts two vacant parcels of land owned by the mall owners, located west and north of the existing mall. Subtracting out the impact to the mall property, the impact of the DAMA to the local tax base is equivalent to that of OT2B.

By way of further clarification of this issue, coordination with the Snyder County Tax Assessment Office has indicated that two parcels owned by the Susquehanna Valley Mall are impacted by the DAMA Alternative, Parcels 12-09-283A and 12-09-283B. Both are vacent parcels. Parcel 12-09-283A has an assessed value of $4,805,850 which is for the value of the stores in the mall, even though the mall is not physically located on this parcel. Similarly, the $137,200 assessment associated with Parcel 12-09-283B is for the value of the movie theatre complex in the mall, even though the movie structures are not physically located on this parcel. As such, the DAMA Alternative tax base impact calculation for the parcels associated with the mall is more fiscally representative of an impact to the actual mall structure itself, whereas the construction of the DAMA would truly impact only undeveloped land owned by the mall.

Within Section 2, RC5 clearly has the least impact to the local tax base in Union Township, while RC1-E has the least impact in Point Township.

All alternatives will have an initial negative impact on the tax base. However, this is anticipated to be of short duration as the study area continues to develop. It is acknowledged that property values

TABLE IV-A-8
MUNICIPAL, SCHOOL DISTRICT, AND COUNTY REAL ESTATE TAX BASE REDUCTIONS

	Monroe Township		Shamokin Dam Borough		Selinsgrove S.D.*		Snyder County		Union Township		Lewisburg S.D.		Union County		Point Township		Shikellamy S.D.		West Chillisquaque Township		Milton S.D.		Northumberland County	
Current Revenue***	$90,013		$86,579		$7,497,367		$3,059,523		$46,271		$6,943,942		$3,400,255		$145,968		$6,429,546		$25,894		$4,899,611		$4,058,837	
Value	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%	$	%
DAMA	3,961	4.40	826	0.95	108,076	1.44	25,535	0.83	N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
OT2A	2,364	2.63	1,194	1.38	70,863	0.95	16,743	0.55	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
OT2B	2,974	3.30	2,930	3.38	102,094	1.36	24,122	0.79	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
RC1-E	25	0.03	N/A	N/A	647	0.01	153	0.01	1,258	2.72	19,336	0.28	4,559	0.13	1,760	1.21	18,809	0.29	299	1.15	4,881	0.10	3,714	0.09
RC1-W	25	0.03	N/A	N/A	647	0.01	153	0.01	1,224	2.65	18,719	0.27	4,438	0.13	3,189	2.18	34,087	0.53	249	0.96	4,064	0.08	5,919	0.15
RC5	12	0.01	N/A	N/A	308	0.00	73	0.00	637	1.38	9,791	0.14	2,308	0.07	1,659	1.14	17,736	0.28	276	1.07	4,505	0.09	3,486	0.09
RC6	25	0.03	N/A	N/A	647	0.01	153	0.01	1,577	3.41	24,244	0.35	5,716	0.17	1,656	1.13	17,698	0.28	265	1.02	4,333	0.09	3,450	0.08

* S.D. = School District
** N/A = Not Applicable
***Current Revenues as reported by the taxing body in August 1999

of some properties, particularly those near interchanges, may increase, while others may decrease. Overall, the improvement to the regional transportation system is anticipated to complement the long-term development of the Central Susquehanna Valley.

ii. Mitigation

Mitigation for project related impacts to the real estate/property tax base of the local taxing bodies may be realized in several ways. First of these would be the overall improvement to the transportation infrastructure of the area. Project implementation will serve to improve public safety and enhance the daily operations of the affected entities, thereby minimizing demands on emergency and related services. Secondly, the calculated reductions in real estate tax revenues represent a worst case scenario. These calculated reductions simply analyze the loss in revenue resulting from complete and partial property acquisitions. These figures do not take into account the fact that the majority of the persons displaced by the project will be relocated, to the maximum extent possible, to another location within the same municipality, school district, or at worst, the same county. In accordance with all applicable regulations, these relocations will consist of using existing vacant housing, as available, as well as the potential construction of new housing units. This construction of replacement housing units will serve as a source for regeneration of lost property tax revenues.

Also important to consider is the development (and the resulting increase in the value of taxable land) that is likely to occur as a result of the new highway. In essence, the development potential of select areas will be increased, given their improved access and/or close proximity to the new highway and its associated interchange areas. The resulting development may occur in the form of residential subdivisions, commercial complexes, or industrial facilities, all of which increase the value (and the revenue generated from property tax assessment) of otherwise vacant property. This concept is more clearly identified in the Secondary and Cumulative Impact Analysis, see Section IV.L.

3. Land Use

a. Existing Land Use

Land use in the CSVT project study area, as indicated in Figures IV-A-5 and IV-A-6, has been identified, mapped, and field verified. All municipal comprehensive land use plans and zoning ordinances have been compiled and analyzed in order to formulate an overall understanding of the existing and planned land uses of the project area. Analysis of Figures IV-A-5 and IV-A-6 indicates that the project study area consists of a diverse mixture of land uses. This diverse and highly varied land use mixture consists primarily of low, medium and high density residential, commercial, industrial, agricultural, forested, and old field land uses.

Within Section 1, the Old Trail Corridor is more densely developed than the A-A Hybrid Corridor, by far. Primary land uses in the Old Trail Corridor include medium to high density residential, commercial, and industrial. In general, the strip of land immediately adjacent to existing US Route 11/15 has been intensely developed as a regional commercial center. The area of land between this zone of commercial strip development and existing Old Susquehanna Trail has developed primarily as a medium to high density residential area with limited commercial and industrial inclusions. The area of land to the east of the Old Susquehanna Trail consists of a varied mixture of medium density residential and industrial land uses. The A-A Hybrid Corridor, however, consists primarily of agricultural, forested, and old field land uses with scattered low and medium density residential inclusions. The River Crossings Corridor is similar to the A-A Hybrid Corridor in that it consists primarily of agricultural, forested, and old field land uses with scattered low density residential and commercial inclusions.

i. Impacts

The DAMA alternative impacts the greatest amount of land of the Section 1 alternatives, exceeding the OT2A impact by 55.8 hectares (137.9 acres) and the OT2B alternative by 37.1 hectares (91.6 acres) (see Table IV-A-9). The land use percentages of the impacts remain fairly consistent between the alternatives, with impacts to agricultural lands ranging between 12.5% (OT2A) to 20.5% (DAMA) of the impact; forest impacts ranging between 30.1% (OT2A) and 32.8% (DAMA); old field impacts ranging between 26.5% (OT2B) and 28.1% (OT2A); developed land impacts ranging between 16.2% (DAMA) and 22.3% (OT2A); and impacts to wetlands, waterbodies, and barren lands ranging from 2.5% (DAMA) to 7.0% (OT2A). In general, DAMA impacts are comparably bigger for agricultural, old field, and forest lands, while the Old Trail alternatives impacts are comparably bigger for wetlands and barren lands.

Unlike the Section 1 alternatives, the Section 2 alternatives impact similar areas (see Table IV-A-10). In general, RC1-E and RC6 impacts to forest lands are greater than the RC1-W and RC5 alternatives, while the RC1-W alternative impacts are comparably greater to developed lands and the RC5 alternative impacts comparably more agricultural lands than the other Section 2 alternatives.

TABLE IV-A-9
SECTION 1 GENERALIZED LAND USE IMPACTS*

Land Use Type	Section 1		
	DAMA [Hectares (Acres)]	OT2A [Hectares (Acres)]	OT2B [Hectares (Acres)]
Agricultural Land	46.5 (115.0)	21.4 (52.9)	24.7 (61.0)
Forest Land	74.4 (183.9)	51.5 (127.3)	68.4 (169.0)
Old Field	63.5 (157.0)	48.1 (118.8)	50.3 (124.3)
Developed Land	36.7 (90.7)	38.1 (94.1)	34.2 (84.6)
Other**	5.8 (14.2)	12.1 (29.8)	12.3 (30.3)
TOTAL	227.0 (560.8)	171.1 (422.9)	189.9 (469.2)

* Detailed land cover impacts are provided in Table IV-F-1.
** Other land use category includes wetlands, waterbodies, and barren lands.

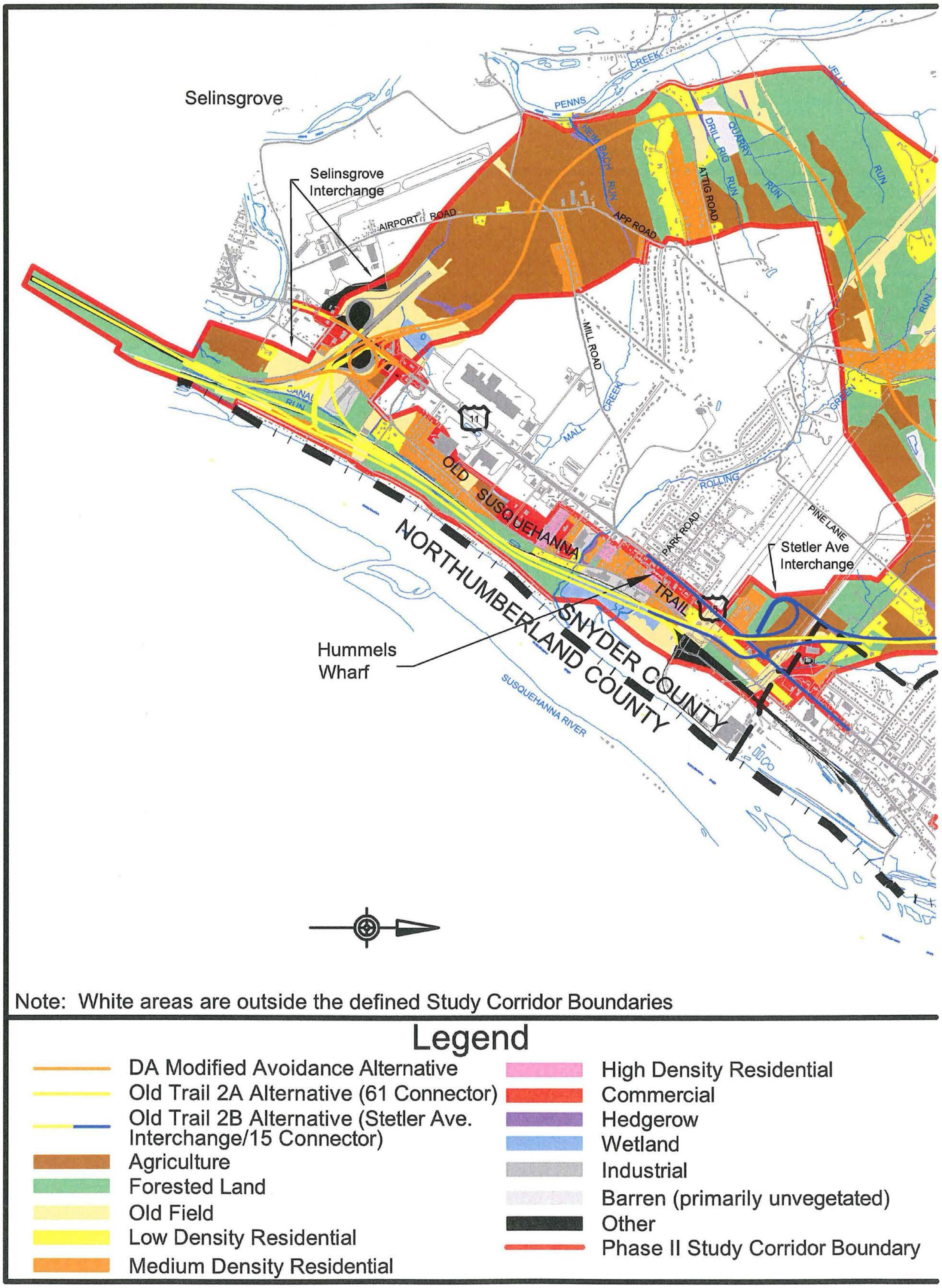
TABLE IV-A-10
SECTION 2 GENERALIZED LAND USE IMPACTS*

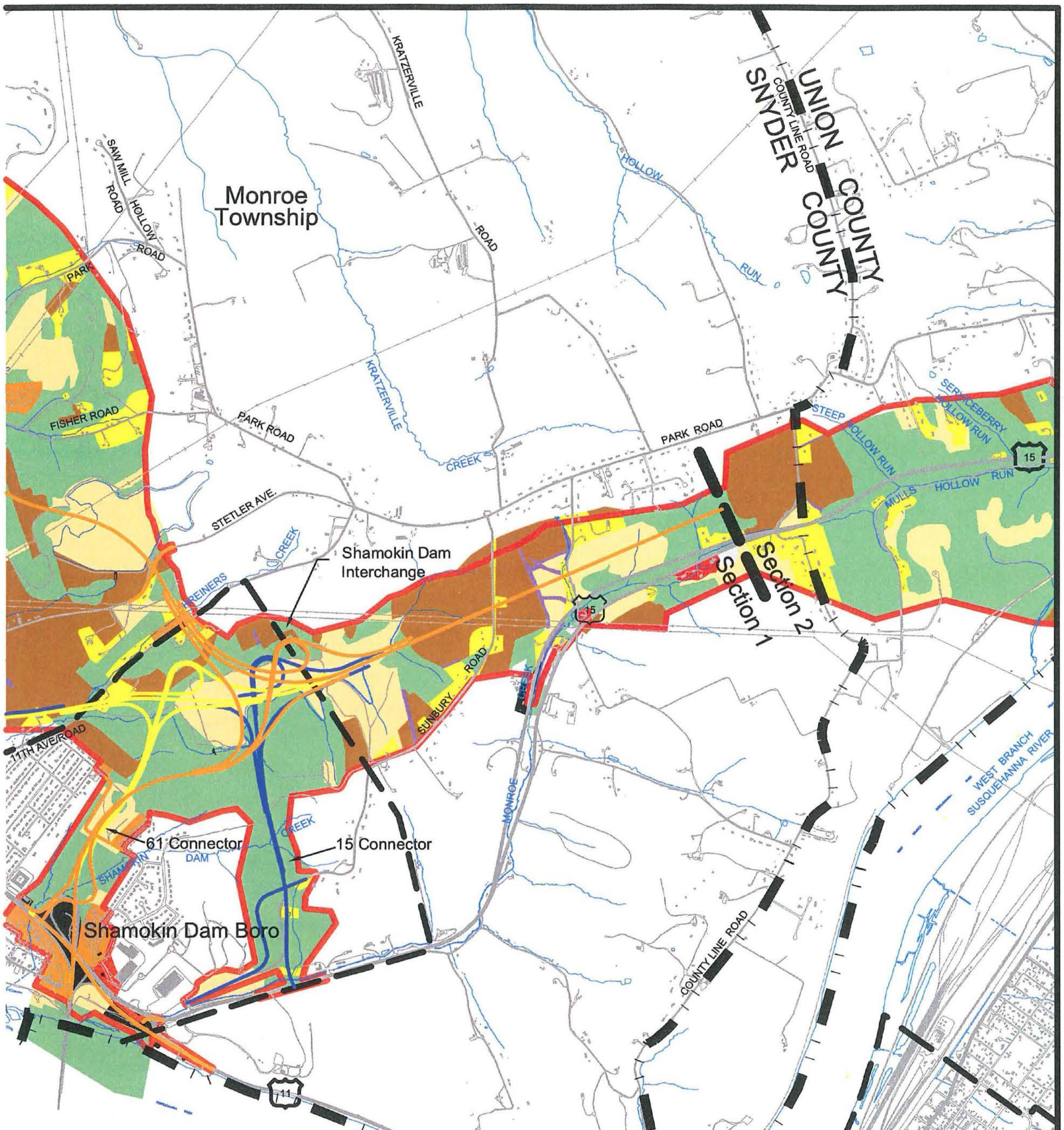
Land Use Type	Section 2			
	RC1-E [Hectares (Acres)]	RC1-W [Hectares (Acres)]	RC5 [Hectares (Acres)]	RC6 [Hectares (Acres)]
Agricultural Land	29.9 (73.8)	32.0 (79.0)	40.8 (100.8)	32.0 (79.0)
Forest Land	88.9 (219.6)	70.8 (175.0)	75.6 (186.8)	89.5 (221.3)
Old Field	13.6 (33.6)	8.8 (21.8)	15.8 (38.9)	14.2 (35.2)
Developed Land	25.2 (62.4)	41.3 (102.0)	24.0 (59.3)	26.5 (65.5)
Other**	5.15 (12.5)	4.6 (11.3)	5.3 (13.0)	5.2 (12.8)
TOTAL	162.7 (401.9)	157.5 (389.1)	161.5 (398.8)	167.4 (413.8)

* Detailed land cover impacts are provided in Table IV-F-1
** Other land use category includes wetlands, waterbodies, and barren lands.

ii. Mitigation

Mitigation is not proposed beyond compensation to landowners for property acquisition and habitat mitigation discussed in Section IV.F.1.


Selinsgrove
Selinsgrove Interchange
AIRPORT ROAD
PENNS CREEK
HEIM BACH RUN
APP ROAD
DRILL RIG RUN
ATTIG ROAD
QUARRY RUN
JELLY RUN
MILL ROAD
MALL CREEK
ROLLING GREEN RUN
PINE LANE
PARK ROAD
CANAL RUN
11
OLD SUSQUEHANNA TRAIL
NORTHUMBERLAND COUNTY
SNYDER COUNTY
Stetler Ave Interchange
Hummels Wharf
SUSQUEHANNA RIVER
Note: White areas are outside the defined Study Corridor Boundaries
Legend
DA Modified Avoidance Alternative
Old Trail 2A Alternative (61 Connector)
Old Trail 2B Alternative (Stetler Ave. Interchange/15 Connector)
Agriculture
Forested Land
Old Field
Low Density Residential
Medium Density Residential
High Density Residential
Commercial
Hedgerow
Wetland
Industrial
Barren (primarily unvegetated)
Other
Phase II Study Corridor Boundary



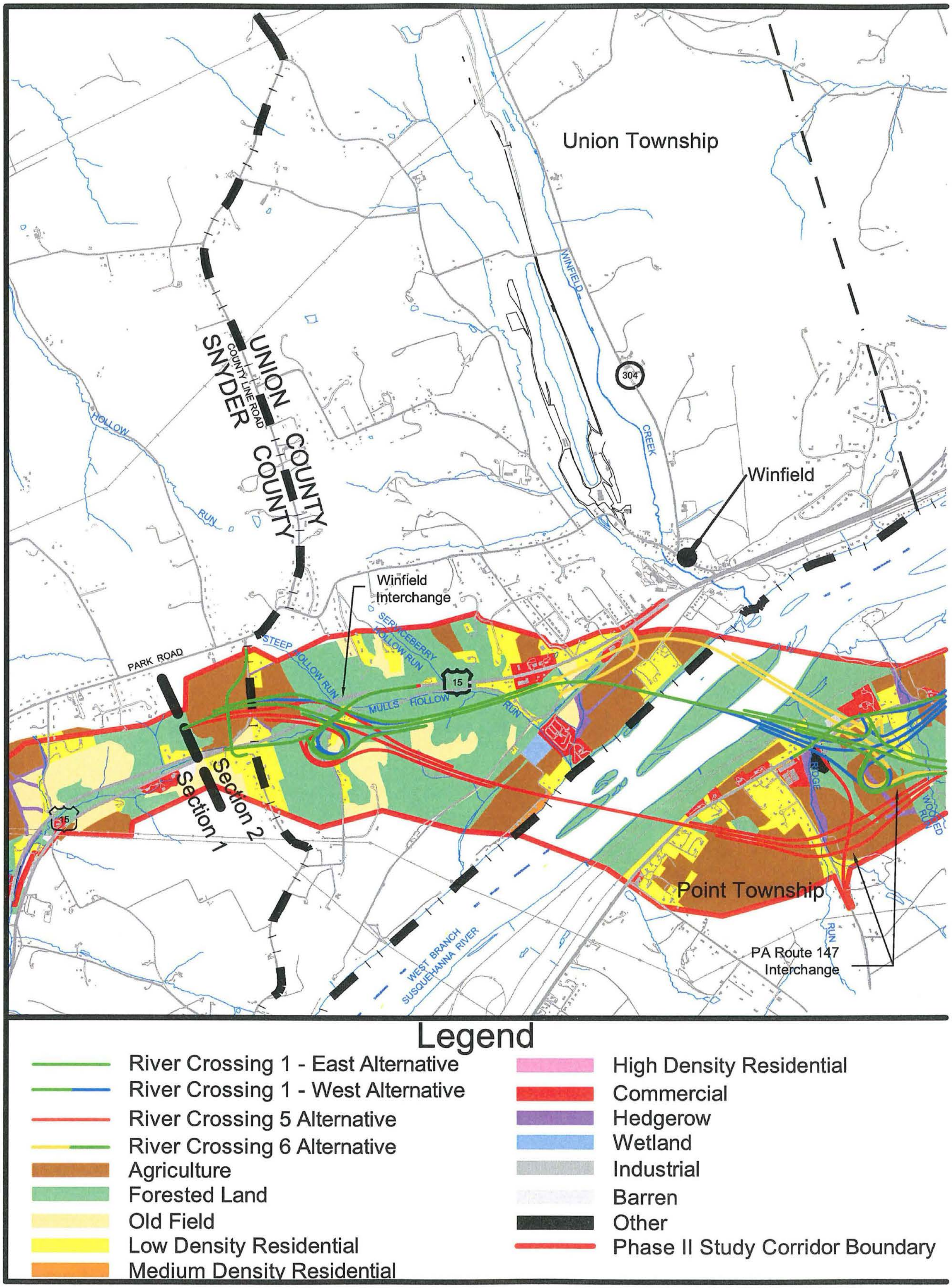
Central Susquehanna Valley Transportation Project

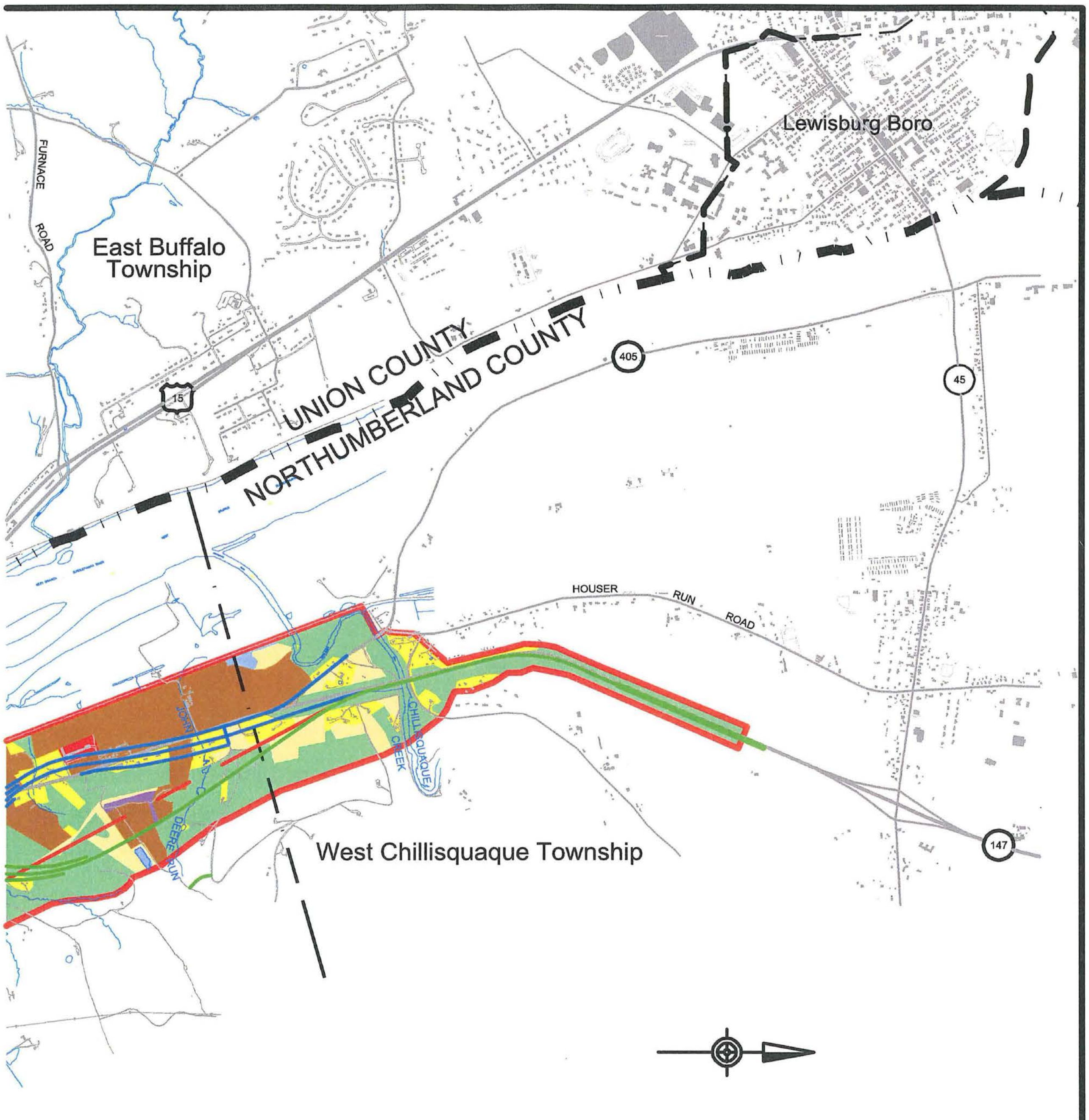
Figure IV-A-5

Section 1-Land Use

0 300 600 900 Scale in Meters

0 1250 2500 3750 Scale in Feet


Union Township
UNION COUNTY
SNYDER COUNTY
COUNTY LINE ROAD
WINFIELD
CREEK
304
Winfield
Winfield Interchange
PARK ROAD
STEEP HOLLOW RUN
SERVICEBERRY HOLLOW RUN
MULLS HOLLOW RUN
HOLLOW
RUN
15
Section 2
Section 1
Point Township
WEST BRANCH SUSQUEHANNA RIVER
PA Route 147 Interchange
Legend
River Crossing 1 - East Alternative
River Crossing 1 - West Alternative
River Crossing 5 Alternative
River Crossing 6 Alternative
Agriculture
Forested Land
Old Field
Low Density Residential
Medium Density Residential
High Density Residential
Commercial
Hedgerow
Wetland
Industrial
Barren
Other
Phase II Study Corridor Boundary



Note: White areas are outside the defined Study Corridor Boundaries

Central Susquehanna Valley Transportation Project

Figure IV-A-6

Section 2-Land Use

0	300	600	900		0	1250	2500	3750
Scale in Meters					Scale in Feet			

b. Future Land Use

Reasonably foreseeable and/or planned future land uses of the CSVT project study area have been investigated, mapped, and field verified. Coordination with the individual project area municipalities was completed to identify all speculative and planned future development areas. Figure IV-A-7 shows the locations of these identified potential future development areas. Some of the more noteworthy potential future developments include the proposed runway expansion at the airport, the southwestern expansion of the Susquehanna Valley Mall, the multi-family residential development of the Fisher (App) Farm, the development of a Super Walmart at the former God's Holiness Camp Grove, the residential subdivision of the property located between the Gunter Development and Orchard Hills neighborhoods of Shamokin Dam (i.e., the Golden Gate Development), the residential subdivision of the property in Point Township located northeast of the Mertz Greenhouses (i.e., the Chadwick Development), and the residential subdivision of the property east of PA Route 147, just south of the Chillisquaque Creek in West Chillisquaque Township (i.e., the Chilli-Point Development).

i. Impacts

Project implementation will directly impact some of the land areas identified for potential future development. The DAMA and OT2A, with the proposed PA Route 61 Connector, would directly impact the land area slated for potential future development as the Golden Gate residential subdivision. All Section 2 project alignment alternatives will directly impact (in varying capacities) the land area slated for potential future development as the Chadwick's residential subdivision and the Chilli-Point residential subdivision.

ii. Mitigation

Mitigation is not proposed beyond compensation to landowners for property acquisition and habitat mitigation discussed in Section IV.F.1.

c. Planning Consistency

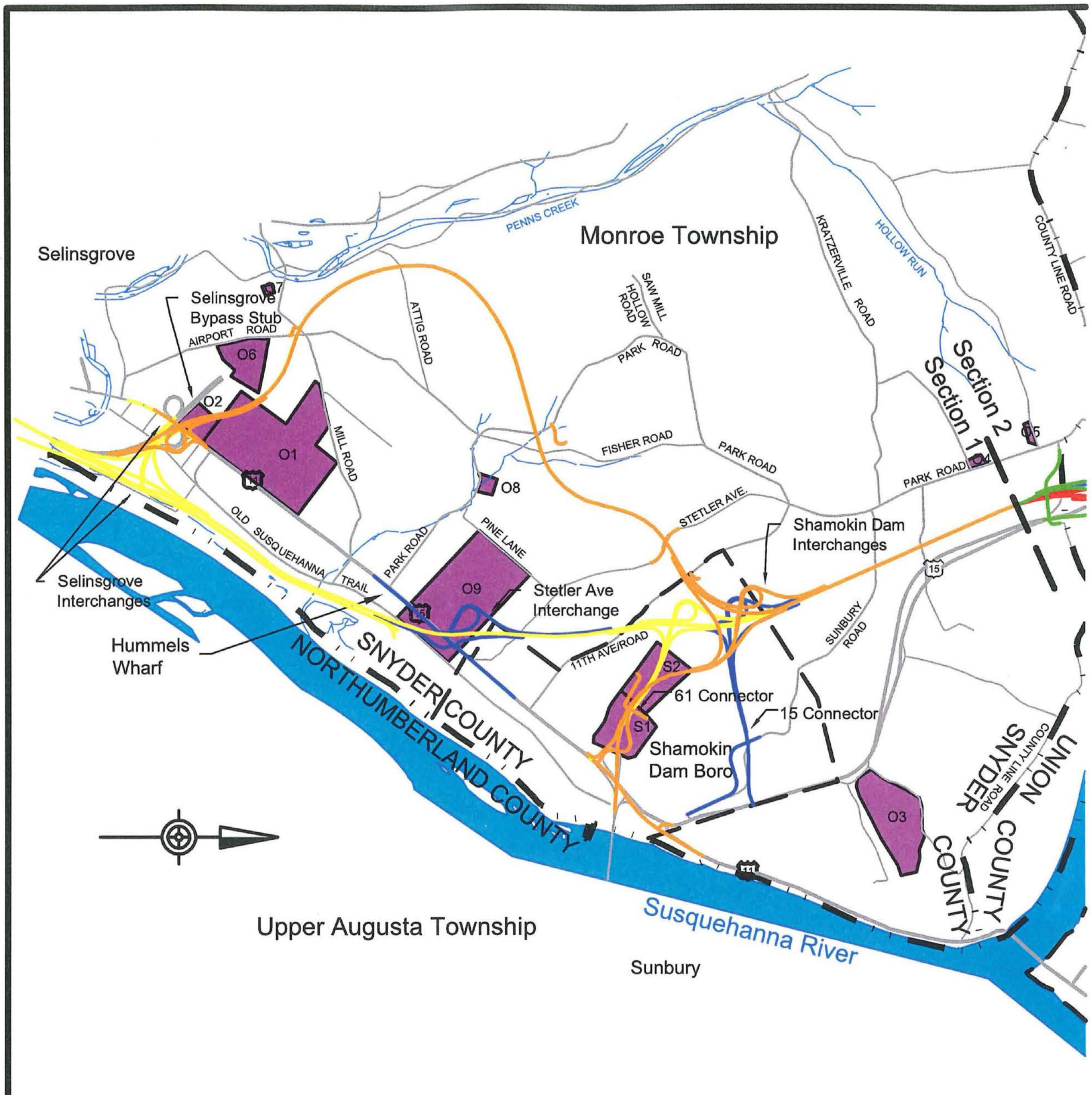
Transportation planning, as it is currently performed in Pennsylvania, is a cooperative venture between the state, regional agencies, local governments, and the public. Regional transportation plans are created to reflect the long-term transportation policies of the region. This planning process is what leads to the identification of transportation projects that are ultimately funded for study.

Transportation Improvement Programs (TIPs) are four year-year outlooks that are cooperatively developed by local, regional, and state transportation officials. TIPs identify specific projects and the resources needed to implement them in a given region. In the Central Susquehanna Valley region, there are three different regional planning agencies, the Williamsport Area Metropolitan Planning Organization (MPO), known as WATS, the Susquehanna Economic Development Association Council of Governments (SEDA COG), which is a Local Development District (LDD), and the Northern Tier Regional Planning Commission, which is also a LDD. In the immediate project area the SEDA COG is the regional planning authority, covering Snyder, Northumberland, and Union Counties.

TIPs are compiled into a Statewide Transportation Improvement Program (STIP). The STIP is required by the U.S. Department of Transportation, and the STIP includes all highways and transit projects to be implemented over a four year period. The Twelve Year Transportation Program, a mid-range plan required by Pennsylvania law, incorporates the STIP as the plan for the first four years of the twelve-year projection. The Twelve Year Program also identifies other projects to be implemented beyond the four year range of the STIP. The Twelve Year Program is updated every two years.

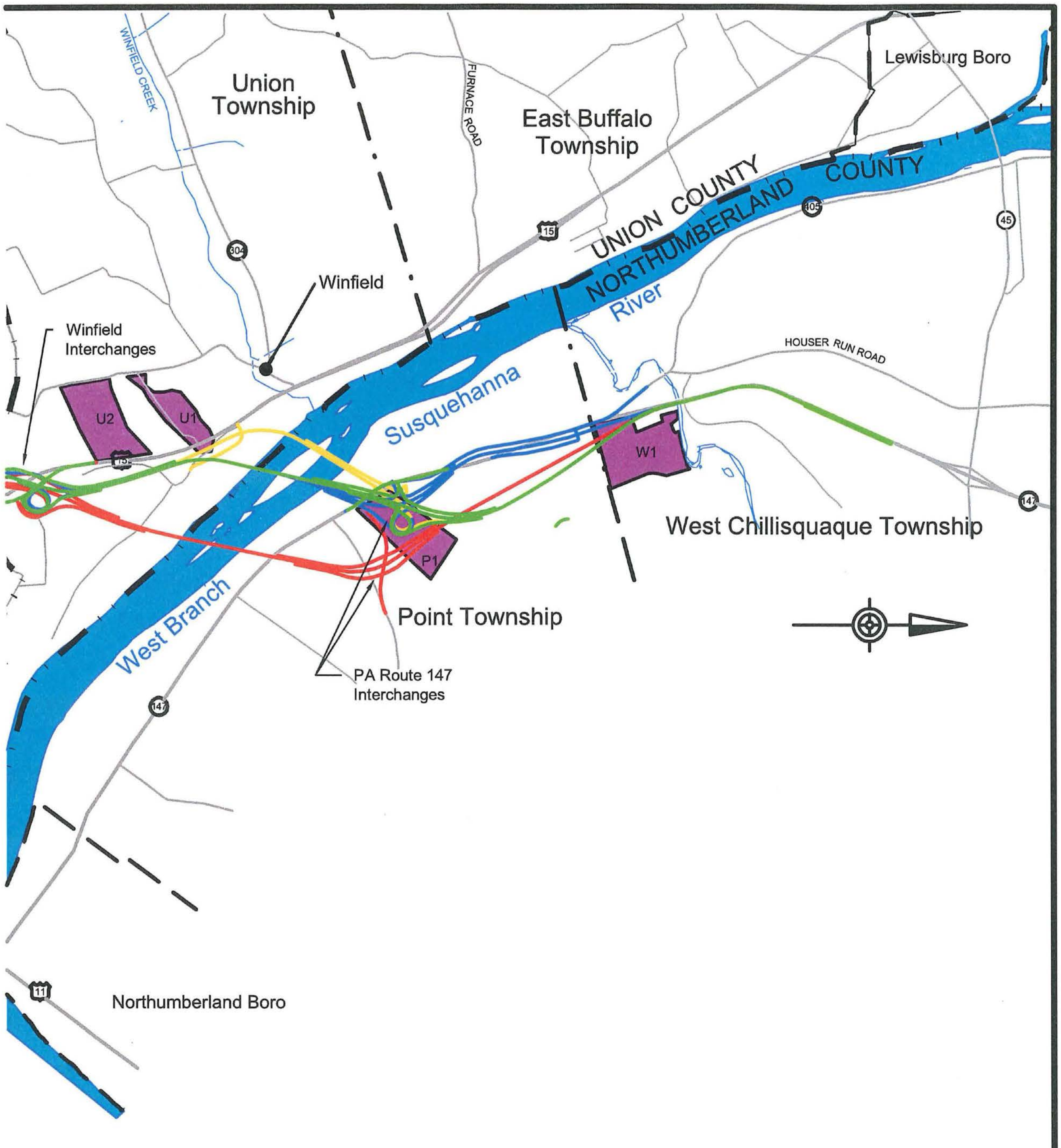
Local citizens and public officials, concerned about the continued residential and economic growth in the Central Susquehanna Valley and the resultant increases in traffic congestion, petitioned the SEDA COG to institute efforts to have the Shamokin Dam Bypass project restudied. As a result, in July 1993, the Central Susquehanna Valley Transportation (CSVT) Project was added to the TIP, the STIP, and the Twelve Year Program. In 1994, approval was given to study improvements to the roadway system in the Central Susquehanna Valley, particularly U.S. Routes 11/15, 11, 15, and 147. The CSVT Project has been continuously maintained on the TIP, STIP, and Twelve Year Program as a result of ongoing public and legislative testimony relating to the need for the roadway improvement each time the Twelve Year Program is updated (every two years). Therefore, this project is consistent with the regional transportation goals of the Central Susquehanna Valley.

Additionally, Pennsylvania has also prepared a statewide long-range transportation plan, known as PennPlan, which identifies transportation directions and mechanisms to measure progress toward the objectives. PennPlan is broken down into broad policy goals for different corridors throughout the state. One of the objectives listed in PennPlan for the Susquehanna Valley Corridor (which parallels the Susquehanna River and West Branch Susquehanna River from Harrisburg to Williamsport and includes portions of Snyder, Union, and Northumberland Counties) is to enhance safety and reduce congestion on U.S. 15 in Snyder and Union Counties. Since the CSVT Project intends to improve safety and reduce congestion on U.S. 15, the CSVT Project is considered wholly consistent with PennPlan.



Legend

- DA Modified Avoidance Alternative
- Old Trail 2A Alternative (61 Connector)
- Old Trail 2B Alternative (Stetler Ave. Interchange /15 Connector)
- River Crossing 1 - East Alternative
- River Crossing 1 - West Alternative
- River Crossing 5 Alternative
- River Crossing 6 Alternative
- O1 Potential Future Development Areas



W1	Chilli-Point Development	O3	Monroe Meadows
P1	Chadwick's	O4	Bartman & Brouse
U1	Winfield Estates	O5	Chubb
U2	Winfield Acres	O6	Fisher (App) Farm
S1	Golden Gate Development	O7	Airport Expansion
S2	Broscious Property	O8	Park Ridge Development
O1	Susquehanna Valley Mall	O9	Indian Village Associates
O2	Comfort Inn		

Central Susquehanna Valley Transportation Project

Figure IV-A-7

Potential Future Development Areas

0 500 1000 1500
Scale in Meters

0 2000 4000 6000
Scale in Feet

Individual county and municipal comprehensive plans have also been reviewed to determine their consistency with the proposed project and identify community needs that may provide mitigation for project-specific impacts. Reviewed plans include the Union County Comprehensive Plan (1996), the Snyder County Comprehensive Plan (2001), and the Shamokin Dam (1984), Monroe Township (1986), Point Township (1985), and West Chillisquaque Township (1992) comprehensive plans. Northumberland County is currently preparing a comprehensive plan. It will be completed in 2003. Union Township does not have a comprehensive plan.

The Executive Summary of the Union County Vision 21 Plan, Volume 1, identifies improvement to Routes 15, 45, and 192 as one of the important issues listed in the County. Another identified goal is to promote alternatives to strip development along Routes 15, 45, and 192 by limiting driveway access, requiring vegetative buffers, cluster development incentives, and Resource Protection Areas.

The Snyder County Comprehensive Plan (2001) recommends that transportation corridor plans should be developed for the U.S. Routes 11/15 corridor. This plan should seek to maintain corridor mobility, increase motorist safety, and establish priorities for preserving and enhancing corridor amenities.

Shamokin Dam Borough's Comprehensive Plan includes numerous references to needed improvements to recreational facilities including Attig Park on 8th Avenue and further development of Fabridam Park. Other public improvements identified in the 1984 Plan include development of welcome signs/gateways at major entrance points to the Borough [i.e. 61 bridge, Routes 11/15]; "finishing the bypass"; and construction of a community ambulance building on a parcel of land along the Old Trail that is owned by the Borough.

Subsequent conversations with the Borough Manager have indicated that the Borough's first recreation priority is development of a park in the Orchard Hills area. Preliminary subdivision plans submitted for the area show a parcel to be dedicated to the Borough. The focus of the park is expected to be for younger children who do not use the trail to the Gunter Development to access Attig Park. The Borough's second priority is the development of the rail line portion of Fabridam Park into a trail and to improve Fabridam Park.

The 1986 Monroe Township Comprehensive Plan states that the growth of the area may warrant the need for more parks in the future. In particular, the development that will eventually take place near the mall in the southwestern portion of the Township. Another possible park in the Penn's Creek area is also mentioned. The other significant community projects included in the plan are the construction of a new municipal building (complete), and possible sale and development of the abandoned municipal landfill as an equestrian center or Christmas tree farm. Brief mention is also made for renovating the old municipal building (Fisher one-room school) into a library branch, recreation center, or senior citizens' center.

The earlier version of the Monroe Township Plan showed the bypass as originally planned. The 1986 Plan shows the project as 'dead,' but lists possible ways of resurrecting the project to some degree to spur economic development. No mapping is included in the 1986 Plan that shows specific road improvements around the interchange. Recent coordination with Snyder County has indicated that Monroe Township's Comprehensive Plan has been completed, but has not yet officially been adopted.

Monroe Township's Comprehensive Plan is currently being revised. The new comprehensive plan for Monroe Township is expected to be completed in 2003.

The Point Township and Northumberland Borough Comprehensive Plan indicates that land should be set aside in a centralized portion of Point Township for a multi-purpose recreational facility (complete). A demand for a community center for youth is also identified; potential locations include an empty school, church, or other building. No other significant, planned community facilities are identified in the plan. There are no references to major improvements to SR 0147 in the plan.

The West Chillisquaque Township Comprehensive Plan goals include strengthening techniques for agricultural preservation, concentrating development, developing regional sewage facilities, and encouraging the completion of a new Route 147 connection to Routes 15 and 11 on the west side of the Susquehanna River to reduce congestion in the Northumberland area. No improvements were planned for local recreational sites.

In summary, the proposed project is consistent with available comprehensive plans in the region and is specifically supported in several of the plans. The most common community facility need identified in the plans involve improvements or additions to recreational facilities. The needs identified in the plans are listed as possible mitigation measures, as applicable, throughout the EIS.

B. NOISE

A preliminary assessment of traffic noise levels was conducted for the CSVT Project in accordance with FHWA traffic noise standards (23 CFR 772) and PENNDOT guidelines. Noise monitoring and modeling, impact evaluation, and mitigation feasibility and reasonableness will be discussed for all alternatives within both Section 1 and Section 2.

> More detailed information on the noise analysis conducted for the project is located in the Noise Technical Support Data. An index for the Technical Support Data is located in Section IX, Appendix A.

The intent of the noise analysis is to determine if projected future noise levels will approach or exceed State or Federal noise abatement criteria (NAC) as a result of the preliminary design of the

CSVT Project. During final design of the selected alternative, additional noise analyses will be performed.

The noise analysis was completed using the PENNDOT noise guidelines that were in effect at the time that the Draft EIS was prepared. These guidelines, contained in Design Manual 1A, Chapter 8 - Noise, were effective February 25, 1996, and were superceded by new guidelines, Publication No. 24 - Project Level Highway Traffic Noise Handbook, which was effective February 2, 2002.

To be consistent, the noise analysis using the 2030 traffic volumes contained in this Final EIS was also prepared using the older guidelines.

Additional noise analyses will be completed during the Final Design phase of this project. The Final Design noise analysis will be completed following PENNDOT's newest noise guidelines, effective February 2002.

The first step in a preliminary noise analysis is to assess the existing acoustical environment. Monitoring of the existing conditions is the primary means of establishing background, ambient sound levels. Monitoring was conducted at 62 locations within the project area during the AM and PM peak traffic hours. These ambient sound levels serve as a baseline when determining future impacts, as well as serve to calibrate the computer model.

Upon completion of the monitoring, a computer model of the existing roadway network and monitored receptors is constructed using data from digital topographical and contour maps and existing traffic volumes recorded in the field. The noise levels generated from this existing "calibration" model are compared to the actual monitored levels to ensure the model is accurately predicting the existing noise environment. Modeling for this project was accomplished by applying the FHWA STAMINA 2.0/OPTIMA computer model.

To represent the actual conditions, a numerical coordinate system of the roadway network and receivers is used. The STAMINA 2.0/OPTIMA computer model utilizes a three-dimensional, Cartesian coordinate (X, Y, and Z) system to represent the roadways, terrain features, and receivers in the study area. Noise levels can then be predicted for various scenarios of traffic flow, geometrics, and topography.

In addition to the definition of physical features within the coordinate geometry system, the model includes two other categories of input variables, traffic characteristics, and site features. Traffic characteristics (i.e., volumes and speeds) are entered for up to three different vehicle types: passenger cars, medium trucks (having two axles, six wheels, and weighing between 4,500 Kg and 12,000 Kg), and heavy trucks (three or more axles, weighing greater than 12,000 Kg). Site features, referred to as alpha and shielding adjustments, are provided for every combination of roadway segments and receptors included in the model.

The next step in the noise analysis is to predict probable future design year (2030) noise levels using the model with the proposed alternatives in place and proposed traffic volumes, and to determine if the future noise levels will approach or exceed State or Federal NAC.

Noise levels are projected for locations adjacent to the proposed improvements, referred to as receptors. These points represent groupings of residential units that would have similar acoustic propagation characteristics. Where future levels are shown to approach or exceed NAC, mitigation consideration is warranted.

Table IV-B-1 outlines the NAC as defined in Federal standards (23 CFR 772). In all cases throughout the CSVT study area, receptors fall under Activity Category B. For Activity Category B receptors, PENNDOT considers a level of 66 dBA up to 67 dBA as "approaching" the NAC. In addition, Federal standards stipulate that abatement considerations are required if the project results in a "substantial increase" above existing conditions. Table IV-B-2 outlines "substantial increase" over existing noise level NAC.

Where receptors are predicted to exceed the NAC, mitigation measures are evaluated for feasibility and reasonableness. Feasibility and reasonableness are discussed in more detail in the Mitigation Section of the noise analysis.

Noise attenuation devices, such as walls or earth berms, are generally accepted as the most cost-effective methods for abating or mitigating noise levels associated with highway traffic.

All noise levels presented in this analysis are hourly, A-weighted equivalent sound levels in decibels [Leq (H) in dBA]. Essentially, they are hourly average levels.

1. Impacts

Residences located near US Routes 11/15, US Route 11, US Route 15, and S.R. 147 are currently exposed to noise levels near or above NAC. The design year 2030 traffic projections for the No-Build Alternative will result in more than a doubling of car and truck traffic along these routes, resulting in noise levels above impact criteria for many additional residences along these routes, as well as potentially higher noise levels for residences currently impacted.

A summary of predicted future noise impacts for the CSVT alternatives is presented in Table IV-B-3. Table IV-B-3 lists the numbers of residences where the future noise levels (2030) approach or exceed Federal and state noise abatement criteria (NAC). Figure IV-B-1 depicts the residences where the future noise levels (2030) approach or exceed the NAC for the alternatives studied in Section 1 (DAMA, OT2A, OT2B). This figure also serves as an index map for a series of figures (Figures IV-B-2 through IV-B-7) that are enlargements of the study area. Figure IV-B-8 depicts the residences that have future noise levels that approach or exceed NAC for the alternatives studied in Section 2 (RC1-

TABLE IV-B-1
NOISE ABATEMENT CRITERIA
HOURLY A-WEIGHTED SOUND LEVEL DECIBELS (dBA)

ACTIVITY CATEGORY	Leq (h)	DESCRIPTION OF ACTIVITY CATEGORY
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.
Source: 23 CFR Part 772		

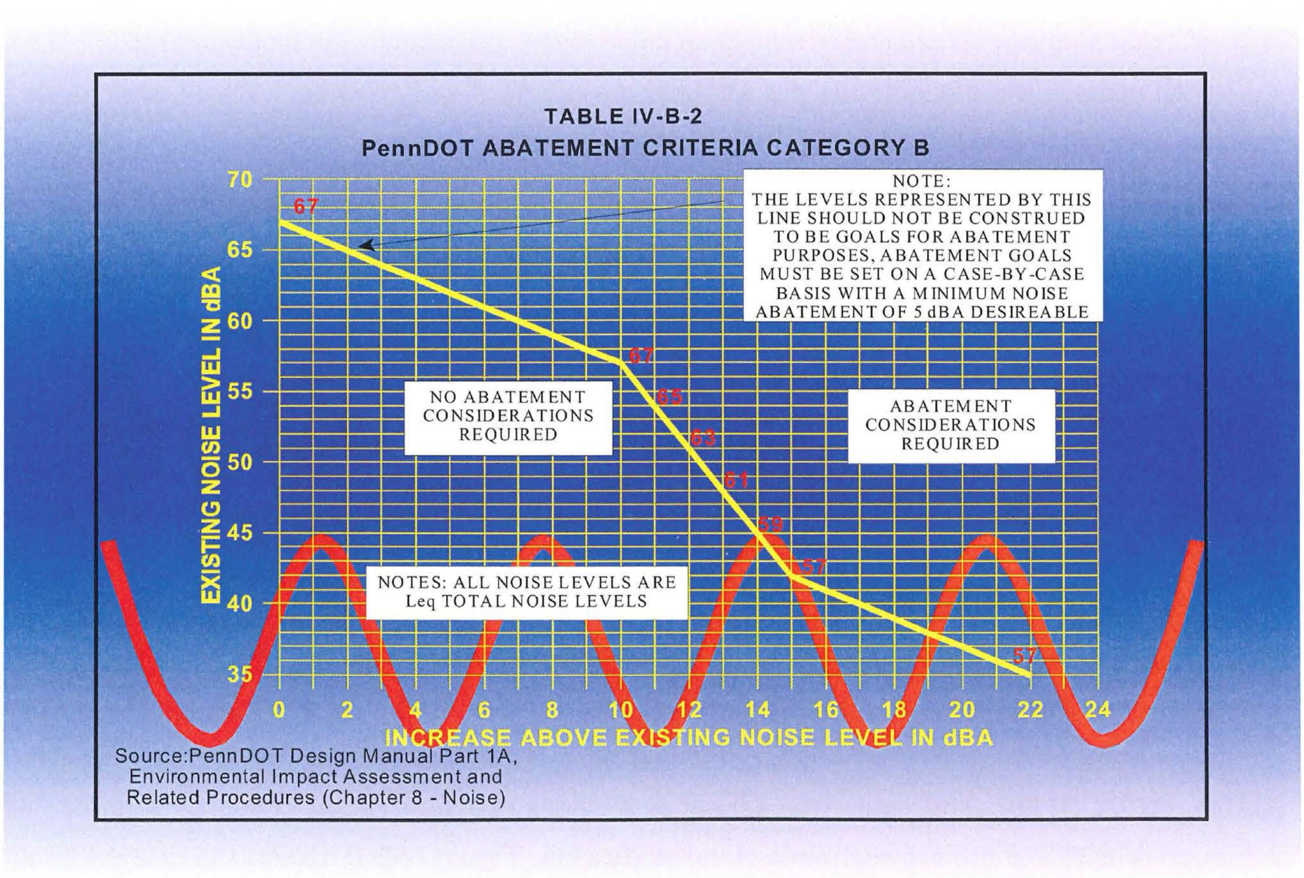


TABLE IV-B-3
PREDICTED FUTURE NOISE IMPACTS

Alternative	Number of Residential Impacts
DAMA	109
OT2A	234
OT2B	209
RC1-E	36
RC1-W	37
RC5	42
RC6	35

E, RC1-W, RC5 and RC6). This figure serves as an index map for a series of figures (Figures IV-B-9 through IV-B-12) that are enlargements of the study area. The enlargements (Figures IV-B-2 through 7 and IV-B-9 through 12) also indicate the following information.

- Summary of existing noise levels (in dBA)
- Summary of future noise levels (in dBA)
- Number of residences impacted in that location for each alternative
- Whether mitigation is feasible and reasonable for the areas that warrant abatement consideration for each alternative

a. Section 1

The preliminary noise analysis undertaken for the Section 1 alternatives indicates that the DAMA results in the fewest number of noise impacted residences among the three proposed alternatives. Although this alternative produces the fewest number of residential noise impacts, the individual noise impacts may be considered substantially greater as no major traffic noise sources are present in much of the DAMA corridor. The OT2A and 2B Alternatives share a similar corridor, and thus, a similar number of impacts. The OT2A Alternative impacts an additional number of residential units as compared to the OT2B Alternative due to the location of the 61 Connector in relation to the Gunter and Orchard Hills communities.

A more detailed analysis of impacted residences in Section 1 for DAMA and OT2A and 2B is presented in the tables included on Figures IV-B-2 through IV-B-7, which summarize existing and future conditions. The impacted houses shown in red on the figures listed above are those that will be directly affected by the corresponding alternative.

It is important to note that these impacts are probable impacts based on the preliminary designs of the Section 1 alternatives. The noise impacts will be further verified during final design for the selected alternative.

b. Section 2

The preliminary noise analysis undertaken for the Section 2 alternatives indicates that the River Crossing Alternatives share similar impact characteristics, as the four alternatives share common footprints during parts of their course. The RC-6 Alternative results in the fewest number of noise impacts. The RC1-E, RC 5, and RC1-W Alternatives each result in only a slightly greater number of noise impacts.

A more detailed analysis of impacted residences in Section 2 for RC1-E, RC1-W, RC5 and RC6 which summarize existing and future conditions is presented in the tables which are included on Figures IV-B-9 through IV-B-12. The impacted houses shown in red on the Figures listed above are those that will be directly affected by the corresponding alternative.

It is important to note that these impacts are probable impacts based on the preliminary designs of the Section 2 alternatives. The noise impacts will be further verified during final design for the selected alternative.

2. Mitigation Measures

Following is a summary of mitigation measures including the definitions of feasibility and reasonableness as they relate to noise abatement and a brief explanation of specific mitigation measures proposed throughout the project study area.

At sites where noise abatement consideration is warranted (levels approach or exceed NAC), a feasible and reasonable analysis was performed. Locations of preliminary noise barriers are presented on Figures IV-B-1 through IV-B-12 for each alternative where barriers are determined feasible and reasonable.

Feasibility deals with engineering and acoustical considerations. In order for abatement measures to be considered feasible they must fulfill the following criteria.

- Provide a noise reduction of at least 5 dBA at a majority of impacted receptors
- Placement of a noise barrier is such that it will not restrict access to vehicular or pedestrian travel
- Placement of a noise barrier is such that it will not cause a safety problem with sight distance
- Noise barrier must be constructible from an engineering standpoint

Reasonableness is based on a number of factors, including the following.

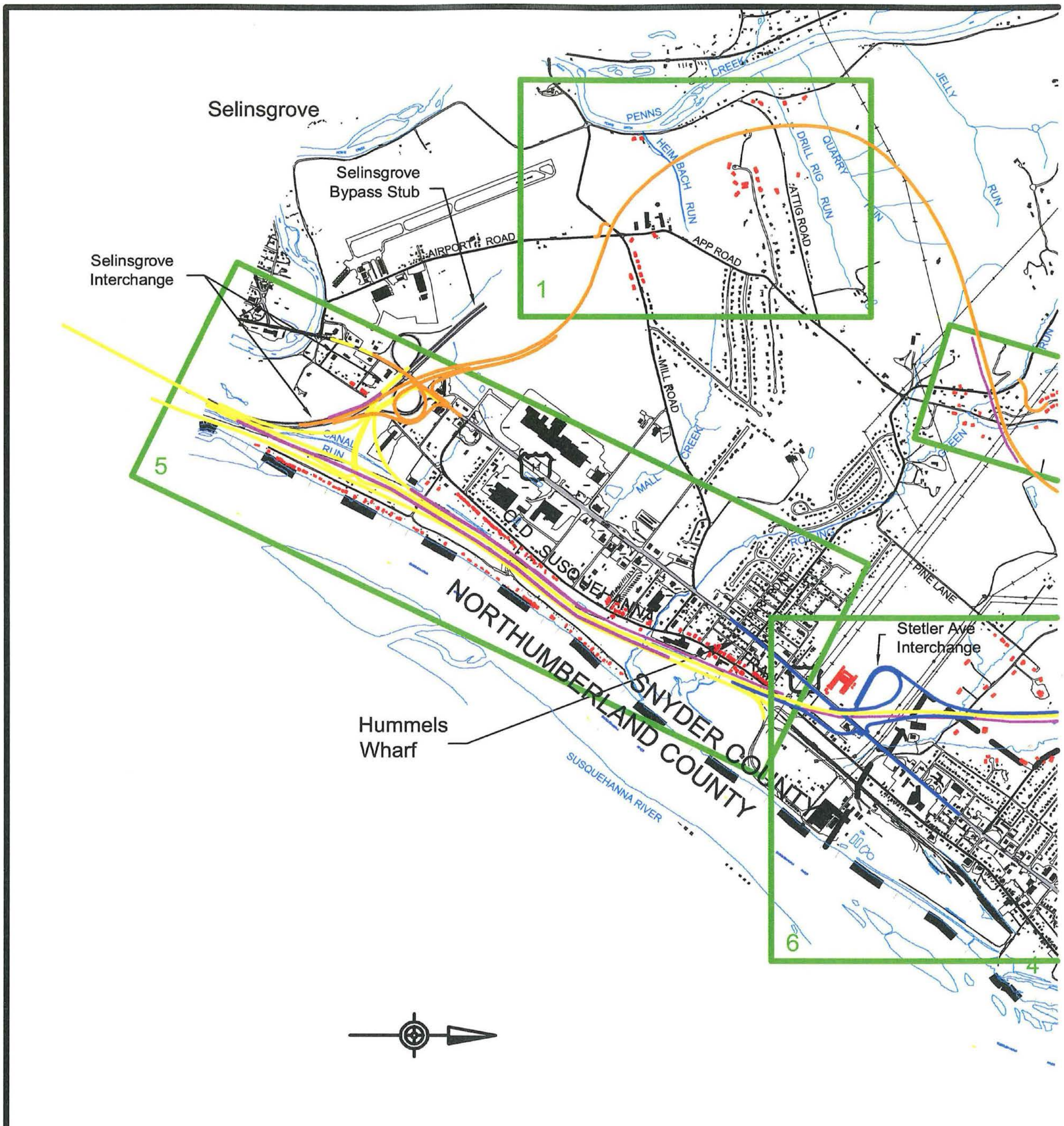
- Noise mitigation benefits
- Desires of those affected
- Comparison of existing to future noise levels
- Development trends and land use controls
- Cost per residence
- Cost/dBA at unit protected
- Barrier constructability and maintenance
- Barrier impact on utilities and drainage

In terms of cost per residence, PENNDOT uses the maximum Federal criteria to determine reasonableness for barriers. This limits the expense for noise barriers to $50,000 per residence benefitted.

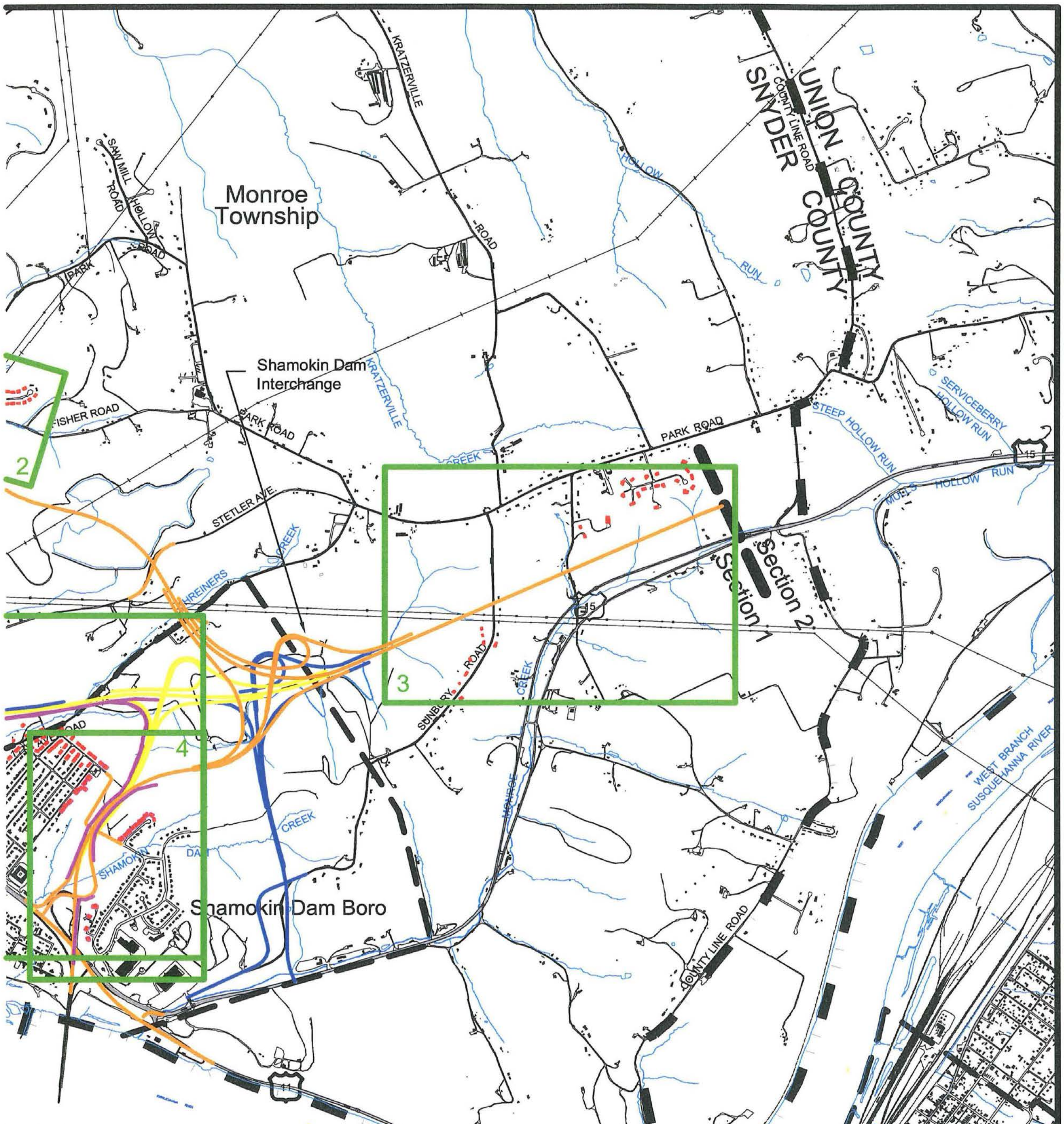
Mitigation in the form of vertical noise barriers was analyzed for those receptors that warranted noise abatement. Those receptors located where mitigation is considered not feasible were generally a result of unmitigatable traffic noise from local roads or the considerably higher elevation of the homes in relation to the noise barrier. Those receptors located where mitigation is considered feasible but not reasonable were generally a result of excessive cost of the barrier per benefitted residence. The noise abatement measures (preliminary noise barriers) that are considered feasible and reasonable are shown on Figures IV-B-2 through IV-B-7 and Figures IV-B-9 through IV-B-12. These barriers are mainly between 3.7 meters to 5.5 meters (12 to 18 feet) high, resulting in an average noise reduction of 5 to 10 dBA depending on their location within the project study area. Estimated mitigation costs for each alternative are presented in Table IV-B-4.

During final design of the selected alternative, additional noise analyses will be performed along with detailed cost-effectiveness analyses to specify noise mitigation measures, including roadway design modifications, as needed.

Noise abatement guidelines, as reported in PENNDOT's old noise policy, Design Manual 1A, Chapter 8 - Noise, have been used in this analysis. New noise abatement guidelines were developed



DA Modified Avoidance Alternative
Old Trail 2A Alternative (61 Connector)
Old Trail 2B Alternative (Stetler Ave. Interchange /15 Connector)
Proposed Noise Barriers
Noise Impacted Residential Units
Enlargement Areas

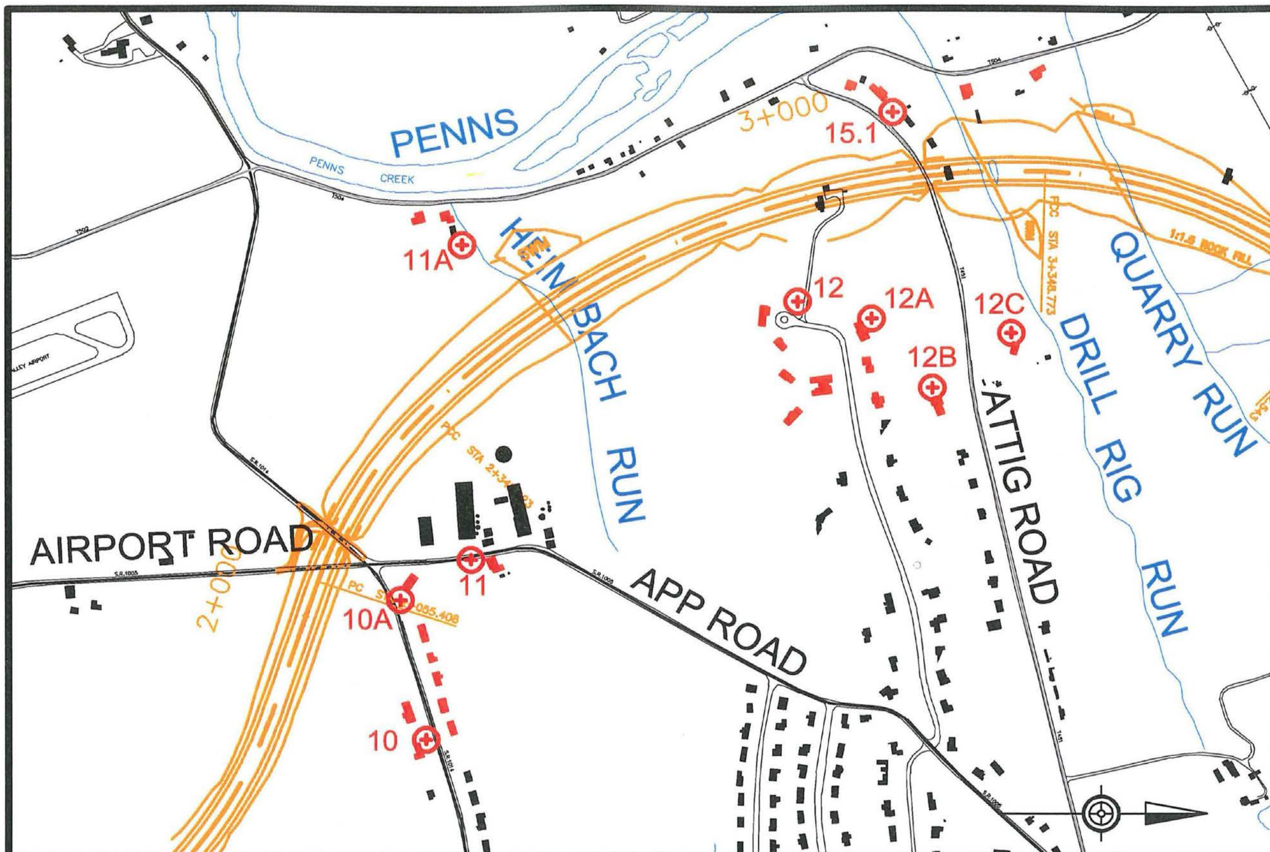


Central Susquehanna Valley Transportation Project

Figure IV-B-1

Section 1-
Noise Impacts Index Map

0 300 600 900 Scale in Meters
0 1250 2500 3750 Scale in Feet



Receptor Number**	1998 Existing Modeled (dBA)	2030 DAMA Modeled (dBA)	Impacted Residential Units (No.)	Mitigation*
10	65	67	4	Not Feasible
10A	64	69	4	Not Feasible
11	66	70	1	Not Feasible
11A	45	63	2	Feasible but not Reasonable
12	37	64	5	Not Feasible
12A	36	62	3	Not Feasible
12B	35	60	1	Not Feasible
12C	35	62	1	Not Feasible
15.1	44	63	4	Feasible but not Reasonable

*Mitigation explanation in Section IV.B.2.
** Receptors not listed do not meet the criteria for mitigation consideration.

Legend

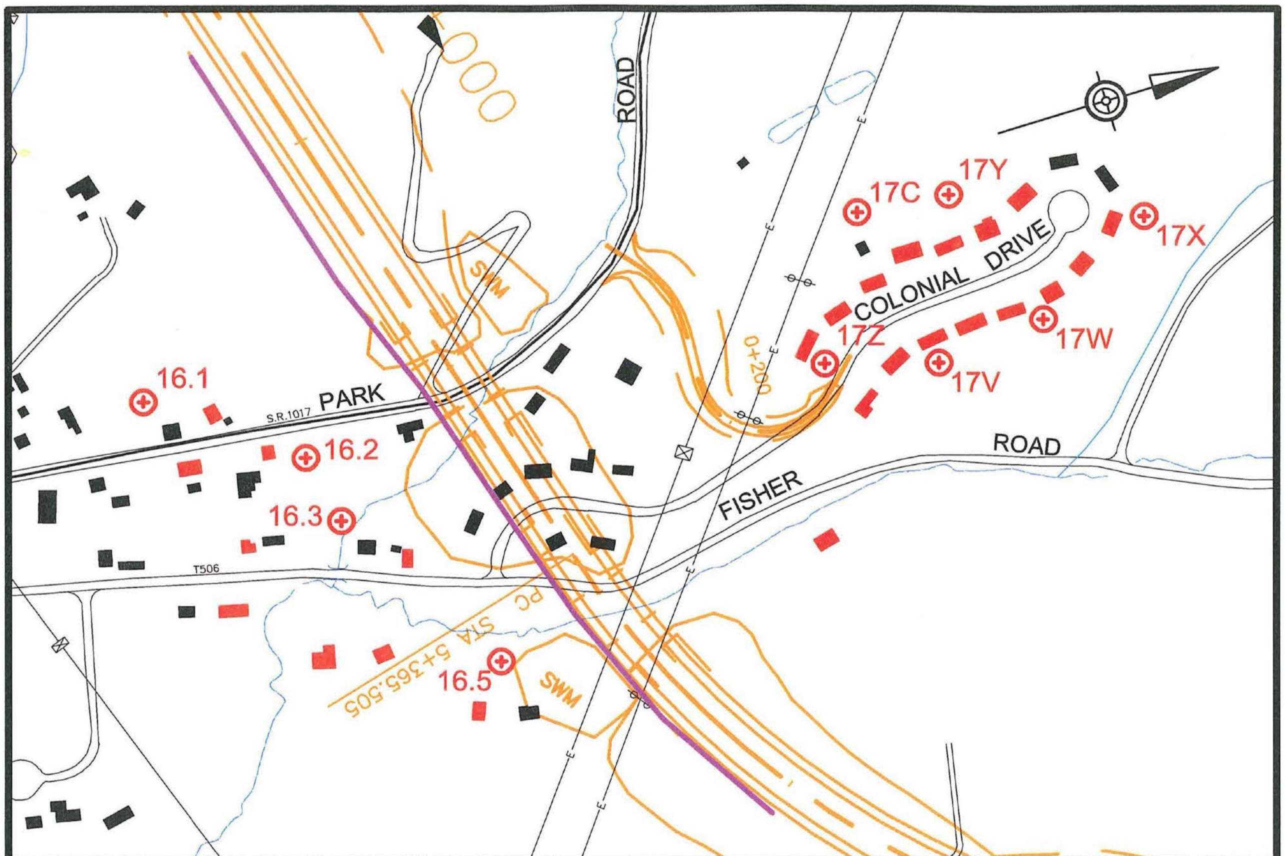
- DA Modified Avoidance Alternative
- Noise Impacted Residential Units
- 10⊕ Impacted Noise Receptors

Central Susquehanna Valley Transportation Project

Figure IV-B-2

DAMA
Noise Impacts - Map 1

0 100 200 300 Scale in Meters
0 400 800 1200 Scale in Feet



Receptor Number**	1998 Existing Modeled (dBA)	2030 DAMA Modeled (dBA)	Impacted Residential Units (No.)	Mitigation*
16.1	49	63	4	Feasible and Reasonable
16.2	50	65	2	Feasible and Reasonable
16.3	50	65	2	Feasible and Reasonable
16.5	47	64	1	Feasible and Reasonable
17C	40	59	3	Not Feasible
17V	36	60	3	Not Feasible
17W	33	58	2	Not Feasible
17X	29	57	3	Not Feasible
17Y	30	58	2	Not Feasible
17Z	35	62	3	Feasible but not Reasonable

* Mitigation explanation in Section IV.B.2.
** Receptors not listed do not meet the criteria for mitigation consideration.

Legend

- DA Modified Avoidance Alternative
- Noise Impacted Residential Units
- 10⊕ Impacted Noise Receptors
- Proposed Noise Barriers

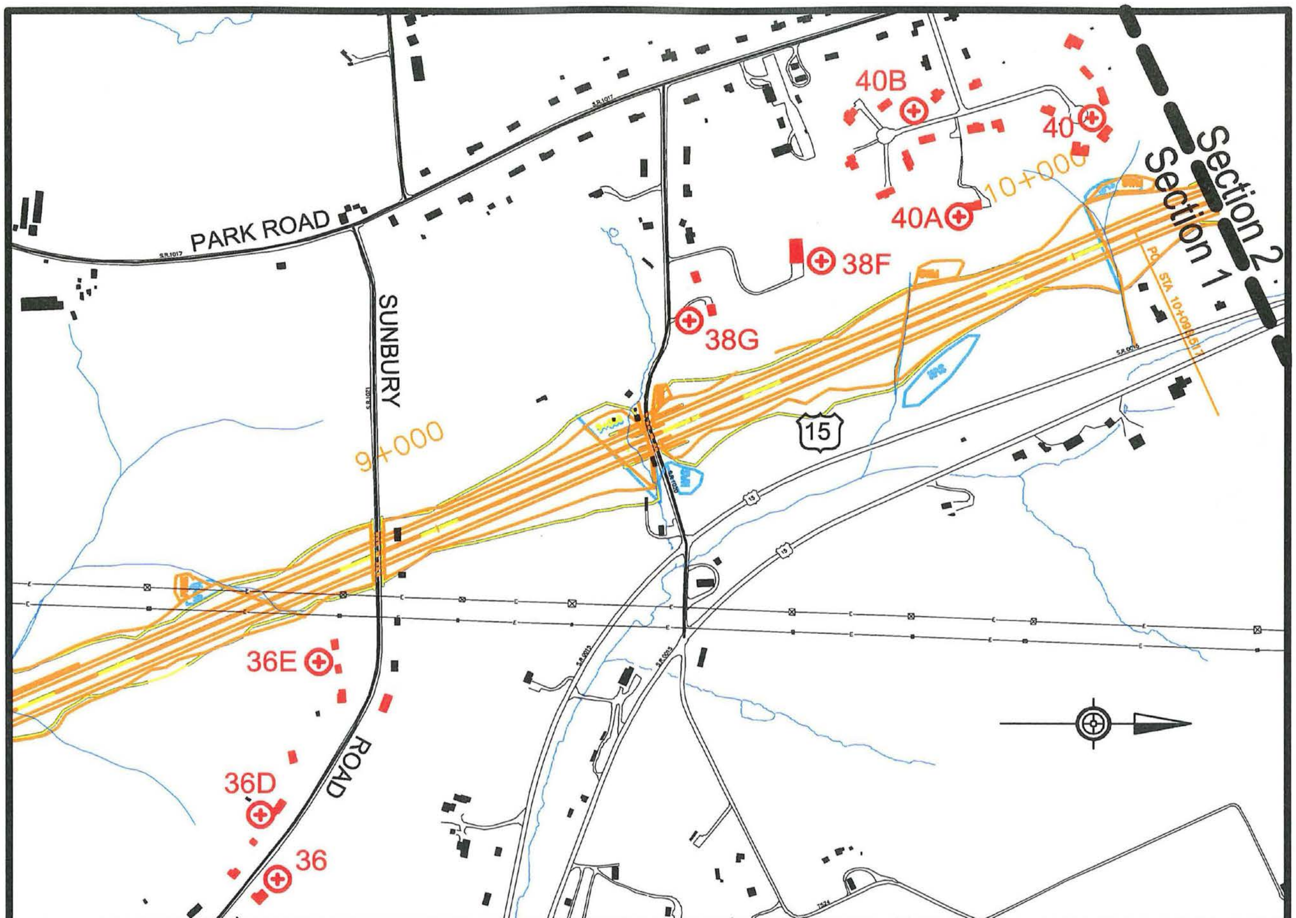
Central Susquehanna Valley Transportation Project

Figure IV-B-3

DAMA
Noise Impacts - Map 2

0 50 100 150 Scale in Meters

0 200 400 600 Scale in Feet



Receptor Number**	1998 Existing Modeled (dBA)	2030 DAMA, OT2A, and OT2B Modeled (dBA)	Impacted Residential Units (No.)	Mitigation *
36	43	59	1	Not Feasible
36D	43	61	4	Not Feasible
36E	51	67	4	Feasible but not Reasonable
38F	53	66	1	Not Feasible
38G	53	64	2	Feasible but not Reasonable
40	44	64	5	Feasible but not Reasonable
40A	54	67	6	Feasible but not Reasonable
40B	47	60	6	Not Feasible

* Mitigation explanation in Section IV.B.2.
** Receptors not listed do not meet the criteria for mitigation consideration.

Legend

- DA Modified Avoidance Alternative
- Old Trail 2A Alternative (61 Connector)
- Old Trail 2B Alternative (Stetler Ave. Interchange /15 Connector)
- Noise Impacted Residential Units
- 10 Impacted Noise Receptors

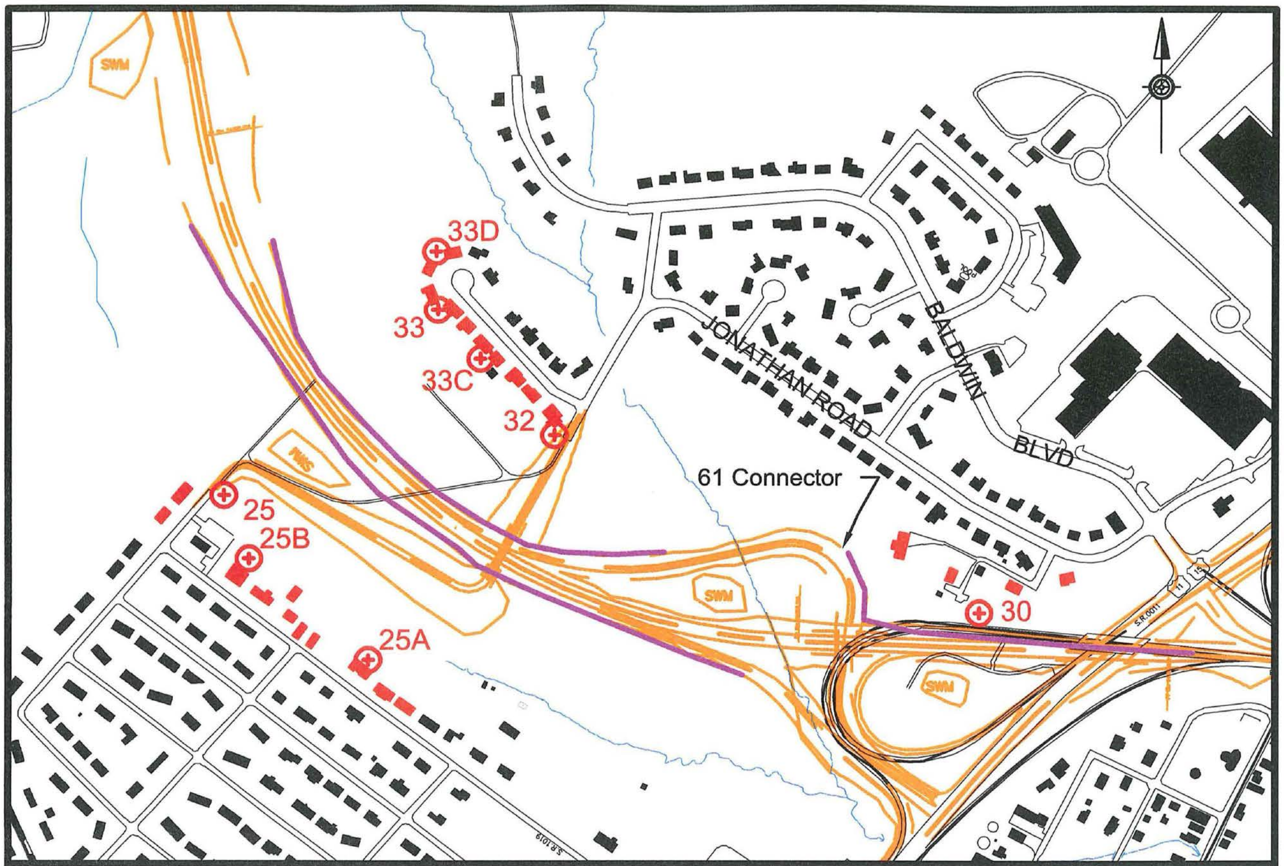
Central Susquehanna Valley Transportation Project

Figure IV-B-4

DAMA, OT2A and OT2B Noise Impacts - Map 3

0 100 200 300 Scale in Meters

0 400 800 1200 Scale in Feet



Receptor Number**	1998 Existing Modeled (dBA)	2030 DAMA Modeled (dBA)	Impacted Residential Units (No.)	Mitigation*
25	46	61	2	Feasible and Reasonable
25A	47	60	3	
25B	45	59	6	
30	64	70	4	
32	48	61	2	
33	47	60	2	
33C	40	60	4	
33D	39	57	2	

* Mitigation explanation in Section IV.B.2.
** Receptors not listed do not meet the criteria for mitigation consideration.

Legend

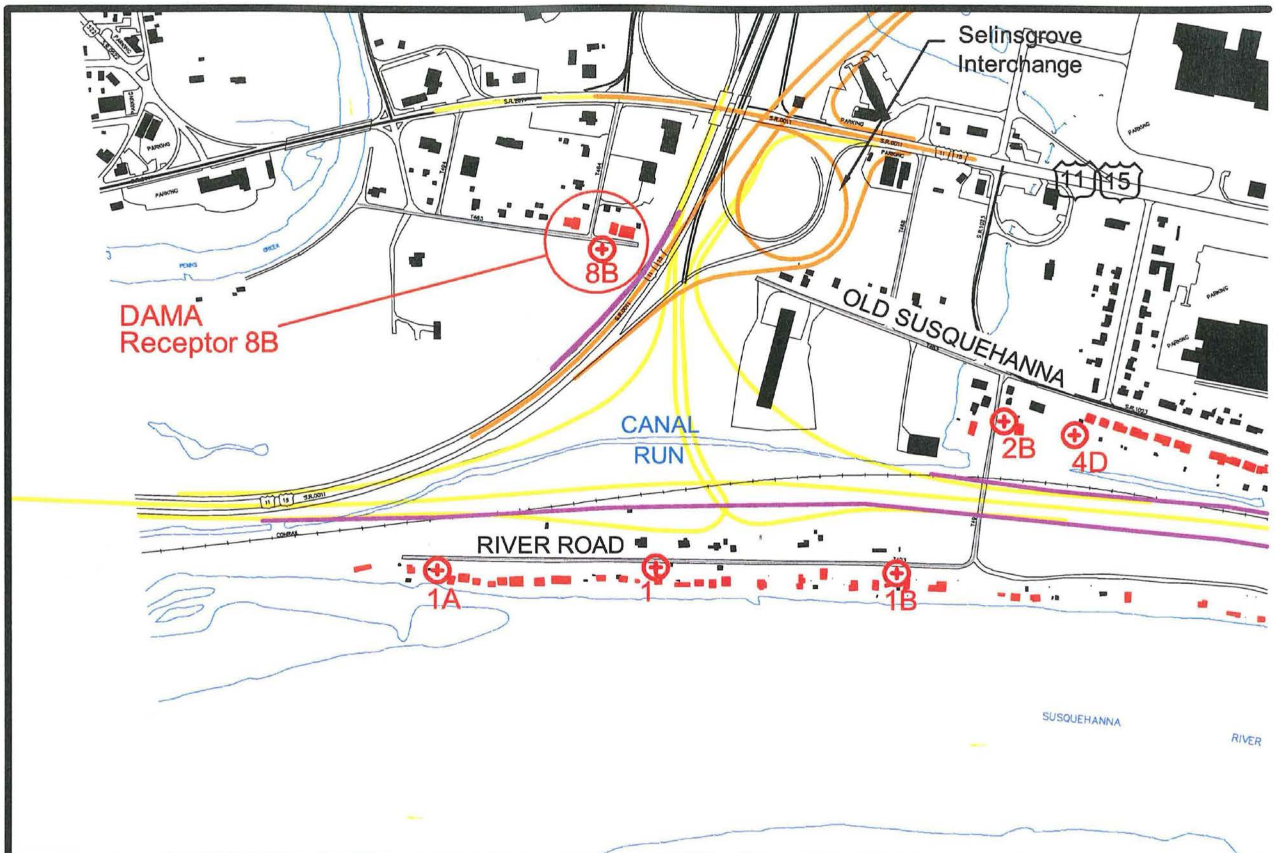
- DA Modified Avoidance Alternative
- Proposed Noise Barriers
- Noise Impacted Residential Units
- 10 Impacted Noise Receptors

Central Susquehanna Valley Transportation Project

Figure IV-B-5

DAMA
Noise Impacts - Map 4

0 70 140 210 Scale in Meters
0 300 600 900 Scale in Feet



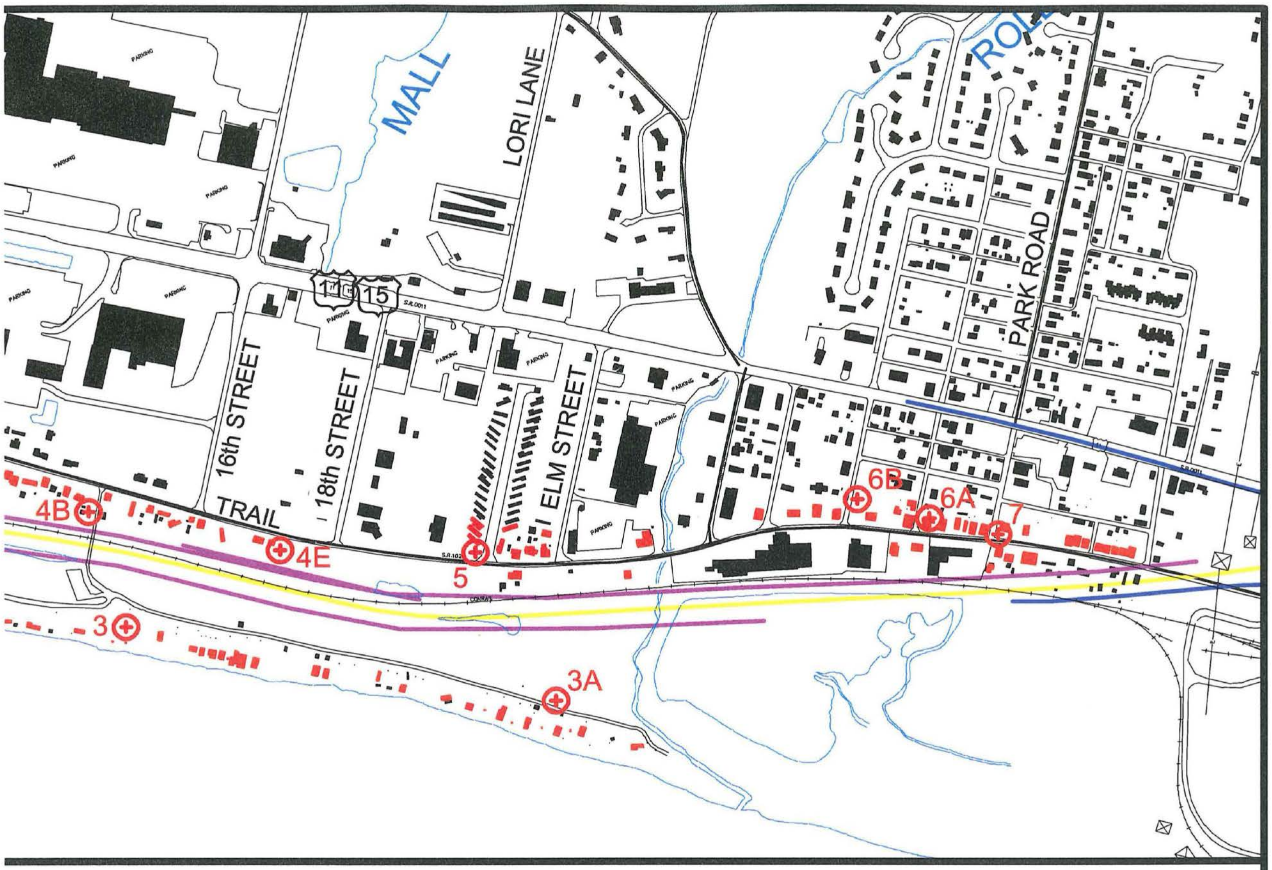
Receptor Number**	Existing modeled (dBA)	2030 DAMA Modeled (dBA)	Impacted Residential Units (No.)	Mitigation*
8B	66	70	5	Feasible and Reasonable

Receptor Number**	1998 Existing Modeled (dBA)	2030 Old Trail 2A Modeled (dBA)	2030 Old Trail 2B Modeled (dBA)	Old Trail 2A Impacted Residential Units (No.)	Old Trail 2B Impacted Residential Units (No.)	Mitigation *
1	53	65	65	9	9	Feasible and Reasonable
1A	60	68	68	10	10	Feasible and Reasonable
1B	47	68	68	11	11	Feasible and Reasonable
2B	55	67	67	2	2	Feasible and Reasonable
3	50	69	69	14	14	Feasible and Reasonable
3A	47	68	68	11	11	Feasible and Reasonable

* Mitigation explanation in Section IV.B.2 Mitigation same for OT2A & OT2B unless noted otherwise
** Receptors not listed do not meet the criteria for mitigation consideration.

Legend

- DA Modified Avoidance Alternative
- Old Trail 2A Alternative (61 Connector)
- Old Trail 2B Alternative (Stetler Avenue Interchange /15 Connector)
- Proposed Noise Barriers
- Noise Impacted Residential Units
- 10 Impacted Noise Receptors



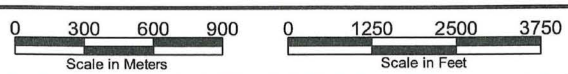
Receptor Number**	1998 Existing Modeled (dBA)	2030 OT2A Modeled (dBA)	2030 OT2B Modeled (dBA)	OT2A Impacted Residential Units (No.)	OT2B Impacted Residential Units (No.)	Mitigation *
4B	58	68	68	10	10	Feasible and Reasonable
4D	57	66	66	10	10	Feasible and Reasonable
4E	59	70	70	4	4	Feasible and Reasonable
5	66	68	68	12	12	Feasible and Reasonable
6A	68	68	68	12	12	Feasible and Reasonable
6B	61	66	66	4	4	Feasible and Reasonable
7	67	69	69	15	15	Feasible and Reasonable

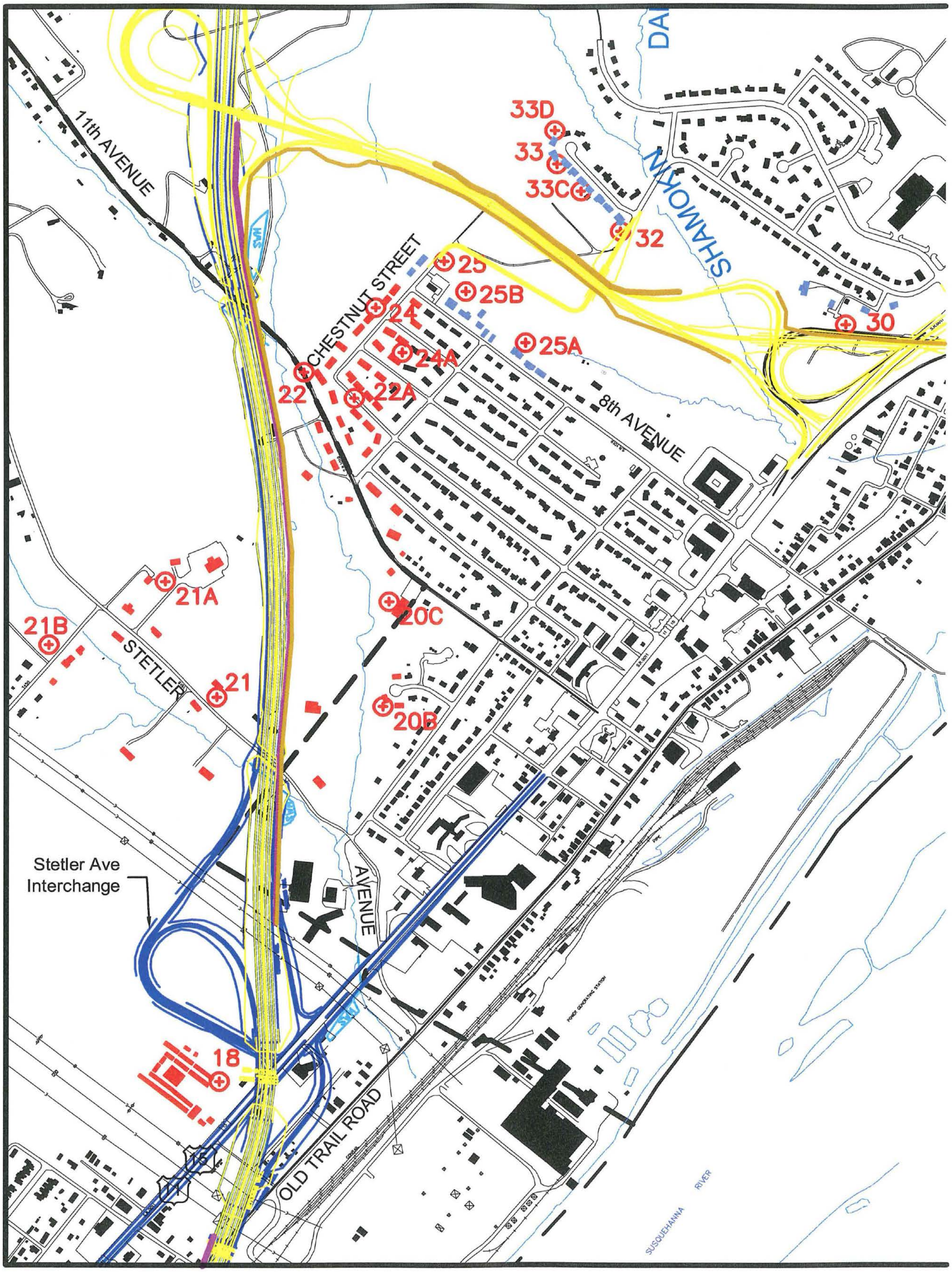
* Mitigation explanation in Section IV.B.2 Mitigation same for OT2A & OT2B unless noted otherwise
** Receptors not listed do not meet the criteria for mitigation consideration.

Central Susquehanna Valley Transportation Project

Figure IV-B-6

DAMA, OT2A, and OT2B Noise Impacts - Map 5




11th AVENUE
33D
33
33C
32
SHAMOKIN
25
25B
30
CHESTNUT STREET
24
24A
25A
22
22A
8th AVENUE
21A
21B
20C
STETLER
21
20B
Stetler Ave
Interchange
AVENUE
18
OLD TRAIL ROAD
15
11
SUSQUEHANNA RIVER

Receptor Number**	1998 Existing Modeled (dBA)	2030 OT2A Modeled (dBA)	2030 OT2B Modeled (dBA)	OT2A Impacted Residential Units (No.)	OT2B Impacted Residential Units (No.)	Mitigation *
18	65	68	67	Church Camp	Church Camp	Not Feasible
21	52	66	66	4	4	Feasible but Not Reasonable
21A	43	62	62	6	6	Feasible but Not Reasonable
21B	40	57	57	3	3	Feasible but Not Reasonable
20B	49	63	63	5	5	Feasible and Reasonable
20C	44	63	63	6	6	Feasible and Reasonable
22	61	69	69	8	8	Feasible and Reasonable
22A	45	64	64	11	11	Feasible and Reasonable
24	44	62	62	4	4	Feasible and Reasonable
24A	40	57	57	9	9	Feasible and Reasonable
25	46	64	--	2	--	Feasible and Reasonable
25A	47	59	--	3	--	Feasible and Reasonable
25B	45	59	--	6	--	Feasible and Reasonable
30	64	70	--	4	--	Feasible and Reasonable
32	48	61	--	2	--	Feasible and Reasonable
33	47	60	--	2	--	Feasible and Reasonable
33C	40	60	--	4	--	Feasible and Reasonable
33D	39	57	--	2	--	Feasible and Reasonable

* Mitigation explanation in Section IV.B.2. Mitigation same for OT2A & OT2B unless noted otherwise
** Receptors not listed do not meet the criteria for mitigation consideration.

Legend

- Old Trail 2A Alternative (61 Connector)
- Old Trail 2B Alternative (Stetler Ave. Interchange /15 Connector)
- Proposed Noise Barriers for OT2A
- Proposed Noise Barriers for OT2B
- Noise Impacted Residential Units
- Noise Impacted Residential Units by OT2A Only
- 10 Impacted Noise Receptors

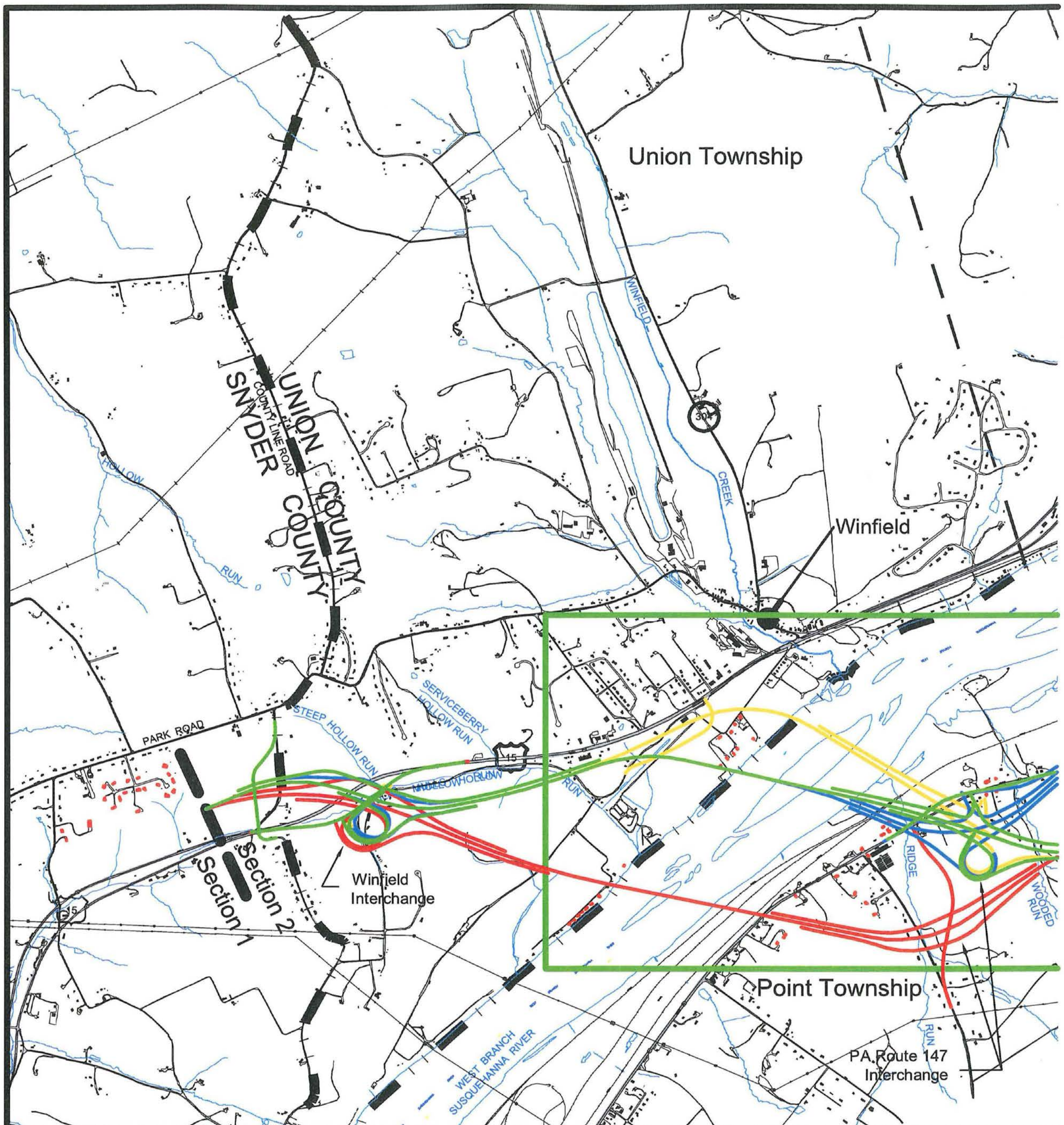
Central Susquehanna Valley Transportation Project

Figure IV-B-7

OT2A and OT2B
Noise Impacts - Map 6

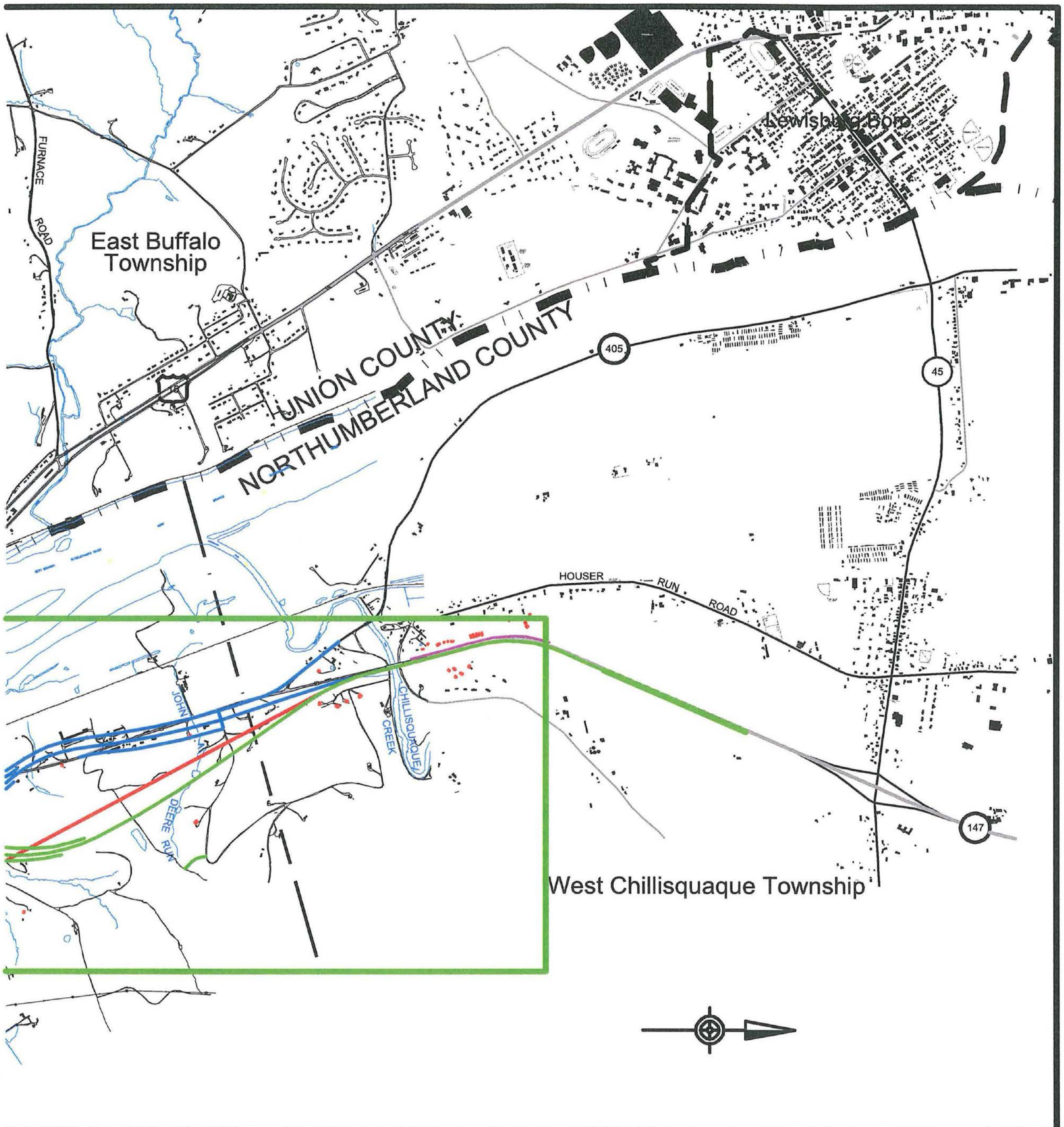
0 300 600 900 Scale in Meters

0 1250 2500 3750 Scale in Feet



Legend

- River Crossing 1 - East Alternative
- River Crossing 1 - West Alternative
- River Crossing 5 Alternative
- River Crossing 6 Alternative
- Proposed Noise Barriers
- Noise Impacted Residential Units
- Enlargement Areas

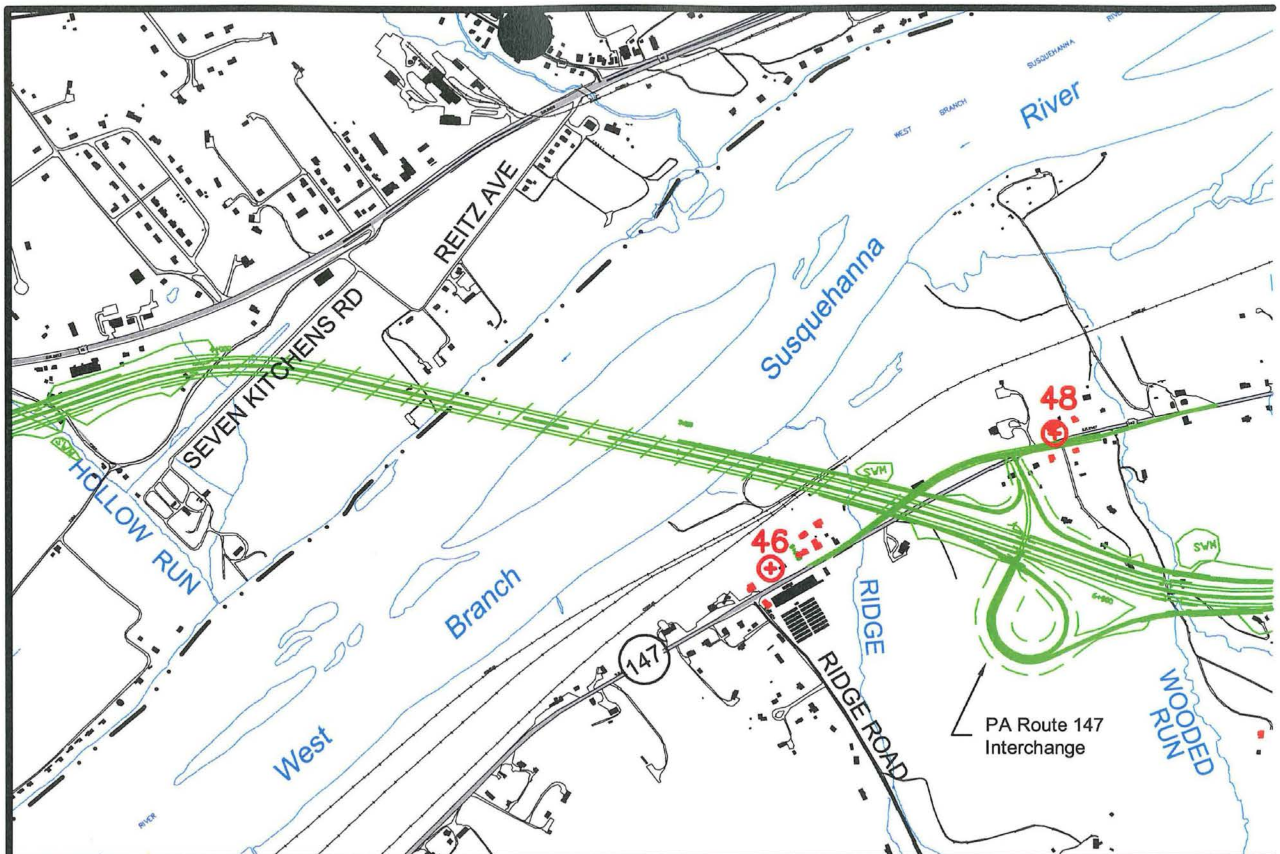


Central Susquehanna Valley Transportation Project

Figure IV-B-8

Section 2-
Noise Impacts Index Map

0	300	600	900	0	1250	2500	3750
Scale in Meters				Scale in Feet			



Receptor Number	1998 Existing Modeled (dBA)	2030 RC1-E Modeled (dBA)	Impacted Residential Units (No.)	Mitigation *
46	65	70	6	Not Feasible
47O	41	59	1	Feasible but not Reasonable
48	73	65	4	Not Feasible
49C	48	63	1	Not Feasible
50B	59	66	1	Feasible but not Reasonable
50G	59	68	3	Feasible but not Reasonable

* Mitigation explanation in Section IV.B.2.

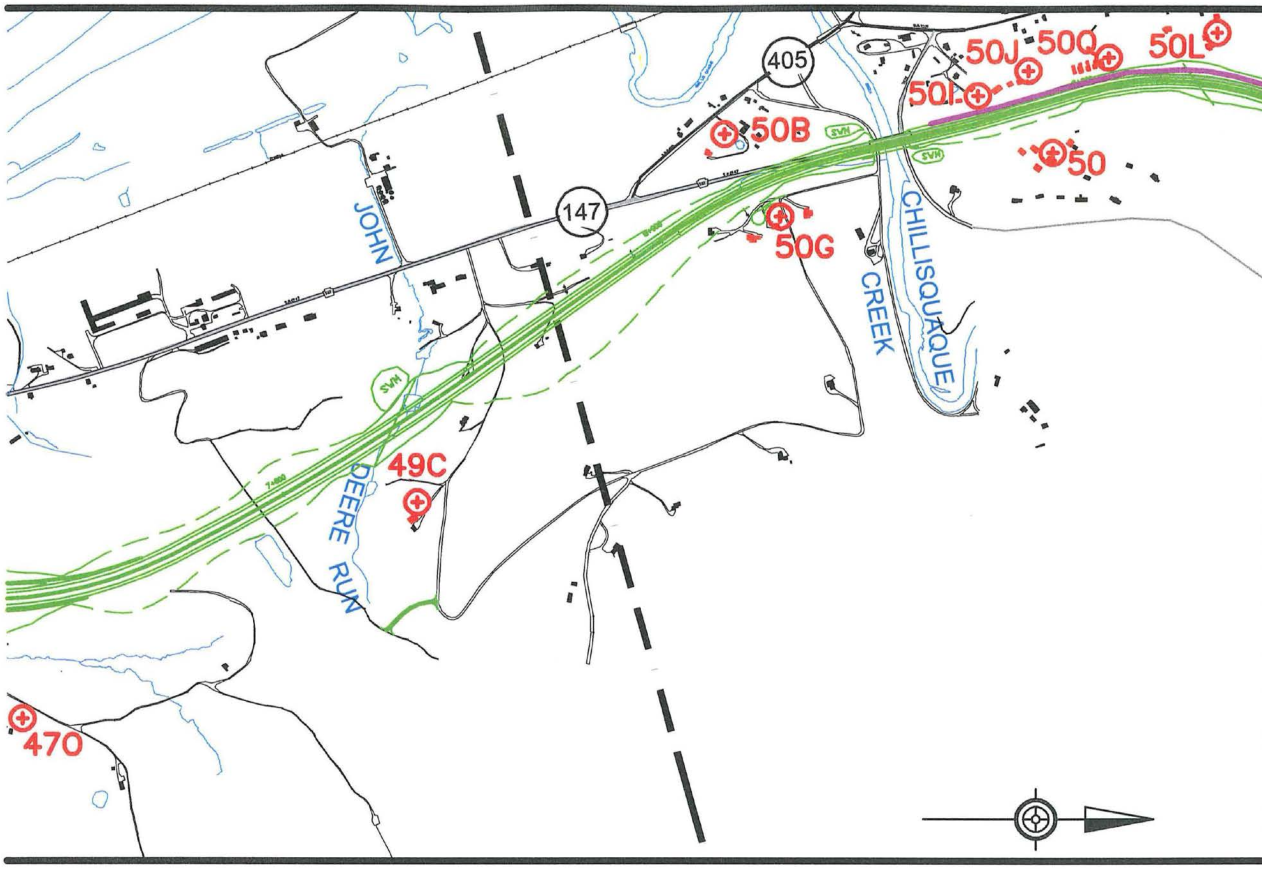
Legend

River Crossing 1 East Alternative

Noise Impacted Residential Units

10 Impacted Noise Receptors

Proposed Noise Barriers



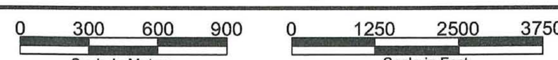
Receptor Number	1998 Existing Modeled (dBA)	2030 RC1-E Modeled (dBA)	Impacted Residential Units (No.)	Mitigation *
50	53	65	5	Not Feasible
50I	64	71	2	Feasible and Reasonable
50J	61	68	4	Feasible and Reasonable
50L	59	66	4	Feasible and Reasonable
50Q	62	68	5	Feasible and Reasonable

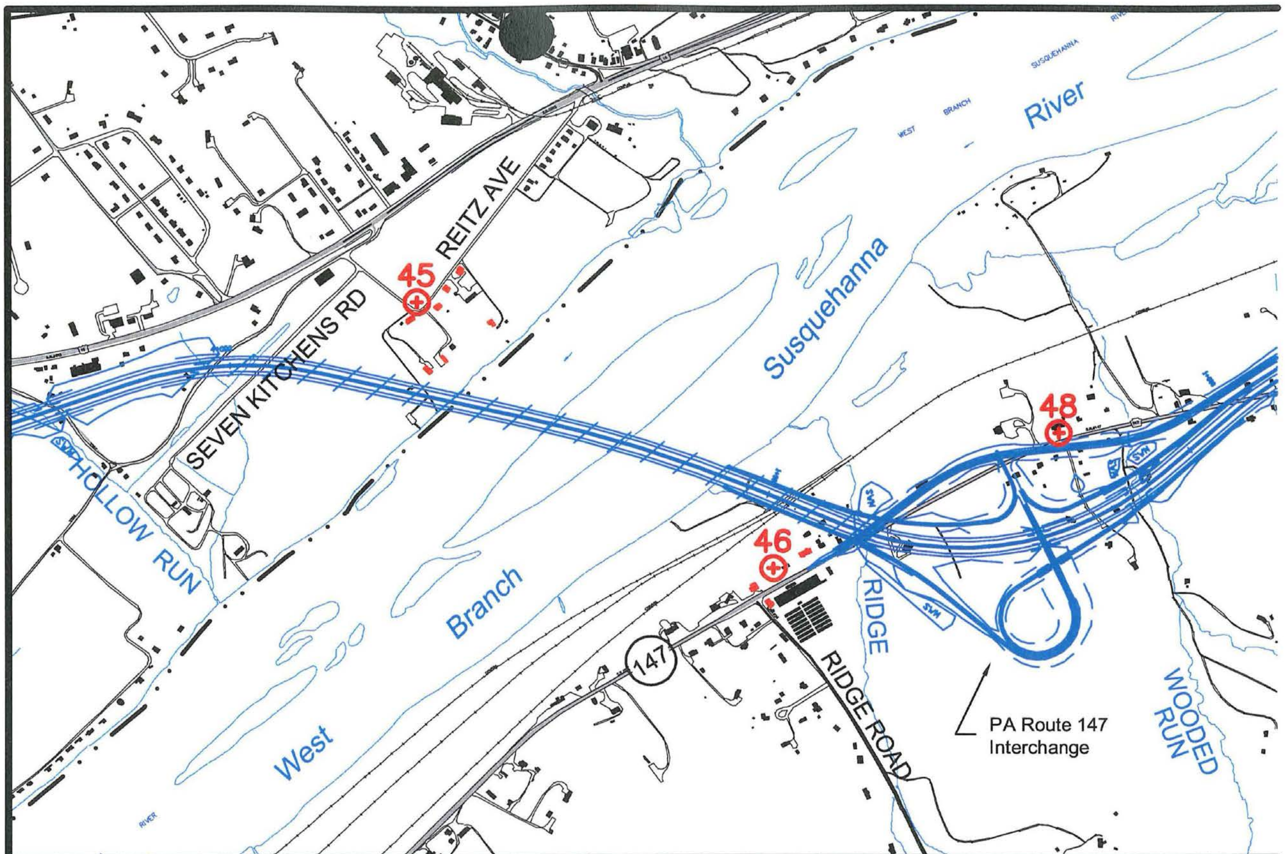
* Mitigation explanation in Section IV.B.2.

Central Susquehanna Valley Transportation Project

Figure IV-B-9

RC1-E
Noise Impacts





Receptor Number	1998 Existing Modeled (dBA)	2030 RC1-W Modeled (dBA)	Impacted Residential Units (No.)	Mitigation *
45	50	62	7	Not Feasible
46	65	70	3	Not Feasible
48	73	66	1	Not Feasible
48D	67	69	1	Not Feasible
50B	59	67	1	Feasible but not Reasonable
50G	59	68	4	Not Feasible

* Mitigation explanation in Section IV.B.2.

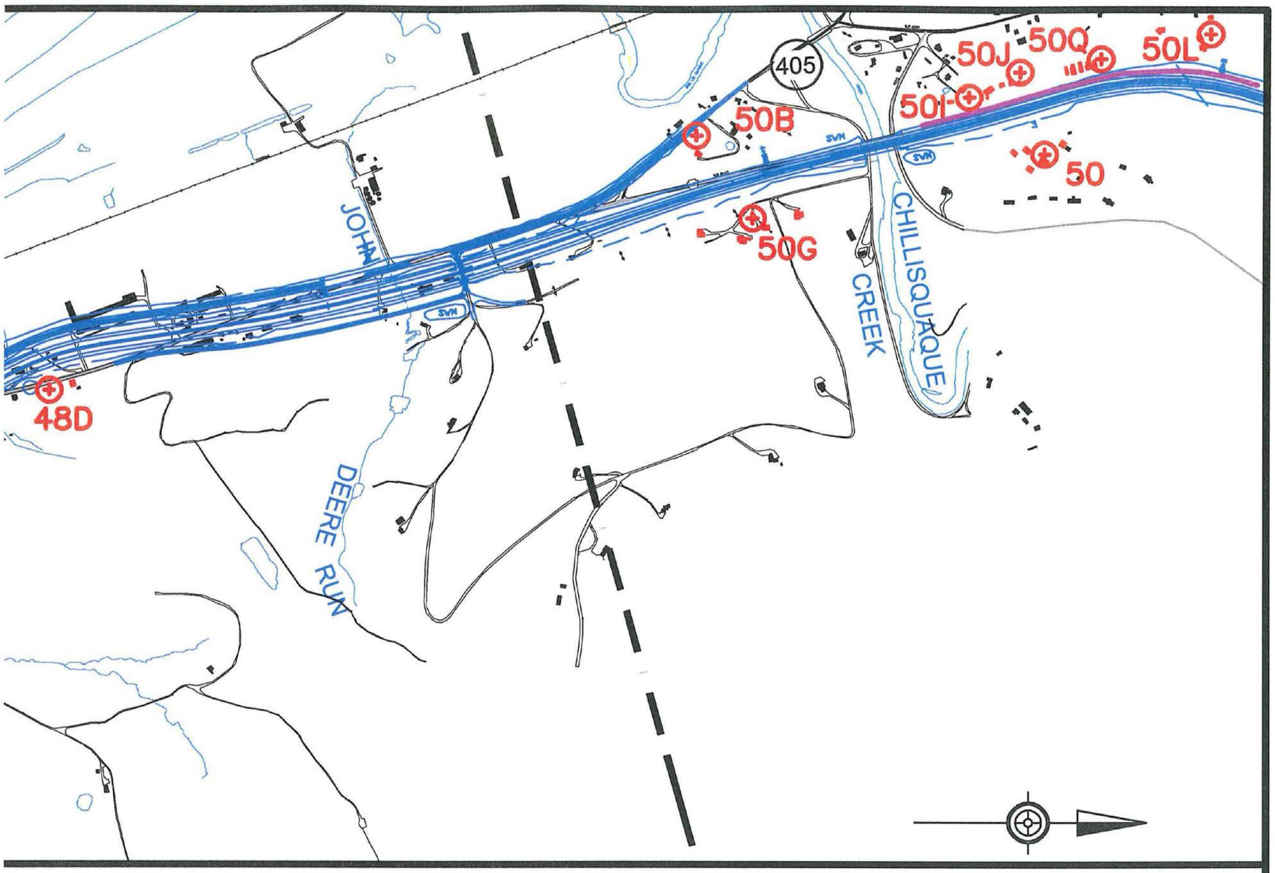
Legend

River Crossing 1 West Alternative

Noise Impacted Residential Units

10⊕ Impacted Noise Receptors

Proposed Noise Barriers



Receptor Number	1998 Existing Modeled (dBA)	2030 RC1-E Modeled (dBA)	Impacted Residential Units (No.)	Mitigation *
50	53	66	5	Not Feasible
50I	64	71	2	Feasible and Reasonable
50J	61	68	4	Feasible and Reasonable
50L	59	66	4	Feasible and Reasonable
50Q	62	68	5	Feasible and Reasonable

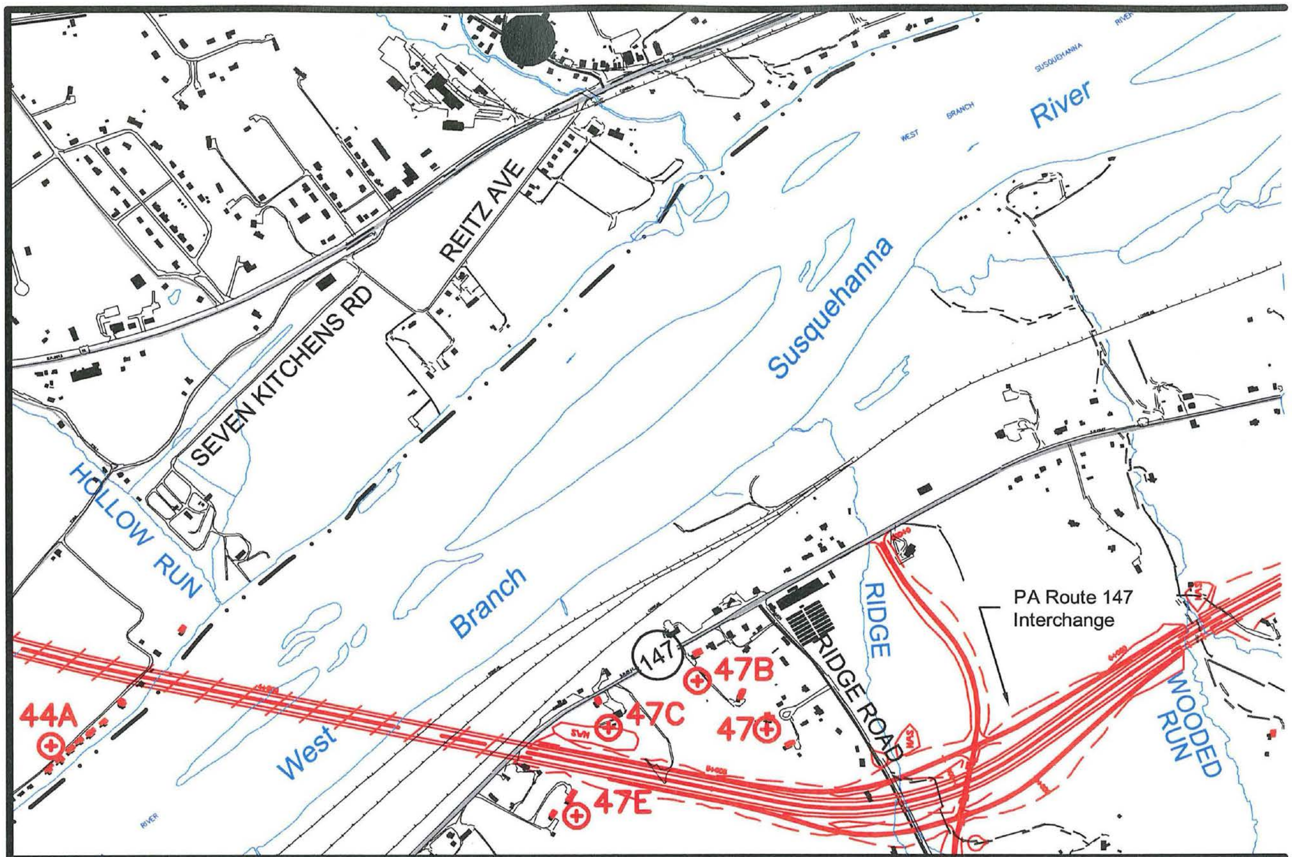
* Mitigation explanation in Section IV.B.2.

Central Susquehanna Valley Transportation Project

Figure IV-B-10

RC1-W
Noise Impacts

0 300 600 900 Scale in Meters
0 1250 2500 3750 Scale in Feet

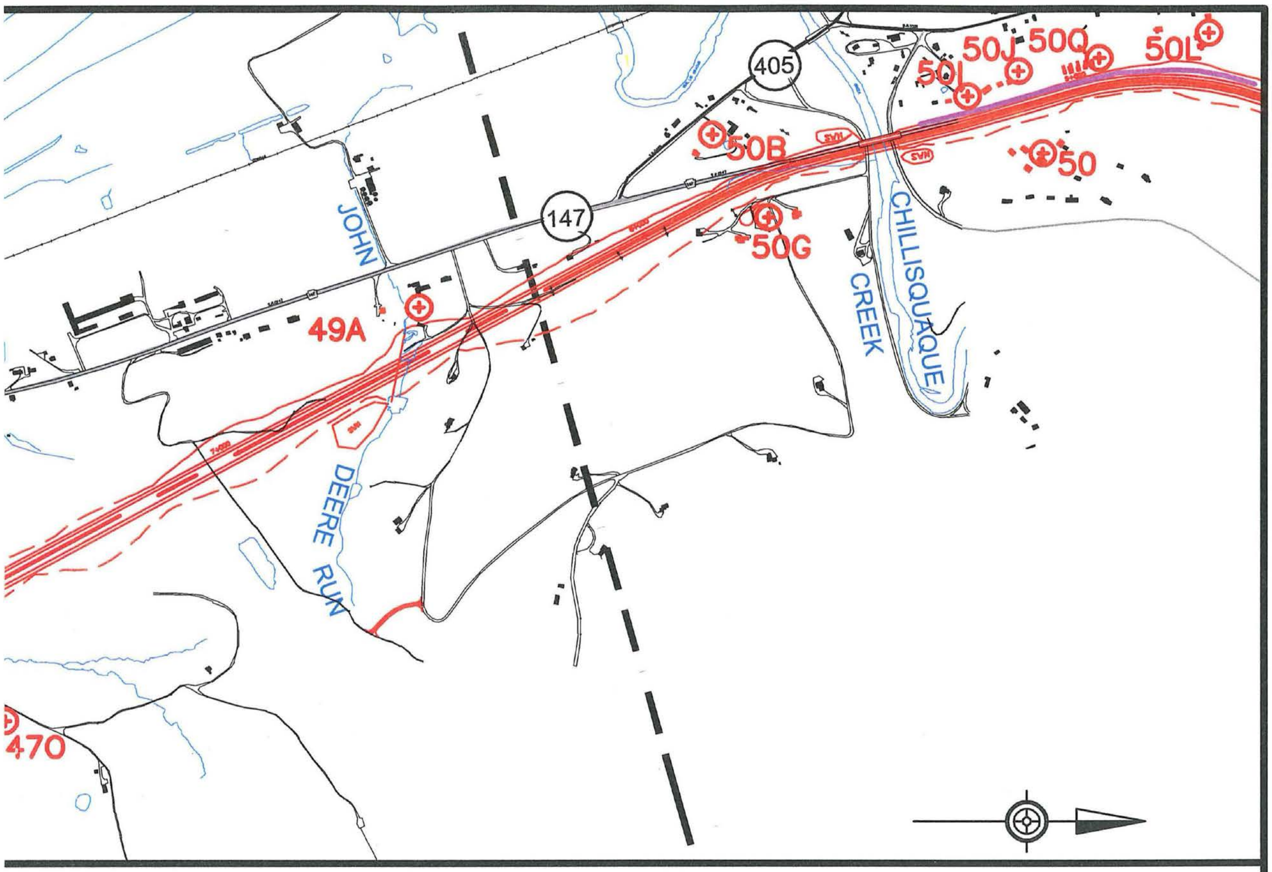


Receptor Number	1998 Existing Modeled (dBA)	2030 RC5 Modeled (dBA)	Impacted Residential Units (No.)	Mitigation *
44A	43	61	7	Feasible but not Reasonable
47	51	64	2	Not Feasible
47B	60	66	2	Not Feasible
47C	61	70	1	Not Feasible
47E	56	66	2	Not Feasible
47O	41	59	1	Feasible but not Reasonable
49A	59	68	3	Feasible but not Reasonable
50B	59	66	1	Feasible but not Reasonable
50G	59	68	3	Feasible but not Reasonable

* Mitigation explanation in Section IV.B.2.

Legend

- River Crossing 5 Alternative
- Noise Impacted Residential Units
- 10⊕ Impacted Noise Receptors
- Proposed Noise Barriers



Receptor Number	1998 Existing Modeled (dBA)	2030 RC1-E Modeled (dBA)	Impacted Residential Units (No.)	Mitigation *
50	53	66	5	Not Feasible
50I	64	71	2	Feasible and Reasonable
50J	61	68	4	Feasible and Reasonable
50L	59	66	4	Feasible and Reasonable
50Q	62	68	5	Feasible and Reasonable

* Mitigation explanation in Section IV.B.2.

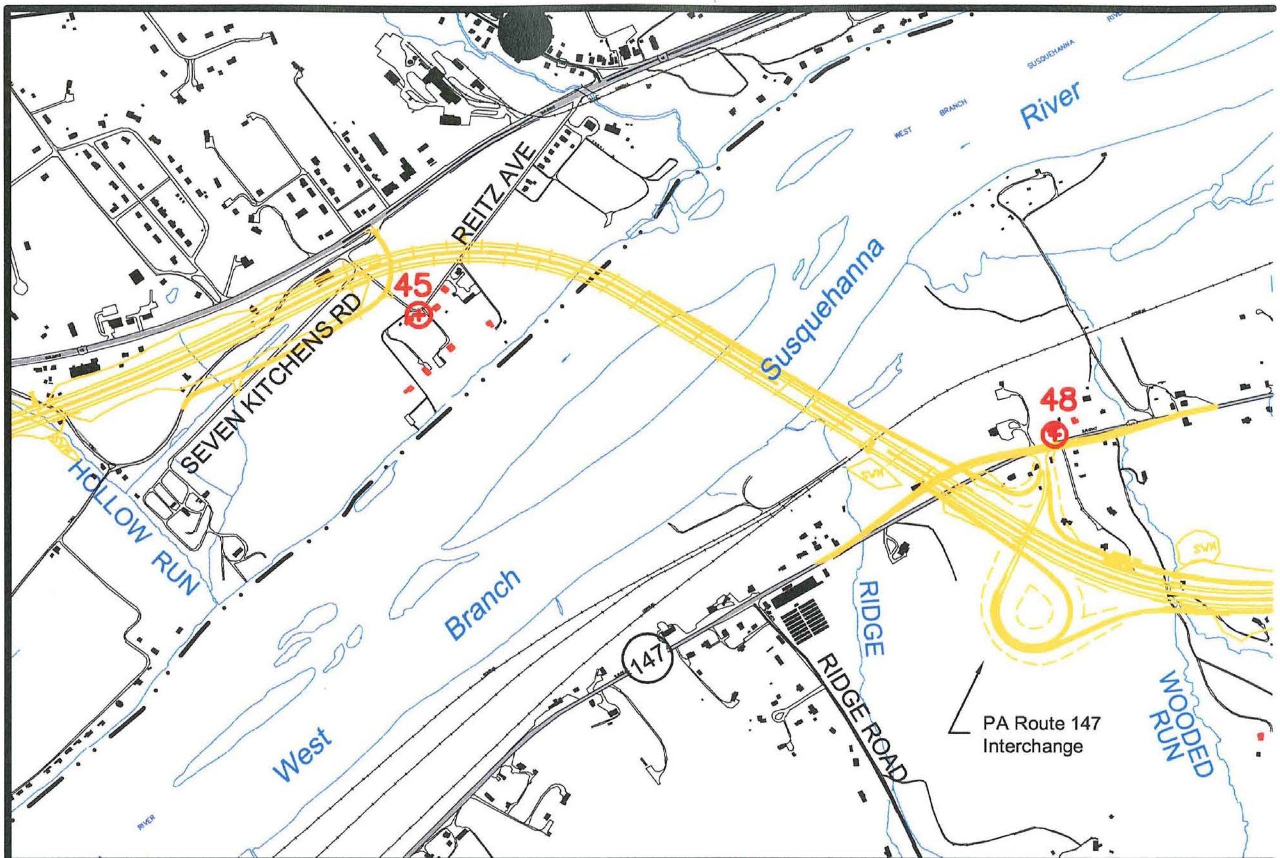
Central Susquehanna Valley Transportation Project

Figure IV-B-11

RC 5
Noise Impacts

0 300 600 900
Scale in Meters

0 1250 2500 3750
Scale in Feet



Receptor Number	1998 Exisiting Modeled (dBA)	2030 RC6 Modeled (dBA)	Impacted Residential Units (No.)	Mitigation *
45	51	64	7	Feasible but not Reasonable
47O	41	59	1	Feasible but not Reasonable
48	73	68	2	Not Feasible
49C	48	63	1	Not Feasible
50B	59	66	1	Feasible but not Reasonable
50G	59	68	3	Feasible but not Reasonable

* Mitigation explanation in Section IV.B.2.

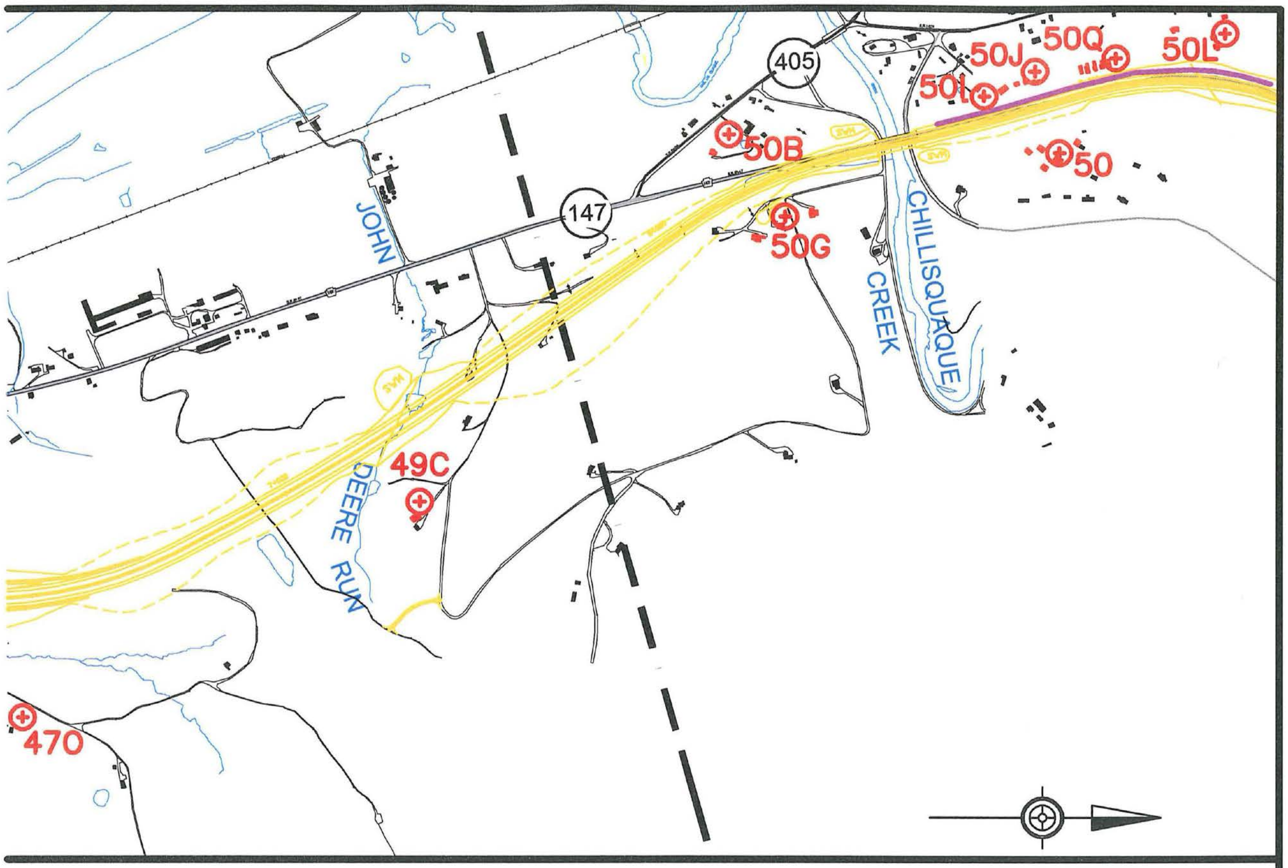
Legend

River Crossing 6 Alternative

Noise Impacted Residential Units

10⊕ Impacted Noise Receptors

Proposed Noise Barriers



Receptor Number	1998 Existing Modeled (dBA)	2030 RC1-E Modeled (dBA)	Impacted Residential Units (No.)	Mitigation *
50	53	66	5	Not Feasible
50I	64	71	2	Feasible and Reasonable
50J	61	68	4	Feasible and Reasonable
50L	59	66	4	Feasible and Reasonable
50Q	62	68	5	Feasible and Reasonable

* Mitigation explanation in Section IV.B.2.

Central Susquehanna Valley Transportation Project

Figure IV-B-12

RC 6
Noise Impacts

0 300 600 900 Scale in Meters
0 1250 2500 3750 Scale in Feet

by PENNDOT in 2002. The noise abatement guidelines contained in PENNDOT's new noise policy, Publication No. 24 - Project Level Highway Traffic Noise Handbook, are slightly different.

The noise analysis completed during the Final Design stage of the project will follow PENNDOT's newest noise abatement guidelines.

TABLE IV-B-4
FEASIBLE AND REASONABLE MITIGATION COSTS

Alternative	Residential Impacts	Mitigatable Residences	Non-Impacted Residential Benefits[1]	Impacted Residential Benefits[2]	Estimated Mitigation Cost
DAMA	109	32	31	7	$3,199,550
OT2A	234	192	87	0	$11,532,150
OT2B	209	167	46	0	$8,637,050
RC1-E	36	15	7	0	$861,650
RC1-W	37	15	7	0	$861,650
RC 5	42	15	7	0	$861,650
RC 6	35	15	7	0	$861,650

1 Residential units not warranting mitigation consideration, but receiving at least a 3 dBA reduction from proposed mitigation are considered benefiting.

2 Residential units warranting mitigation consideration, but not receiving the required 5 dBA reduction to be considered feasible. However, these residential units receive at least a 3 dBA insertion loss from proposed mitigation and are considered benefiting.

C. AIR QUALITY

The CSVT Project will not result in any adverse impact to air quality within the project study area. The air quality analysis was conducted in compliance with FHWA, U.S. Environmental Protection Agency (U.S. EPA) guidance as well as the Pennsylvania Department of Transportation's (PENNDOT) Project Level Air Quality Handbook (Pub. 321, March 1996). Modeling was conducted under free-flow and stop-and-go traffic conditions. Multiple new alignment alternatives

> More detailed air quality information is located in the Air Quality Technical Support Data. An index for the Technical Support Data is located in Section IX, Appendix A.

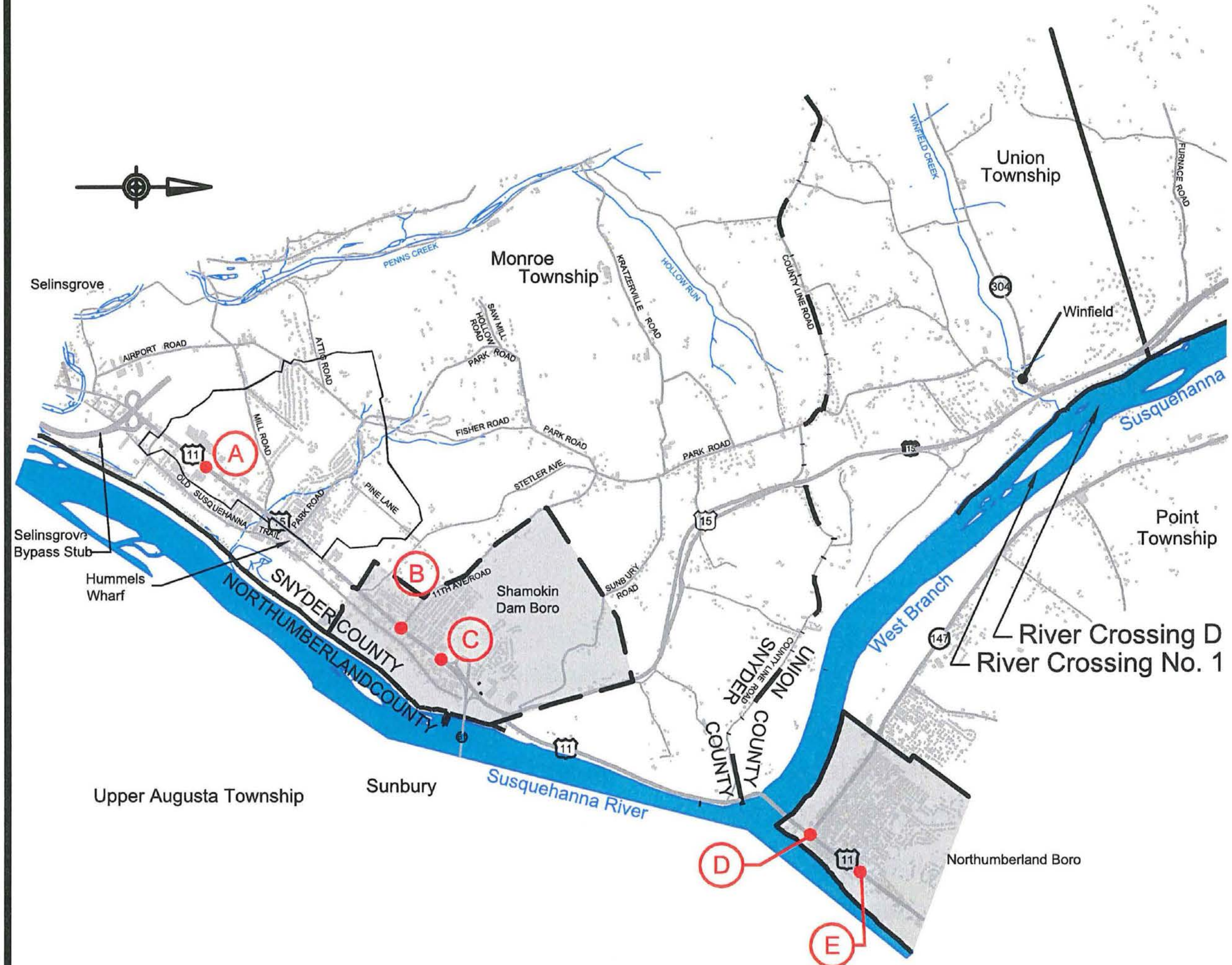
(DAMA, OT2A, OT2B, and four river crossings) and a No-Build Alternative for the design year (2030) have been evaluated in conjunction with the existing conditions (2001). The receptor sites shown on the project constraint mapping located in Section X of Volume 2 of this Draft EIS are those sites along the proposed new alignments analyzed under the free-flow conditions. In addition to these sites, intersection modeling was conducted at seven signalized intersections in the study area. These seven intersections were modeled for each Build/No-Build scenario to document the air quality trends at stop-and-go locations. These intersections were chosen for the air quality analysis because they produce the highest projected traffic volumes and longest overall vehicular delays on either the existing network or the new alignment alternatives in the design year (2030). The longer a vehicle idles at a traffic signal, the more pollutants are released to the environment. These signalized intersection locations are shown on Figure IV-C-1.

The computer model MOBILE 5b was used to predict vehicular emissions while the CAL3QHC model was utilized to determine the dispersion from the roadway network.

1. Impacts

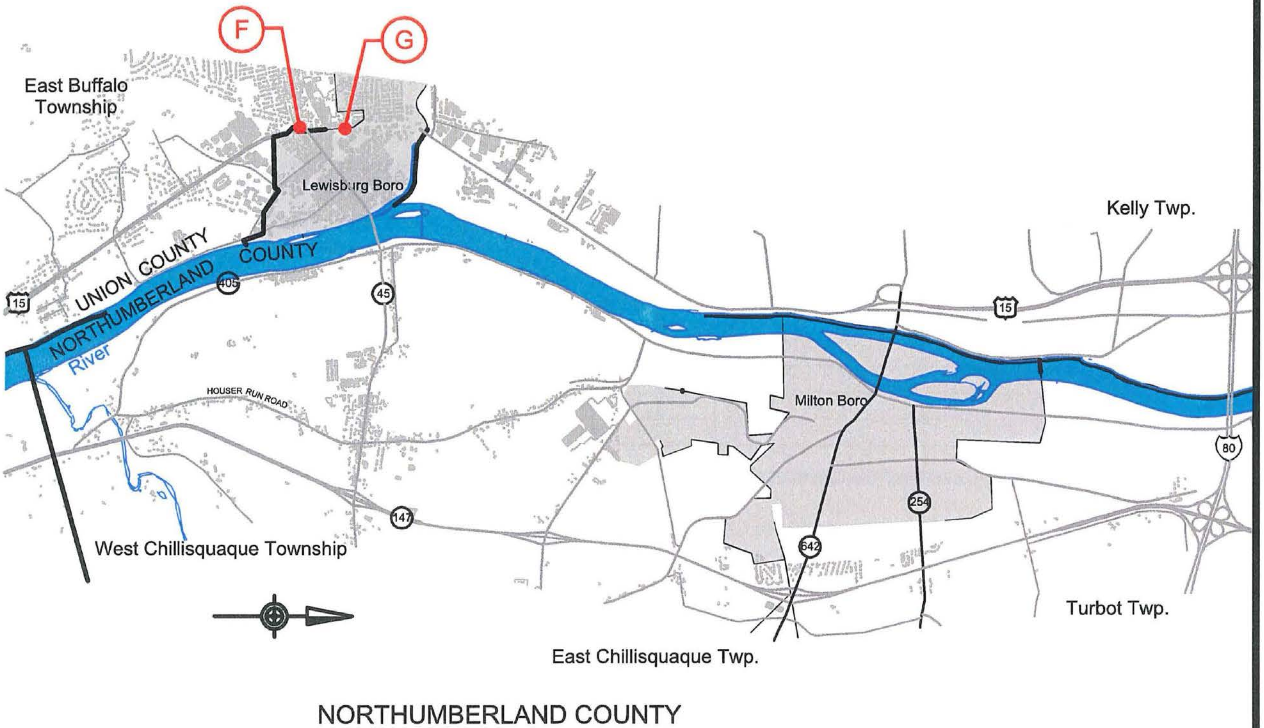
The design year (2030) predicted carbon monoxide (CO) concentrations under the free-flow sections of the alternatives are very similar to those modeled for the existing conditions (2001). In all cases, for the free flow conditions, the future CO levels at the modeled receptors will not substantially deviate. Where increases in CO levels do occur, they can be described as minimal and well below the National Ambient Air Quality Standard (NAAQS) for CO. Therefore, the CO impacts are not considered to be significant, and the differences among the seven new alignment alternatives (and No-Build Alternative) are inconsequential. The detailed results of this modeling are tabulated and reported in the Air Quaility Technical Support Data. In addition to the 193 receptors analyzed under free flow conditions adjacent to the proposed build alternatives, intersection modeling was conducted at several intersections within the project area. The intersections chosen for evaluation were based upon overall projected (2030) vehicle volumes and projected delays. PM peak traffic conditions were used to reflect worst-case modeling scenarios. Table IV-C-1 shows the modeled CO levels. As indicated in the table, the resultant CO levels for the build conditions are well below the one hour NAAQS for CO.

Upon reviewing the results of the CAL3QHC air quality analyses, it has been determined that the construction of any of the proposed new alignment alternatives will not result in concentrations that exceed the NAAQS. However, the No-Build Alternative would be characterized by further increases in traffic volumes, which, in turn, will increase congestion and degrade the air quality. The failing levels-of-service for the signalized intersections under the No-Build Alternative result in longer vehicular idling times, and increased pollution concentrations. Any build scenario would provide a more free-



Legend

- ● WORST CASE SIGNALIZED INTERSECTIONS (see above)
- (A) U.S. ROUTES 11/15 SUSQUEHANNA MALL DRIVE
- (B) U.S. ROUTES 11/15 AND 11TH AVENUE
- (C) U.S. ROUTES 11/15 AND 8TH AVENUE
- (D) U.S. ROUTE 11 AND DUKE STREET (PA 147 NORTH)
- (E) U.S. ROUTE 11 AND KING STREET (PA 147 SOUTH)
- (F) U.S. ROUTE 15 AND MARKET STREET (PA 45)
- (G) U.S. ROUTE 15 AND PA 192



Central Susquehanna Valley Transportation Project

Figure IV-C-1

Worst Case Signalized Intersection Locations In Study Area

0 750 1500 2250 Scale in Meters

0 3000 6000 9000 Scale in Feet

flowing roadway network by moving traffic from the existing 11/15 corridor to the CSVT Alternatives, thereby decreasing congestion and the resultant degradation of air quality.

TABLE IV-C-1
INTERSECTION ANALYSIS

Intersection Location	Worst Case 1 Hour Concentrations*							
	2001 Existing Conditions		2030 No Build		2030 DAMA/OT2A/All Section 2 Alternatives		2030 OT2B/All Section 2 Alternatives	
	mg/m	ppm	mg/m	ppm	mg/m	ppm	mg/m	ppm
US 11/15 and Susquehanna Mall Drive	8.5	7.4	6.4	5.6	7.2	6.3	5.8	5.1
US 11/15 and 11th Avenue	8.1	7.1	8.6	7.5	6.5	5.7	7.0	6.1
US 11/15 and 8th Avenue	9.8	8.6	10.5	9.2	7.9	6.9	8.0	7
US 11 and King Street (Route 147 South)	7.6	6.6	8.2	7.2	7.7	6.7	7.7	6.7
US 11 and Duke Street (Route 147 North)	7.0	6.1	7.9	6.9	6.8	5.9	7.9	6.9
US 15 and Market Street (Route 45)	9.6	8.4	12.0	10.5	10.4	9.1	11.2	9.8
US 15 and Route 192	8.9	7.8	10.4	9.1	9.6	8.4	9.7	8.5

*1 Hour National Ambient Air Quality Standard (NAAQS) for CO is 40 mg/m^3 (35 ppm).

2. Conformity

Regional air quality concerns have been evaluated for the CSVT Improvement Project. In accordance with the Clean Air Act Amendments of 1990 (CAAA), all transportation projects, plans, or programs in nonattainment and maintenance areas must conform to the State Implementation Plan (SIP). A final conformity rule was issued by the US EPA on November 24, 1993, as part of 40 CFR Part 51. The final conformity rule requires that transportation plans and programs in nonattainment areas are consistent with the most recent estimates of mobile source emissions; provide for the expeditious implementation of transportation control measures in the applicable implementation plan, and contribute to annual emission reductions in ozone and carbon monoxide nonattainment areas.

The project is situated within the Harrisburg non-MPO ozone non-attainment area. As required by the CAAA of 1990 (Clean Air Act, as amended), a study of vehicle emissions was performed for this area. Nine projects on the FFY 2001 (federal Fiscal Year) TIP (Transportation Improvement Plan) and LRP (Long Range Plan), including the CSVT project, are projected to have an impact on air quality in the region. However, the regional evaluation of the projects on the TIP/LRP indicates a lower level of volatile organic compounds (VOC) and nitrous oxides (NOx) emissions (components of ozone) in future years, compared to the base year (1990). Therefore, the projects on the TIP/LRP for the Harrisburg non-MPO area conform with the current implementation plan and satisfy the conformity requirements of the CAAA of 1990.

3. Mitigation

The future CO concentrations for all Build Alternatives as well as the No-Build Alternative, are well below the NAAQS for CO. Therefore, regional or localized air quality impacts are not anticipated, and mitigation measures associated with operation of the facility will not be required.

The construction phase of any highway project has the potential for temporarily impacting ambient air quality through such means as fugitive dust resulting from grading operations or increased particulate matter and fumes from operation of heavy equipment. Typical control measures will include wetting of exposed soil and covering of trucks and other dust sources. These measures have been proven effective in limiting particulate matter emissions. All reasonable actions will be taken to prevent particulate matter from becoming airborne, including the use of water or chemicals for control of dust and the prompt removal of earth or other material deposited onto paved roadways. In addition, visible dust will not be allowed to pass onto adjacent properties. No open burning of construction or demolition waste will be permitted. If any paving materials plant (or other air contamination source) will be constructed as part of the construction of this project, DEP will be contacted to obtain the necessary approvals. Any required plan approvals will be obtained prior to the construction of the air contamination sources. The contractor will be required to comply with PA DEP "Rules and Regulations: Title 25" which defines air pollution control measures.

D. AGRICULTURAL RESOURCES

Agricultural resources are evaluated according to respective federal and state laws that define them. Studies for the CSVT project were conducted in accordance with the following legislation and policies: Federal Farmland Protection Policy Act (FPPA) of 1981 as amended 1984/1989; PA Act 100 of 1979, amending the Administrative Code of 1929; PA Act 43 of 1981, The Agricultural Area Security Law; and Agricultural Land Preservation Policy

> Additional details of the existing conditions related to and impacts upon agricultural resources are contained in a Farmland Technical Support Data File, available for review. An index of the Technical Support Data is located in Section IX, Appendix A.

(ALPP) [4 PA Code, Chapter 7, §7.301 et seq., as Amended (E.O. 1997-6)]. For transportation improvement studies, these regulations and policies require an alternatives evaluation to document that avoidance, minimization, and mitigation alternatives were considered.

Pennsylvania laws primarily define "productive agricultural land" based upon the use of land for commercial purposes for the production of crops, livestock and/or livestock products. Product processing and marketing facilities can also constitute productive agricultural land. Federal law defines "farmland" based upon the natural soil and topographic conditions mapped by the USDA and/or defined by local agencies. State laws require applicable review approval; Federal law requires a Farmland Conversion Impact Rating process.

Conversion of farmland resources is restricted by law and policies, is subject to agency review, and often requires review board approval. Review agencies include the County offices of the US Department of Agriculture/Natural Resources Conservation Service (USDA NRCS); Pennsylvania Department of Agriculture/Bureau of Farmland Protection (BFP); and Agricultural Lands Condemnation Approval Board (ALCAB). An alternatives analysis has been conducted to evaluate alternatives to avoid, minimize, and mitigate for impacts to farmland resources, and demonstrate that no practical alternative to conversion of farmland resources exists.

Construction of any of the CSVT build alternatives would have impacts to FPPA farmland, productive agricultural land, individual agricultural operations, and land that meets criteria for ALPP categories. The No-Build Alternative would have no impact to any agricultural resources in the project area.

1. Federal Farmland Protection Policy Act (FPPA) Farmland

Farmland as defined by the FPPA in the study area includes prime farmland and additional farmland of statewide importance. These are areas with soil conditions that produce the highest yields with the fewest management practices and erosion concerns. FPPA farmland would be impacted by the alternatives studied in detail, except for the No-Build Alternative. Figure IV-D-1 illustrates the extent of FPPA farmland and the Build Alternatives evaluated in detail during Phase II studies. Tables IV-D-1 and IV-D-2, FPPA Farmland, includes quantitative impacts for Section 1 and Section 2 alternatives on (i.e., area directly converted) prime farmland and additional farmland of statewide importance. Tables IV-D-1 and IV-D-2 also include quantities derived from a Farmland Conversion Impact Rating (FCIR). The FCIR was completed by the study team in conjunction with the USDA NRCS. Where the FCIR total rating is below 160 points, the area is considered already effectively committed to urban development, and no further studies are necessary to comply with the FPPA. Where the FCIR total

TABLE IV-D-1
FPPA FARMLAND/SECTION 1
AREA MEASUREMENTS IN HECTARES AND (ACRES)

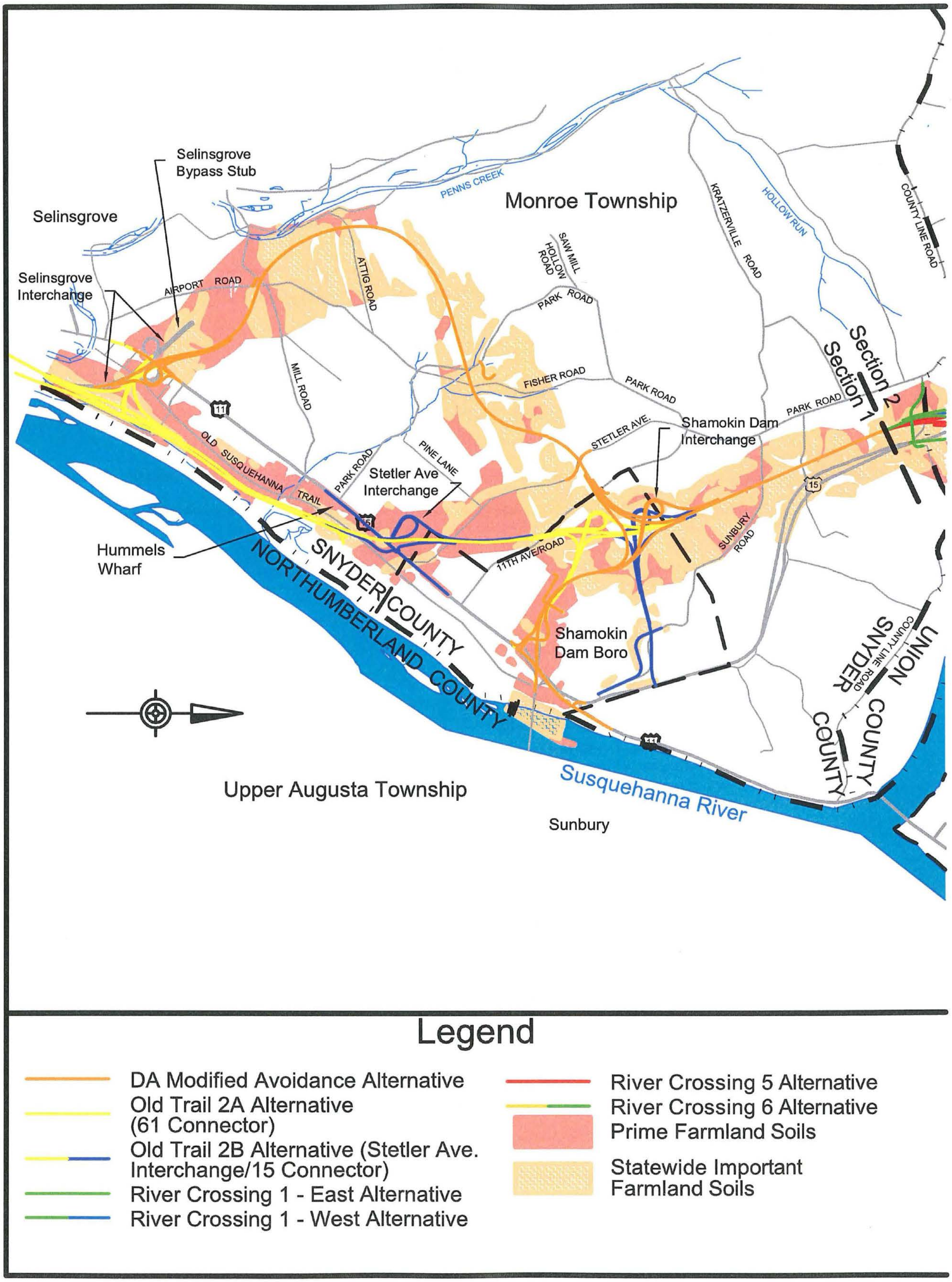
	DAMA	OT2A	OT2B
Farmland Protection Policy Act (FPPA) Farmland			
Prime Farmland Soils	58.0 (143.4)	70.5 (174.1)	68.6 (169.6)
Additional Farmland of Statewide Importance	78.6 (194.3)	46.6 (115.2)	54.5 (134.6)
FPPA Farmland Total:	136.7 (337.7)	117.1 (289.3)	123.1 (304.2)
FCIR (Site Assessment+Land Evaluation) = Total	83+47=130	60+59=119	63+55=118

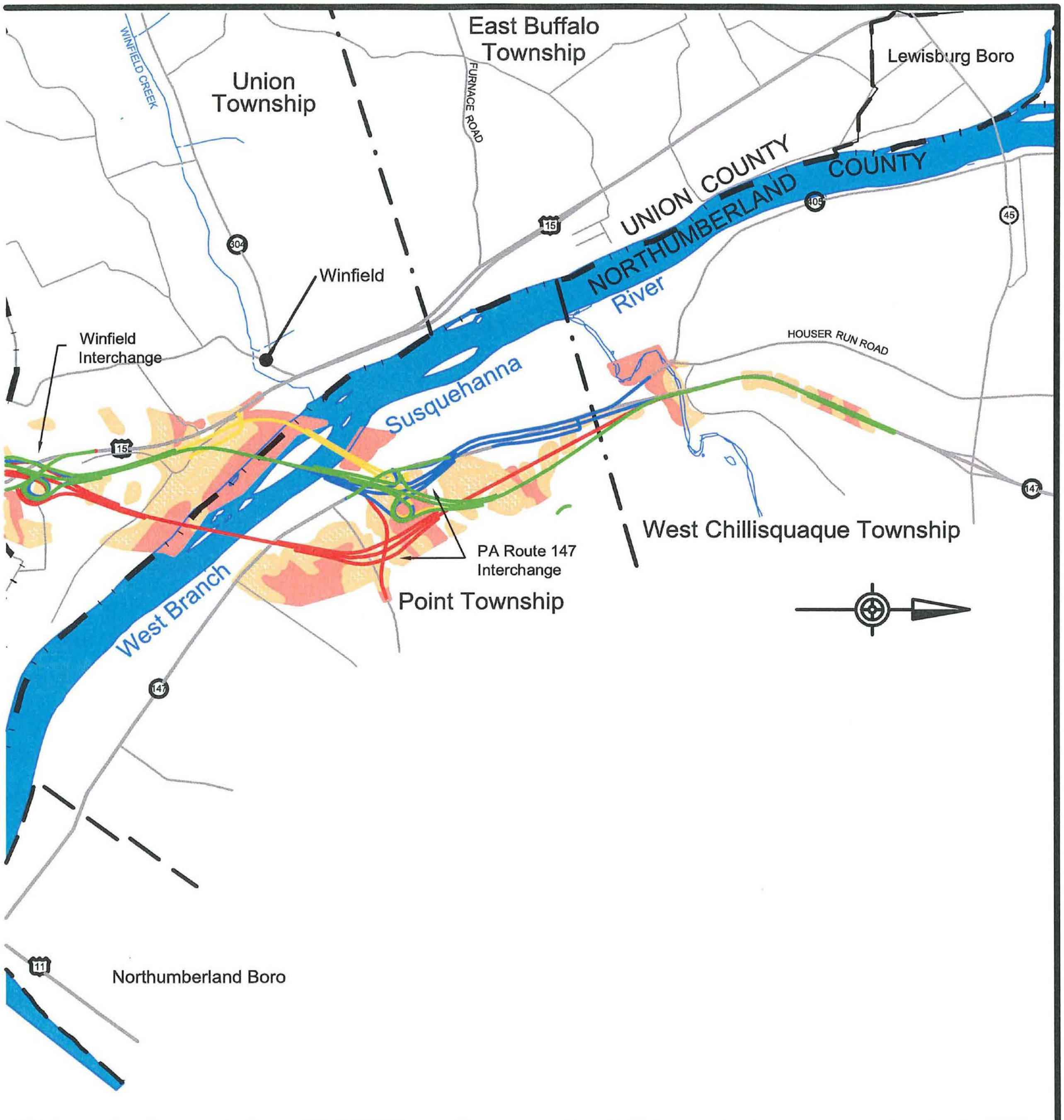
TABLE IV-D-2
FPPA FARMLAND/SECTION 2
AREA MEASUREMENTS IN HECTARES AND (ACRES)

	RC1-E	RC1-W	RC 5	RC 6
Farmland Protection Policy Act (FPPA) Farmland				
Prime Farmland Soils	22.6 (55.8)	18.5 (45.6)	22.8 (56.4)	25.0 (61.8)
Additional Farmland of Statewide Importance	43.5 (107.6)	40.8 (100.9)	46.3 (114.4)	47.1 (116.3)
FPPA Farmland Total:	66.1 (163.4)	59.3 (146.5)	69.1 (170.8)	72.1 (178.1)
FCIR (Site Assessment + Land Evaluation) = Total **Snyder County**	86+67=153	86+67=153	86+65=151	86+67=153
FCIR (Site Assessment + Land Evaluation) = Total **Union County**	70+56=126	70+56=126	72+55=127	70+53=123
FCIR (Site Assessment + Land Evaluation) = Total **Northumberland Co.**	83+61=144	88+53=141	79+52=131	78+58=136

rating is 160 or more, the FPPA requires the agencies to consider alternatives that would avoid, minimize, and/or mitigate for conversion of FPPA farmland.

The worst-case alternative combination in terms of FPPA farmland, DAMA and RC6, would impact 208.8 hectares (515.8 acres). The alternative combination of least impact, OT2A and RC-1 W, would impact 176.4 hectares (435.8 acres) of FPPA farmland (16 percent less impact than the worst-case alternative). FCIR ratings are lowest (average 131.7) for Alternative OT2B and RC5 (in Sections 1 and 2, respectively) and are highest (average 138.2) for Alternative DAMA and RC1-E (in Sections 1 and 2, respectively). The difference between results of FPPA farmland impact calculations and FCIR totals comes about because FPPA farmland area impacted is only one of several factors used to determine the FCIR. There is no direct correlation between the amount of FPPA land impacted and the


Selinsgrove Bypass Stub
Selinsgrove
Selinsgrove Interchange
Monroe Township
PENNS CREEK
HOLLOW RUN
KRATZERVILLE ROAD
SAW MILL HOLLOW ROAD
ATTIG ROAD
AIRPORT ROAD
PARK ROAD
MILL ROAD
FISHER ROAD
COUNTY LINE ROAD
Section 2
Section 1
Shamokin Dam Interchange
STETLER AVE.
PINE LANE
Stetler Ave Interchange
OLD SUSQUEHANNA TRAIL
Hummels Wharf
11TH AVE/ROAD
SUNBURY ROAD
SNYDER COUNTY
NORTHUMBERLAND COUNTY
Shamokin Dam Boro
UNION COUNTY
SNYDER COUNTY
Upper Augusta Township
Susquehanna River
Sunbury
Legend
DA Modified Avoidance Alternative
Old Trail 2A Alternative (61 Connector)
Old Trail 2B Alternative (Stetler Ave. Interchange/15 Connector)
River Crossing 1 - East Alternative
River Crossing 1 - West Alternative
River Crossing 5 Alternative
River Crossing 6 Alternative
Prime Farmland Soils
Statewide Important Farmland Soils



Central Susquehanna Valley Transportation Project

Figure IV-D-1

Farmland Protection Policy Act (FPPA) Farmlands

0 500 1000 1500 Scale in Meters

0 2000 4000 6000 Scale in Feet

FCIR. The FCIR is contained in Section IX, Appendix E. The Rationale for Site Assessment Criteria and additional information are contained in the Farmland Technical Support Data File.

2. Productive Agricultural Land

Productive Agricultural Land is defined in PA Act 43 as land used for production for commercial purposes of crops, livestock, and livestock products, including the processing and marketing facilities provided that at least half of the processed or marketed product originates from the same operation. Processing and marketing facilities include milk houses on dairy operations, and produce stands where the market owner produces the majority of the products merchandised. Examples of crops, livestock, and livestock products are included in the Project Technical Support Data File. PA Act 100 and PA Act 43 require PENNDOT to determine that there is *no reasonable and prudent alternative* to the conversion of productive agricultural land, and to obtain the concurrence and approval of the Agricultural Lands Condemnation Approval Board (ALCAB) prior to condemning productive agricultural land for projects such as the CSVT project.

Productive agricultural land would be impacted by the alternatives studied in detail, except for the No-Build Alternative. Figure IV-D-2 illustrates the extent of productive agricultural land and the Build Alternatives. Tables IV-D-3 and IV-D-4, Productive Agricultural Land, includes quantitative impacts upon productive agricultural land, including direct impacts (required right of way) and indirect impacts [land rendered impractical to farm ("unfarmable") or inaccessible], in Section 1 and 2, respectively.

The worst-case alternative in terms of productive agricultural land, DAMA and RC5 would impact 129.6 hectares (320.3 acres) in total, including direct impacts of 95.7 hectares (236.5 acres). The new alignment build alternative of least impact, OT2A and RC1-E, would impact 88.9 hectares (217.2 acres) of total productive agricultural land (32 percent less impact than the worst-case alternative), including 59.2 hectares (146.3 acres) due to direct impacts.

3. Agricultural Operations

Aside from the quantitative impacts on productive agricultural land, the project study evaluates the impacts upon individual agricultural operations (producers and processing and marketing facilities that produce 50% or more of their products). There are roughly 20 agricultural (farm) operations, which could be impacted by the project alternatives. Compared to the statistical average farm size (53.4 hectares/132 acres) for the involved Counties, there are eight farms of greater size [ranging 160 to

TABLE IV-D-3
PRODUCTIVE AGRICULTURAL LAND/SECTION 1
AREA MEASUREMENTS IN HECTARES AND (ACRES)

	DAMA	OT2A (61 Connector)	OT2B (Stetler Av./15)
Productive Agricultural Land			
Direct Impact	48.9 (120.8)	23.3 (57.4)	25.9 (63.9)
Rendered Impractical to Farm*	1.8 (4.5)	3.6 (8.9)	1.8 (4.5)
Rendered Inaccessible**	10.6 (26.3)	3.2 (7.7)	3.4 (8.3)
Total Productive Ag. Land Impacts:	61.3 (151.6)	30.1 (74.0)	31.1 (76.7)
Agricultural Operations			
Agricultural Operations (Total/Full-Time)	4/3	4/2	4/2
Impacts Critical to Operation Viability	0***	0	1

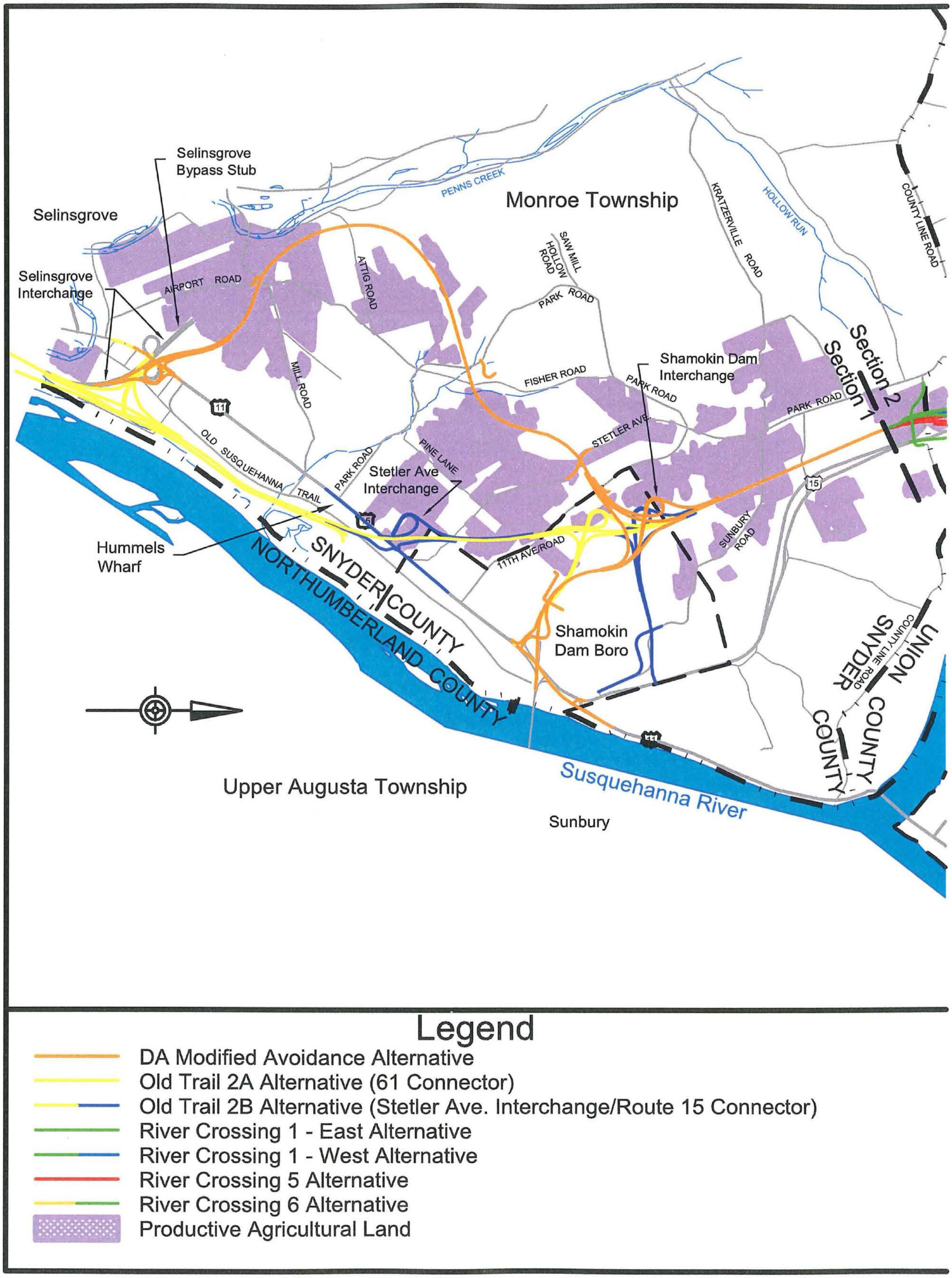
* Impractical to Farm due to remnant size and/or shape
** Inaccessible for farming due to access considerations
*** Mitigation (replacement water supply) would be necessary to assure continued operation of one agricultural producer (S6)

TABLE IV-D-4
PRODUCTIVE AGRICULTURAL LAND/SECTION 2
AREA MEASUREMENTS IN HECTARES AND (ACRES)

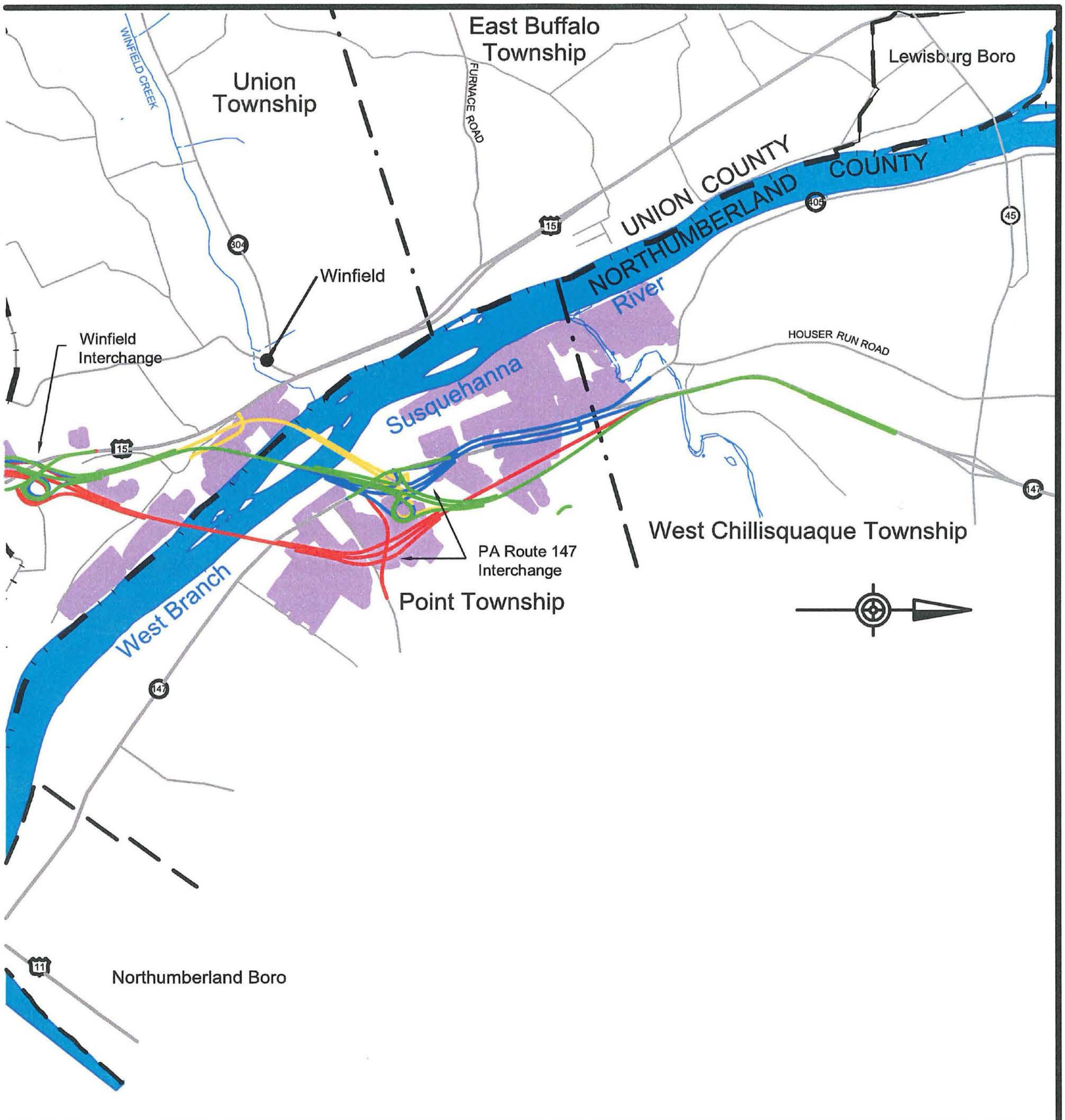
	RC1-E	RC1-W	RC 5	RC 6
Productive Agricultural Land				
Direct Impact	34.7 (85.7)	34.3 (84.7)	45.6 (112.6)	36.6 (90.5)
Rendered Impractical to Farm*	21.8 (53.8)	6.0 (14.7)	18.0 (44.4)	21.1 (52.1)
Rendered Inaccessible**	0.3 (0.7)	25.5 (62.9)	3.5 (8.6)	0.0 (0.0 A)
Total Productive Ag. Land Impacts:	**56.7 (140.1)**	**65.8 (162.4)**	**67.0 (165.6)**	**57.7 (142.6)**
Agricultural Operations				
Agricultural Operations (Total/Full-Time)	7 / 6	9 / 7	7 / 6	8 / 7
Impacts Critical to Operation Viability	1	2	1	1

*Impractical to Farm due to remnant size and/or shape
**Inaccessible for farming due to access considerations

over 770 hectares (400 to over 1900 acres)]. There are three dairy operations, three beef cattle producers, four grain/feed crop growers (one that also grows vegetables for a local cannery), two horticultural nurseries, four produce growers/produce stands, two horse breeding businesses, and a rabbit meat producer. One family farm near Hummels Wharf has two centuries of farming tradition in



Selinsgrove
Bypass Stub
Selinsgrove
Selinsgrove
Interchange
PENNS CREEK
Monroe Township
AIRPORT ROAD
ATTIG ROAD
SAW MILL HOLLOW ROAD
KRATZERVILLE ROAD
HOLLOW RUN
COUNTY LINE ROAD
PARK ROAD
MILL ROAD
FISHER ROAD
Shamokin Dam
Interchange
Section 2
Section 1
PARK ROAD
11
OLD SUSQUEHANNA TRAIL
PARK ROAD
PINE LANE
STETLER AVE.
Stetler Ave
Interchange
15
SUNBURY ROAD
Hummels
Wharf
SNYDER COUNTY
NORTHUMBERLAND COUNTY
11TH AVE/ROAD
Shamokin
Dam Boro
UNION COUNTY
SNYDER COUNTY
COUNTY LINE ROAD
Upper Augusta Township
Susquehanna River
Sunbury
Legend
DA Modified Avoidance Alternative
Old Trail 2A Alternative (61 Connector)
Old Trail 2B Alternative (Stetler Ave. Interchange/Route 15 Connector)
River Crossing 1 - East Alternative
River Crossing 1 - West Alternative
River Crossing 5 Alternative
River Crossing 6 Alternative
Productive Agricultural Land



Central Susquehanna Valley Transportation Project

Figure IV-D-2

Productive Agricultural Lands

0 500 1000 1500 Scale in Meters

0 2000 4000 6000 Scale in Feet

the area. Seven operations retail their products directly; most sell products to the wholesale market. There are 12 full-time farm operations and five part-time farm operations in the project alternative impact areas.

Agricultural operations would be impacted by the alternatives studied in detail (except for the No-Build Alternative). Figures IV-D-3 and IV-D-4 illustrate the location of agricultural operations and the Build Alternatives. Tables IV-D-3 and IV-D-4, Productive Agricultural Land, include quantitative and qualitative agricultural operations impact information. Qualitative information includes an assessment of businesses likely to be unable to continue operation at their current location as a direct result of the project.

The worst-case alternative combination in terms of number of operations impacted, OT2B and RC1-W would impact 14 agricultural operations, including 2 dairy, 3 livestock and 4 crop producing operations, 4 produce markets, and one landscape nursery operation. The alternative combinations that impact the fewest operations, DAMA and RC1-E and DAMA and RC5, would impact 11 agricultural operations (15 percent less impact than the worst-case alternative). A detailed account of impacts to agricultural operations from each project Alternative is contained in the Farmland Technical Support Data File. Because the CSVT project would affect productive agricultural land, PENNDOT would likely be requesting approval from the ALCAB prior to condemning productive agricultural land for this project in accordance with PA Acts 100 and 43. A Farmland Assessment Report would be prepared and a special-purpose hearing would be conducted.

4. Agricultural Land Preservation Policy (ALPP)

Created and amended by Governors' Executive Orders, the Agricultural Land Preservation Policy (4 Pa Code Chapter 7, § 7.301 et seq./ Prime Agricultural Land Policy as amended) is intended to protect the Commonwealth's "primary agricultural land" from irreversible conversion. The policy applies to productive agricultural land, not including timber, provided that the land has been in active agricultural use the preceding three years. This land is defined as "primary" agricultural land if it meets one or more designations. The policy classifies "primary" agricultural land into these priority categories: 1) Preserved Farmland (Agricultural Conservation Easements or subject to Development Rights Covenants); 2) Agricultural Security Area (enrolled in municipal Act 43 ASA); 3) Clean and Green Participants (preferentially assessed in the Farmland and Forest Land Assessment Act, PA Act 1974-319); 4) Agricultural Zoning District (planned and effectively zoned); and 5) Suitable Soils (unique farmland and soils with capability class I through IV). There is no preserved farmland in the study area, but the other categories exist.

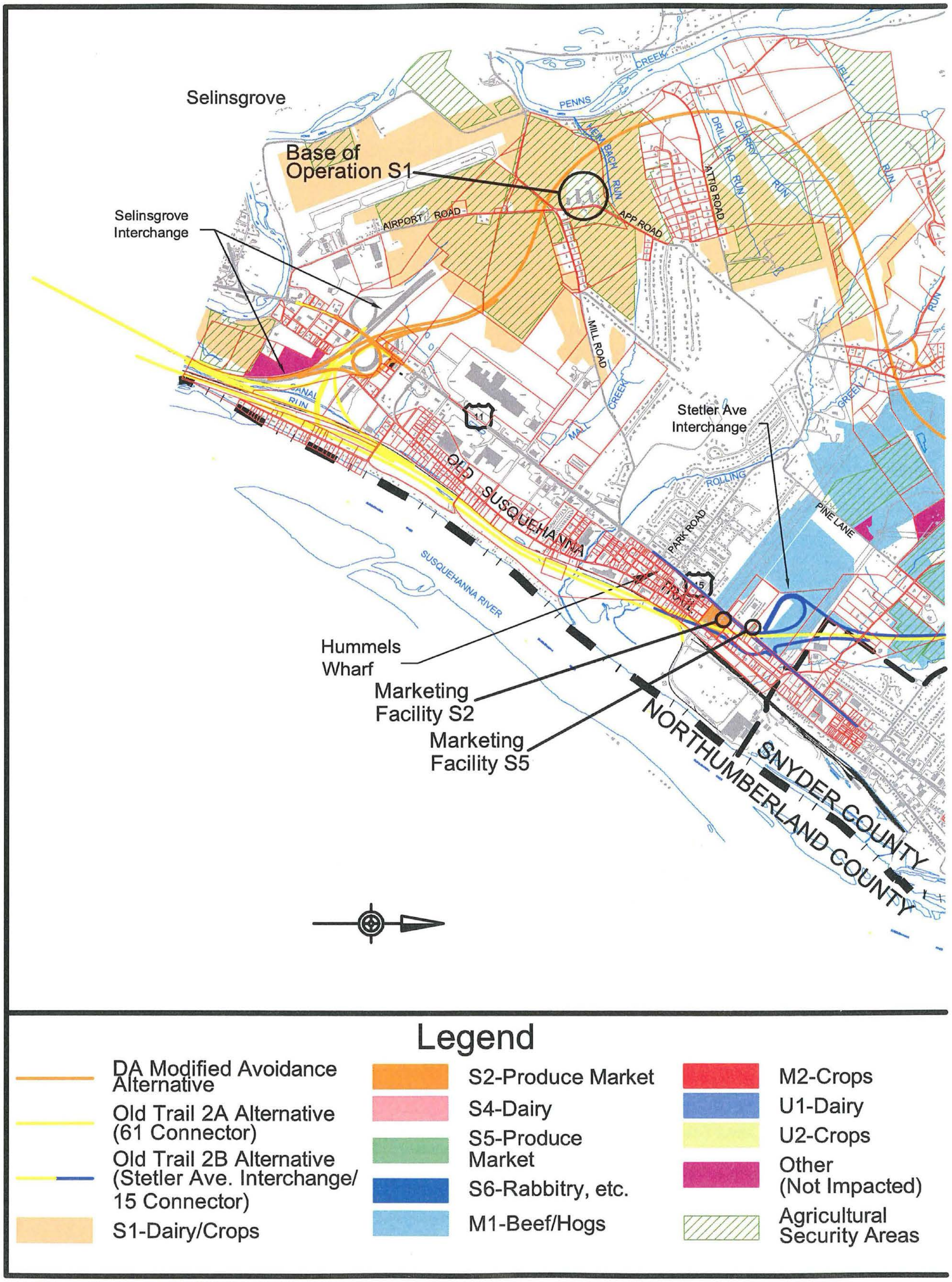
Primary agricultural land would be impacted by the alternatives studied in detail (except for the No-Build Alternative). Tables IV-D-5 and IV-D-6 include respective Section 1 and 2 quantitative primary agricultural land impacts. Impacts to land that meets criteria for multiple categories were assessed and reported according to the highest priority category (e.g., an ASA, zoned for agriculture and containing Class II soil would only be counted as Second Highest Priority (ASA) and not counted again under lower categories).

TABLE IV-D-5
PRIMARY AGRICULTURAL LAND PRIORITY CATEGORIES/SECTION 1
DIRECT IMPACTS IN HECTARES AND (ACRES)

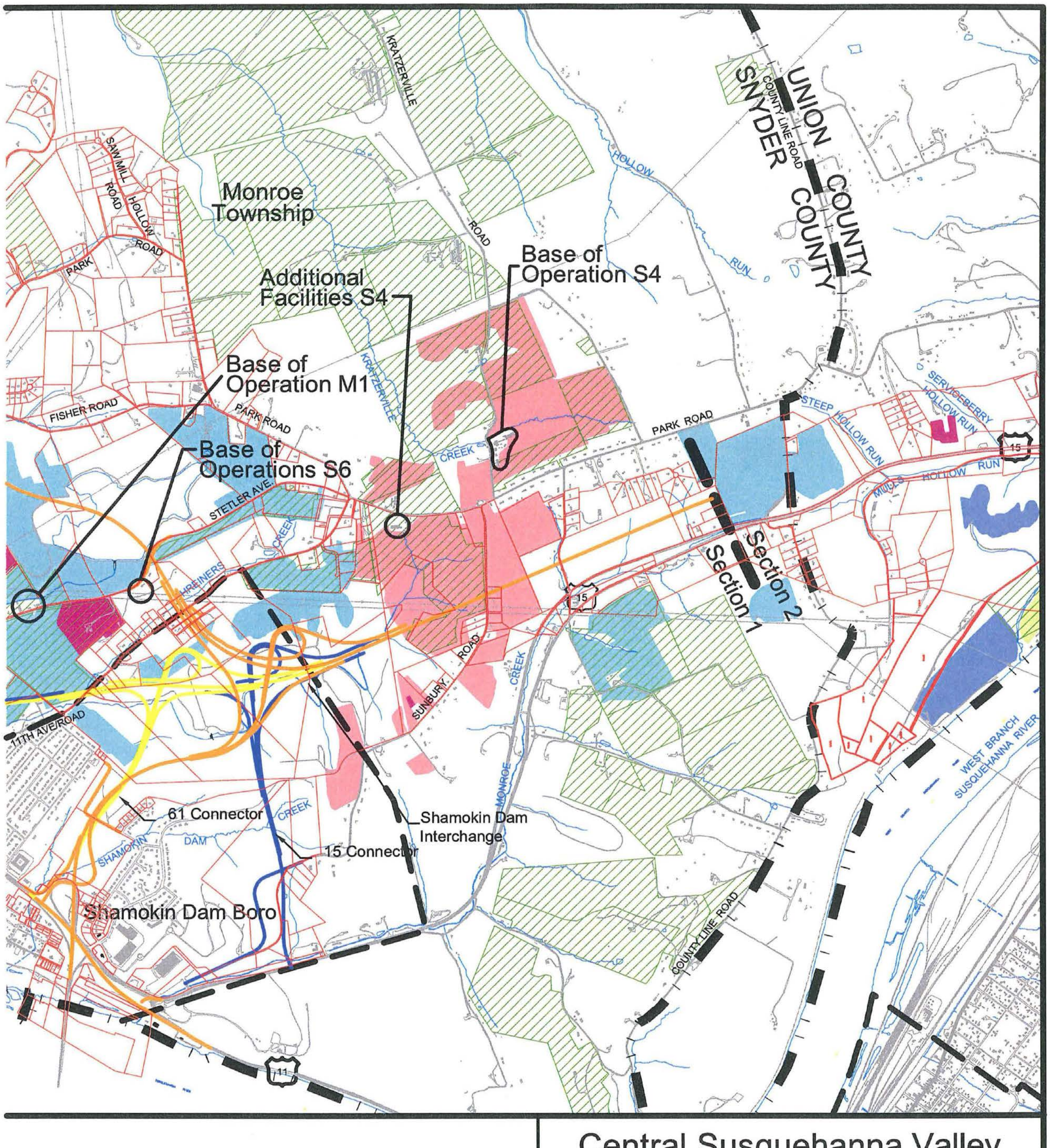
	DAMA	OT2A (61 Connector)	OT2B (Stetler Av./15)
Primary Agricultural Land (ALPP)/Direct Impacts			
2nd Priority: Ag. Security Areas	28.8 (71.2)	8.4 (20.7)	8.4 (20.9)
3rd Priority: Clean and Green	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)
4th Priority: Zoned/Planned for Agr.	4.3 (10.7)	6.2 (15.3)	6.4 (15.7)
5th Priority: Land Capability Class I-IV	14.4 (35.5)	5.2 (14.1)	9.5 (23.4)
Total Primary Agricultural Land:	47.5 (117.4)	19.8 (50.1)	24.3 (60.0)

TABLE IV-D-6
PRIMARY AGRICULTURAL LAND PRIORITY CATEGORIES/SECTION 2
DIRECT IMPACTS IN HECTARES AND (ACRES)

	RC1-E	RC1-W	RC5	RC6
Primary Agricultural Land (ALPP)/Direct Impacts				
2nd Priority: Ag. Security Areas	1.0 (2.6)	5.1 (12.6)	10.3 (25.5)	1.0 (2.6)
3rd Priority: Clean and Green	6.0 (14.9)	6.0 (14.9)	5.1 (12.6)	6.0 (14.9)
4th Priority: Zoned/Planned for Agr.	9.8 (24.2)	9.8 (24.2)	7.9 (19.6)	9.8 (24.2)
5th Priority: Land Capability Class I-IV	15.7 (38.8)	13.8 (34.1)	18.7 (46.3)	17.6 (43.6)
Total Primary Agricultural Land:	32.5 (80.5)	34.7 (85.8)	42.0 (104.0)	34.3 (85.3)



Selinsgrove
Base of Operation S1
Selinsgrove Interchange
AIRPORT ROAD
APP ROAD
PENNS CREEK
MILL ROAD
ATTIG ROAD
PARK ROAD
PINE LANE
Stetler Ave Interchange
OLD SUSQUEHANNA TRAIL
SUSQUEHANNA RIVER
Hummels Wharf
Marketing Facility S2
Marketing Facility S5
NORTHUMBERLAND COUNTY
SNYDER COUNTY
11
15
Legend
DA Modified Avoidance Alternative
Old Trail 2A Alternative (61 Connector)
Old Trail 2B Alternative (Stetler Ave. Interchange/ 15 Connector)
S1-Dairy/Crops
S2-Produce Market
S4-Dairy
S5-Produce Market
S6-Rabbitry, etc.
M1-Beef/Hogs
M2-Crops
U1-Dairy
U2-Crops
Other (Not Impacted)
Agricultural Security Areas

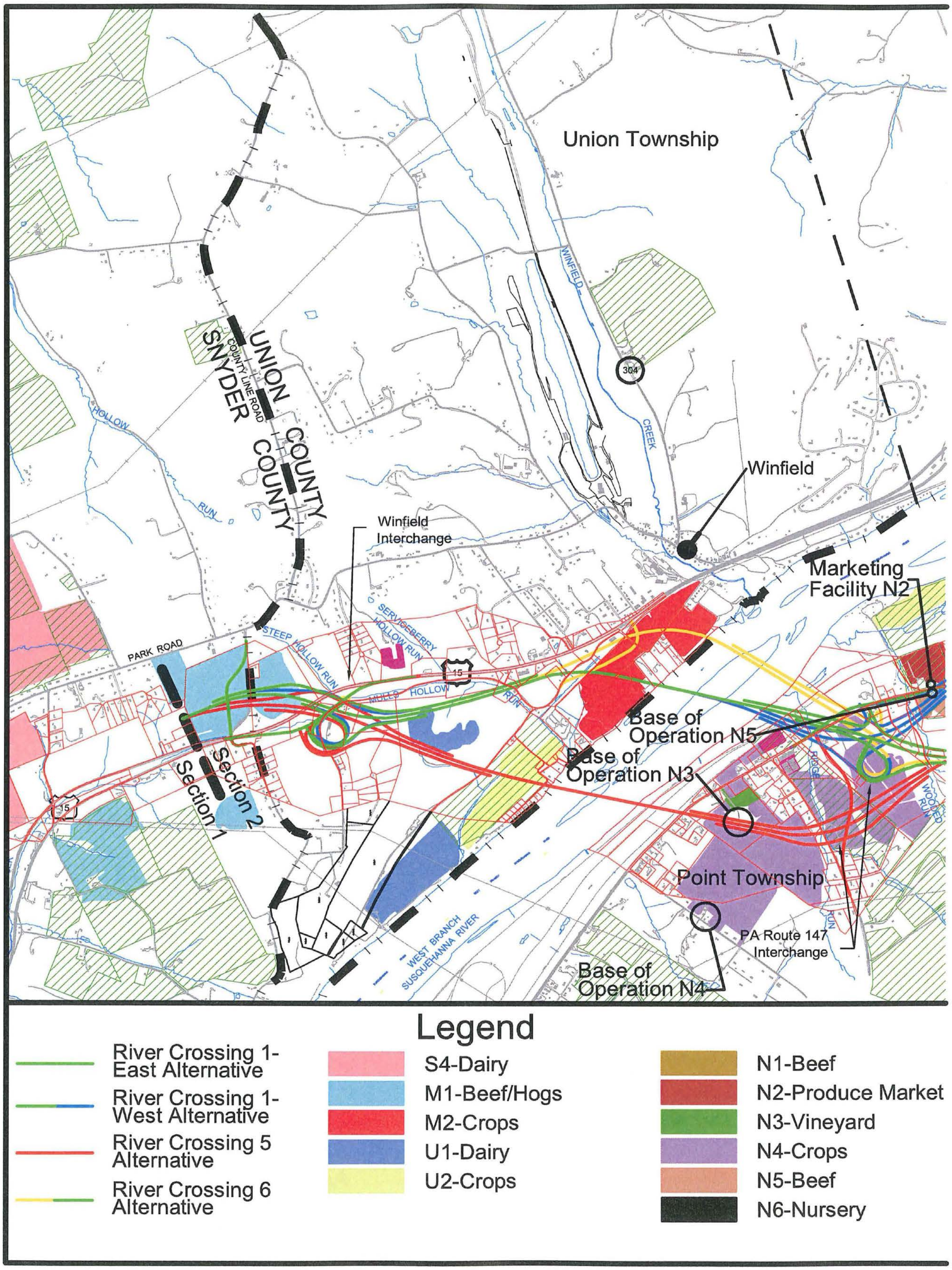


Central Susquehanna Valley Transportation Project

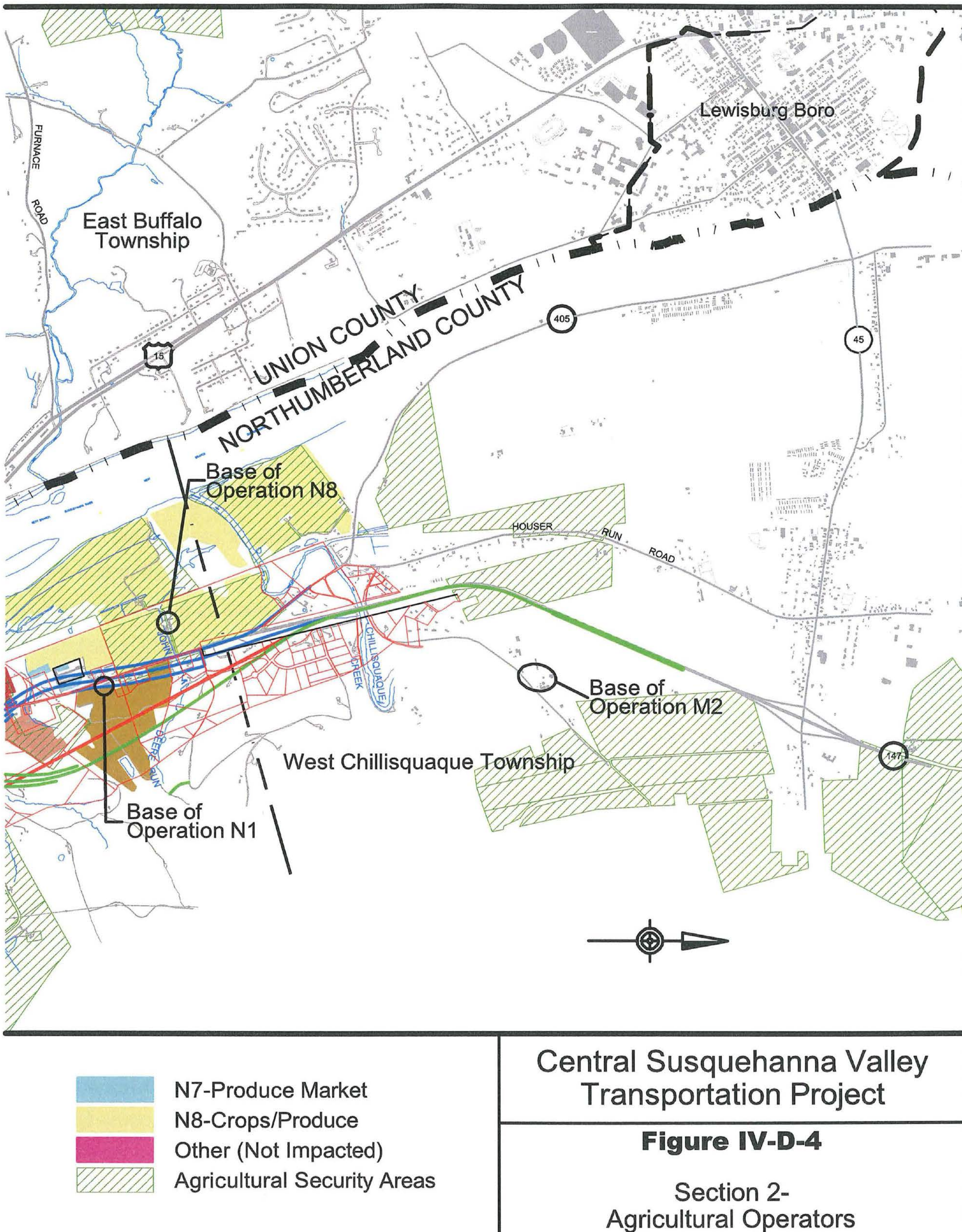
Figure IV-D-3

Section 1-
Agricultural Operators

0 300 600 900 Scale in Meters
0 1250 2500 3750 Scale in Feet



Union Township
UNION COUNTY
SNYDER COUNTY
COUNTY LINE ROAD
WINFIELD
CREEK
304
Winfield
Winfield Interchange
Marketing Facility N2
PARK ROAD
STEEP HOLLOW RUN
SERVICEBERRY HOLLOW RUN
MULLS HOLLOW RUN
HOLLOW
RUN
15
Base of Operation N5
Base of Operation N3
Section 2
Section 1
Point Township
PA Route 147 Interchange
Base of Operation N4
WEST BRANCH SUSQUEHANNA RIVER
WOODED RUN
Legend
River Crossing 1- East Alternative
River Crossing 1- West Alternative
River Crossing 5 Alternative
River Crossing 6 Alternative
S4-Dairy
M1-Beef/Hogs
M2-Crops
U1-Dairy
U2-Crops
N1-Beef
N2-Produce Market
N3-Vineyard
N4-Crops
N5-Beef
N6-Nursery



Central Susquehanna Valley Transportation Project

Figure IV-D-4

Section 2-
Agricultural Operators

5. Avoidance, Minimization, and Mitigation of Impacts to Agricultural Resources

Commonwealth Law (PA Act 100, PA Act 43) and policy (Agricultural Land Preservation Policy) and Federal policy (Farmland Protection Policy Act) mandate study of efforts to avoid, minimize, and mitigate impacts upon agricultural resources. Due to the nature of the project and the widespread extent of agricultural resources, no alternative that would meet the project need would completely avoid agricultural resources. The study team conducted interviews with farm operators to gather information and input regarding alternatives to minimize direct and indirect (e.g., lands rendered inaccessible or unfarmable due to resultant size/geometry) impacts to the respective operations.

Minimization measures have been, and will continue to be, investigated to reduce the degree of impact upon agricultural land. Future efforts include investigating measures to minimize the required right-of-way width, and measures to control runoff/erosion damages. The study team will evaluate replacement of disrupted water supplies necessary for continued operations.

Provisions for replacement access to land-locked parcels will be studied, and implemented if feasible and reasonable. Where replacement right-of-way is not possible or reasonable, the Department will compensate the property owner for damages (loss of use), and/or, at the option of the owner, acquire the property as an uneconomic remnant. If the property is acquired as an uneconomic remnant, the Department will either keep the property (if it has a beneficial use to the Department), or dispose of the property by selling the property to the highest bidder. The Farmland Technical Support Data File contains information about the areas preliminarily determined to be indirectly impacted; either inaccessible or impractical to farm. Additional consideration of mitigation measures may eliminate these impacts. For the CSVT project, Pa Acts 100 and 43 require the Pennsylvania Department of Transportation (PENNDOT) to obtain approval from the Agricultural Lands Condemnation Approval Board (ALCAB) prior to condemnation of productive agricultural land for highway purposes. An ALCAB hearing will be held and a detailed Farmlands Assessment Report (FAR) will be produced, if necessary, after the project's Record of Decision (ROD), but prior to completion of Final Design. Avoidance, minimization, and mitigation efforts specific to individual farm operations and specific farm units would be presented to the ALCAB and addressed in the FAR.

Financial compensation to landowners and long-term (signed, committed) leaseholders of agricultural land would provide mitigation for direct damages. Additional compensation may be provided for indirect damages such as diminution of value of land rendered un-farmable or inaccessible, and/or for loss of business viability.

The Department and its design team will continue efforts to avoid, minimize, and mitigate impacts upon agricultural resources during Final Design.

E. VISUAL QUALITY

Construction of high-speed, multi-lane highways alters the existing landscape with cuts, fills, bridges, paved areas, guide rails, and stormwater retention basins. This can have a significant impact on the visual quality of the area for both local and traveling populations. Of special concern are those who live in identifiable neighborhoods and other concentrated residential areas. To avoid or minimize effects on property setting, these areas must be considered in the evaluation of visual quality. Construction of any of the CSVT build alternatives would have impacts to visual quality within the project area. The No-Build Alternative would have no additional impacts to visual quality in the project area.

1. Impact Determination

Visual impacts are identified from two perspectives: a view **from** the highway and a view **of** the highway. A visual change may be identified for one or both of the perspectives, but it may not necessarily be considered an adverse impact. Adverse or beneficial impacts are determined by the change to the visual character of the viewshed, depending on the placement of the highway within the landscape and it's visual consistency or non-consistency with the surrounding environment. Various engineering features such as roadway, road cuts, fill slopes, and associated structures must be examined when evaluating impact to the viewshed. Nineteen (19) potentially sensitive visual locations were identified and photographed for the comparison of proposed alternatives (see Figures IV-E-1 and IV-E-2 for photo locations). For comparison, 3D Studio Viz graphics software was used to produce computer renderings which show simulated views of the potentially impacted areas. In this section the areas are identified and described, impacts to the existing viewshed are explained, and possible mitigation measures are proposed.

2. Views of the Proposed Alternatives

Impacts to viewers within the project study area were analyzed and are presented by alternative for Section 1 and Section 2.

a. Section 1

i. DAMA

Area 1	Description
Location	In Monroe Manor, at the corner of App Road and Meadowbrook Drive, facing southwest.
Impact	The existing view shows farm fields with an associated farmstead in the background. The proposed view shows the DAMA Alternative in the far distance [approximately 750 m (2,461') away], behind the barn and silos on the left of the photo. At this location the roadway is 14 m (46') above the existing grade, and as it travels northwest it cuts into the gradual slope and disappears from the viewshed. See Figure IV-E-3.
Mitigation	Provide evergreen screening on the northeast side of the highway.

Area 2	Description
Location	In Colonial Acres facing south (downslope) on Colonial Drive.
Impact	The existing view shows Colonial Drive and several homes located on the upper slope/side of Colonial Acres, with the Central Susquehanna Valley in the distance. The proposed view shows the bridge approximately 366 m (1,200') away, below the level of the near ridge and leaving the view of the Valley unobstructed. See Figure IV-E-4.
Mitigation	Landscape fills, and use vegetation screening wherever possible. The bridge will be too high for successful mitigation, so consider using a bridge design (color/texture/materials) that will blend into the landscape. To filter the view of the piers, clusters of trees might be planted if they do not cause additional displacement or create hazards for errant vehicles.

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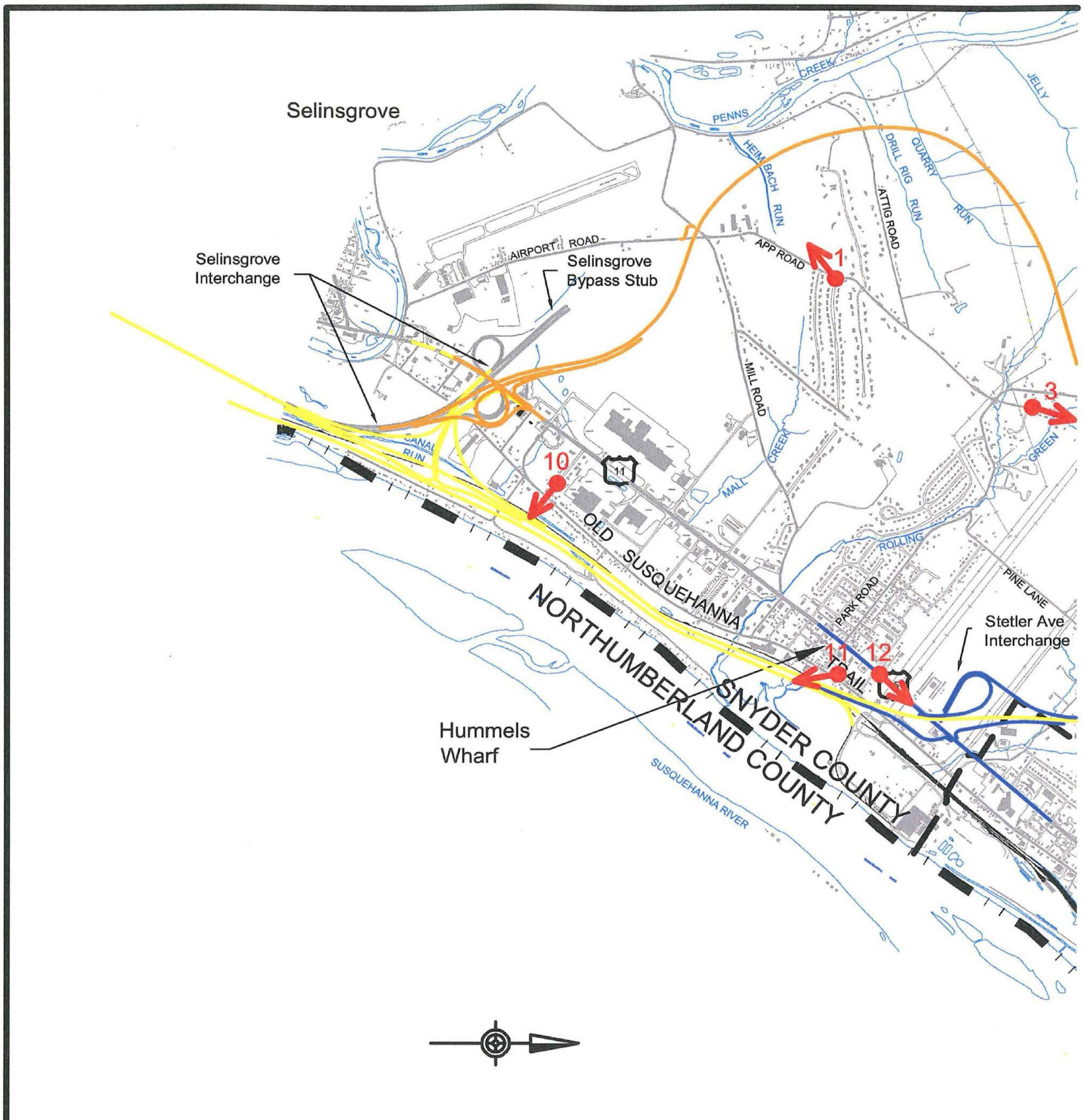


Legend

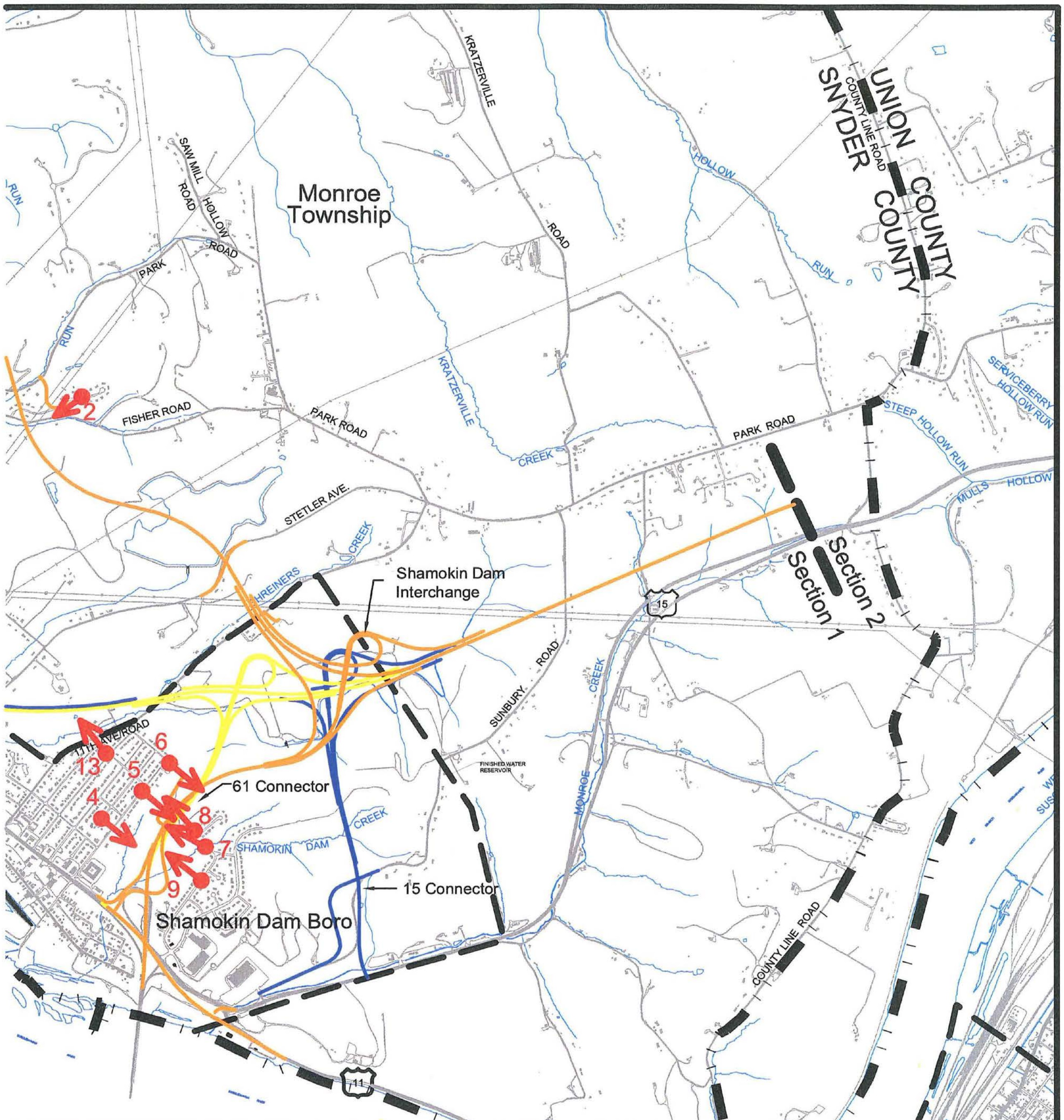
DA Modified Avoidance Alternative

Old Trail 2A Alternative (61 Connector)

Old Trail 2B Alternative (Stetler Ave. Interchange/15 Connector)

Photo Site Location and Direction

11 Photo Site Number

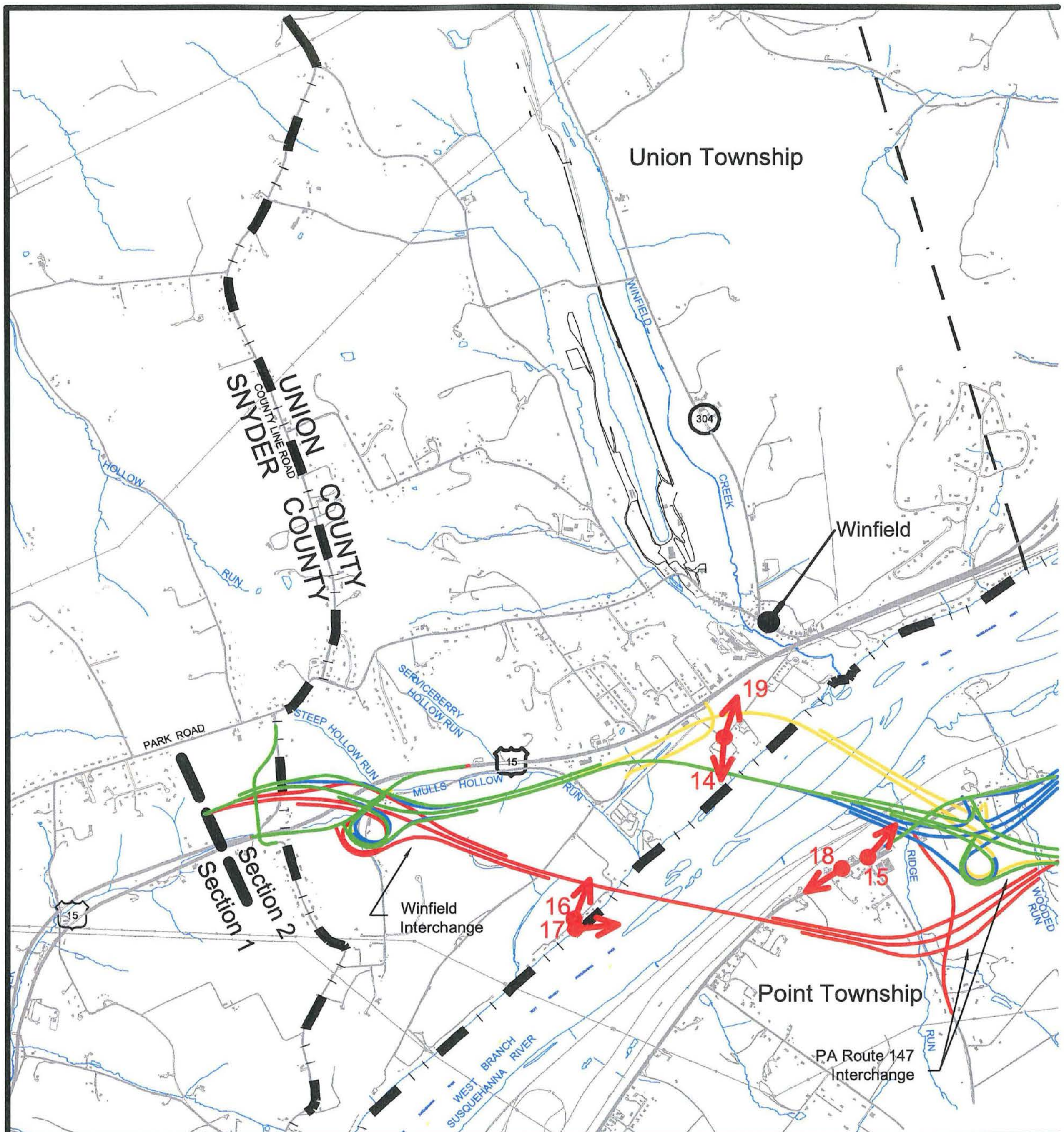


Central Susquehanna Valley Transportation Project

Figure IV-E-1

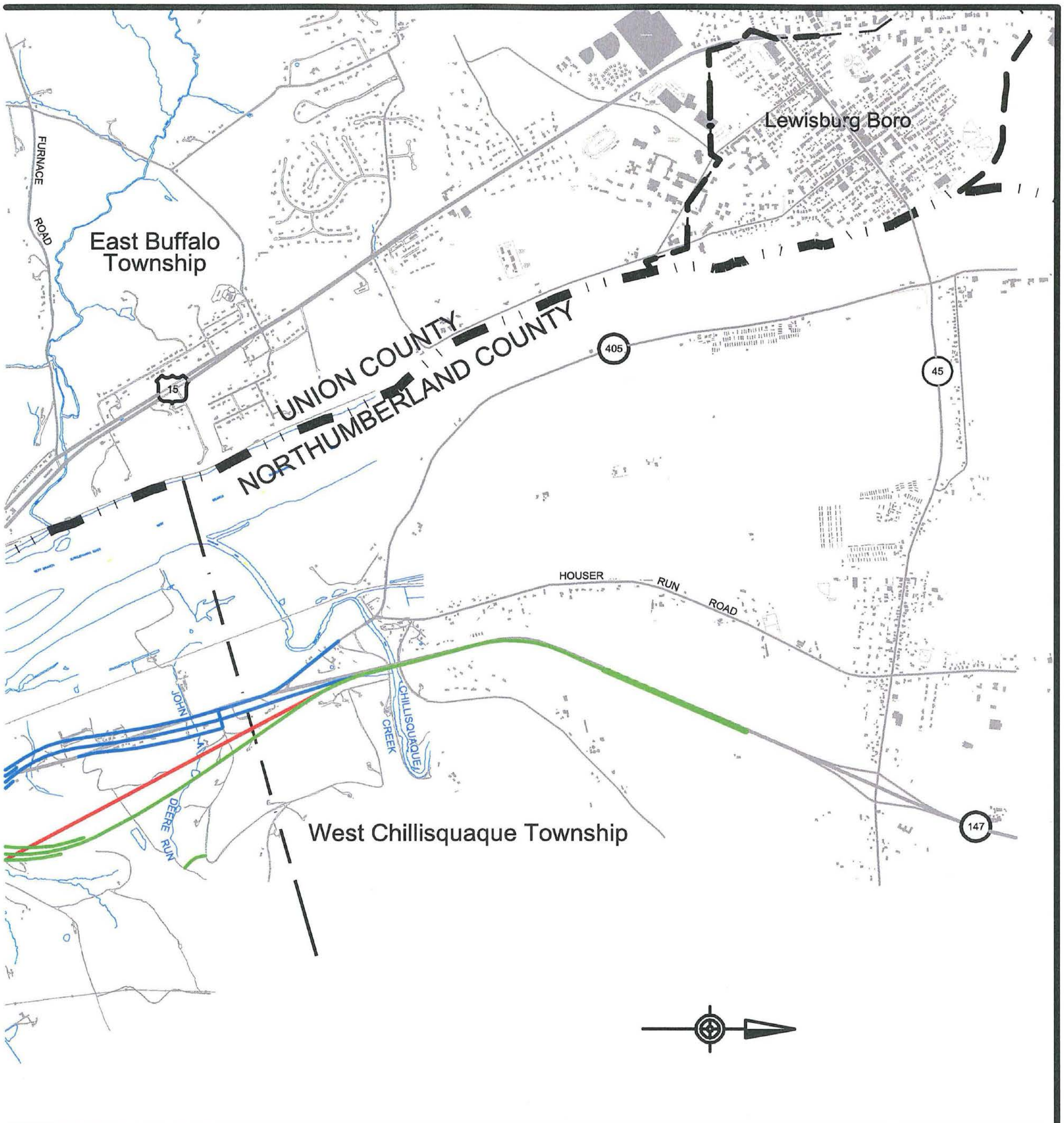
Section 1-Visual Quality Site Locations

0 300 600 900 Scale in Meters
0 1250 2500 3750 Scale in Feet



Legend

- River Crossing 1 - East Alternative
- River Crossing 1 - West Alternative
- River Crossing 5 Alternative
- River Crossing 6 Alternative
- Photo Site Location and Direction
- 11 Photo Site Number



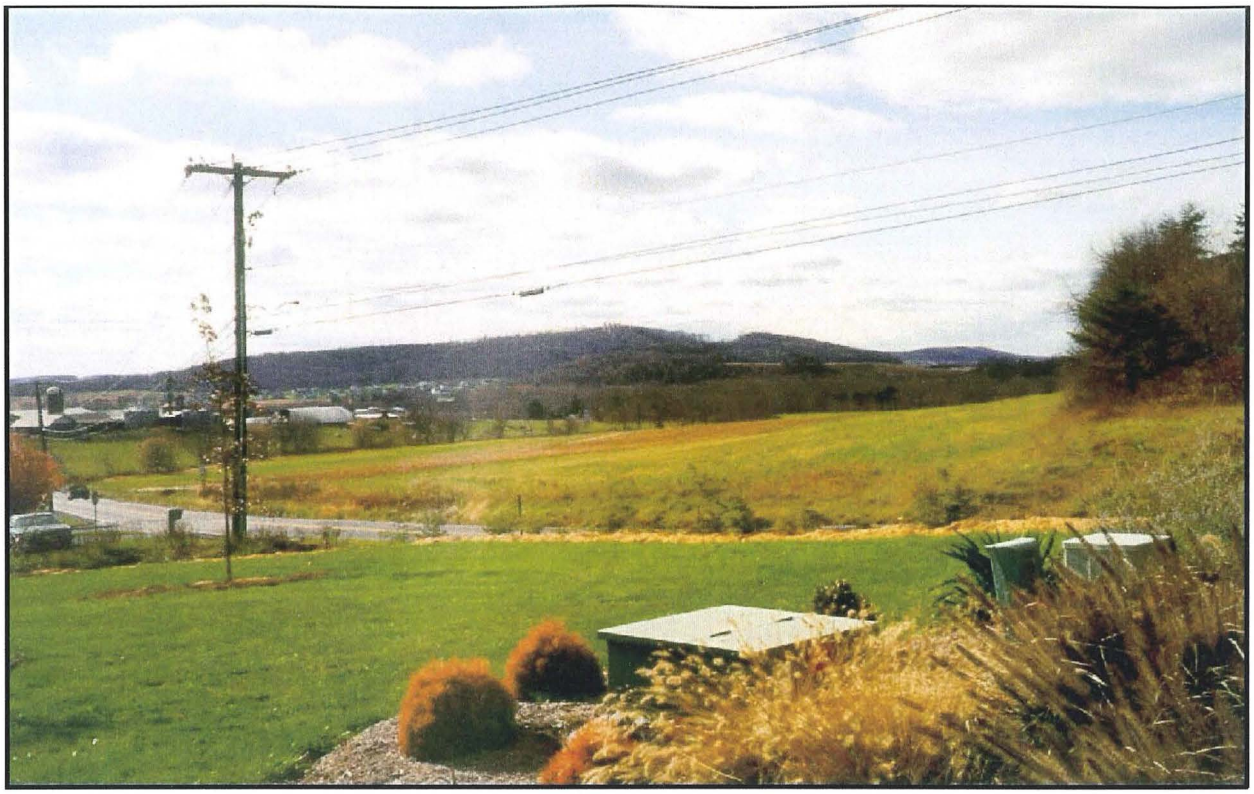
Central Susquehanna Valley Transportation Project

Figure IV-E-2

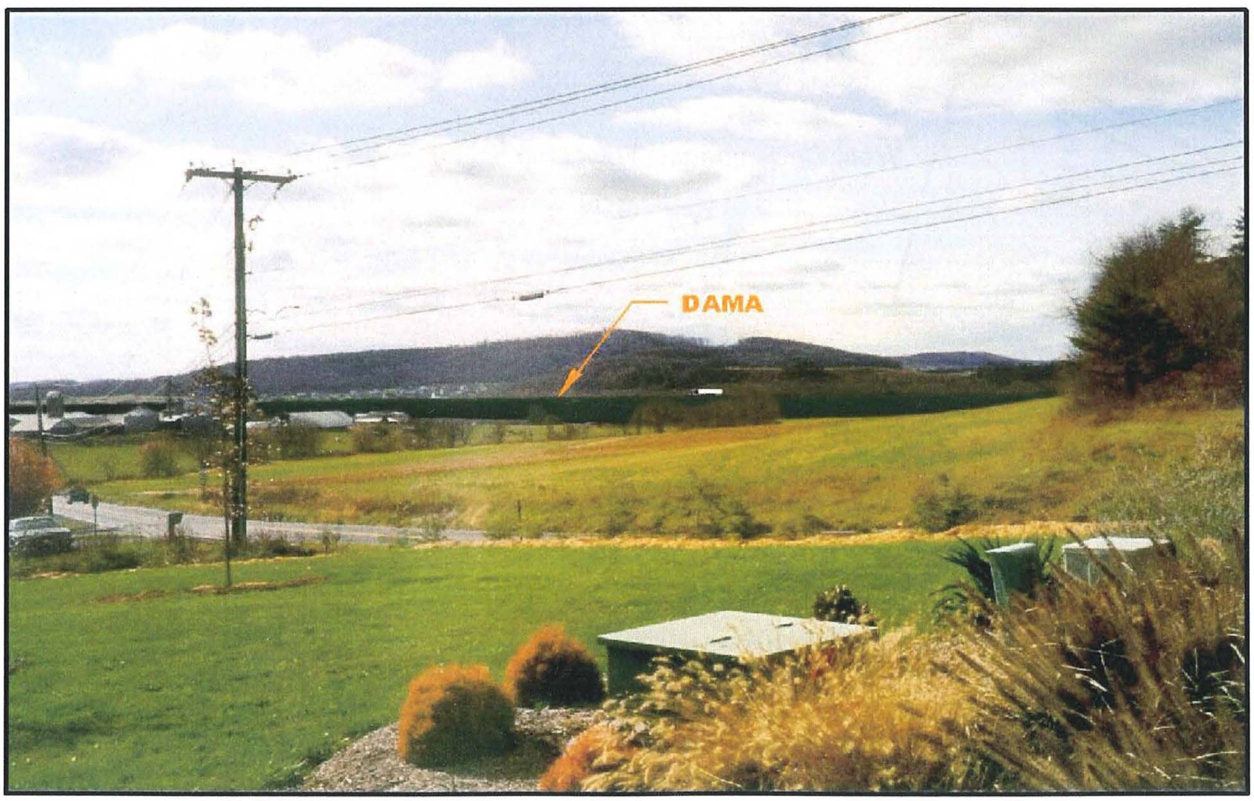
Section 2-Visual Quality Site Locations

0 300 600 900 Scale in Meters

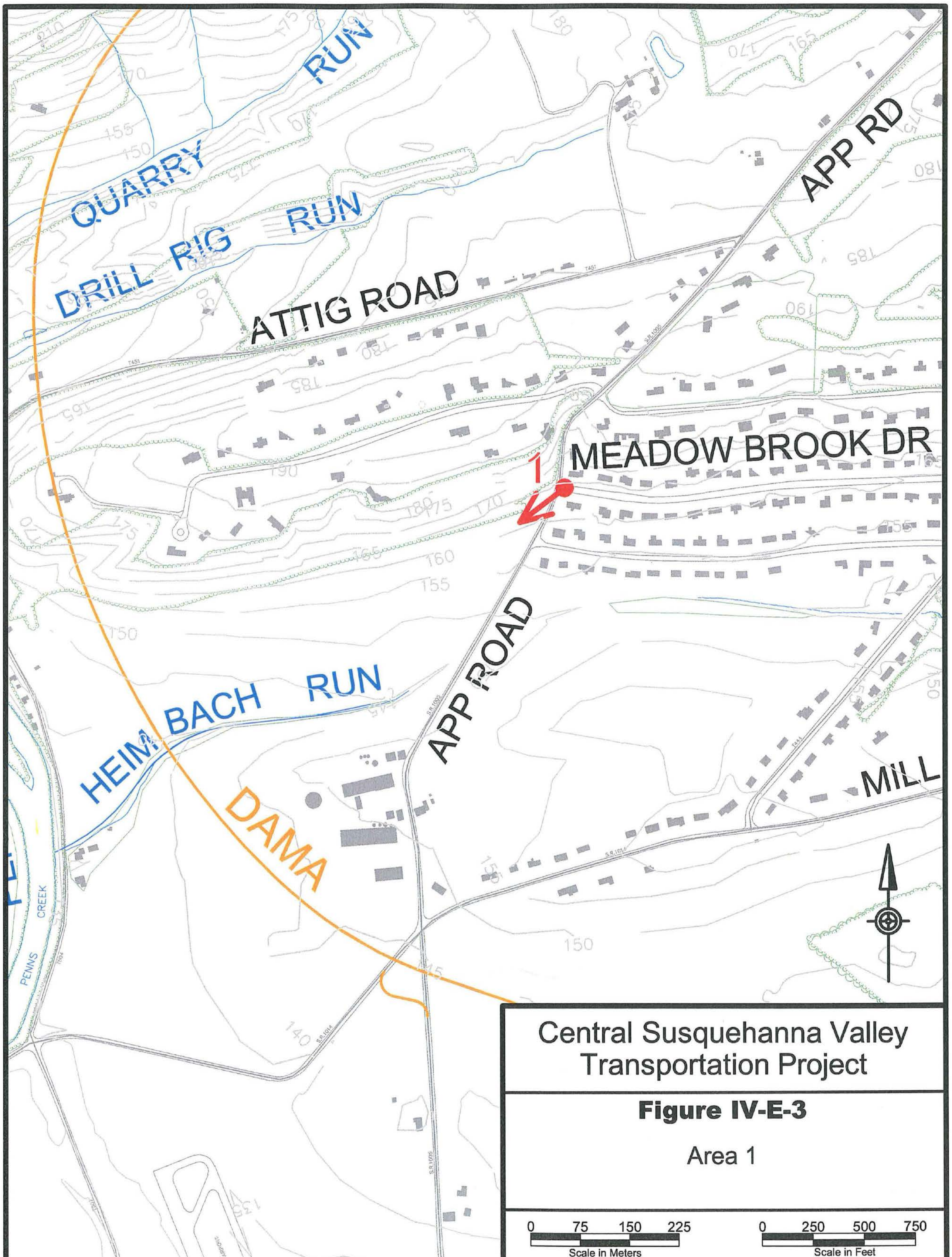
0 1250 2500 3750 Scale in Feet



Before



After

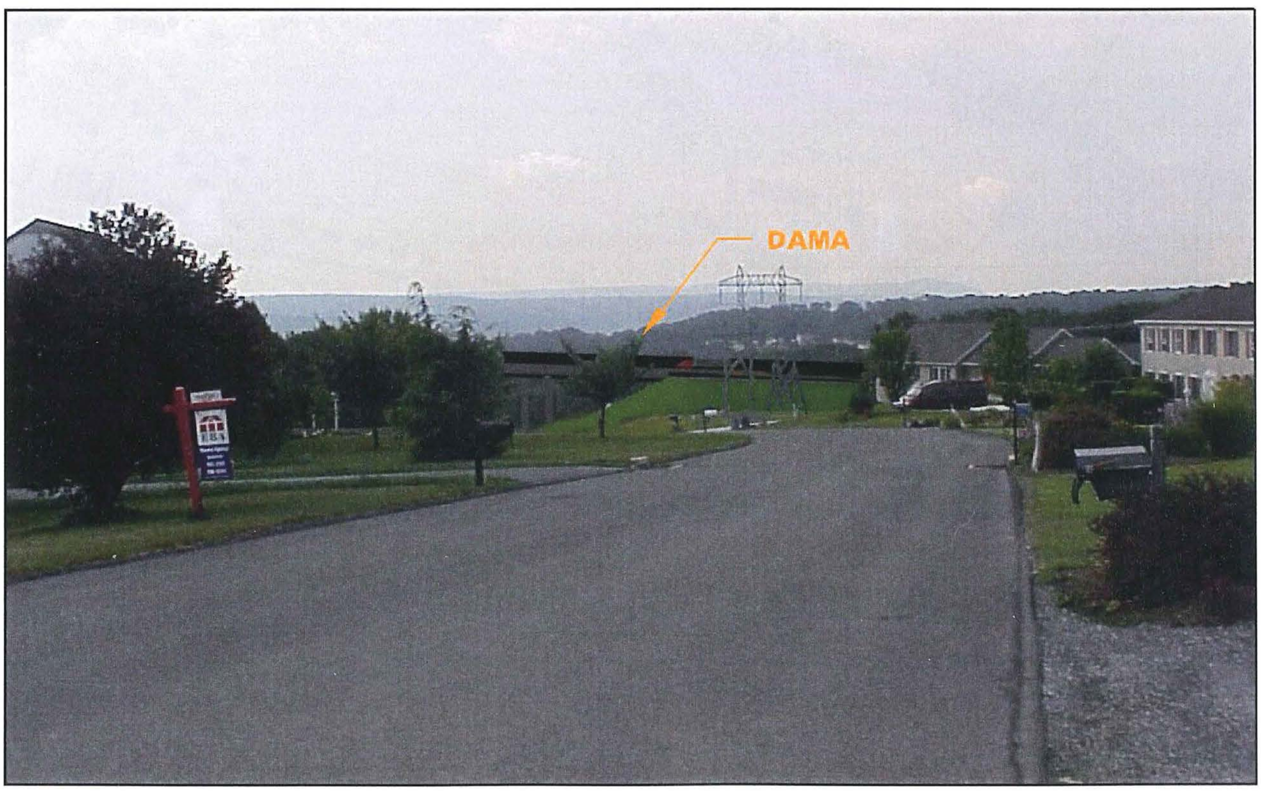


Central Susquehanna Valley Transportation Project

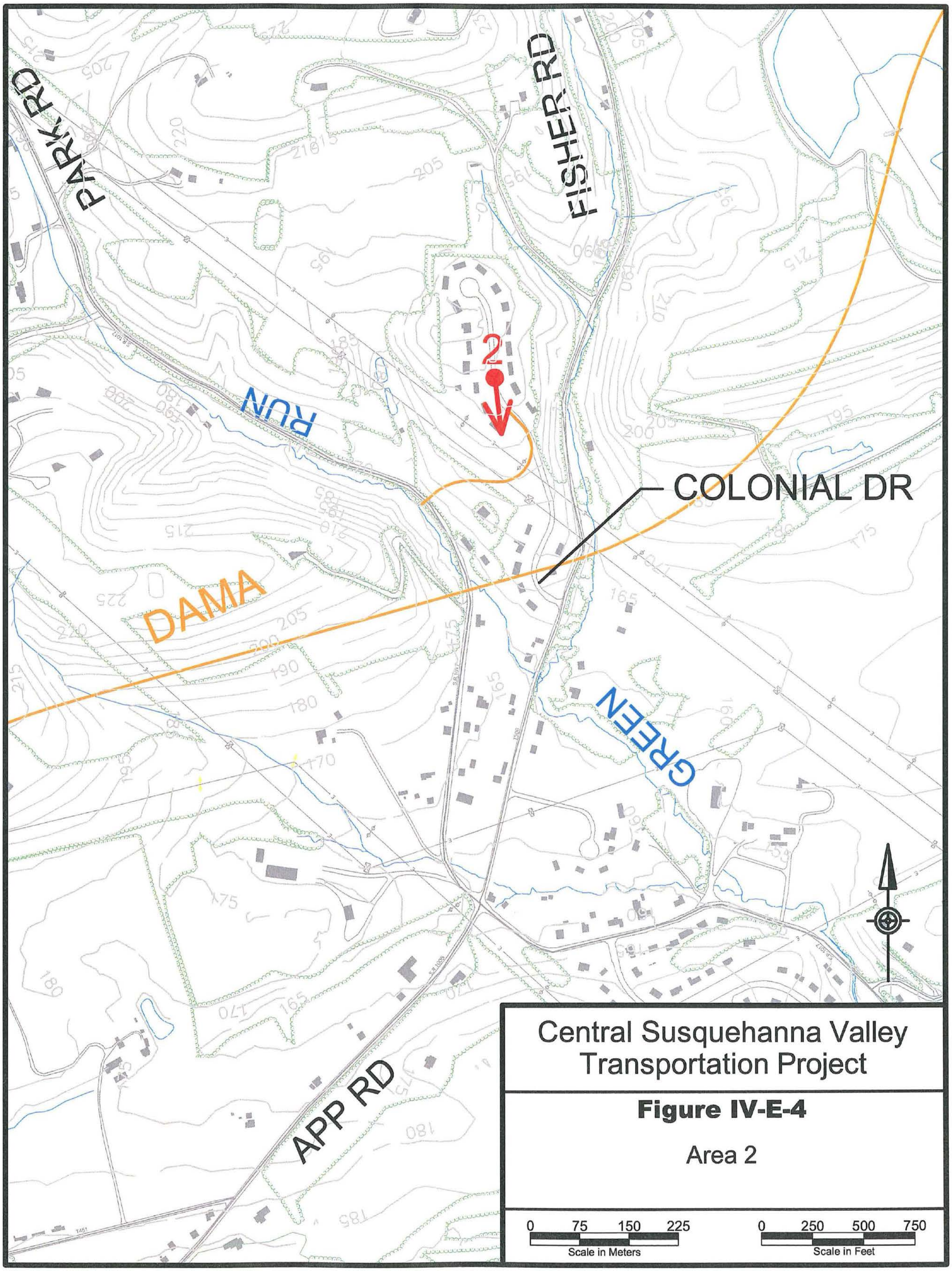
Figure IV-E-3

Area 1

Before



After



Central Susquehanna Valley Transportation Project

Figure IV-E-4

Area 2

Area 3	Description
Location	On Fisher Road, facing north toward the entrance of Colonial Drive.
Impact	The existing view shows five of the houses located within the Colonial Acres community (visible behind the red-roofed farmhouse in the center of the photo). The proposed view shows the 17 m (55') high bridge crossing over Fisher Road, with a grassy fill slope and several piers. Displaced are four of the five above-mentioned Colonial Acres houses. See Figure IV-E-5.
Mitigation	Landscape fills, and use vegetation screening wherever possible. The bridge will be too high for successful mitigation, so consider using a bridge design (color/texture/materials) that will blend into the landscape. To filter the view of the piers, clusters of trees might be planted if they do not cause additional displacement or create hazards for errant vehicles.

Area 4	Description
Location	In the Gunter residential housing development, on King Avenue, facing northeast.
Impact	The existing views show the hollow and related woods located between the Gunter and Orchard Hills developments. The roadway is 350 m (1,148') away, and the trees seen from Area 4 are not impacted. There is no change to the existing viewshed. From this area the view of the OT2A Alternative is virtually identical to the DAMA Alternative. See Figure IV-E-6.
Mitigation	None needed.

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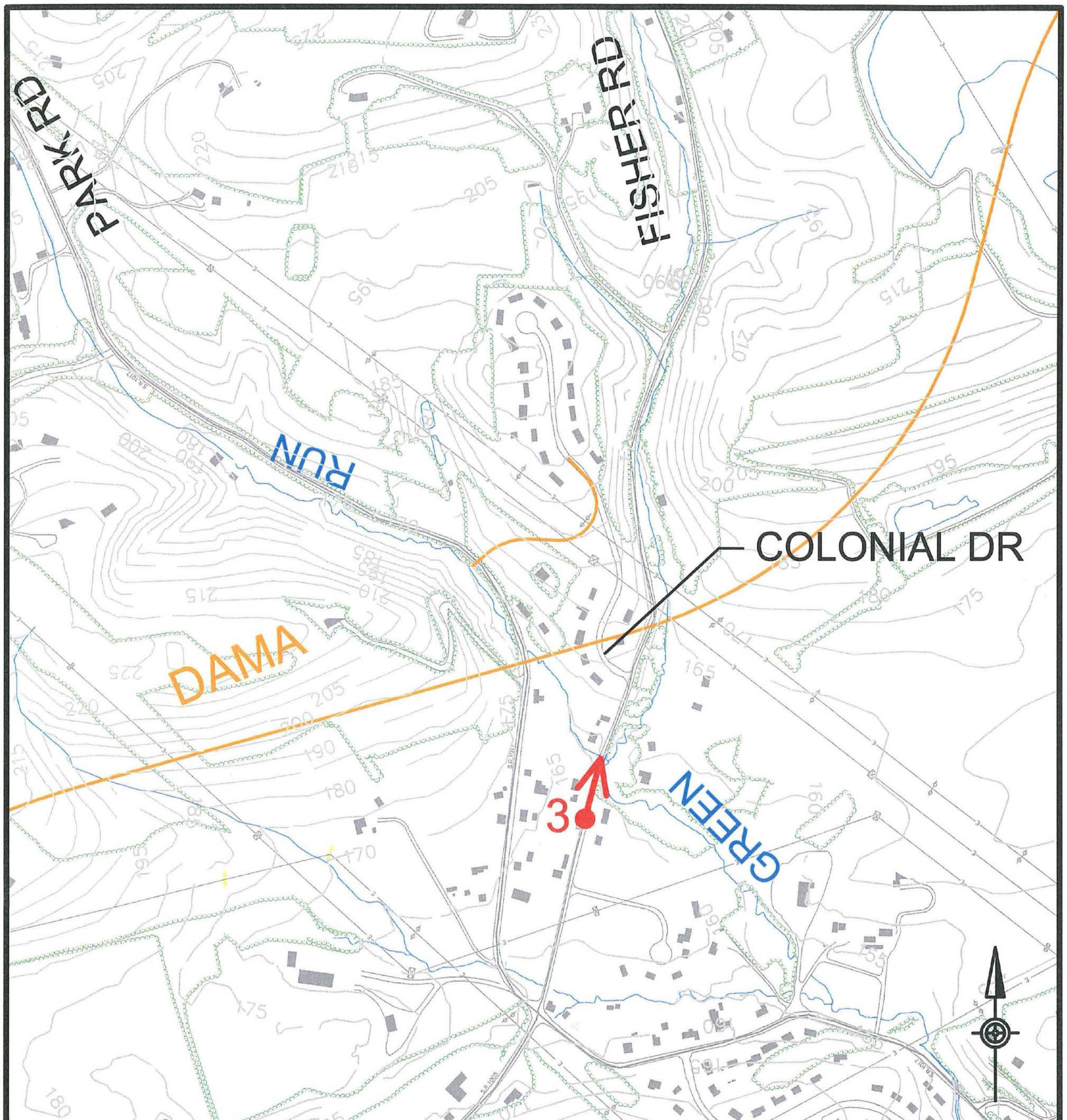
Before

After



Central Susquehanna Valley Transportation Project

Figure IV-E-5

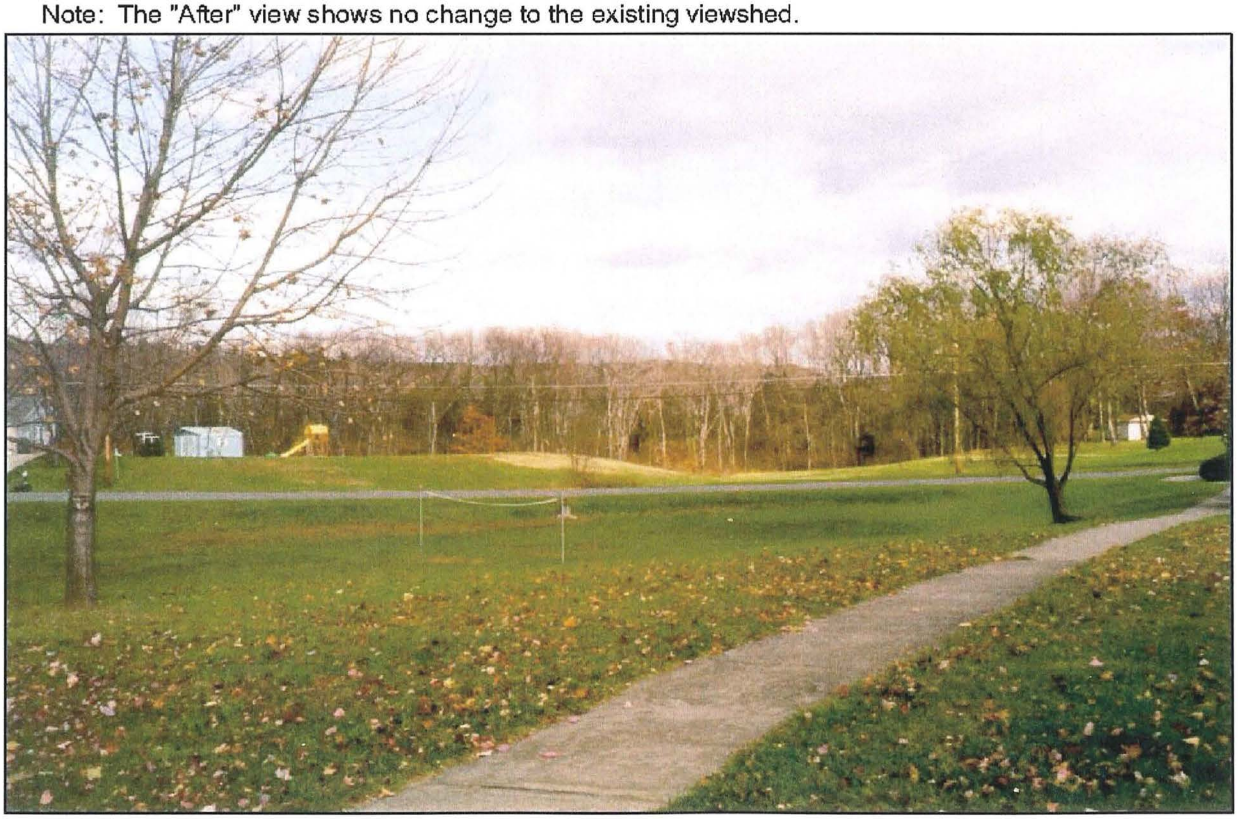
Area 3

0 75 150 225 Scale in Meters

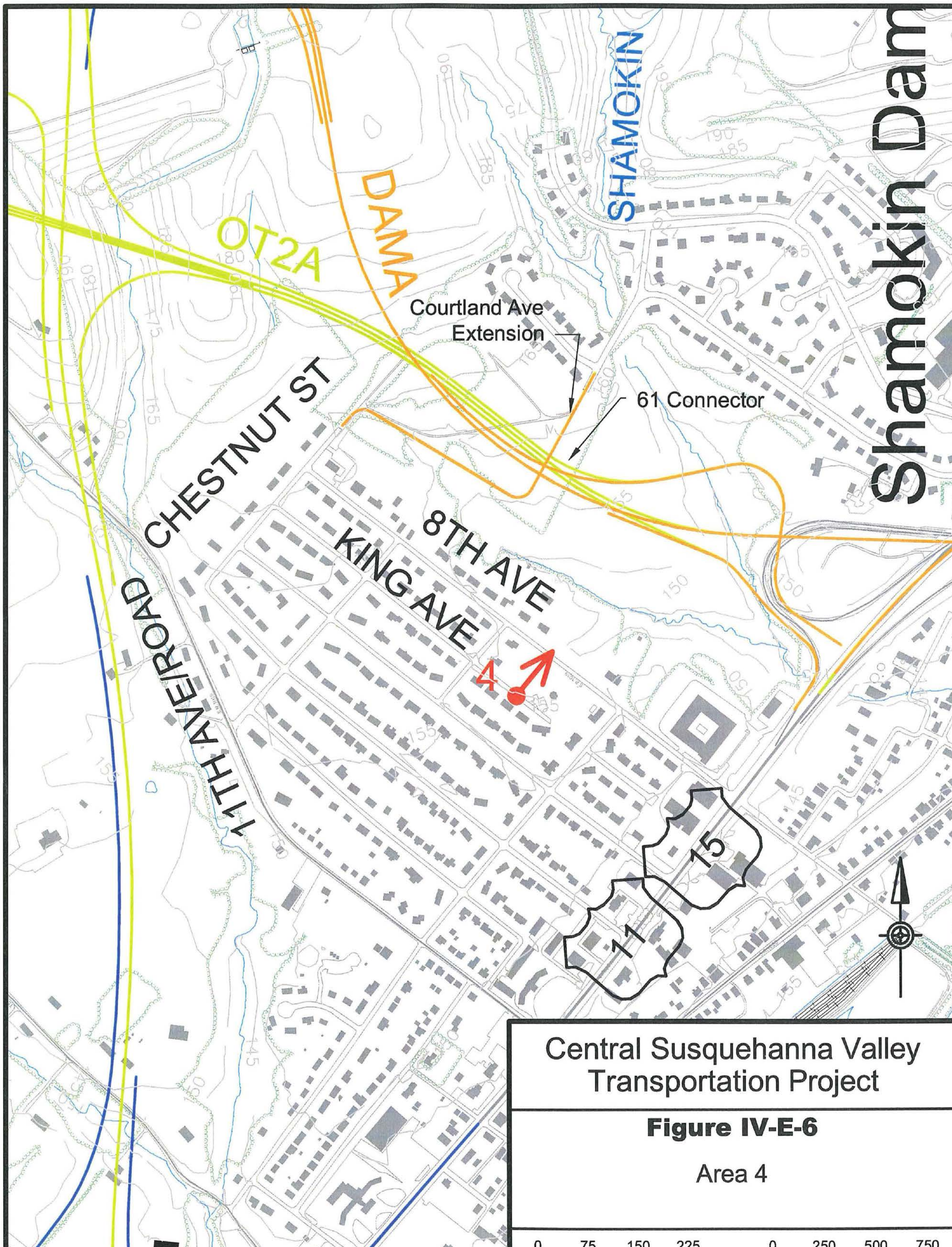
0 250 500 750 Scale in Feet

Before

Note: The "After" view shows no change to the existing viewshed.



After



Central Susquehanna Valley Transportation Project

Figure IV-E-6

Area 4

Area 5	Description
Location	In the Gunter residential housing development, on Eighth Avenue, facing northeast.
Impact	The existing views show the hollow and related woods and dirt trail located between the Gunter and Orchard Hills developments. At Area 5, the Courtland Avenue Extension is approximately 150 m (492') away and the trees seen here are displaced with a grassy berm. The road is about 8 m (26') above the existing grade. From this area the view of the OT2A Alternative is virtually identical to the DAMA Alternative. See Figure IV-E-7
Mitigation	Landscape fills, use landscaping and vegetative screening wherever possible to help soften the view.

Area 6	Description
Location	In the Gunter residential housing development, on Eighth Avenue, facing northeast.
Impact	The existing views show the hollow and related woods and dirt trail located between the Gunter and Orchard Hills developments. Area 6 shows the Courtland Avenue Extension pavement fading into the distance and bearing off to the right approximately 150 m (492') away. The 61 Connector is at the base of the ridgeline, about 245 m (804') away. Visible in the proposed view is the 4.3 m (14') sound barrier, approximately 240 m (787') away. The Courtland Avenue Extension displaces the trees to the right of the photo. See Figure IV-E-8.
Mitigation	Landscape fills, use landscaping and vegetative screening wherever possible to help soften the view.

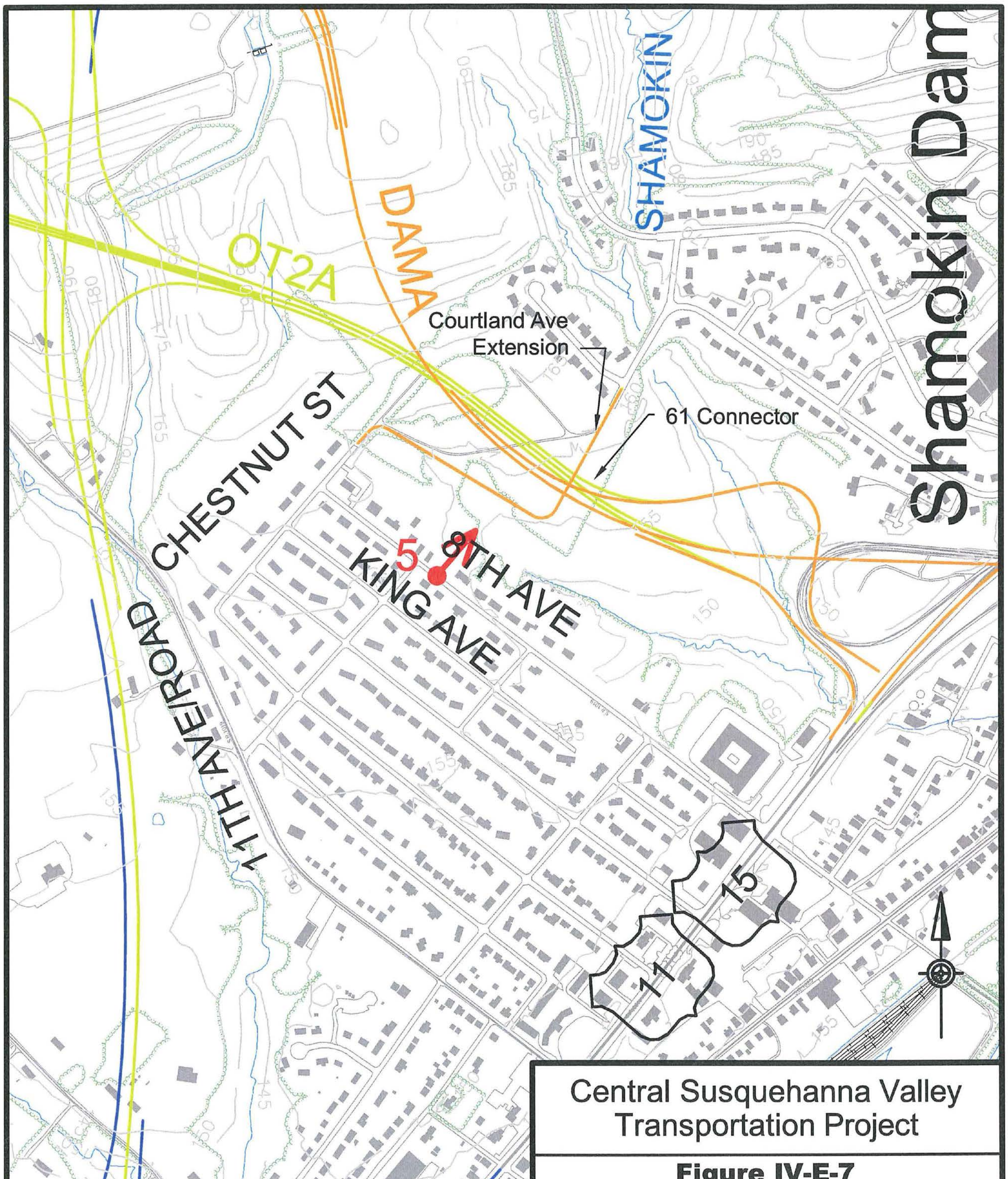
Area 7	Description
Location	On the south side of Orchard Hills, intersection of Courtland Drive and Rome Court, facing southwest.
Impact	The existing view is of the hollow and related woods and dirt trail located between the Gunter and Orchard Hills developments. The Courtland Avenue Extension continues south on fill [beginning 40 m (131') from the viewer], crossing the 61 Connector 200 m (656') away. The proposed view shows the elevation of the Courtland Avenue Extension over the 61 Connector and the bridge in the background. From this area the view of the OT2A Alternative is virtually identical to the DAMA Alternative. See Figure IV-E-9.
Mitigation	Landscape fills, use landscaping and vegetative screening wherever possible to help soften the view.

Area 8	Description
Location	On the south side of Orchard Hills, Rome Court, facing southwest.
Impact	The existing view is of the hollow and related woods located between the Gunter and Orchard Hills developments. There is no visual impact. The existing topography provides a natural buffer between Orchard Hills and the DAMA Alternative. Slightly visible in the background is the top of a 5.5 m (18') sound barrier, approximately 100 m (330') away. From this area the view of the OT2A Alternative is virtually identical to the DAMA Alternative. See Figure IV-E-10.
Mitigation	None needed.

Area 9	Description
Location	On the south side of Orchard Hills, Jonathan Road, facing southwest.
Impact	The existing view is of the hollow and related woods located between the Gunter and Orchard Hills developments. There is no visual impact. The trees provide a natural buffer between Orchard Hills and the DAMA Alternative. From this area the view of the OT2A Alternative is virtually identical to the DAMA Alternative. See Figure IV-E-11.
Mitigation	None needed.

Before

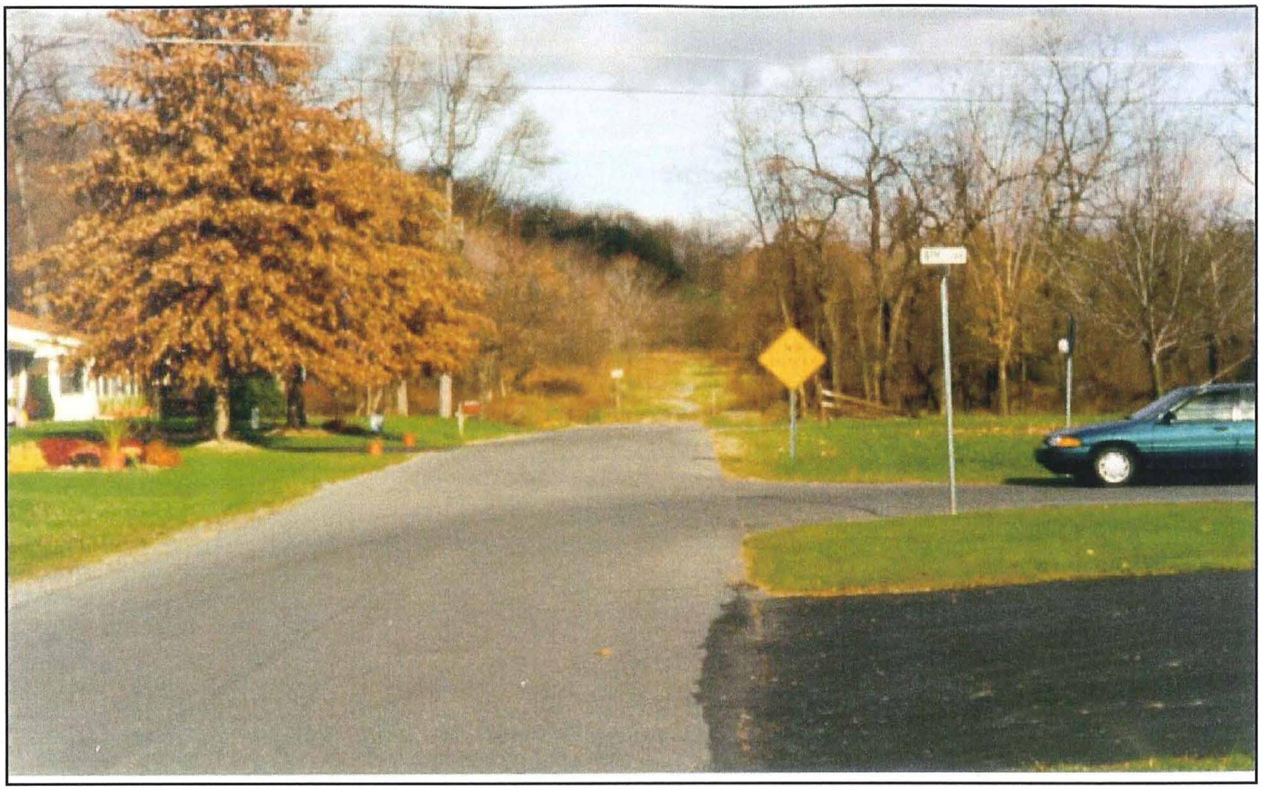
After



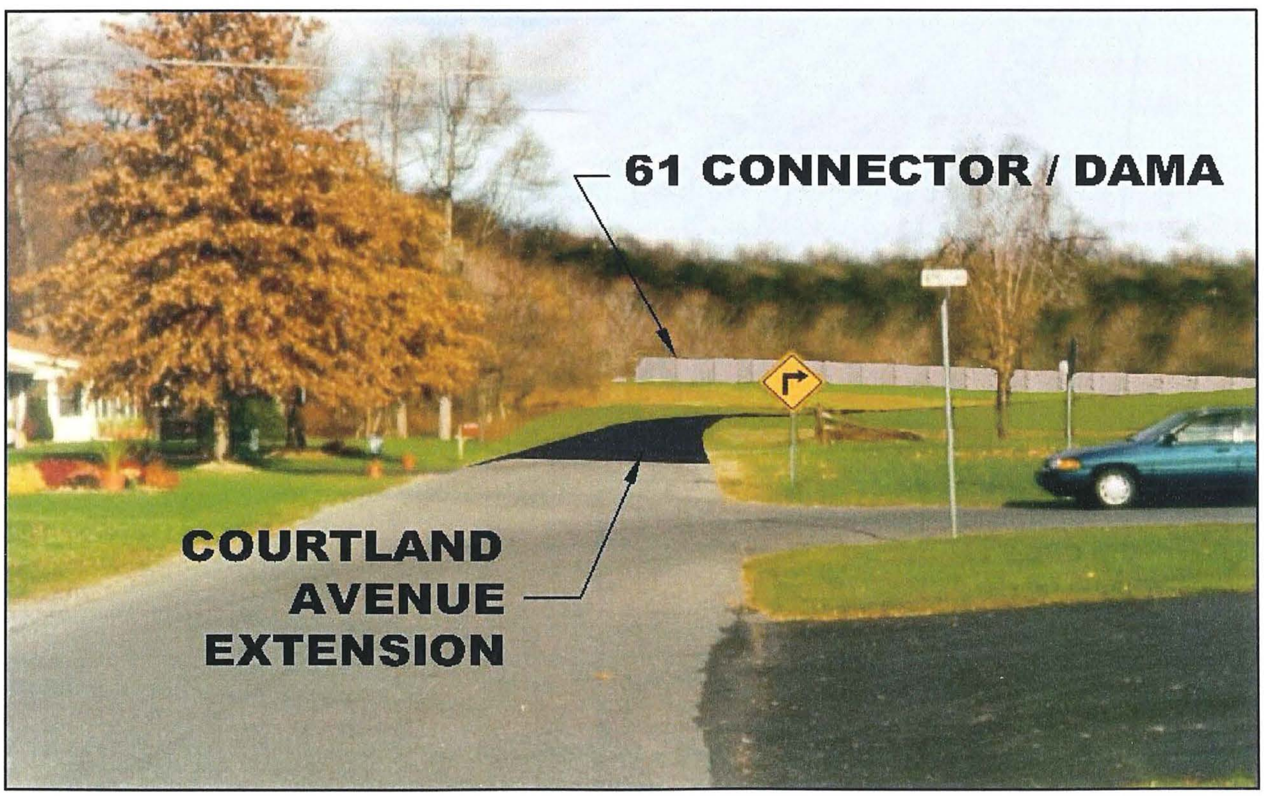
Central Susquehanna Valley Transportation Project

Figure IV-E-7

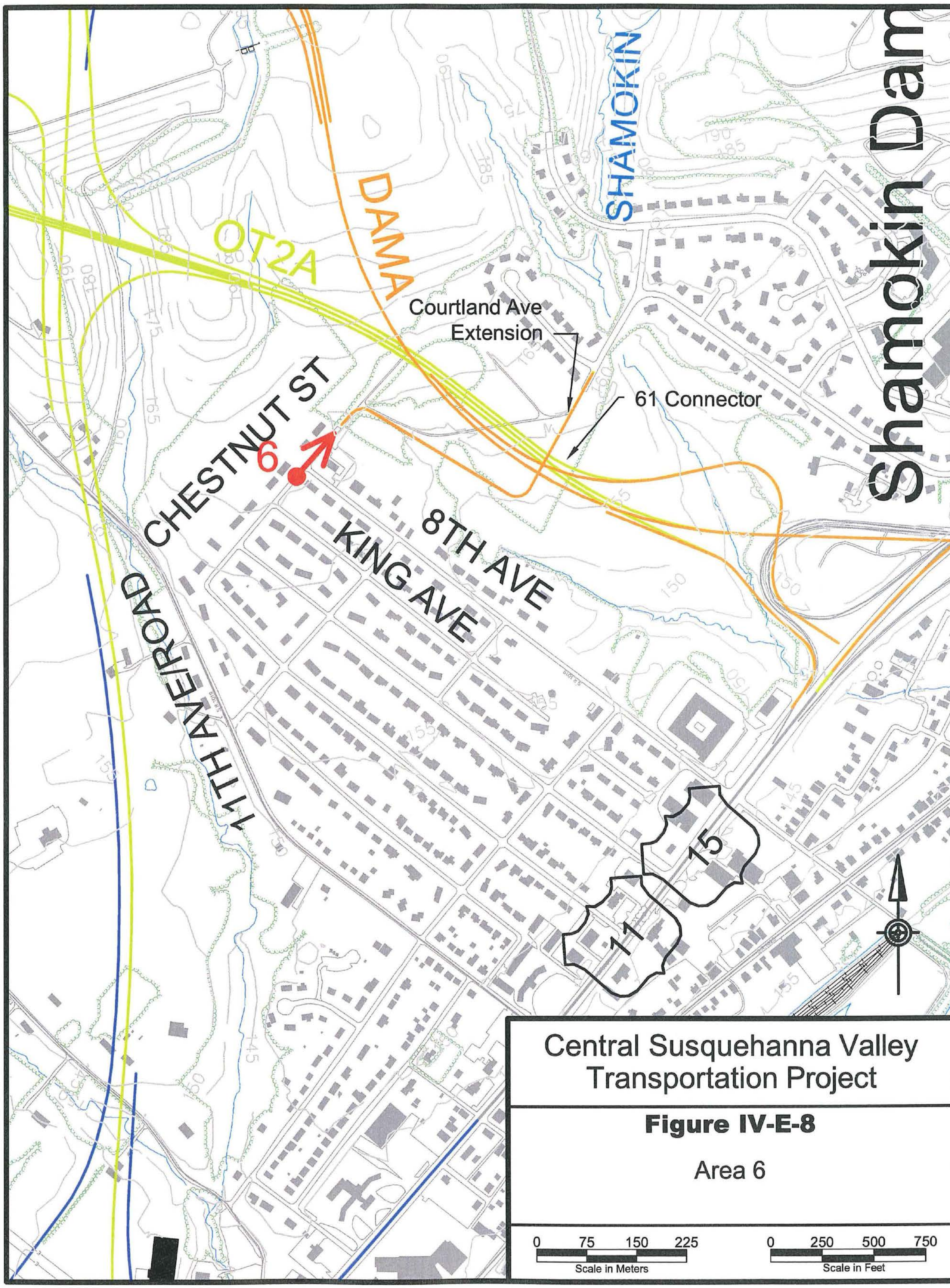
Area 5



Before



After



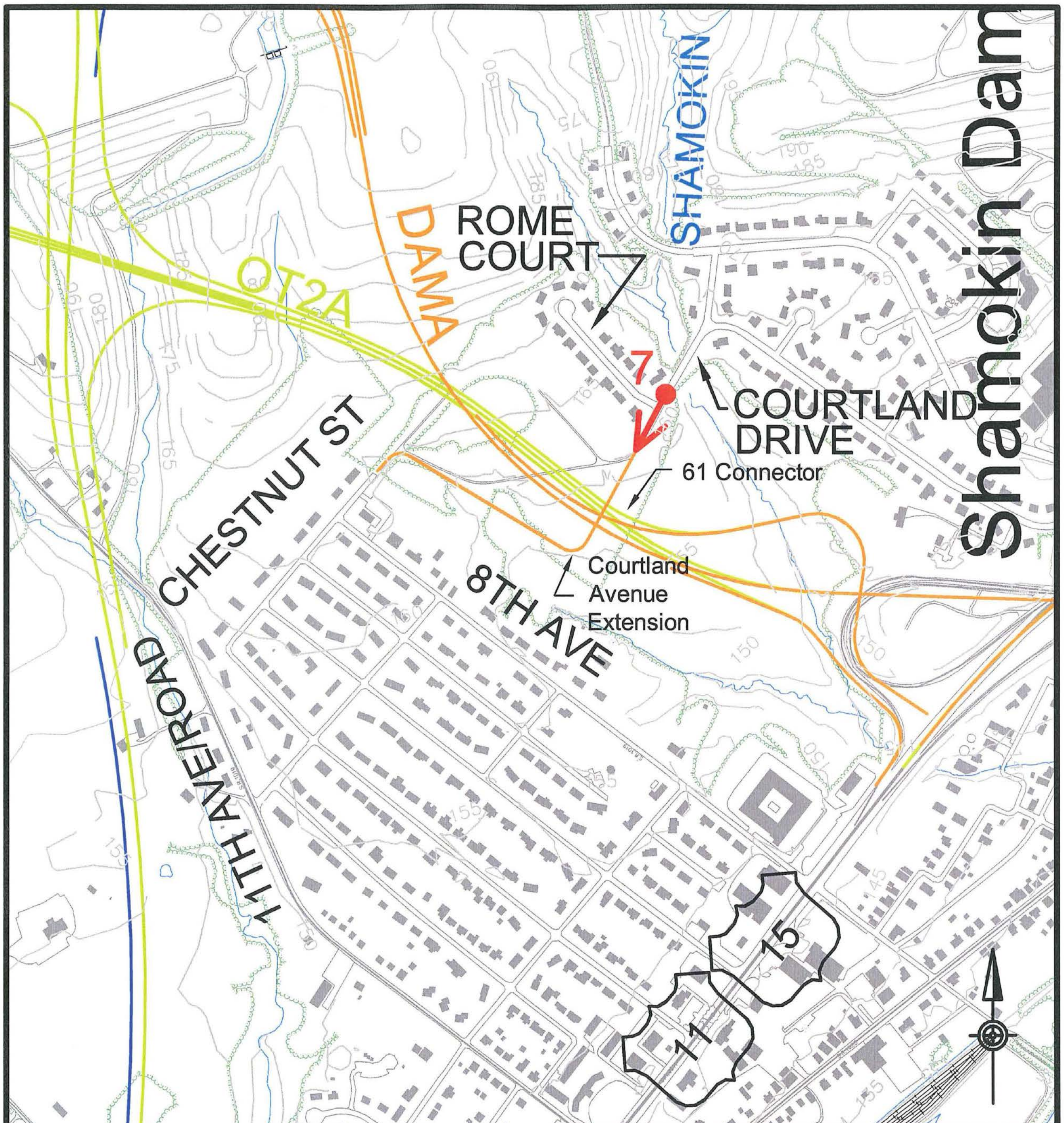
Central Susquehanna Valley Transportation Project

Figure IV-E-8

Area 6

Before

After



Central Susquehanna Valley Transportation Project

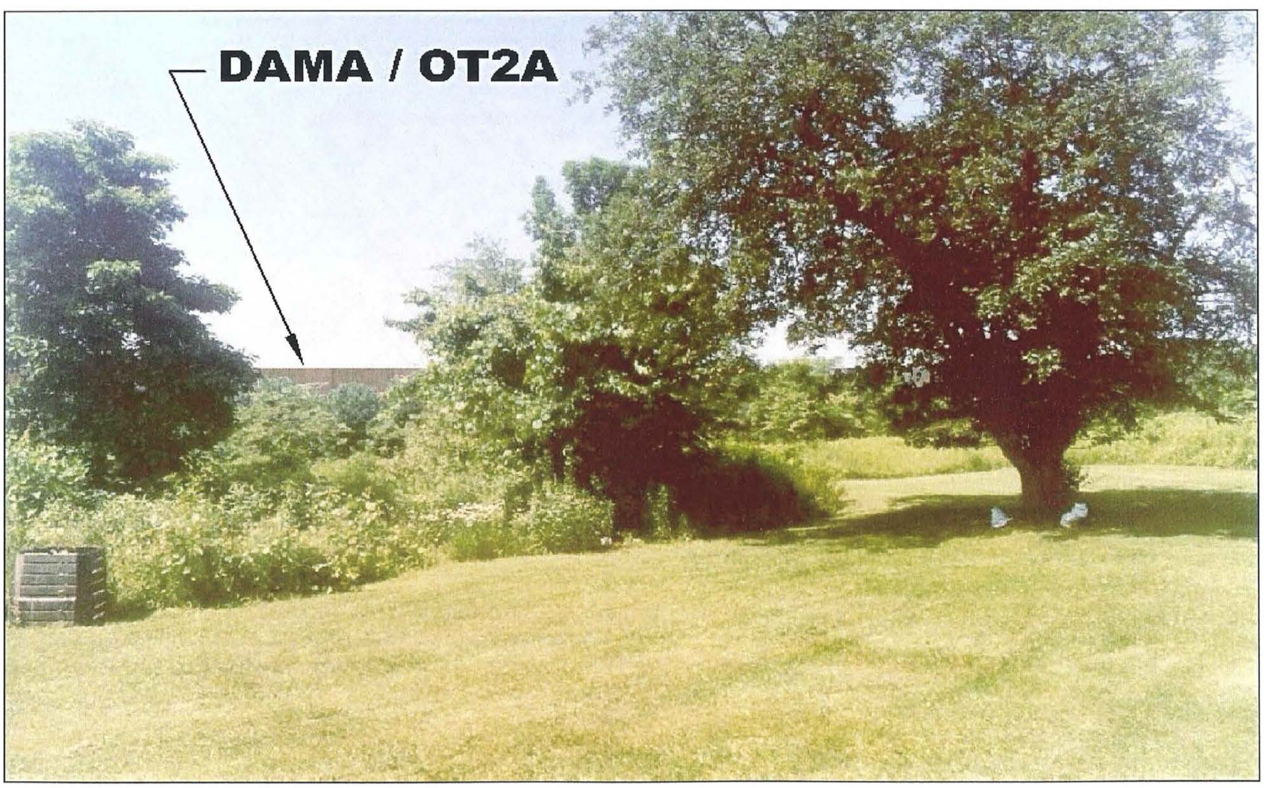
Figure IV-E-9

Area 7

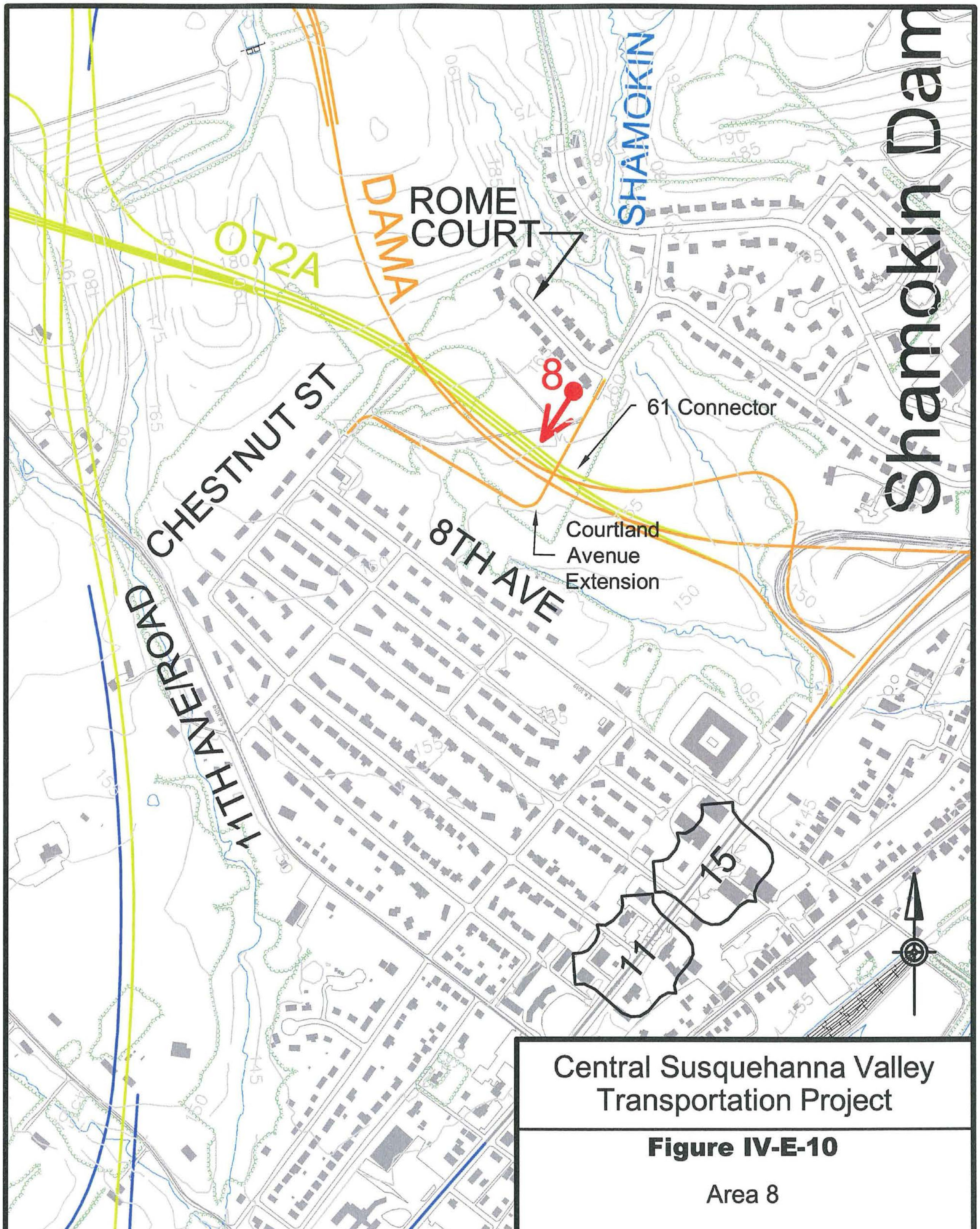
0 75 150 225 Scale in Meters

0 250 500 750 Scale in Feet

Before



After



Central Susquehanna Valley Transportation Project

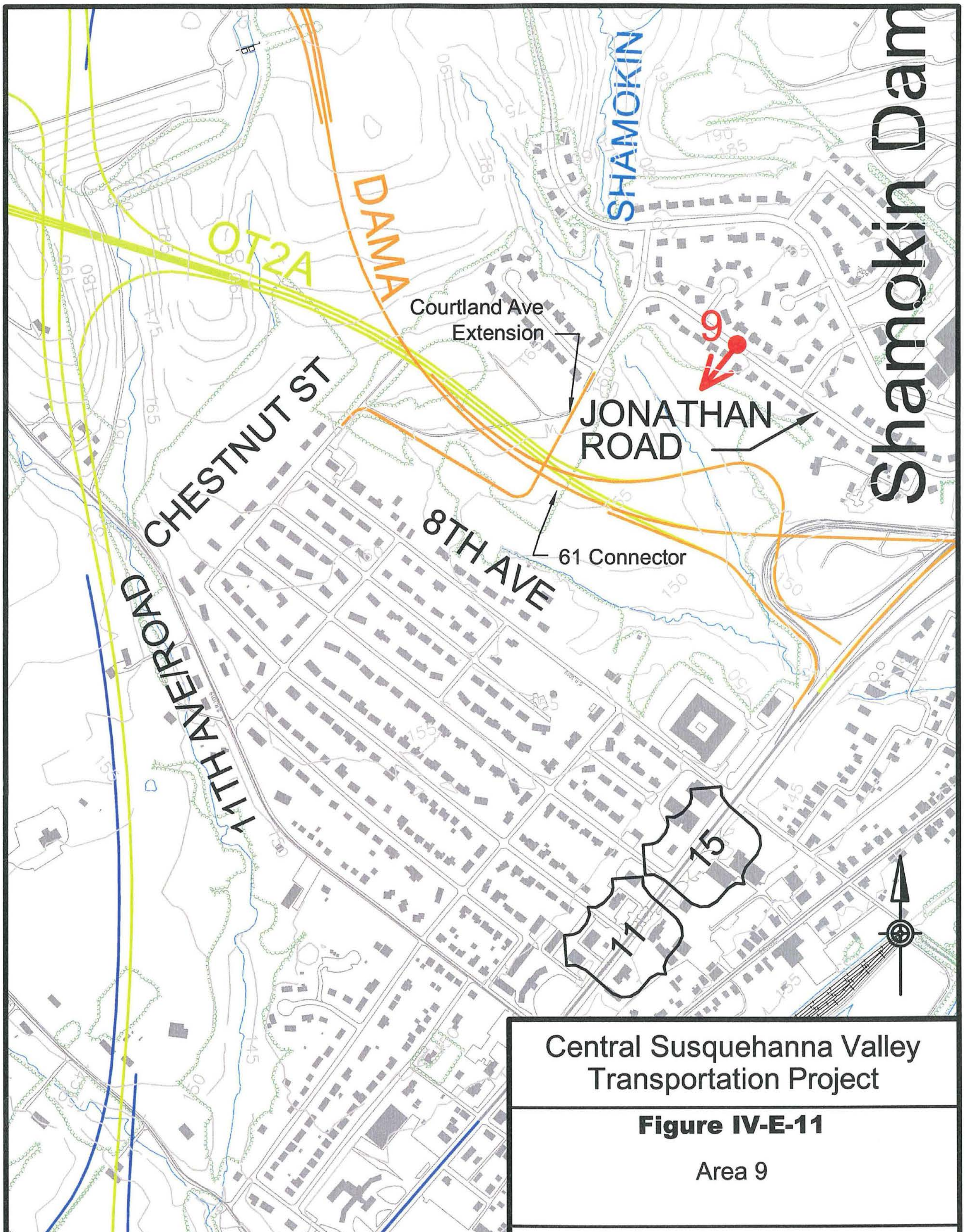
Figure IV-E-10

Area 8

Before

Note: The "After" view shows no change to the existing viewshed.

After



Central Susquehanna Valley Transportation Project

Figure IV-E-11

Area 9

ii. OT2A

Area 6	Description
Location	In the Gunter residential housing development, on Eighth Avenue, facing northeast.
Impact	The existing views show the hollow and related woods and dirt trail located between the Gunter and Orchard Hills developments. Area 6 shows the Courtland Avenue Extension pavement fading into the distance and bearing off to the right approximately 150 m (492') away. The 61 Connector is at the base of the ridgeline, about 245 m (804') away. Visible in the proposed view is the 4.3 m (14') sound barrier, approximately 240 m (787') away. The Courtland Avenue Extension displaces the trees to the right of the photo. See Figure IV-E-12.
Mitigation	Landscape fills, use landscaping and vegetative screening wherever possible to help soften the view.

Area 10	Description
Location	In East Hummels Wharf, on Lenker Avenue, facing southeast toward the Old Susquehanna Trail and the river.
Impact	Part of the riparian corridor is visible behind the houses. The proposed view shows the OT2A Alternative displacing the vegetated community with a road and retaining wall approximately 225 m (738') away from the observer's position. The road itself is approximately 10 meters (32.8') above the existing grade, not including the addition of a 4.3 m (14') sound barrier. See Figure IV-E-13.
Mitigation	The road is too high for successful mitigation, but tinting the color of the retaining wall and sound barrier, and providing evergreen screening on the western side of the highway will help soften the impact.

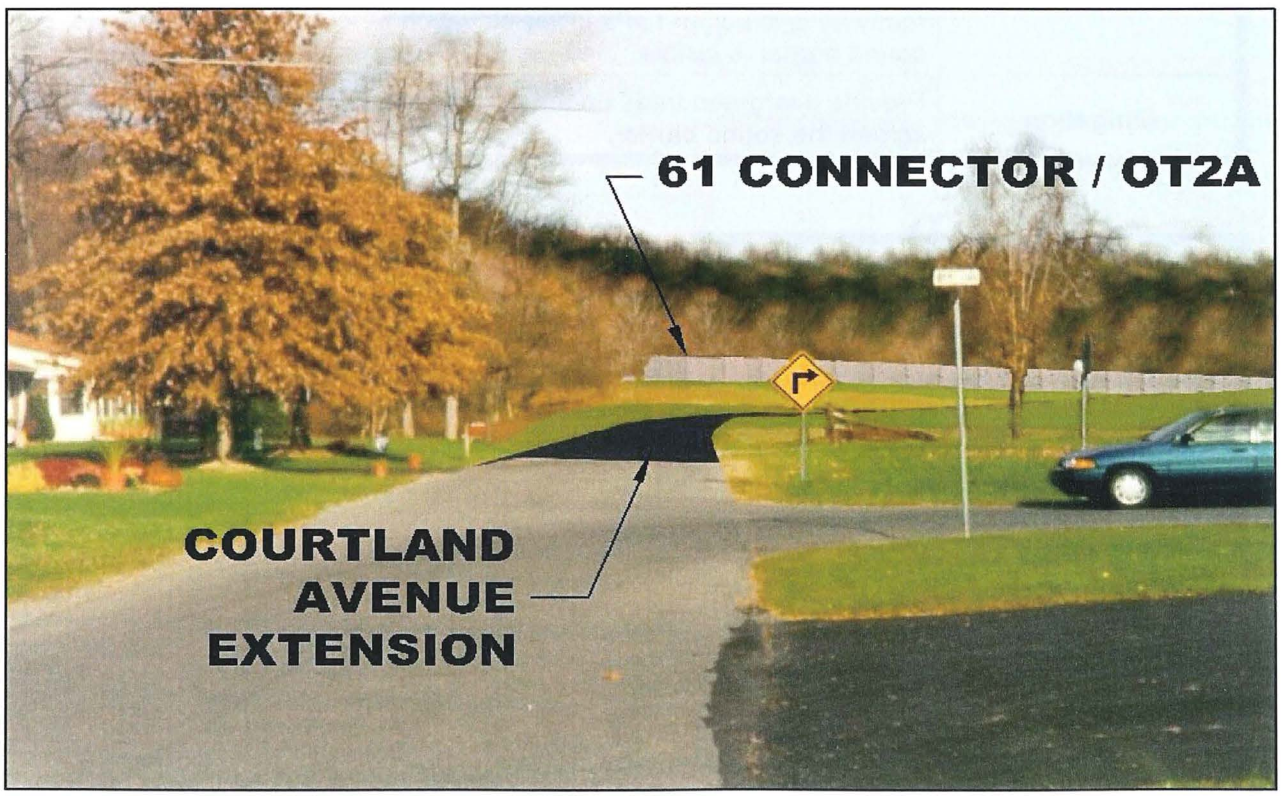
Area 11	Description
Location	In East Hummels Wharf, on Old Susquehanna Trail, one-half block north of Park Road facing south.
Impact	The current view includes two of the homes and associated residential structures located along the Old Susquehanna Trail, with the PP&L Ash Basin in the background. The OT2A proposed view shows the roadway with the road atop an earthen berm 3 m (19.7') high, 150 m (492') away. A sound barrier 4.9 m (16') high shields the road from view, and the garage (in the center of the photo) is displaced. See Figure IV-E-14.
Mitigation	The road is too high for successful mitigation, but tinting the color of the retaining wall and sound barrier, and providing evergreen screening on the western side of the highway will help soften the impact.

Area 12	Description
Location	In East Hummels Wharf, intersection of Runyan Road and US Route 11/15, facing northeast.
Impact	Bailey's Produce Patch can be seen in the distance on the right side of US Route 11/15, with God's Holiness Grove Campground being obscured by the trees on the opposite side of the highway. The proposed view shows a bridge crossing US Route 11/15 approximately 400 m (1,312') away. A few concrete piers are slightly visible, with the bridge deck at a height of 8 m (26'). See Figure IV-E-15.
Mitigation	To filter the view of the piers, clusters of trees might be planted if they do not cause additional displacement or create hazards for errant vehicles.

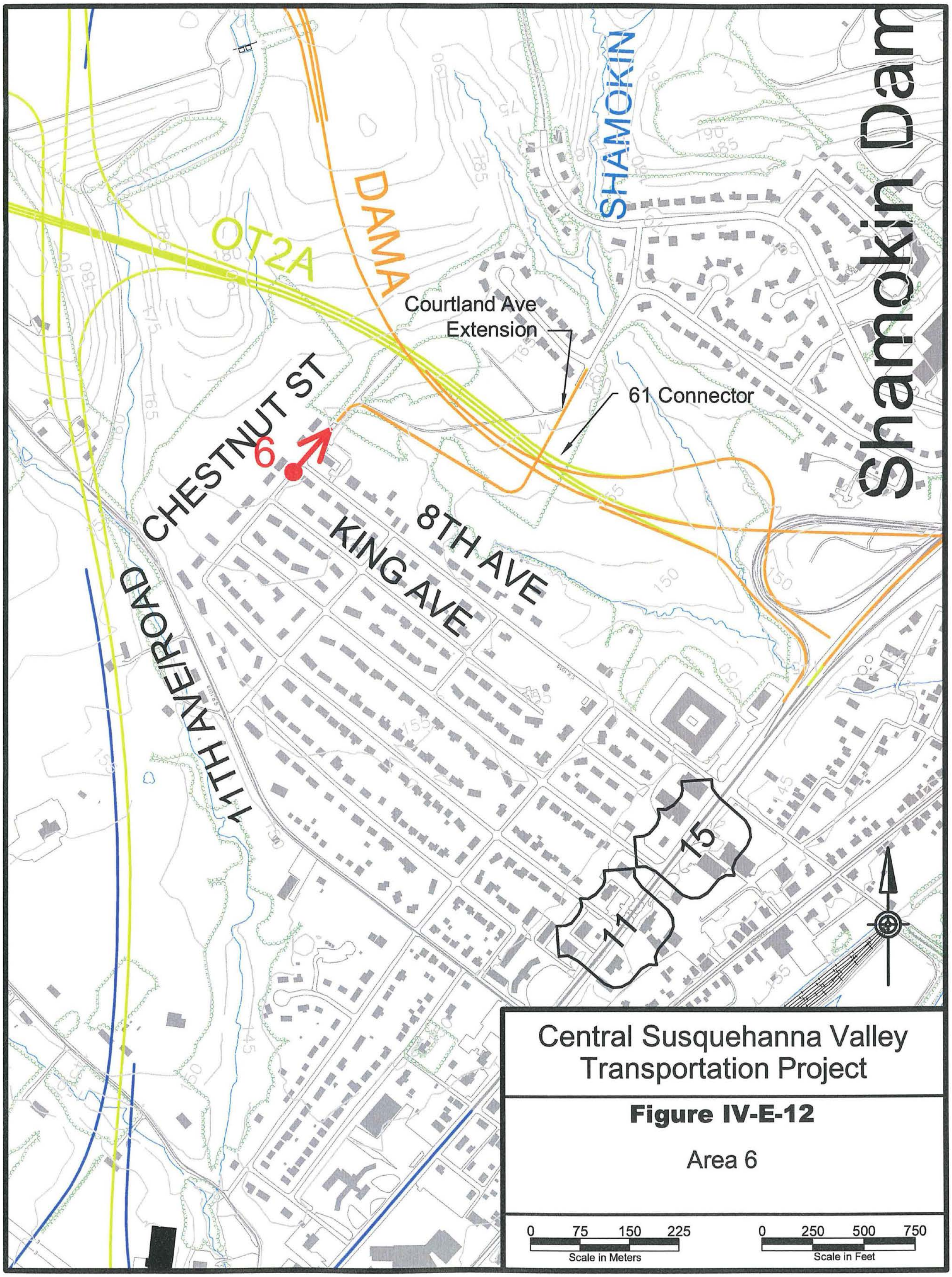
Area 13	Description
Location	On the south side of the Gunter residential development, corner of Queen Avenue and Spruce Street, facing southwest across Eleventh Avenue.
Impact	Mixed agricultural and residential land borders the southern and western limits of the Gunter development. The proposed view shows the OT2A Alternative located about 250 m (820') away, but since the roadway is in cut and at a lower elevation here, only the 5.5 m (18') sound barrier is visible. See Figure IV-E-16.
Mitigation	Provide evergreen trees on the northeast side of the highway to screen the sound barrier.

Areas 4, 5, 7, 8, and 9	These areas are described in Figures IV-E-6 and IV-E-7, and IV-E-9 to IV-E-11.

Before



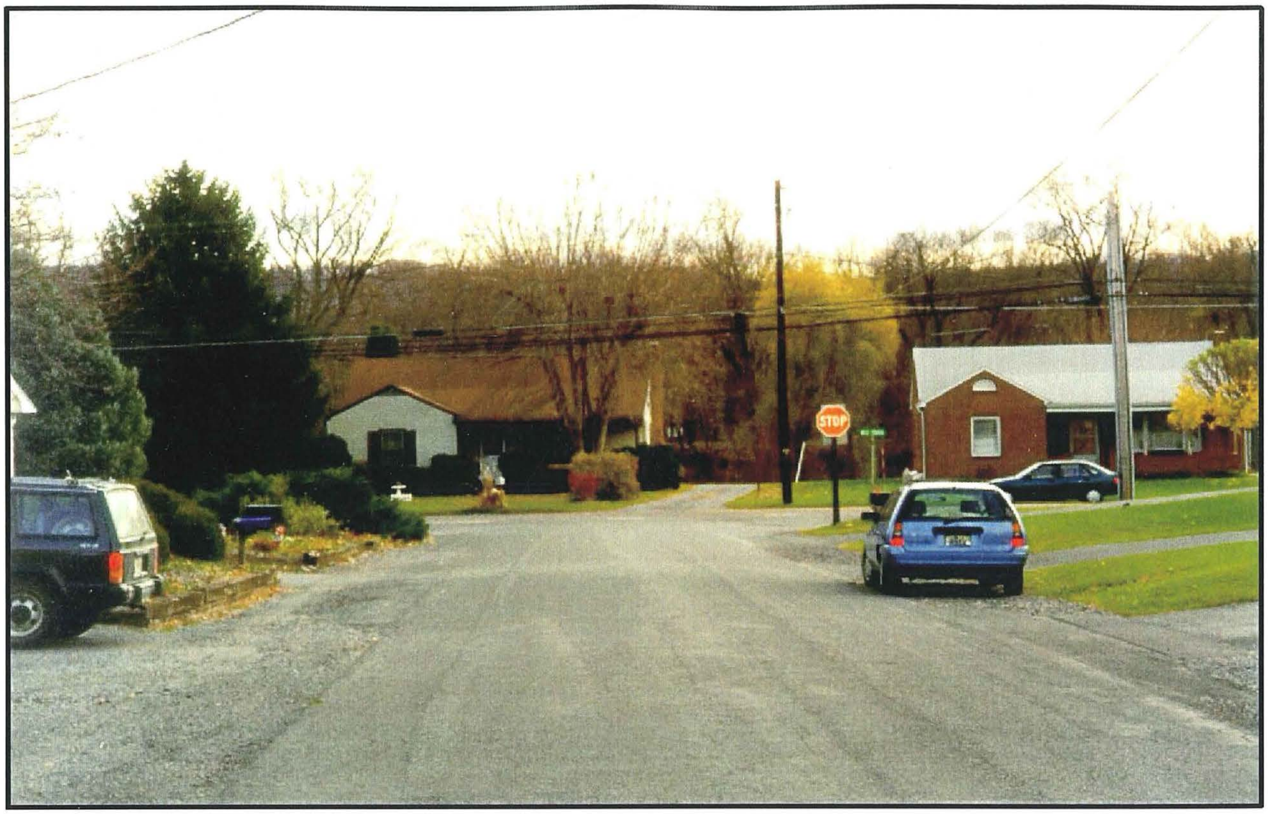
After



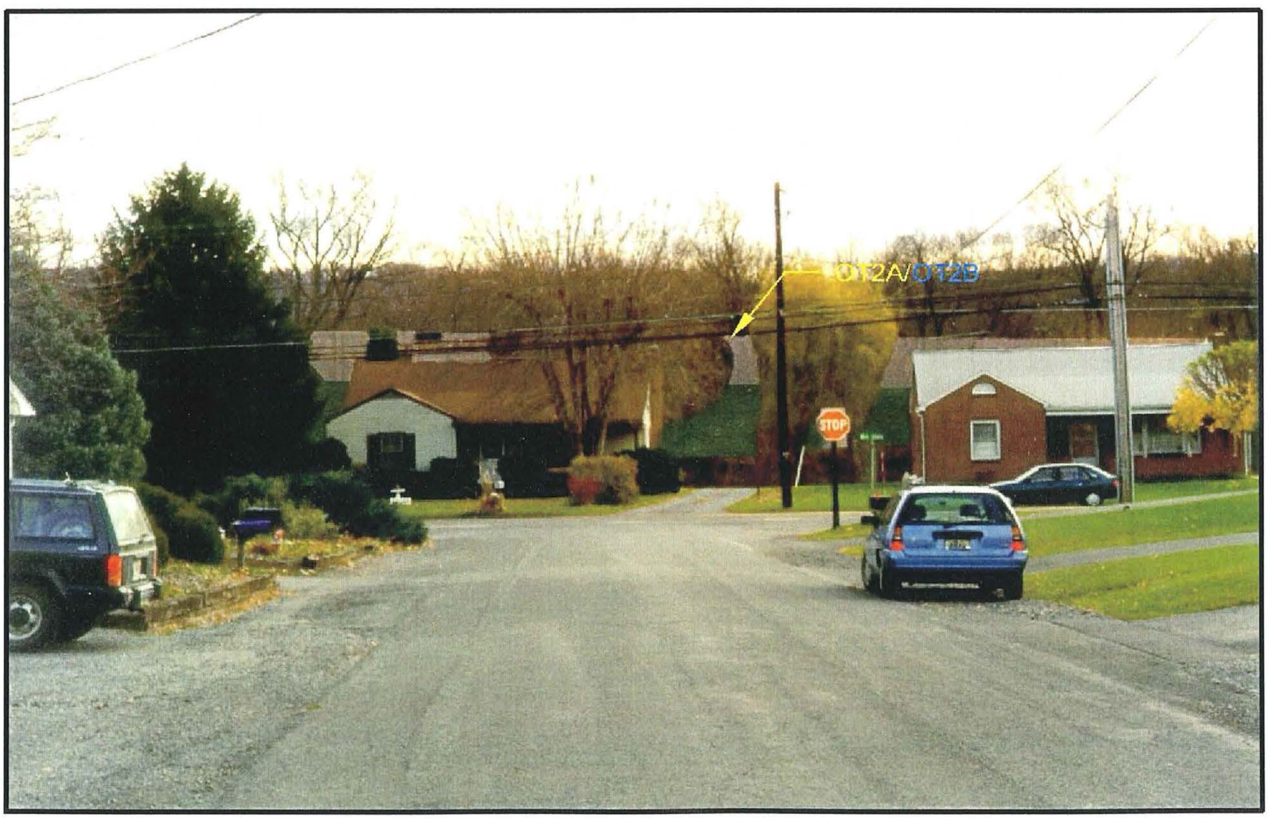
Central Susquehanna Valley Transportation Project

Figure IV-E-12

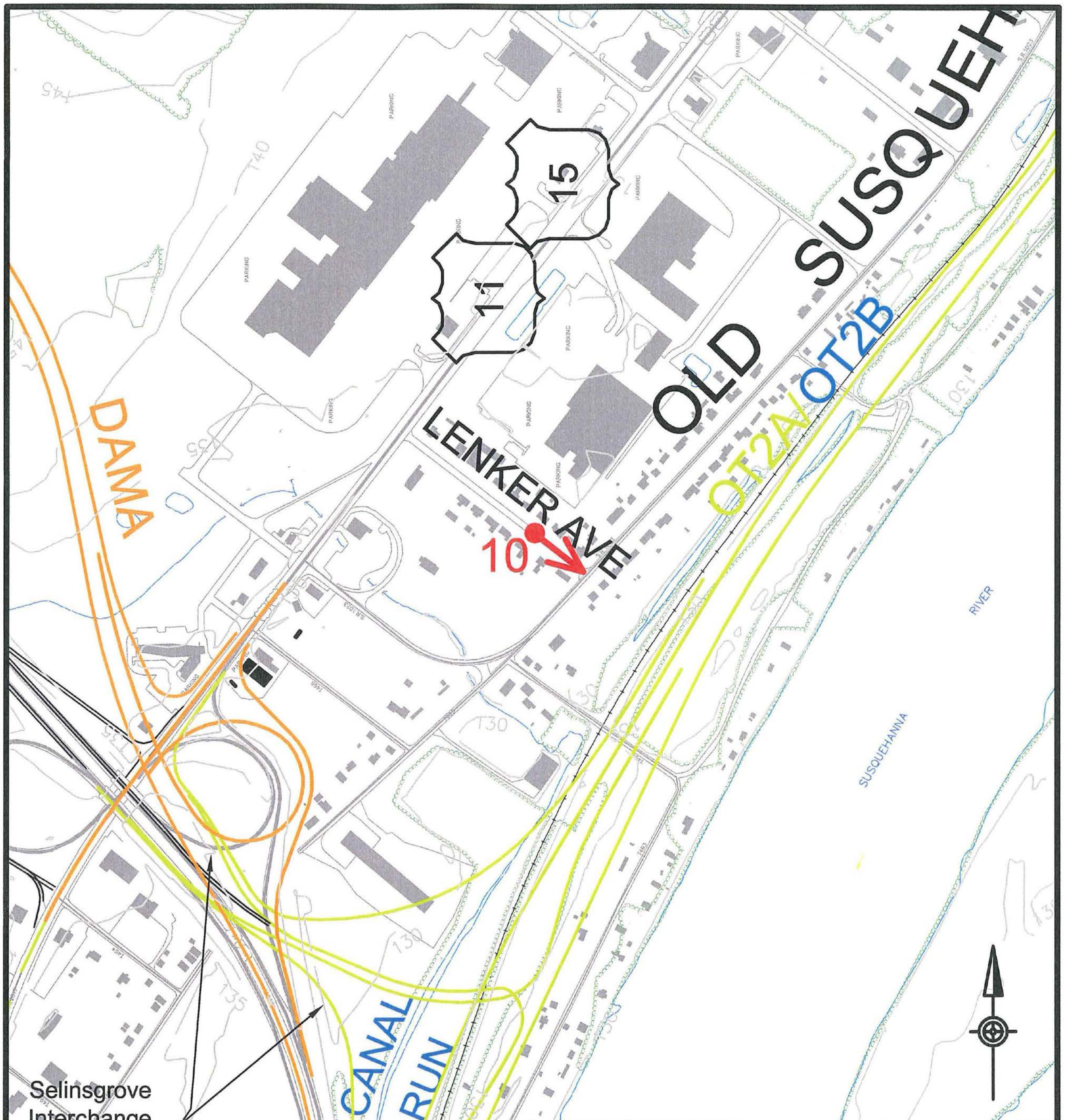
Area 6



Before



After



Central Susquehanna Valley Transportation Project

Figure IV-E-13

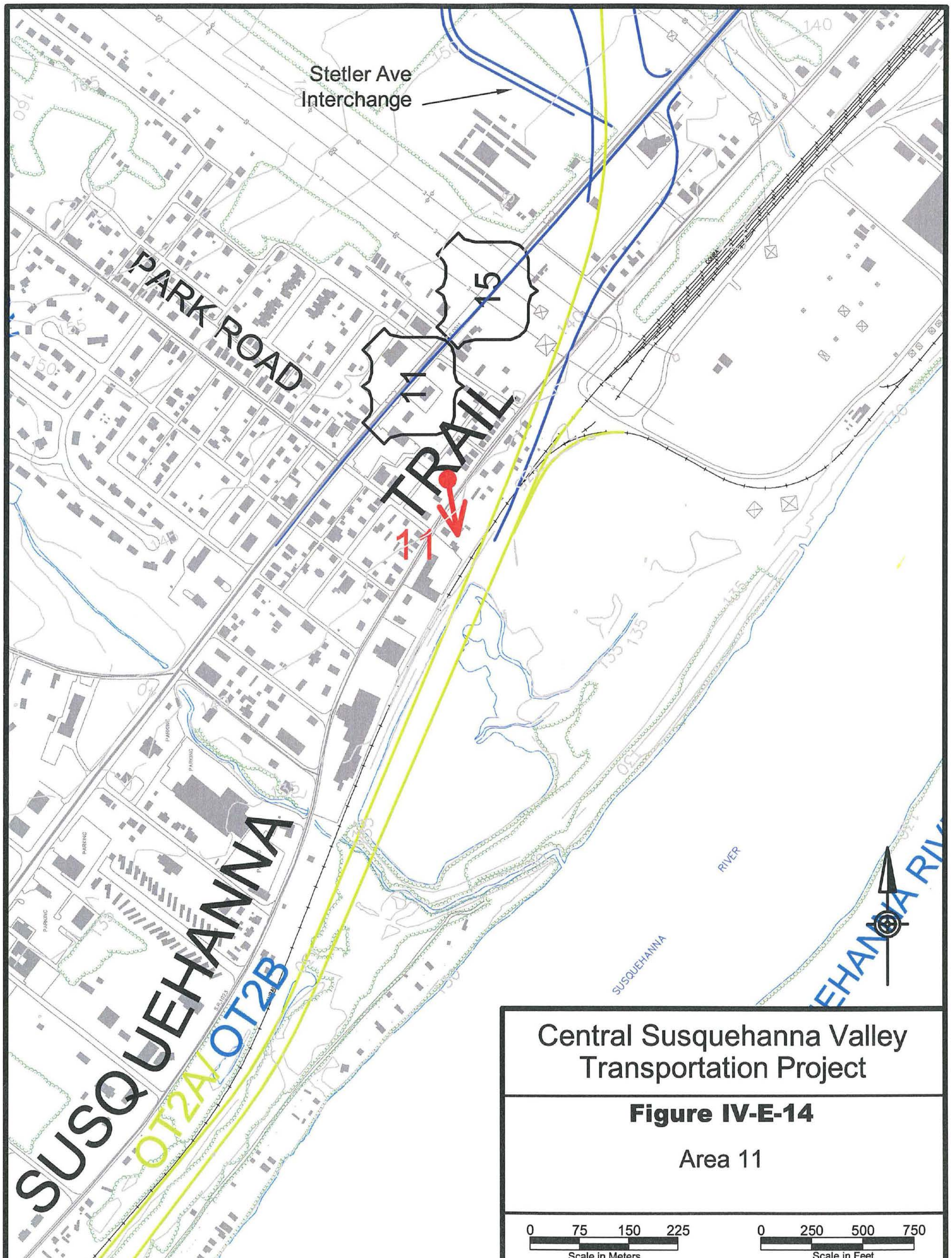
Area 10

0 75 150 225 Scale in Meters

0 250 500 750 Scale in Feet

Before

After



Central Susquehanna Valley Transportation Project

Figure IV-E-14

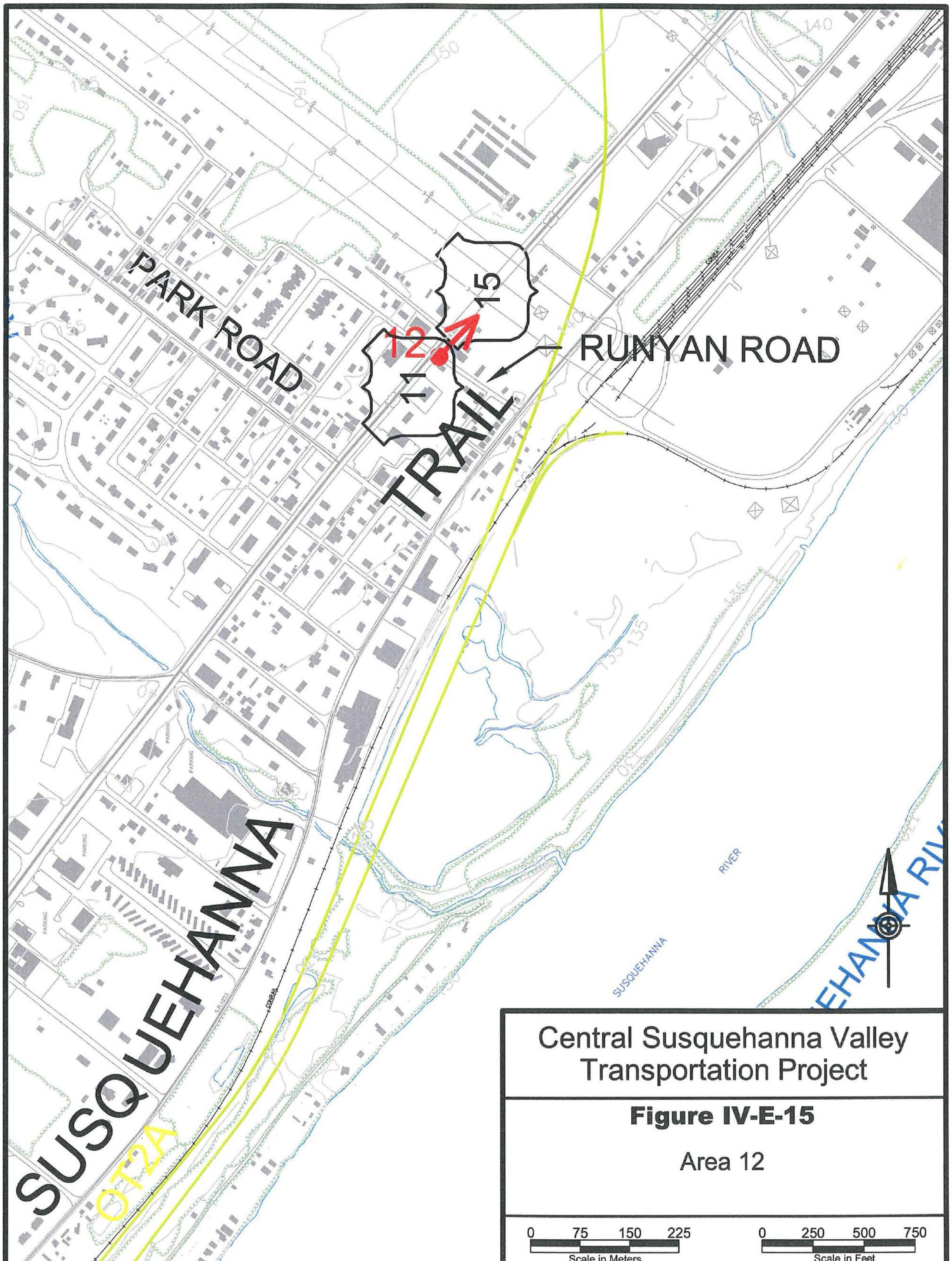
Area 11

0 75 150 225 Scale in Meters

0 250 500 750 Scale in Feet

Before

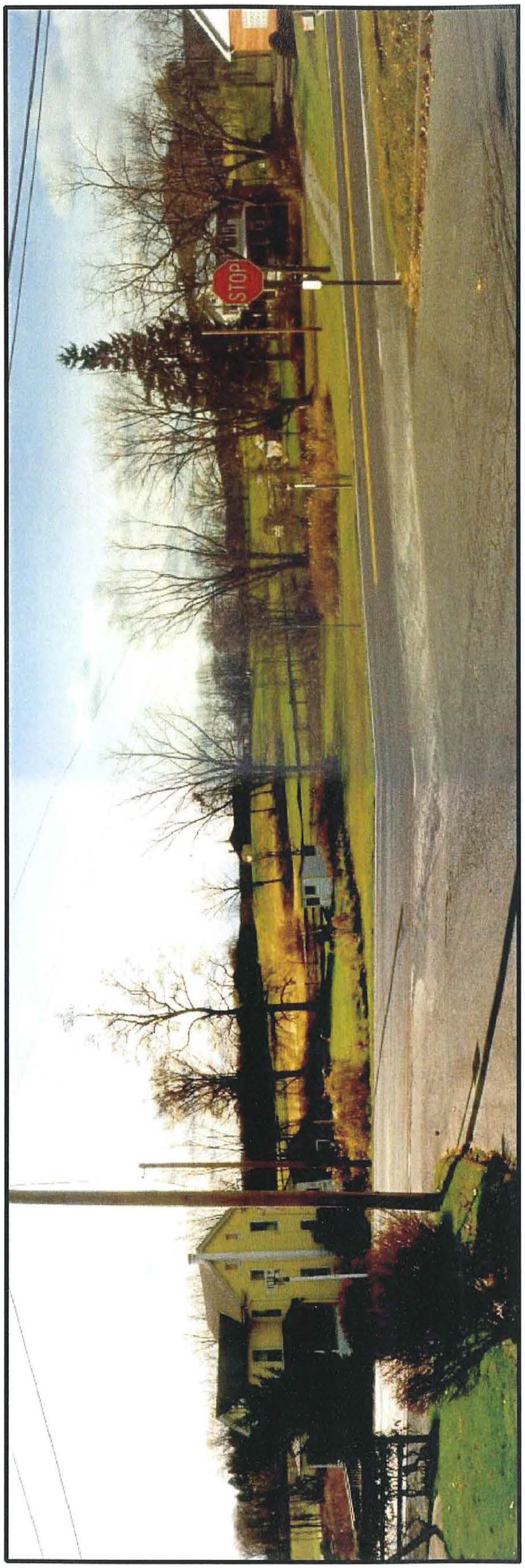
After



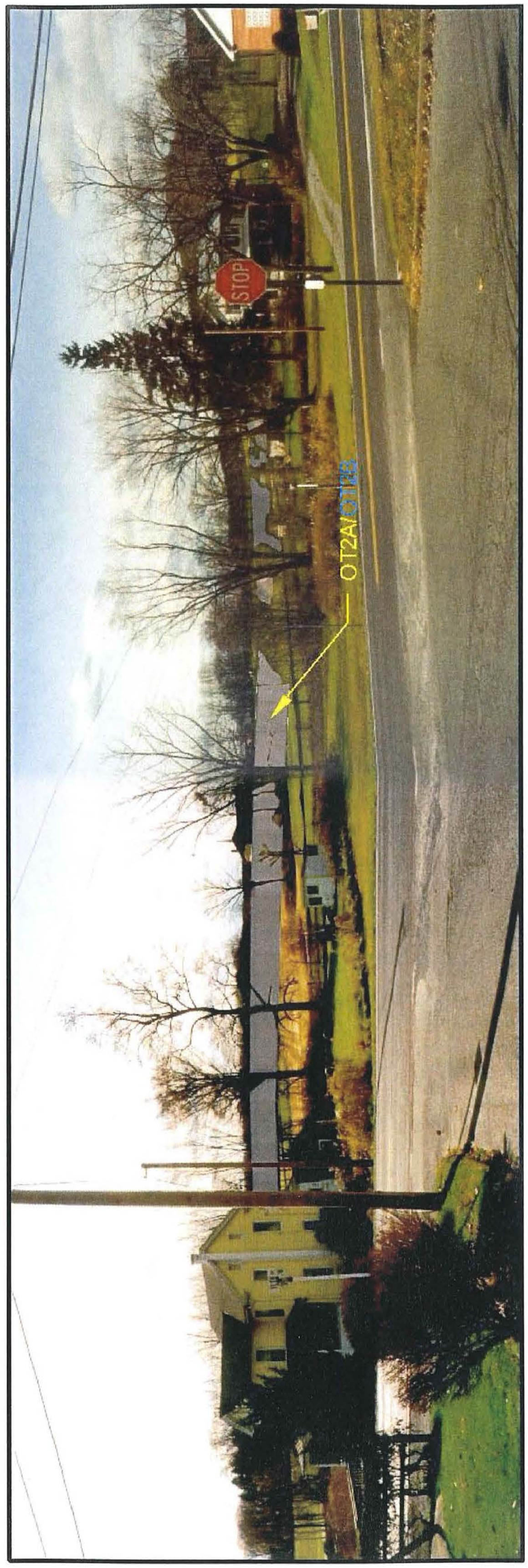
Central Susquehanna Valley Transportation Project

Figure IV-E-15

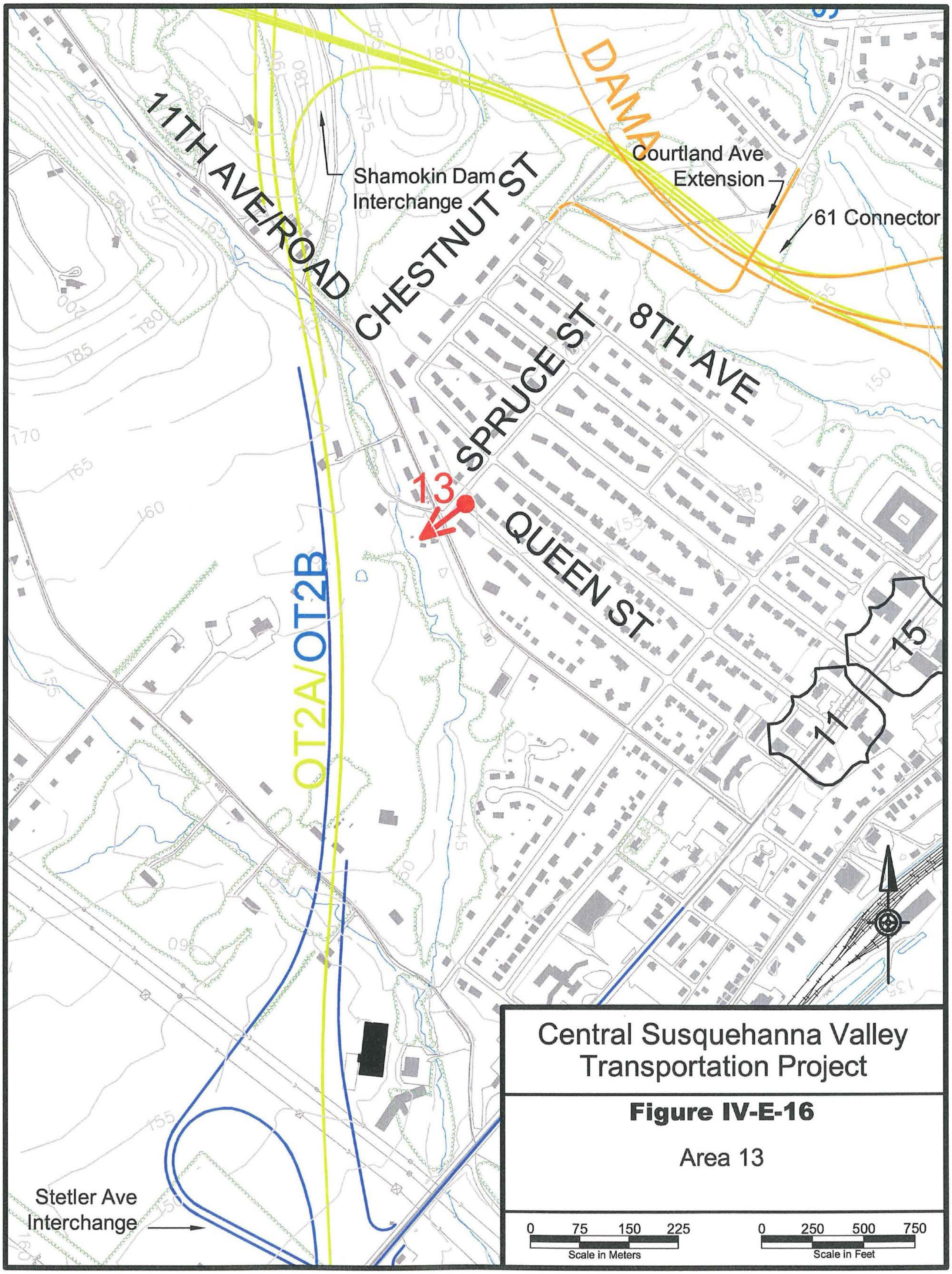
Area 12



Before



After



Central Susquehanna Valley Transportation Project

Figure IV-E-16

Area 13

0 75 150 225
Scale in Meters

0 250 500 750
Scale in Feet

iii. OT2B

Areas 10, 11, and 13	These areas are described in Figures IV-E-13, IV-E-14, and IV-E-16.

Area 12	Description
Location	In East Hummels Wharf, intersection of Runyan Road and US Route 11/15, facing northeast.
Impact	The proposed view (not shown) will be similar to the rendering for OT2A Area 10, except that the OT2B has an interchange constructed to the right side of US Routes 11/15, so the existing roadway would be widened on that side to allow for an on-ramp. See Figure IV-E-15.
Mitigation	To filter the view of the piers, clusters of trees might be planted if they do not cause additional displacement or create hazards for errant vehicles.

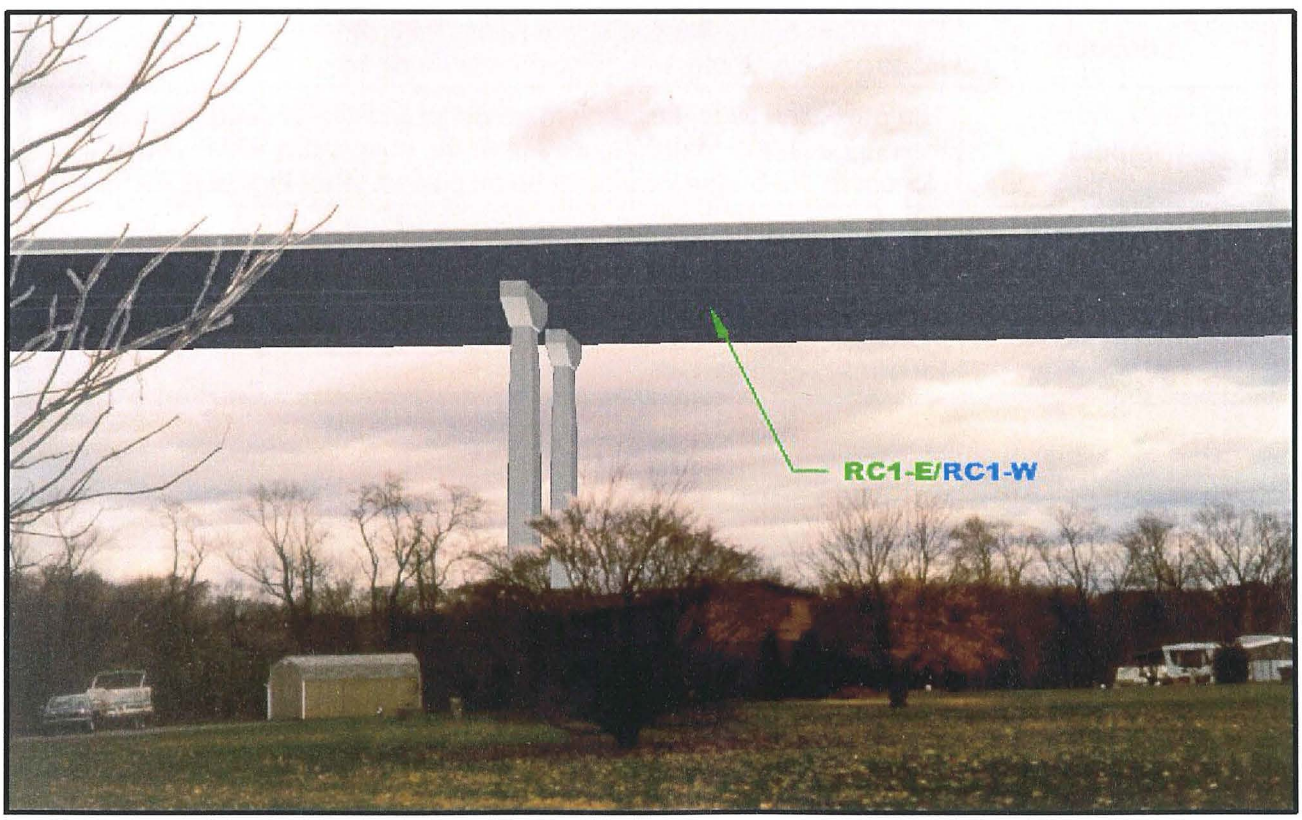
b. Section 2

i. RC1-E

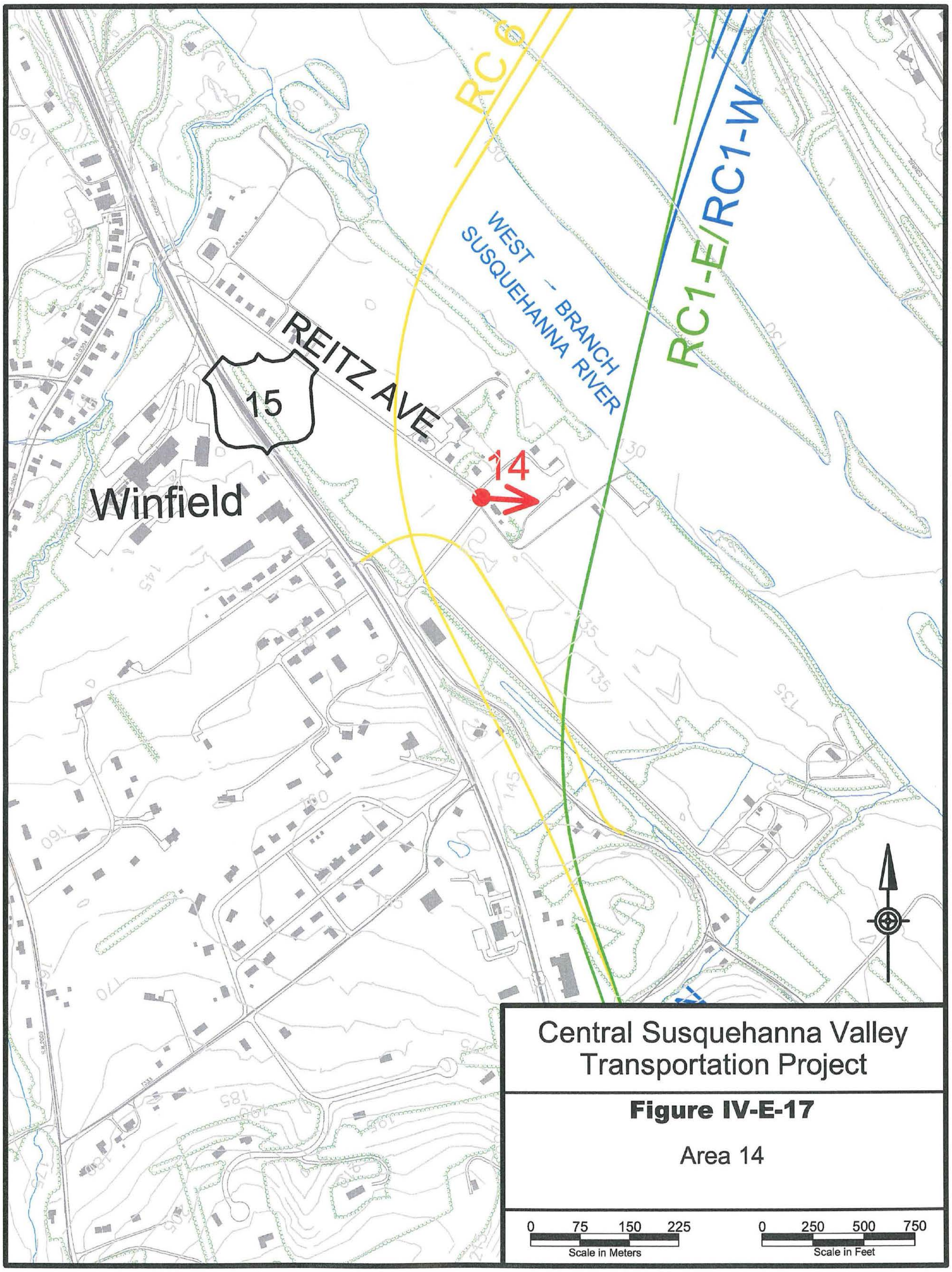
Area 14	Description
Location	Reitz Avenue, near Winfield. The view is to the east, toward the Susquehanna River.
Impact	There will be a substantial impact to the viewshed. While the existing view shows a moderately developed residential area, the proposed view shows a bridge located behind the residential structures, approximately 200 m (656') away. Several piers are visible, supporting the bridge approximately 27 m (88') above the existing grade. See Figure IV-E-17.
Mitigation	The bridge will be too high for successful mitigation, so consider using a bridge design (color/texture/materials) that will blend into the landscape. To filter the view of the piers, clusters of trees might be planted if they do not cause additional displacement or create hazards for errant vehicles.

Area 15	Description
Location	East shore of the Susquehanna River, near the intersection of Ridge Road and PA Route 147. Photo faces northwest.
Impact	The proposed view (not shown) is similar to RC1-W Area 15, except the bridge is 300 m (984') away from the observer and the house closest to the bridge would not be displaced. See Figure IV-E-18.
Mitigation	The bridge will be too high for successful mitigation, so consider using a bridge design (color/texture/materials) that will blend into the landscape. To filter the view of the piers, clusters of trees might be planted if they do not cause additional displacement or create hazards for errant vehicles.

Before



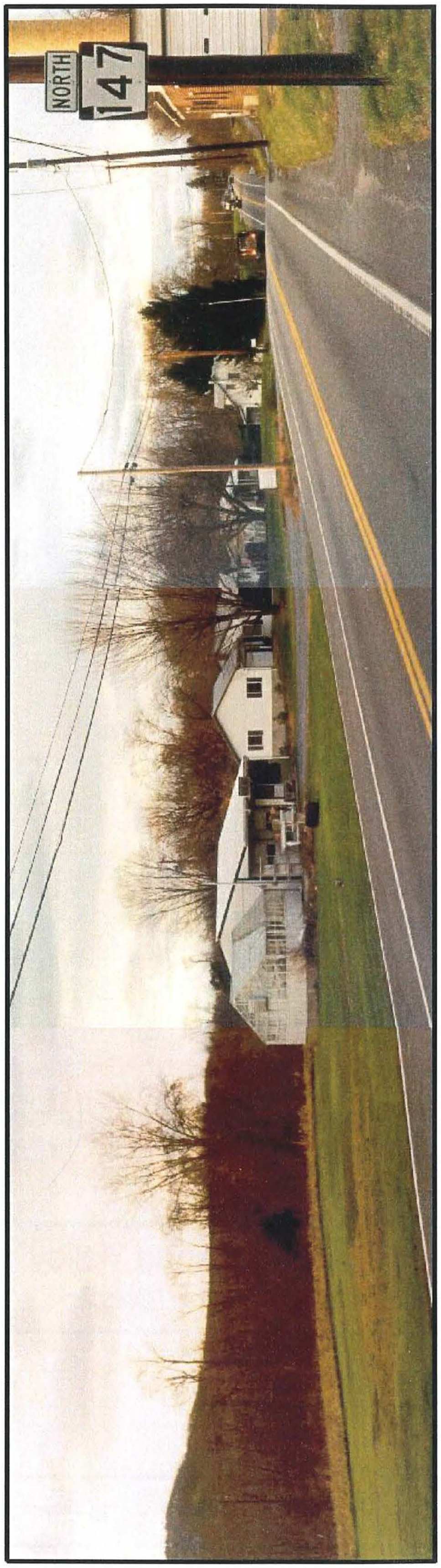
After



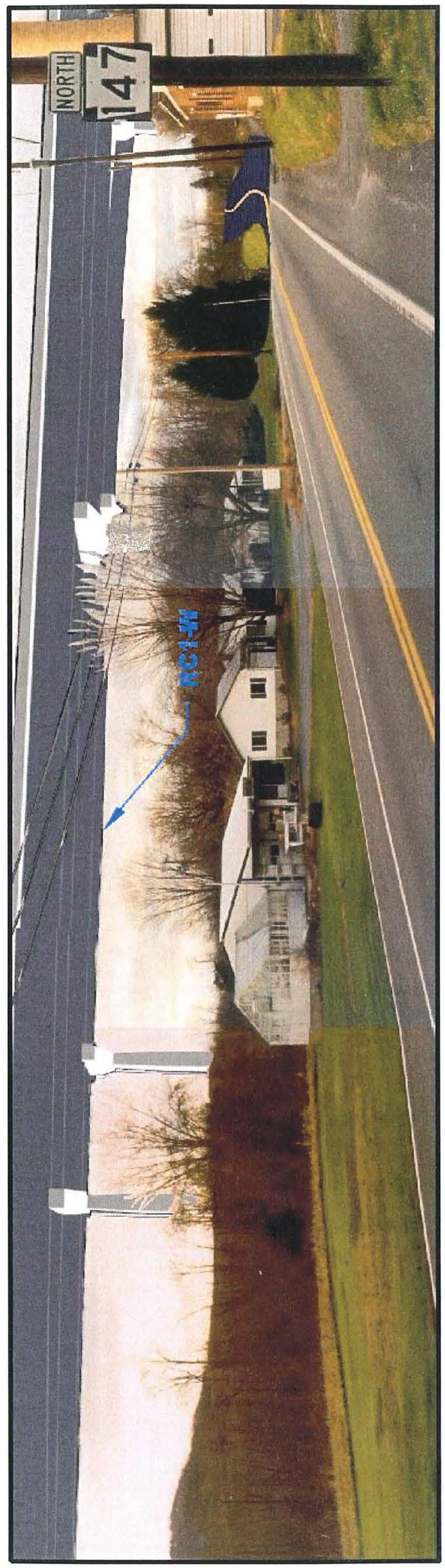
Central Susquehanna Valley Transportation Project

Figure IV-E-17

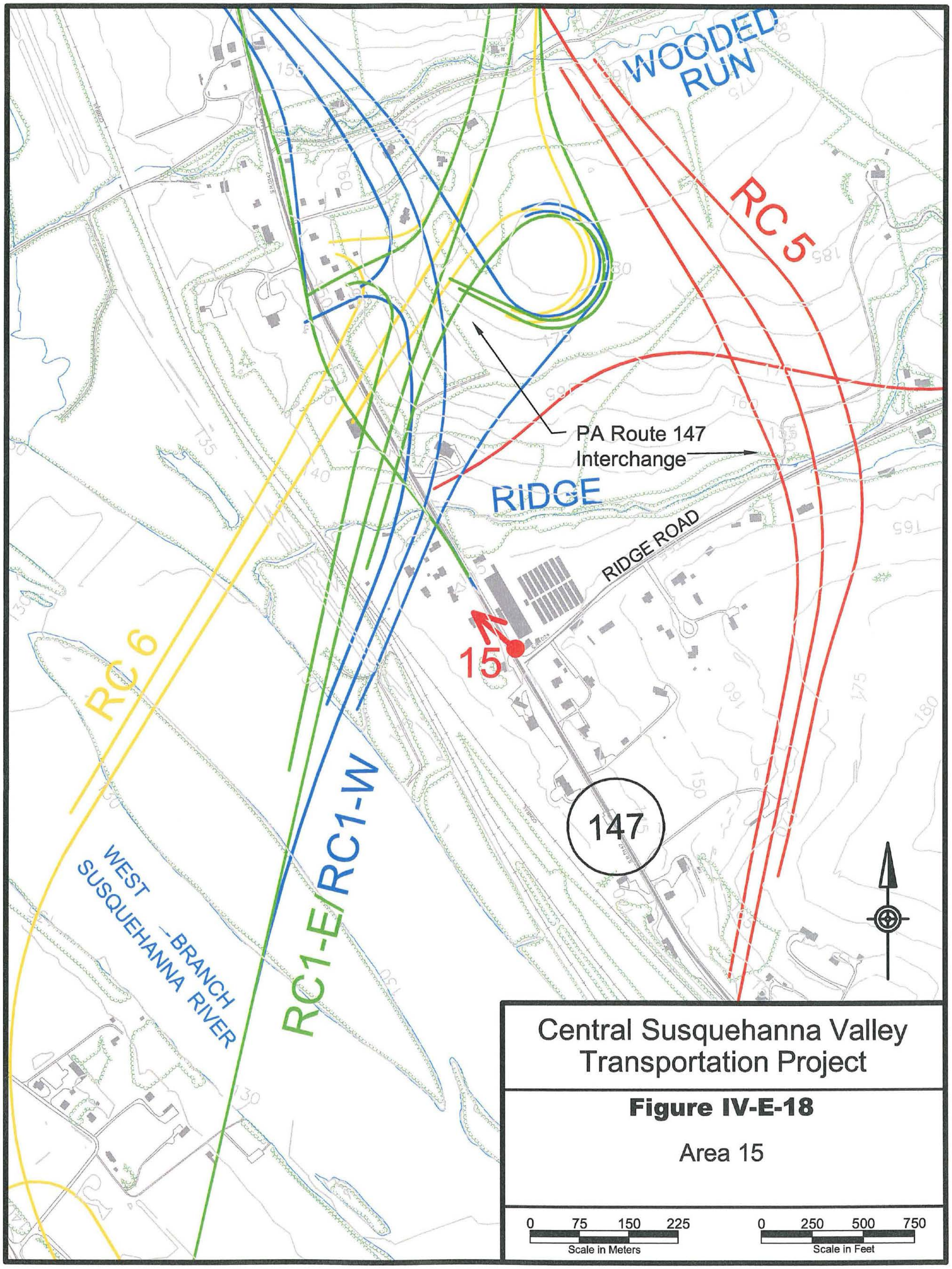
Area 14



Before



After



Central Susquehanna Valley Transportation Project

Figure IV-E-18

Area 15

ii. RC1-W

Area 14	This area is described in Figure IV-E-17.

Area 15	**Description**
Location	East shore of the Susquehanna River, near the intersection of Ridge Road West and PA Route 147. Photo faces northwest.
Impact	Located across the street from Boyd A. Mertz Greenhouse is a cluster of homes, wetlands, crop- and forestland. The proposed view shows a bridge with several piers beyond the trees and houses in the foreground. PA Route 147 is shifted toward the river (left side of the current alignment as seen in this view) and proceeds under the bridge which is 200 m (656') away and 37m (121') above the current grade. The house closest to the bridge is displaced. See Figure IV-E-18.
Mitigation	The bridge will be too high for successful mitigation, so consider using a bridge design (color/texture/materials) that will blend into the landscape. To filter the view of the piers, clusters of trees might be planted if they do not cause additional displacement or create hazards for errant vehicles.

3. View From the Proposed Alternative

Travelers driving through the Central Susquehanna Valley Transportation project area will experience views similar to those seen from the existing US Routes 11/15 and PA Route 147: rolling hills and small valleys, farms mixed with rural/suburban developments, and urban areas. Depending upon the alignment chosen, travelers may view landscapes that are more urban (as with the Old Trail Alternatives) than rural (as with the DAMA Alternative) due to existing land use conditions.

4. Summary

The topography of the project area requires high bridges, deep cuts, tall fill slopes and retaining walls to maintain roadway grades within design standards for safe and efficient travel throughout the project. It is very difficult or impossible to mitigate for all adverse visual quality effects. Measures exist, however, to soften the impacts and should be considered to help maintain - as much as possible - the overall visual quality of the Central Susquehanna Valley.

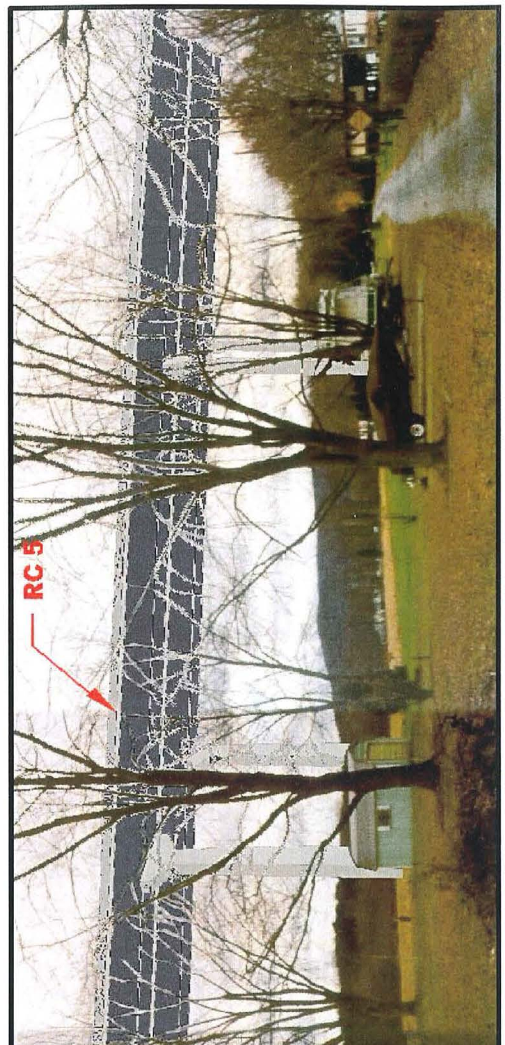
iii. RC5

Area 16	Description
Location	Lee's Lane neighborhood (southeast of Winfield), facing northwest.
Impact	Existing view is of the floodplain and several residential outbuildings in the center of the photo (houses are to the right side), with agricultural fields in the background and forested hills in the far background. The proposed view shows a bridge and seven piers 200 m (656') away, and 37 m (121.4') high. See Figure IV-E-19.
Mitigation	The bridge will be too high for successful mitigation, so consider using a bridge design (color/texture/materials) that will blend into the landscape. Clusters of trees can be planted to filter the view of the piers.

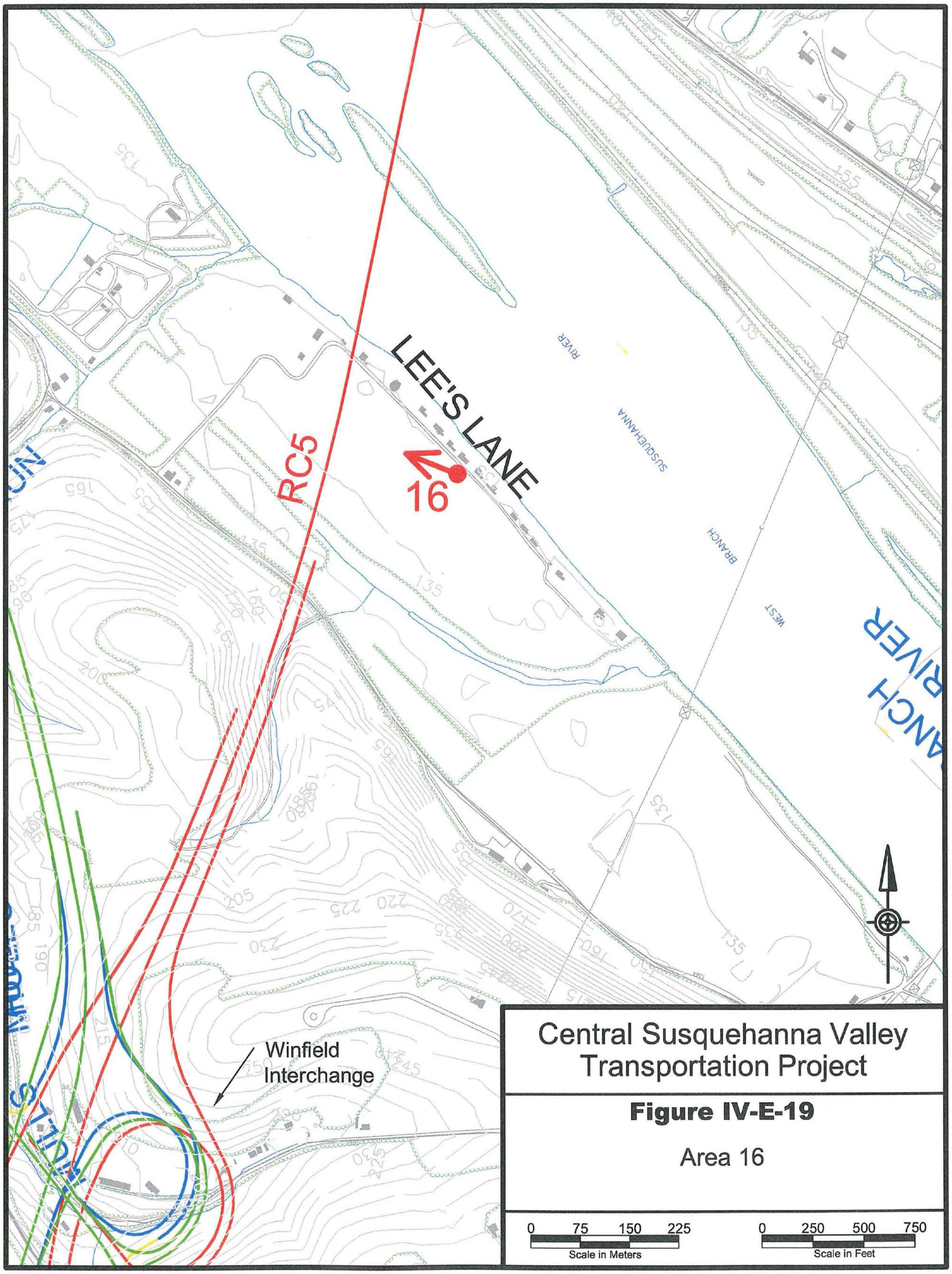
Area 17	Description
Location	Lee's Lane neighborhood (southeast of Winfield), facing north.
Impact	In the foreground are several trees fringing the river, with the Susquehanna and what is locally referred to as Goat Island visible in the background. The proposed view shows the bridge structure and five piers crossing the river, located approximately 450 m (1,476') away. The bridge deck is 39 m (128') above the river. See Figure IV-E-20.
Mitigation	The bridge will be too tall for successful mitigation, so consider using a bridge design (color/texture/materials) that will blend into the landscape.

Area 18	Description
Location	Mertz' Meats parking lot Ridge Road and PA Route 147, facing southeast.
Impact	A home and several commercial establishments are visible below the forested hillside. Trees line both sides of PA Route 147. In the proposed view, a stormwater management system would be located behind the house on the left side of the photo, 300 m (984') away, and some of the hillside trees are displaced. The bridge crosses PA Route 147 15.2 m (50') above the existing grade, 500 m (1,640') from the observer's position. See Figure IV-E-21.
Mitigation	Minimize the depth of cuts along the hillside, revegetate cuts, landscape fills, and use vegetative screening wherever possible. The bridge will be too high for successful mitigation, so consider using a bridge design (color/texture/materials) that will blend into the landscape.

Before



After



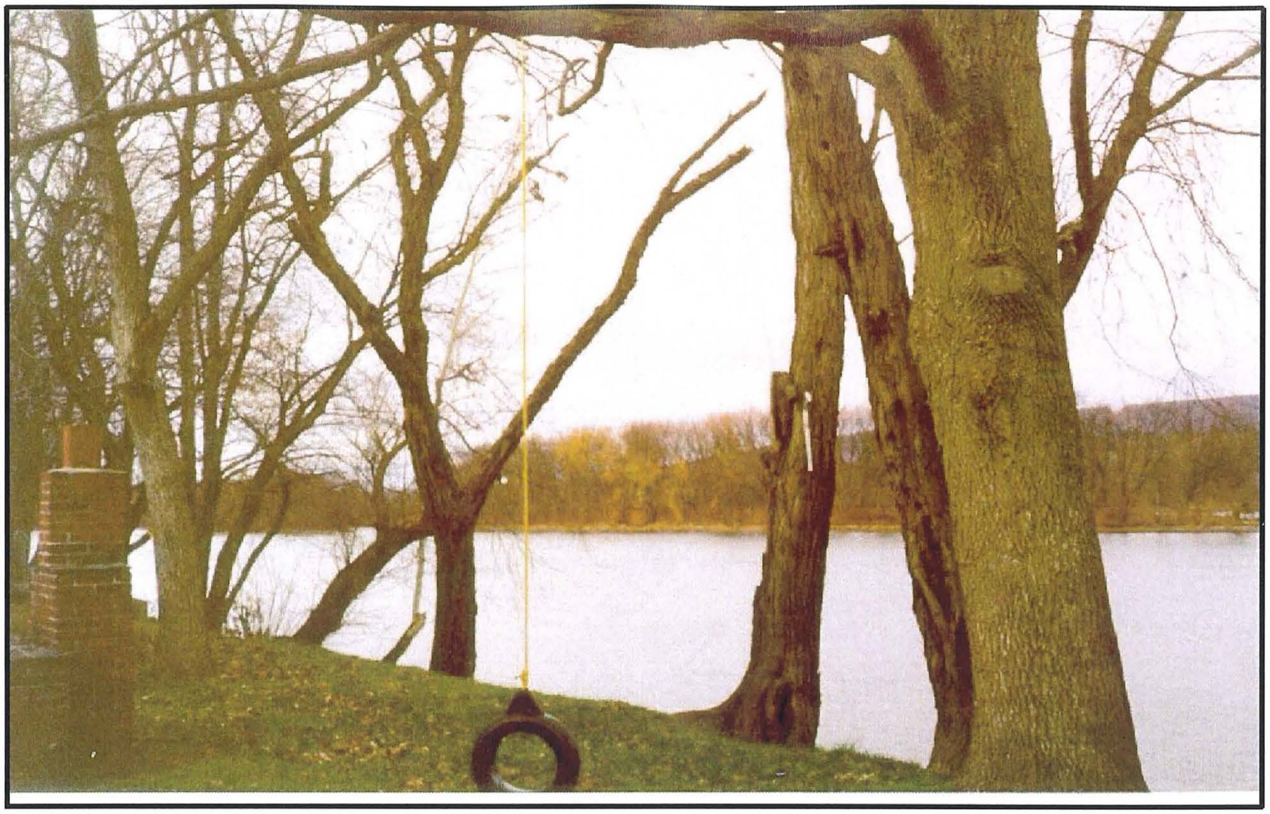
Central Susquehanna Valley
Transportation Project

Figure IV-E-19

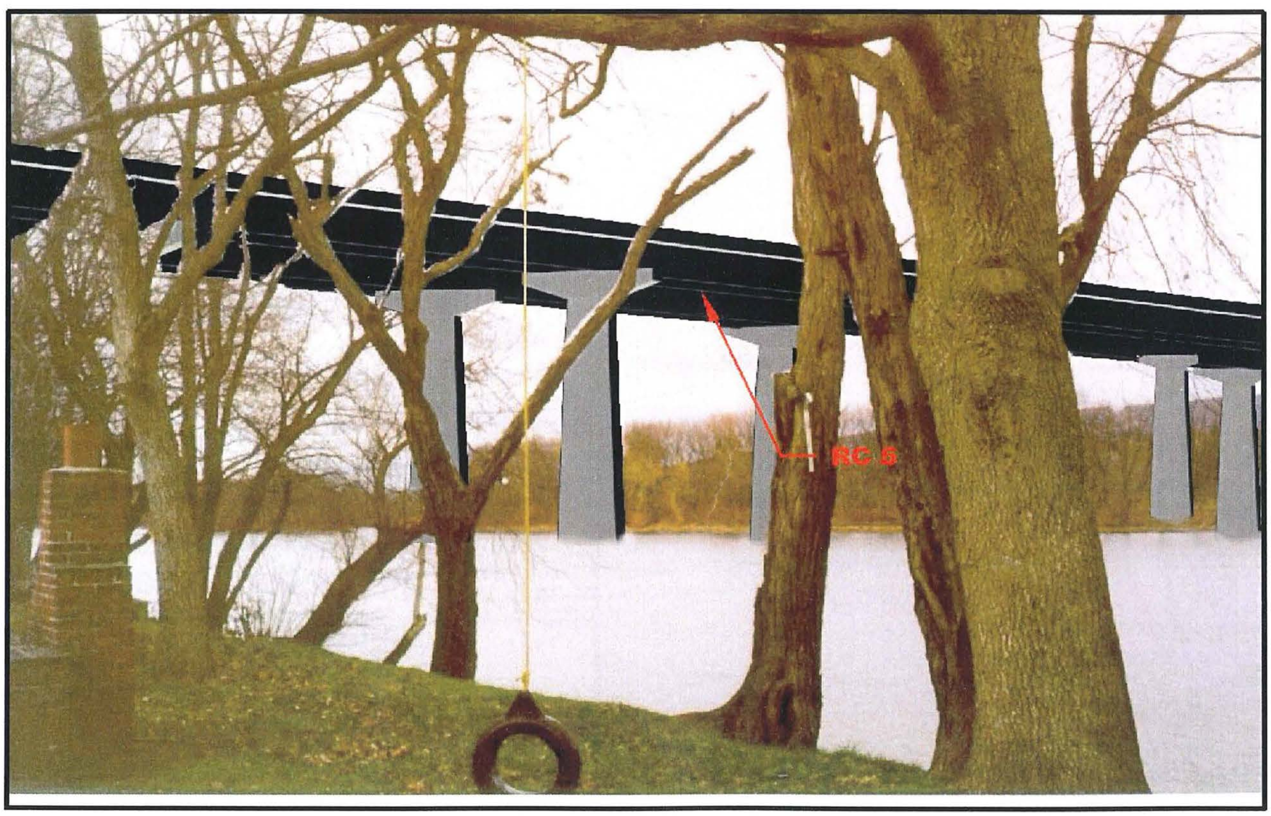
Area 16

0 75 150 225 Scale in Meters

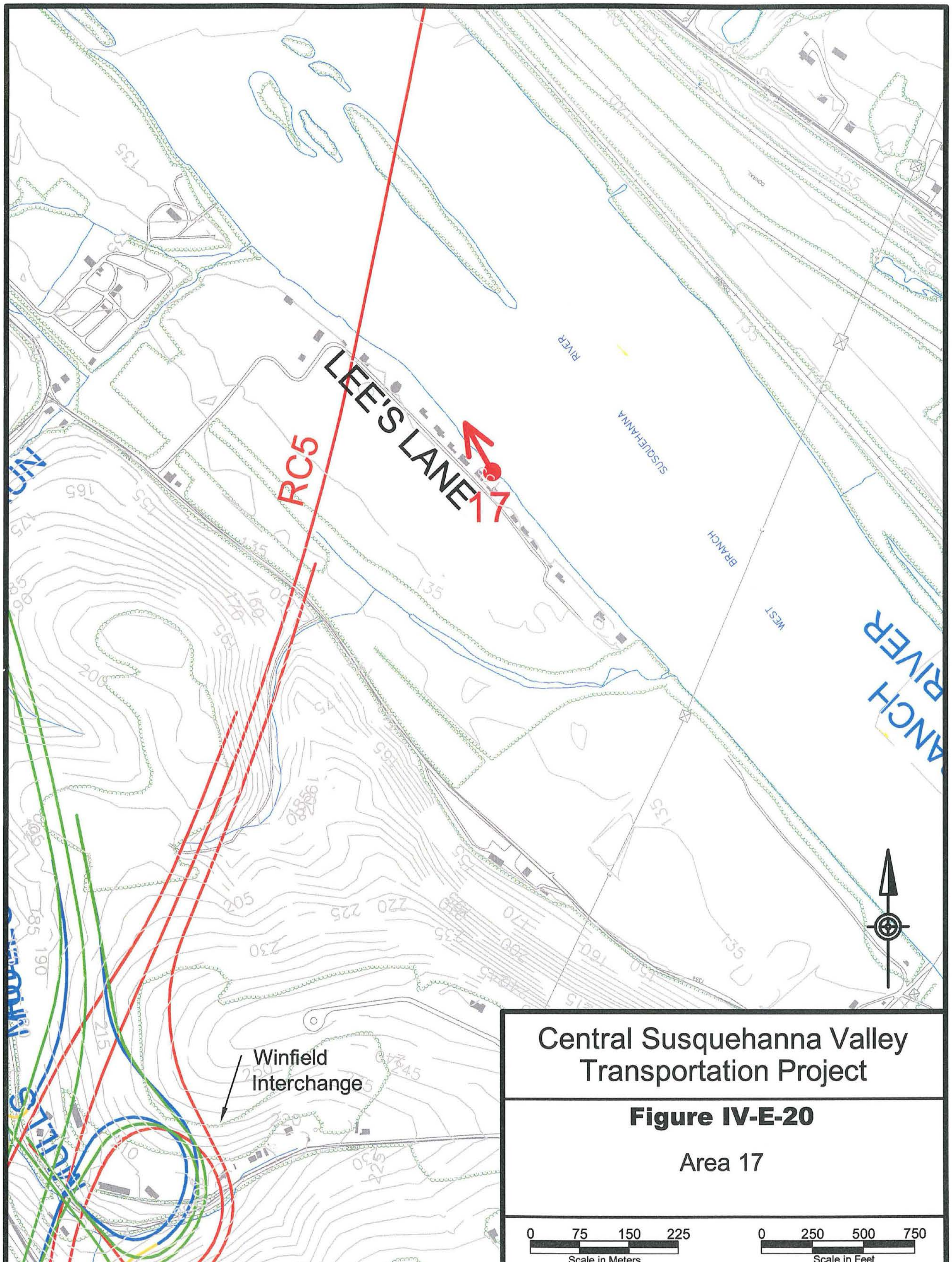
0 250 500 750 Scale in Feet



Before



After



Central Susquehanna Valley Transportation Project

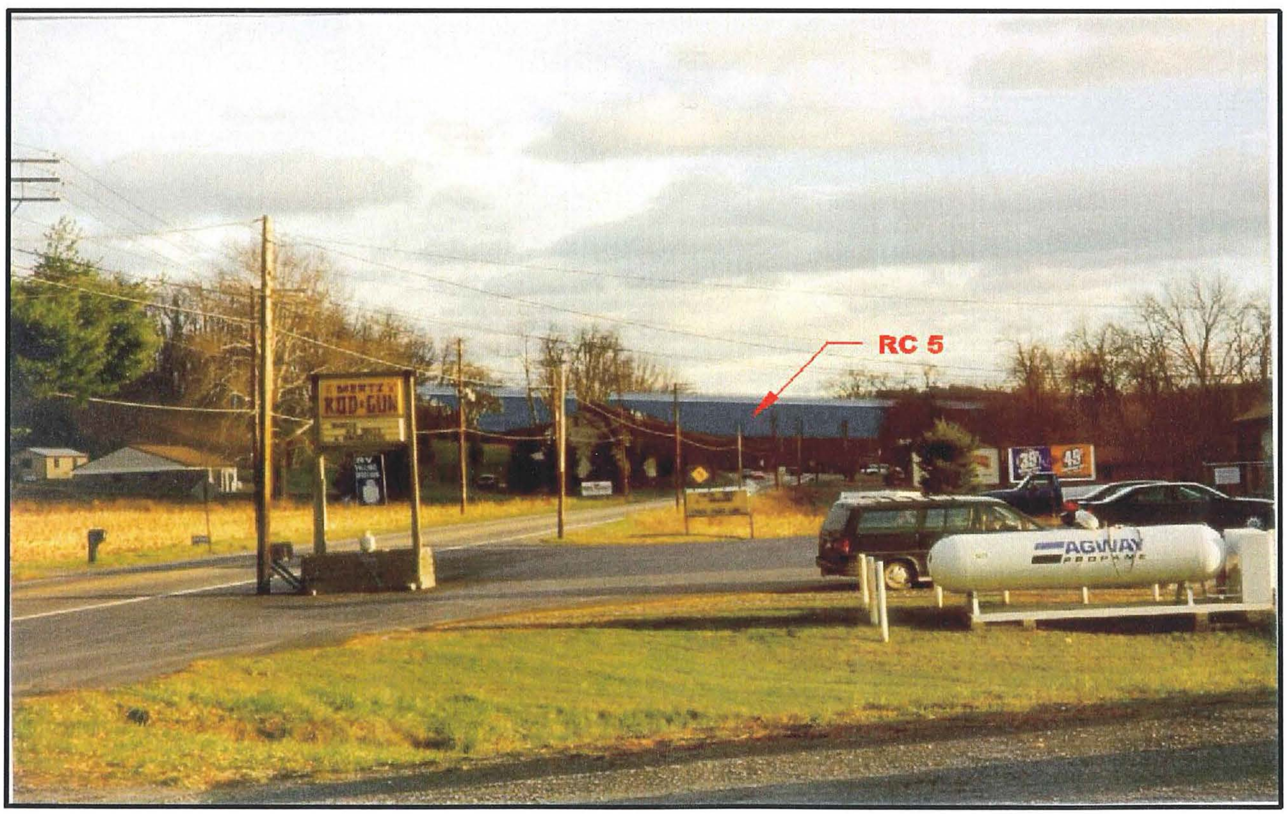
Figure IV-E-20

Area 17

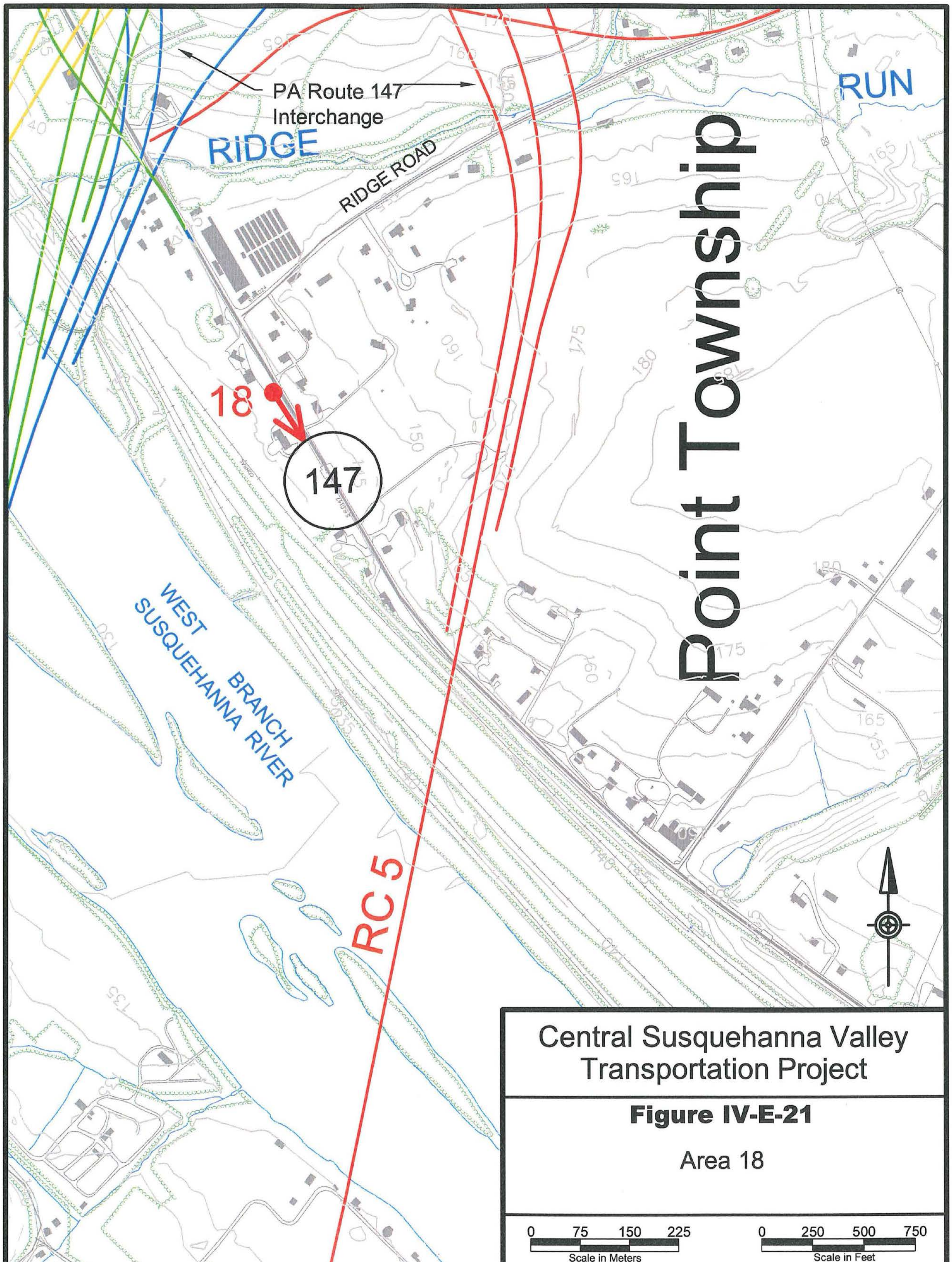
0 75 150 225 Scale in Meters

0 250 500 750 Scale in Feet

Before



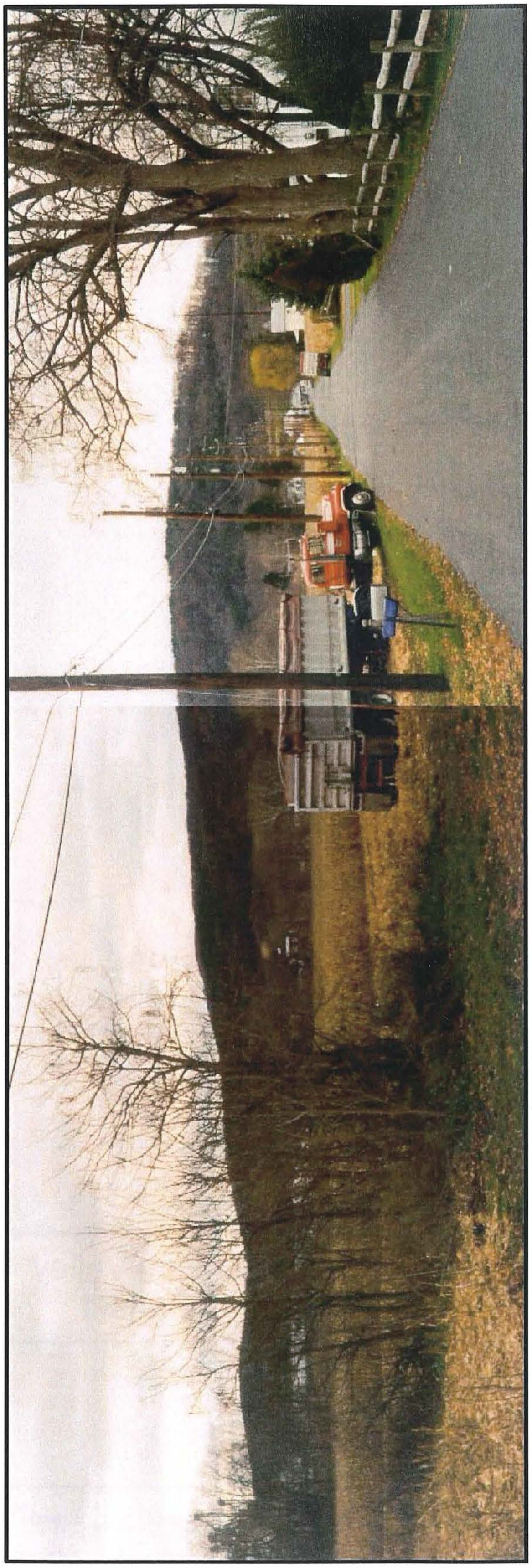
After



Central Susquehanna Valley Transportation Project

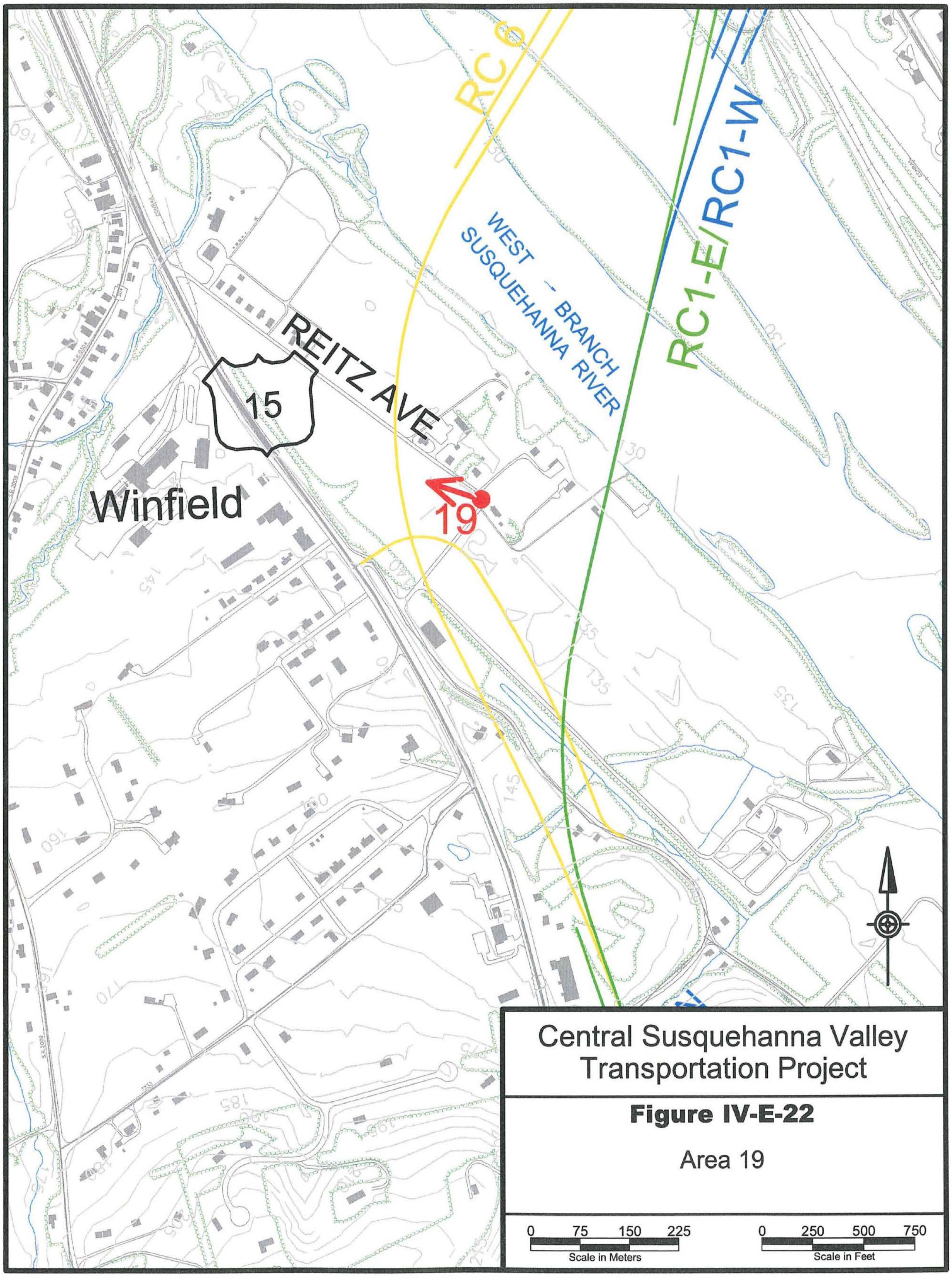
Figure IV-E-21

Area 18



Before

After



Central Susquehanna Valley Transportation Project

Figure IV-E-22

Area 19

iv. RC6

Area 15	This area is described in Figure IV-E-18.

Area 19	**Description**
Location	Reitz Avenue, east of Winfield. The view is to the west-northwest toward the town.
Impact	Parts of Winfield are visible in the distance, while in the foreground, crops are grown on the flat floodplain of the Susquehanna. The viewshed for this location will change substantially. The proposed view shows an arcing bridge approximately 125 m (410') away, with two (2) offset piers carrying the bridge 18 m (59.1') above the current grade. See Figure IV-E-22.
Mitigation	The bridge will be too high for successful mitigation, so consider using a bridge design (color/texture/materials) that will blend into the landscape. To filter the view of the piers, clusters of trees might be planted if they do not cause additional displacement or create hazards for errant vehicles.

Additionally, public involvement will play a role in the further design of the proposed Susquehanna River Bridge. A public advisory committee composed of community members and local officials will be formed. This committee will be given the opportunity to review context sensitive design features and provide comments on various bridge design options.

F. NATURAL RESOURCES

1. Impacts to Vegetation and Wildlife Habitat

The CSVT project build alternatives would have impacts to vegetation and wildlife habitat. Alterations affecting habitat availability and connectivity will occur across the project area, further contributing to the existing fragmented landscape. Preliminary right-of-way estimates show that the project could result in distur-

> More detailed information related to vegetation and wildlife can be found in the Technical Support Data. An index of the Technical Support Data is located in Section IX, Appendix A.

bances of available terrestrial wildlife habitat ranging from 239.35 hectares (599.05 acres) to 324.94 hectares (803.02 acres) [excluding the river crossing, barren land (disturbed, poorly vegetated areas), and developed land]. The No-Build Alternative would have no impacts to vegetation and wildlife habitat within the project area. Terrestrial community impacts in the CSVT project area were assessed using a combination of CADD and GIS and were calculated when community types occurred within the required right-of-way for each alternative. The impacts evaluation addresses potential effects upon vegetative communities, wildlife habitats, landscape patterns, as well as potential concerns regarding State and Federal threatened and endangered species.

Impacts to vegetation and wildlife habitat are described on various levels for each alternative. The calculation of impacts was completed for **terrestrial communities, wildlife habitats, landscape features**, and finally for **wildlife habitat classification categories**. These were derived through use of a terrestrial community habitat mapping system developed for the project. Various terrestrial communities were categorized with respect to factors such as topographic position, vegetative cover, species number, and human disturbance. Mapping created to illustrate the terrestrial community types was then evaluated to identify important landscape features, such as Major Forest Patch Networks (MFPN) (including forest interior), patches (including grassland habitat), and wildlife habitat corridors. Areas were then further analyzed for the wildlife habitat value they provide based on the relative function (degree of connectivity) and organization (distribution patterns) of the important landscape features identified. Detailed information related to terrestrial community types, landscape features, and wildlife habitat classification categories can be found in the Vegetation and Wildlife Technical Memorandum (see Section IX, Appendix A).

a. Terrestrial Community Impacts

Potential impacts to the terrestrial community within the CSVT study area were determined by comparing existing vegetative community conditions affected by each of the proposed project alternatives. Impacts to these various types of terrestrial communities are reported in Table IV-F-1. Throughout the project area, terrestrial community types most commonly impacted by the alternatives include agricultural land, mature oak/hardwood forest, successional hardwood forest, old field habitats, and river floodplain forest.

Figures IV-F-1 and IV-F-2 show the terrestrial community types as they occur in the study corridors along with the alternative footprints. In order to present impacts more clearly and effectively, similar terrestrial communities have been grouped together on the mapping. A more detailed map illustrating individual community types is contained in the Vegetation and Wildlife Technical File. Impacts are listed for individual terrestrial communities in Table IV-F-1. Table IV-F-1 provides a summary

TABLE IV-F-1
INDIVIDUAL TERRESTRIAL COMMUNITY TYPE IMPACT BY ALTERNATIVE

Terrestrial Community Type	Section 1		
	DAMA [Hectares (Acres)]	OT2A [Hectares (Acres)]	OT2B [Hectares (Acres)]
F1 - Oak/Hardwood - Mature (Ridge Top/Ridge Side)	34.13 (84.34)	13.00 (32.13)	18.49 (45.69)
F2 - Oak/Hardwood - Mature (Valley Floor)	0.00 (0.00)	0.37 (0.91)	2.28 (5.64)
F3 - Oak/Hardwood - Pole Stage (Ridge Top/Ridge Side)	0.49 (1.21)	0.00 (0.00)	0.00 (0.00)
F4 - Red Maple/Hardwood	1.53 (3.79)	1.52 (3.75)	1.52 (3.75)
F5 - Oak/Hemlock	0.41 (1.01)	0.00 (0.00)	3.08 (7.62)
F6 - Mesic Ash/Hardwood	0.5 (1.24)	3.19 (7.88)	3.23 (7.99)
F7 - Mesic Oak/Hardwood	0.88 (2.17)	0.00 (0.00)	2.61 (6.45)
F8 - Mesic Sycamore/Hardwood	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
F9 - River Floodplain Forest	0.02 (0.05)	18.36 (45.36)	18.33 (45.30)
F10 - Softwood/Coniferous	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
SF1 - Successional Forest/Hardwood - Mature	2.46 (6.09)	0.86 (2.12)	1.68 (4.16)
SF2 - Successional Forest/Hardwood - Sapling to Pole	12.14 (30.00)	8.16 (20.18)	5.12 (12.66)
SF3 - Successional Forest/Mix - Sapling to Pole	8.25 (20.39)	3.64 (8.99)	1.07 (2.65)
SF4 - Successional Forest/Mix - Mature	9.79 (24.18)	0.00 (0.00)	8.23 (20.34)
SF5 - Successional Forest/Coniferous	1.97 (4.87)	1.47 (3.64)	1.47 (3.64)
HR1 - Upland Tree Hedgerow	0.00 (0.00)	0.00 (0.00)	0.06 (0.14)
HR2 - Upland Shrub Hedgerow	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
HR3 - Upland Equal-Mixed Tree and Shrub Hedgerow	0.95 (2.36)	0.92 (2.26)	1.16 (2.88)
HR4 - Riparian Tree Hedgerow	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
HR5 - Riparian Shrub Hedgerow	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
HR6 - Riparian Equal-Mixed Tree and Shrub Hedgerow	0.90 (2.24)	0.03 (0.07)	0.03 (0.07)

TABLE IV-F-1
(CONTINUED)

Terrestrial Community Type	Section 1		
	DAMA [Hectares (Acres)]	**OT2A [Hectares (Acres)]**	**OT2B [Hectares (Acres)]**
OF1 - Old Field/Shrub Dominated	1.79 (4.42)	0.04 (0.09)	0.05 (0.12)
OF2 - Old Field/Herbaceous Dominated - Not Mowed Regularly	33.45 (82.65)	26.26 (64.89)	30.68 (75.80)
OF3 - Old Field/Herbaceous Dominated - Mowed Regularly	1.85 (4.58)	2.97 (7.34)	2.67 (6.60)
OF4 - Old Field/Equal Shrub and Herbaceous Dominated	26.45 (65.37)	18.81 (46.49)	16.89 (41.74)
AG1 - Agricultural Land - Row Crops/Hay Fields	43.02 (106.31)	16.73 (41.33)	20.04 (49.52)
AG2 - Agricultural Land - Pasture	3.52 (8.70)	4.67 (11.55)	4.64 (11.47)
AG3 - Agricultural Land - Orchard	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
AG4 - Agricultural Land - Conifer Plantation	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
WET - Wetlands	2.79 (6.89)	8.72 (21.55)	8.63 (21.33)
RIVER - Susquehanna River	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
BAR - Barren Land	2.94 (7.27)	3.34 (8.26)	3.61 (8.93)
DEV1 - Developed Land (Nonforested)	35.32 (87.28)	38.09 (94.11)	33.51 (82.79)
DEV2 - Developed Land (Forested)	1.39 (3.42)	0.00 (0.00)	0.73 (1.82)
TOTAL	**226.94 (560.83)**	**171.15 (422.90)**	**189.81 (469.10)**

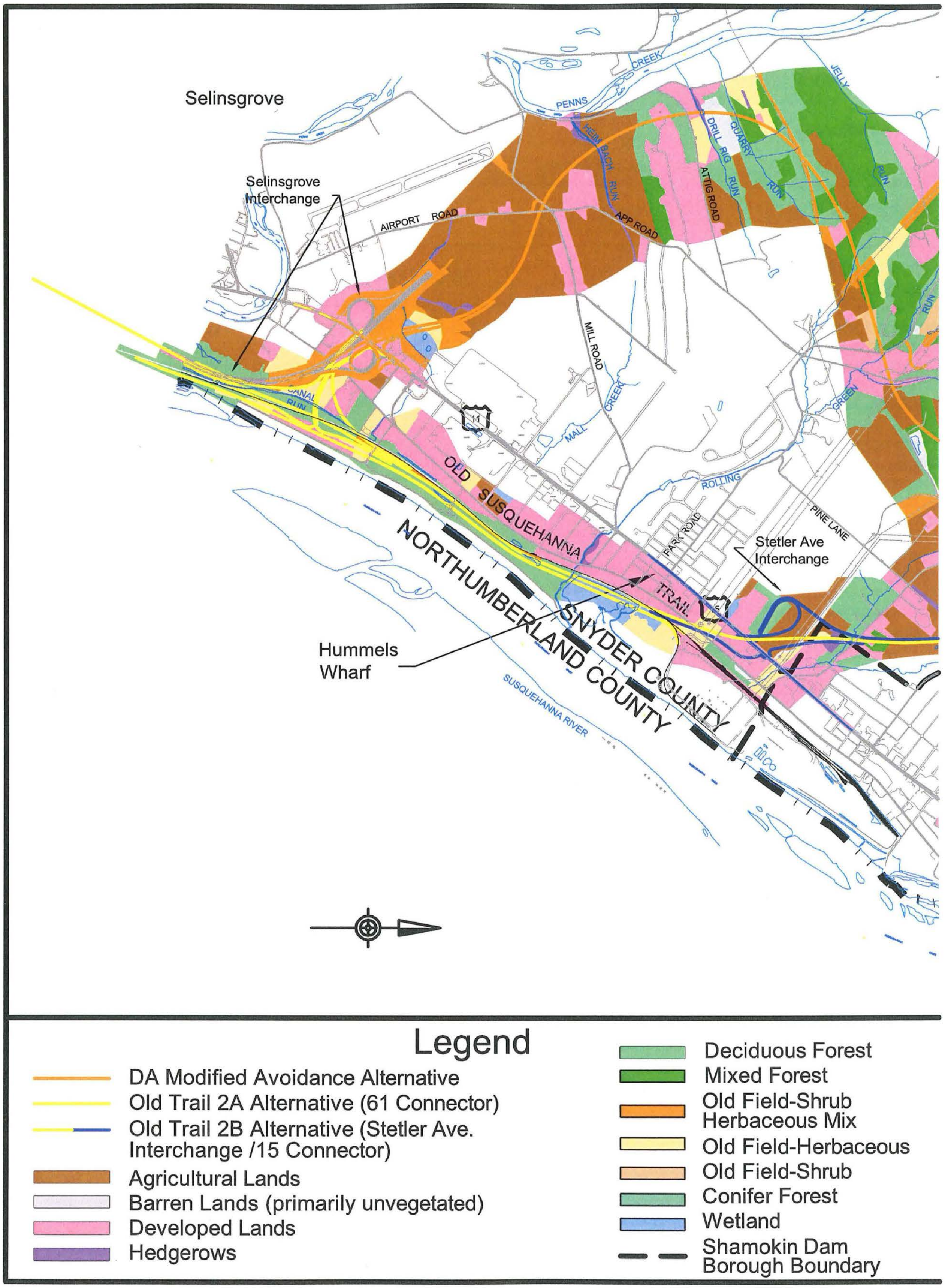
TABLE IV-F-1
(CONTINUED)

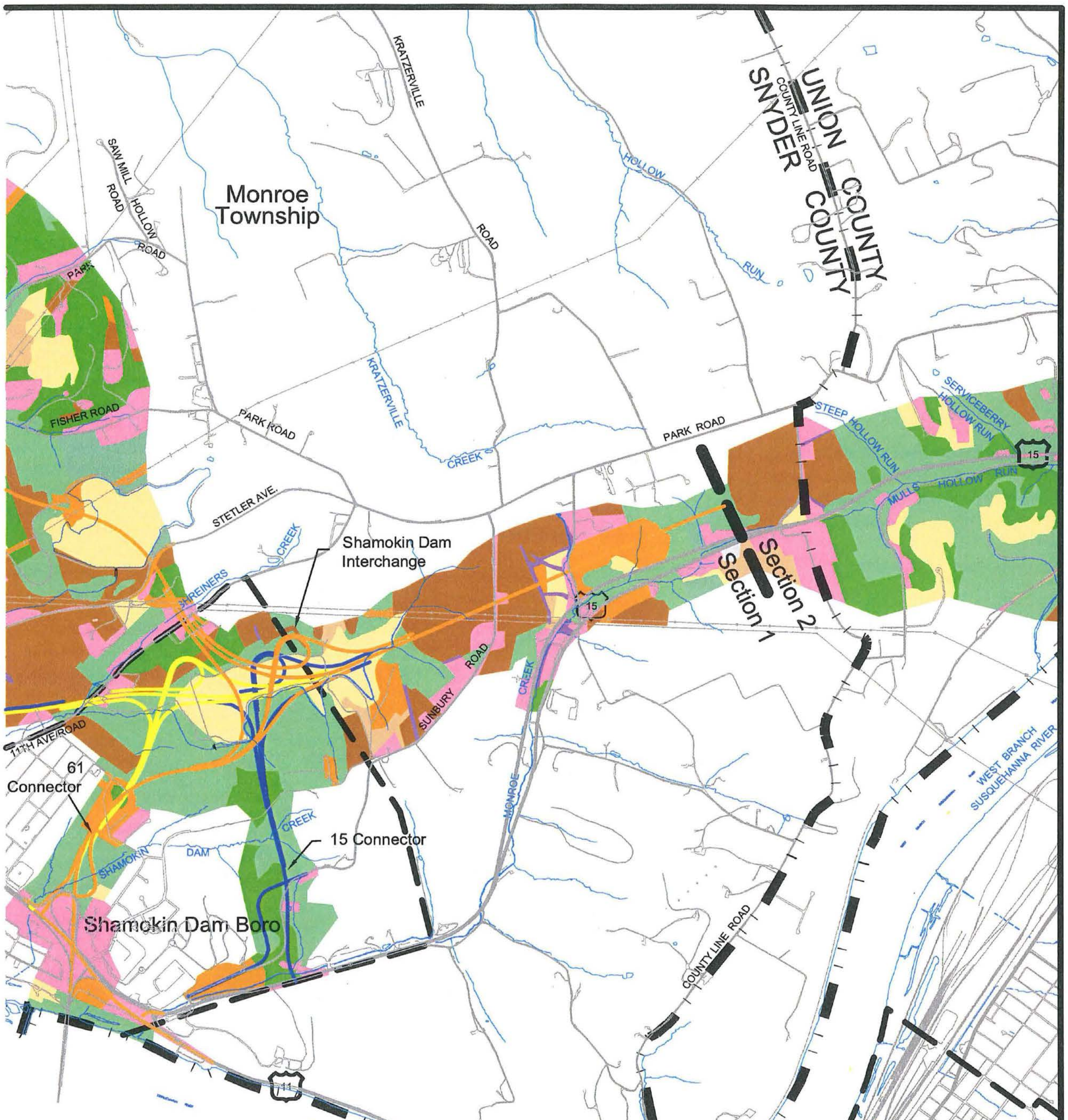
Terrestrial Community Type	Section 2			
	RC1-E [Hectares (Acres)]	RC1-W [Hectares (Acres)]	RC5 [Hectares (Acres)]	RC6 [Hectares (Acres)]
F1 - Oak/Hardwood - Mature (Ridge Top/Ridge Side)	23.87 (58.99)	11.64 (28.77)	21.34 (52.73)	24.19 (59.78)
F2 - Oak/Hardwood - Mature (Valley Floor)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
F3 - Oak/Hardwood - Pole Stage (Ridge Top/Ridge Side)	5.68 (14.03)	5.68 (14.03)	6.70 (16.56)	5.68 (14.03)
F4 - Red Maple/Hardwood	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
F5 - Oak/Hemlock	5.52 (13.64)	4.79 (11.83)	3.47 (8.58)	5.28 (13.04)
F6 - Mesic Ash/Hardwood	8.34 (20.61)	6.79 (16.77)	6.72 (16.60)	8.34 (20.65)
F7 - Mesic Oak/Hardwood	3.35 (8.27)	1.05 (2.59)	1.45 (3.58)	3.14 (7.76)
F8 - Mesic Sycamore/Hardwood	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
F9 - River Floodplain Forest	4.52 (11.17)	4.26 (10.52)	2.29 (5.66)	4.58 (11.28)
F10 - Softwood/Coniferous	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
SF1 - Successional Forest/Hardwood - Mature	1.69 (4.18)	1.42 (3.51)	1.07 (2.64)	1.56 (3.86)
SF2 - Successional Forest/Hardwood - Sapling to Pole	28.02 (69.24)	27.39 (67.69)	27.08 (66.91)	29.21 (72.17)
SF3 - Successional to Forest/Mix - Sapling to Pole	6.56 (16.22)	6.52 (16.22)	2.82 (6.97)	6.38 (15.77)
SF4 - Successional to Forest/Mix - Mature	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
SF5 - Successional Forest/Coniferous	0.08 (0.20)	0.08 (0.20)	0.08 (0.19)	0.08 (0.20)
HR1 - Upland Tree Hedgerow	0.19 (0.47)	0.19 (0.47)	0.19 (0.47)	0.19 (0.47)
HR2 - Upland Shrub Hedgerow	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
HR3 - Upland Equal-Mixed Tree and Shrub Hedgerow	0.96 (2.36)	0.72 (1.78)	1.74 (4.30)	0.90 (2.22)
HR4 - Riparian Tree Hedgerow	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
HR5 - Riparian Shrub Hedgerow	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
HR6 - Riparian Equal-Mixed Tree and Shrub Hedgerow	0.09 (0.22)	0.25 (0.61)	0.65 (1.60)	0.00 (0.01)
OF1 - Old Field/Shrub Dominated	0.18 (0.45)	0.00 (0.00)	0.22 (0.53)	0.18 (0.45)
OF2 – Old Field/Herbaceous Dominated - Not Mowed Regularly	7.37 (18.21)	4.99 (12.32)	9.06 (22.38)	7.49 (18.51)
OF3 - Old Field/Herbaceous Dominated - Mowed Regularly	1.41 (3.48)	2.69 (6.64)	1.62 (4.00)	1.91 (4.71)

TABLE IV-F-1
(CONTINUED)

Terrestrial Community Type	Section 2			
	RC1-E [Hectares (Acres)]	**RC1-W [Hectares (Acres)]**	**RC5 [Hectares (Acres)]**	**RC6 [Hectares (Acres)]**
OF4 - Old Field/Equal Shrub and Herbaceous	4.65 (11.0)	1.14 (2.81)	4.86 (12.01)	4.65 (11.50)
AG1 - Agricultural Land - Row Crops/Hay Fields	28.88 (71.36)	29.08 (71.82)	38.18 (94.33)	30.99 (76.58)
AG2 – Agricultural Land - Pasture	0.99 (2.45)	2.92 (7.20)	2.64 (6.51)	0.99 (2.45)
AG3 - Agricultural Land - Orchard	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
AG4 - Agricultural Land - Conifer Plantation	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
WET – Wetlands	1.32 (3.28)	1.1 (2.74)	1.21 (2.98)	1.76 (4.34)
RIVER - Susquehanna River	3.73 (9.22)	3.45 (8.53)	4.07 (10.05)	3.42 (8.45)
BAR - Barren Land	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
DEV1 - Developed Land (Nonforested)	20.55 (50.78)	34.64 (85.59)	18.05 (44.60)	22.29 (55.08)
DEV2 - Developed Land (Forested)	4.68 (11.57)	6.63 (16.38)	5.97 (14.74)	4.22 (10.42)
TOTAL	**162.63 (401.90)**	**157.42 (389.02)**	**161.48 (398.92)**	**167.43 (413.73)**

Note: WET compartments represent larger wetland areas that were identifiable as individual community types. The WET compartments were identified prior to the wetland delineation. Refer to the Wetland Technical Memorandum for the actual surveyed wetland areas present within each alternative corridor.


Selinsgrove
Selinsgrove Interchange
AIRPORT ROAD
PENNS CREEK
HEIM BACH RUN
APP ROAD
DRILL RIG RUN
ATTIG ROAD
QUARRY RUN
JELLY RUN
MILL ROAD
MILL CREEK
CANAL RUN
OLD SUSQUEHANNA TRAIL
ROLLING GREEN RUN
PARK ROAD
PINE LANE
Stetler Ave Interchange
Hummels Wharf
NORTHUMBERLAND COUNTY
SNYDER COUNTY
SUSQUEHANNA RIVER
Legend
DA Modified Avoidance Alternative
Old Trail 2A Alternative (61 Connector)
Old Trail 2B Alternative (Stetler Ave. Interchange /15 Connector)
Agricultural Lands
Barren Lands (primarily unvegetated)
Developed Lands
Hedgerows
Deciduous Forest
Mixed Forest
Old Field-Shrub Herbaceous Mix
Old Field-Herbaceous
Old Field-Shrub
Conifer Forest
Wetland
Shamokin Dam Borough Boundary



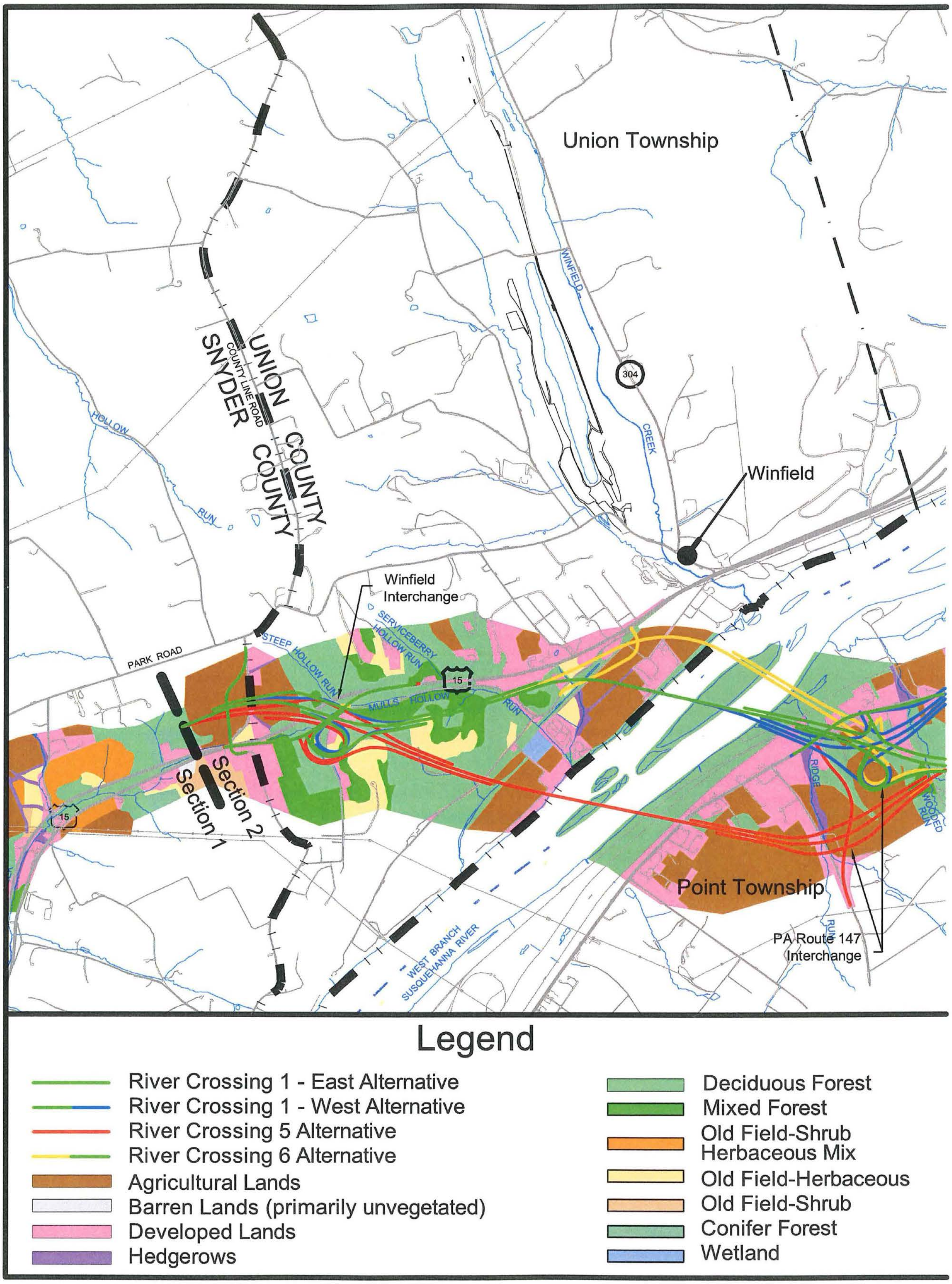
Central Susquehanna Valley Transportation Project

Figure IV-F-1

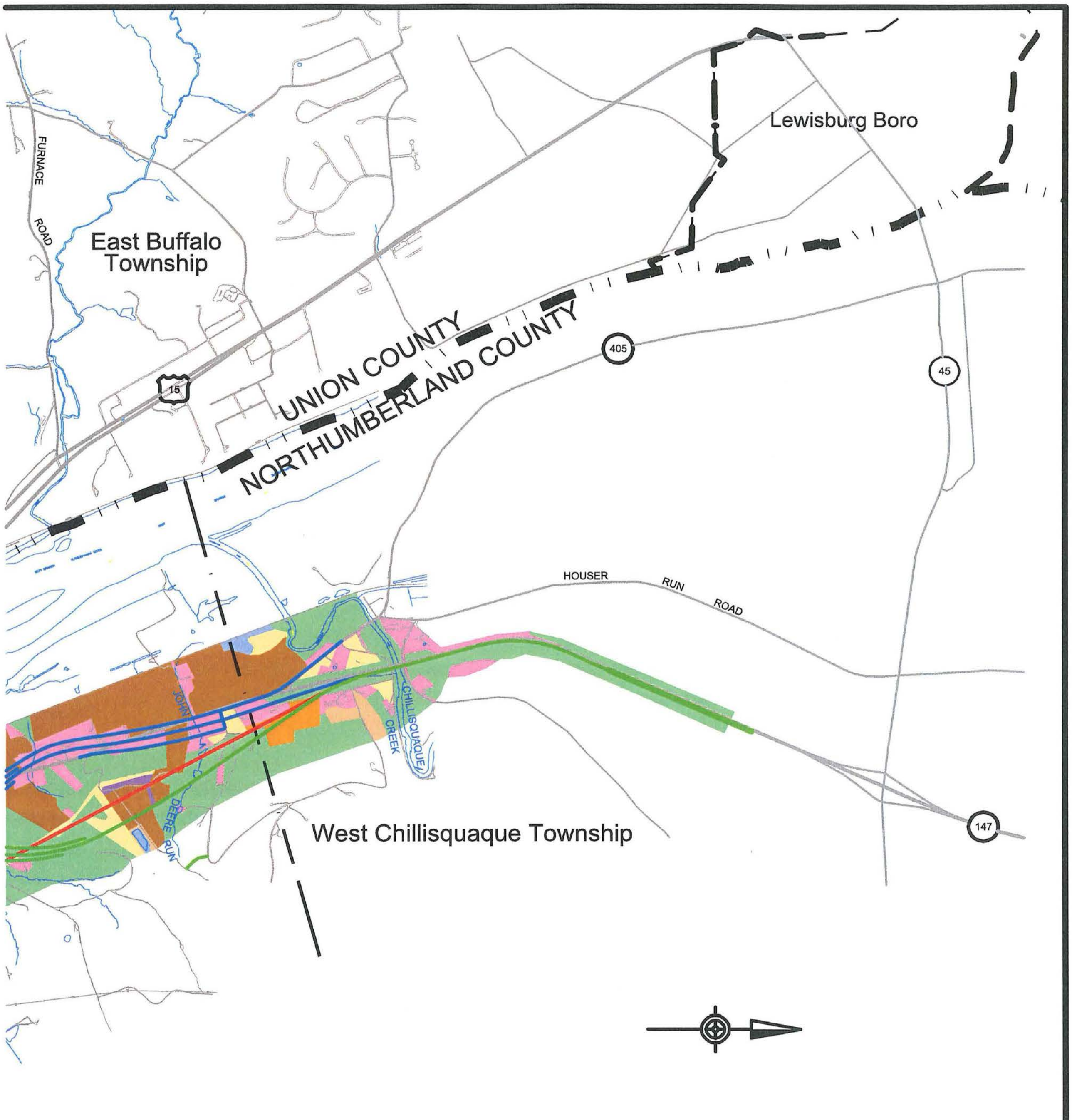
Section 1-
Terrestrial Communities

0 300 600 900 Scale in Meters

0 1250 2500 3750 Scale in Feet



Union Township
Winfield
Winfield Interchange
UNION COUNTY
SNYDER COUNTY
COUNTY LINE ROAD
PARK ROAD
Section 2
Section 1
Point Township
PA Route 147 Interchange
WEST BRANCH SUSQUEHANNA RIVER
Legend
River Crossing 1 - East Alternative
River Crossing 1 - West Alternative
River Crossing 5 Alternative
River Crossing 6 Alternative
Agricultural Lands
Barren Lands (primarily unvegetated)
Developed Lands
Hedgerows
Deciduous Forest
Mixed Forest
Old Field-Shrub Herbaceous Mix
Old Field-Herbaceous
Old Field-Shrub
Conifer Forest
Wetland



Central Susquehanna Valley Transportation Project

Figure IV-F-2

Section 2-
Terrestrial Communities

0 300 600 900 Scale in Meters
0 1250 2500 3750 Scale in Feet

of the terrestrial community impacts for the project by alternative. Impacts resulting from development of each alternative represent a direct loss of habitat available for wildlife.

b. Wildlife Habitat Impacts

Wildlife species, habitats, and terrestrial communities were evaluated to characterize the habitat quality. The assessment involved review of the Terrestrial Community mapping and in-field assessment of wildlife species and habitat characteristics. In-field assessments of representative terrestrial communities throughout the study area involved participation from representatives of the Pennsylvania Game Commission and the US Fish and Wildlife Service. A detailed discussion of the wildlife habitat evaluation is presented in the Vegetation and Wildlife Technical Memorandum. General wildlife impacts associated with various terrestrial community types are described below.

- **Agricultural land:** Impacts to agricultural cropland, hayfields and pasture land may result in the loss of seasonal cover, food source and breeding habitat for songbirds (including neotropical migrants), game birds, mammals, and reptiles. Agricultural pasture land represents the greatest diversity of wildlife observed within agricultural communities. OT2A in Section 1 affects the greatest amount of pasture land, while RC1-W in Section 2 affects the greatest amount of pasture land (7.20 acres).

- **Oak/hardwood forest**: Impacts would result in the loss of available mature deciduous forested habitat that provides a food source (hard mast, soft mast, browse), nesting cavities, and understory cover habitat for a variety of wildlife species such as birds (including neotropical migrants), mammals, reptiles, and amphibians. In the CSVT study area, this type of forest is dominated by oak species, and it ranges in stand age from pole stage to mature. Of the ten types of forested community types, the Oak/Hardwood Mature (F1) forests, Mesic Ash/Hardwood (F6) and Mesic Oak/Hardwood (F7), and Riverine Floodplain (F9) forests were the community types possessing the greatest diversity of wildlife species observed within the forest community types. Of these four forested communities, the DA Modified Avoidance affects the greatest amount of F1, F6, and F7 communities. However, the Old Trail 2A and Old Trail 2B affect the greatest amount of Riverine Floodplain forest. In Section 2, the RC1-E Alternative affects the greatest amount of F1, F6, and F7 habitat. The RC6 Alternative affects the greatest amount of Riverine Floodplain forest habitat

- **Successional hardwood forests**: Impacts would result in the reduction of a diverse forest habitat that provides wildlife habitat value in terms of a food source (primarily soft mast, browse, seeds), canopy habitat for songbirds (including neotropical migrants), and conifer habitat for year round cover and shrub cover in the understory. In the study area, this type of forest habitat is dominated by a mixture of oaks and other species, including white ash, scotch pine, and virginia pine, and stand age ranges from sapling/ pole stage to mature. Of the five types of Successional Forest habitats, the Successional

Forest/Hardwood and Successional Forest Mix communities represented the greatest diversity of wildlife species within the successional forest community type. The DA Modified Avoidance in Section 1 affects the greatest amount of Successional Forest Hardwood and Forest/Mix habitat. In Section 2, the RC6 Alternative affects the greatest Successional Forest habitat.

- **Old field habitats**: Impacts would result in the loss of small, fragmented old field habitat that provides a food source (insects, seeds), cover habitat, and breeding habitat for many wildlife species including ground-nesting songbirds (including neotropical migrants), young game birds (i.e., turkey), small mammals, and reptiles. Old field habitats may be comprised of herbaceous land (grasses and/or forbes) or shubland, or a mixture of both communities. Old field herbaceous dominated and old field/equal shrub and herbaceous communities represented the greatest diversity of species within the old field community types. In Section 1, the DA Modified Avoidance Alternative affects the greatest amount of Old Field habitat. In Section 2, the RC 5 Alternative affects the greatest old field habitat.

- **Riverine forests**: Impacts may reduce mature floodplain silver maple and sycamore forest habitat availability for many species including migrating and breeding neotropical songbirds, waterfowl, mammals, amphibians, and reptiles. In addition, the loss of riverine habitat may disrupt habitat connectivity and reduce corridor widths which are important for wildlife movement.

c. Landscape Feature Impacts

Landscape features affect wildlife species diversity, influence movement patterns, and contribute to habitat value. Landscape features evaluated include an assessment of Major Forest Patch Networks (MFPNs) and wildlife corridors. Important definitions necessary for the understanding of landscape features impacted by the project alternatives are provided below.

- **Patch** represents habitats differing in appearance from adjacent habitats. A patch may affect species diversity and wildlife movement.

- **Major Forest Patch Network (MFPN)** represents a diversity of contiguous forest types with a combined area greater than 40.5 hectares (100 acres). The forest network contributes to wildlife species diversity. (Forest land represents the second most extensive and connected habitat within the CSVT project area and locale.) The forest network may contain interior forest habitat, promote wildlife movement functions, contain a diversity of forested communities, and provide important life requisite values (i.e., evergreen habitat for thermal cover) for wildlife species.

- **Corridors** represent narrow habitats that differ from the dominant land use type and serve as conduits for movement as well as providing habitat for species. Three types of corridors were evaluated.

- **Riverine** - the habitat zone adjacent to a river
- **Hedgerow/Line** - narrow [less than 15.2 meters (50 feet)], linear habitat that connects similar habitats; hedgerow/line corridor habitat is characterized as edge habitat
- **Strip** - linear habitat greater than 15.2 meters (50 feet) in width

MFPN habitats were further reviewed to determine the extent and size of potential forest interior habitat within the MFPN. Forest interior habitat, as understood for the purposes of the project, is described below.

- **Forest Interior Habitat** represents forest habitat 100 meters (330 feet) from an edge of disturbance (agricultural field, powerline, developments) which typically represented the edge of the MFPN. A majority of all forest interior habitat is within a MFPN. However, four additional areas not associated with a MFPN contain minimal interior habitat. Each of the 4 areas contain forest interior habitat ranging from 0.15 hectares (0.38 acres) to 2.78 hectares (6.87 acres) in area, totaling 3.59 hectares (8.87 acres). In the few cases that existed where an inclusion of non-forested habitat patches occurred inside a MFPN, the edge of the patch was also considered a disturbance edge. Some MFPNs may contain linear corridors (shrub habitat within powerline corridors) that are not considered permanent barriers.

Forests containing interior forest habitat provide breeding habitat for area sensitive neotropical migratory bird species. Neotropical migratory birds have experienced population declines due to forest habitat loss and fragmentation. Human related activities such as agriculture, urban development, and development of highways, transmission lines, and gas pipe lines are cited as factors causing fragmentation and contributing to the bird species declines.

Potential impacts to MFPNs as a result of the development of the CSVT project include loss of forest habitat, community diversity, reduction in patch size, loss of interior forest habitat, and disruption of movement. Potential impacts upon wildlife corridors as a result of the development of the CSVT project result in the disruption of movement between similar habitats or within a habitat. Figures IV-F-3 and IV-F-4 show the distribution of landscape features throughout the study corridor along with alternative footprints. Tables IV-F-2 and IV-F-3 identify the potential impacts upon MFPNs and forest interior associated with the various MFPNs, and Table IV-F-4 identifies the potential impacts upon wildlife corridors by alternative.

None of the Section 1 or Section 2 Alternatives directly affect forest interior habitat not associated with a major forest patch network. DAMA indirectly affects 0.03 hectares (0.06 acres) of forest interior habitat not associated with a MFPN. Old Trail Alternatives do not indirectly affect forest interior

TABLE IV-F-2
MAJOR FOREST PATCH NETWORK IMPACTS

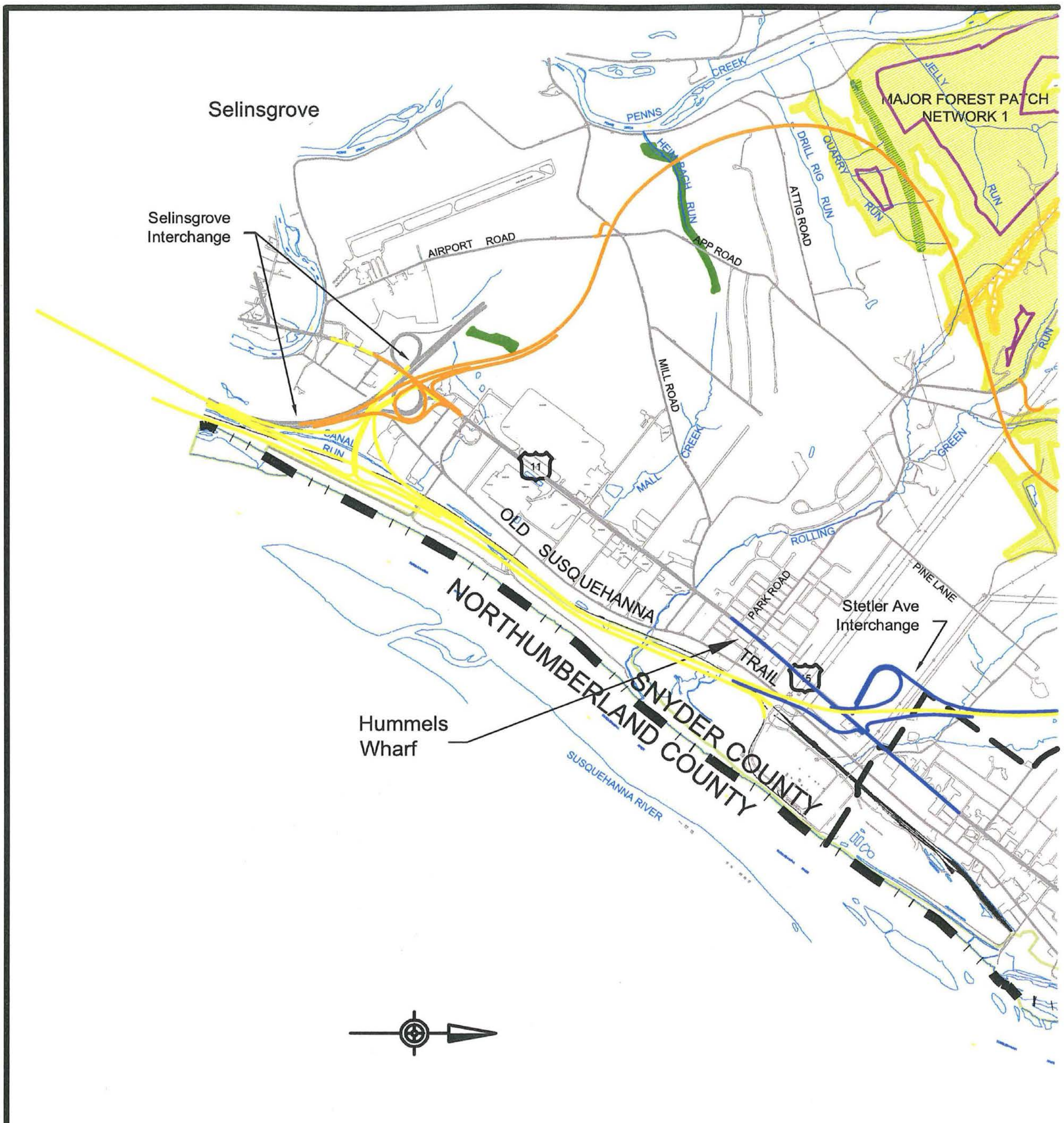
MAJOR FOREST PATCH NETWORK	SECTION 1		
	DAMA [HECTARES (ACRES)]	OT2A [HECTARES (ACRES)]	OT2B [HECTARES (ACRES)]
MFPN1	22.91 (56.61)	0.00 (0.00)	0.00 (0.00)
MFPN2	31.53 (77.89)	20.24 (50.00)	38.64 (92.58)
MFPN3	4.81 (11.89)	0.00 (0.00)	0.00 (0.00)
TOTAL	**59.25 (146.39)**	**20.24 (50.00)**	**38.64 (92.58)**

MAJOR FOREST PATCH NETWORK	SECTION 2			
	RC1-E [HECTARES (ACRES)]	RC1-W [HECTARES (ACRES)]	RC5 [HECTARES (ACRES)]	RC6 [HECTARES (ACRES)]
MFPN2A	29.33 (72.49)	29.33 (72.49)	27.30 (67.47)	29.33 (72.47)
MFPN4	1.91 (4.72)	1.75 (4.33)	0.70 (1.72)	2.48 (6.12)
MFPN4A	27.96 (69.10)	9.64 (23.82)	18.65 (46.07)	27.48 (67.91)
TOTAL	**59.20 (146.31)**	**40.72 (100.64)**	**46.65 (115.26)**	**59.29 (146.50)**

habitat not associated with a MFPN. RC1-E, RC1-W, and RC6 indirectly affect equal area of forest interior habitat. RC5 indirectly affects the least area of forest interior habitat.

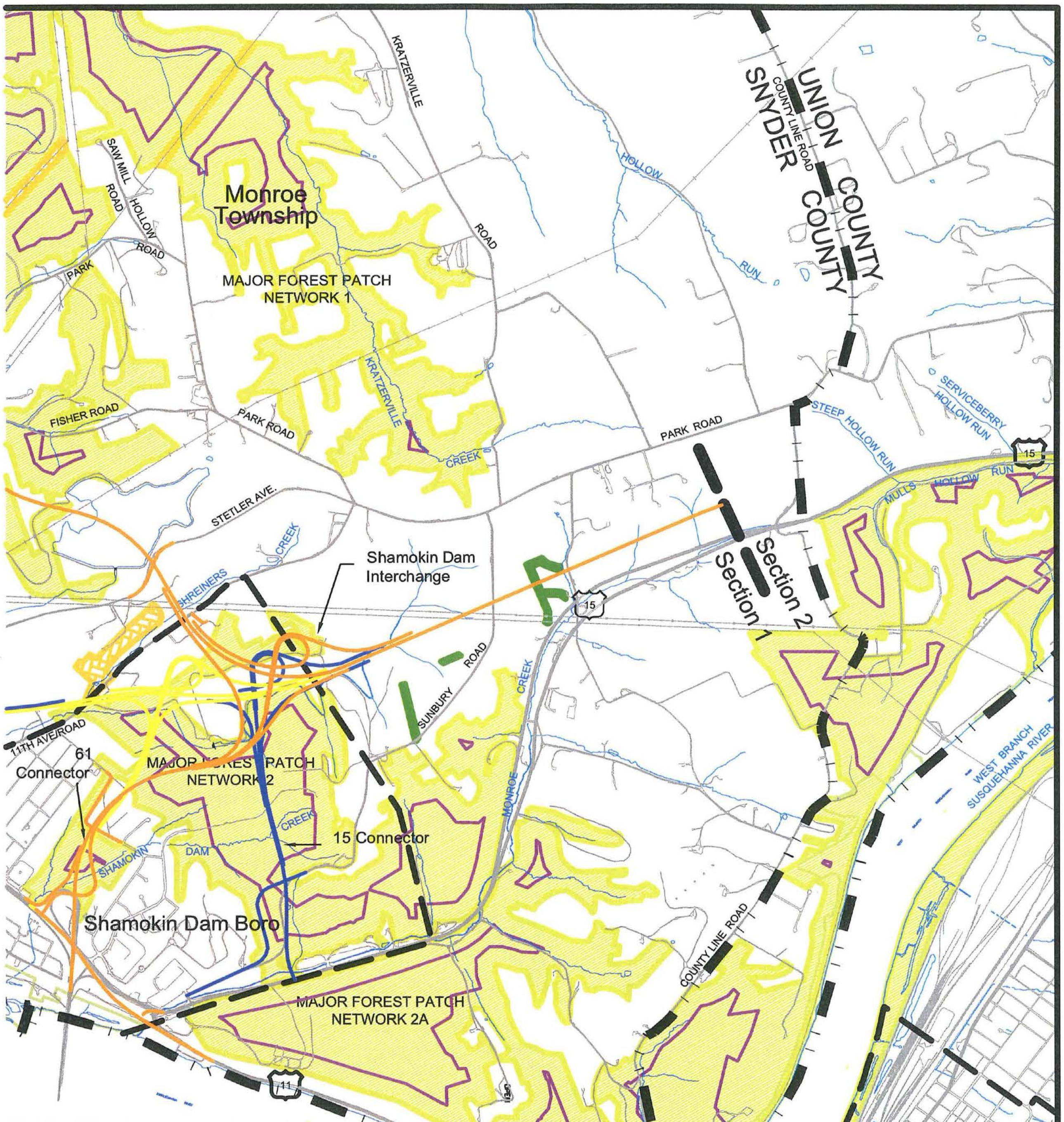
Larger grassland habitat patches were further reviewed to assess potential affects upon wildlife species diversity. For the purposes of the CSVT Project, grassland habitat is considered to be dominated by grass species (Poaceae or Gramineae), contain less than 25% shrubs, and be greater than 16.2 hectares (40 acres) in size. Grassland habitat provides breeding habitat for grassland bird species. These bird species have experienced population declines due to habitat loss associated with development, habitat successional changes, and decreased quality associated with fragmentation and agricultural practices.

The Build Alternatives in Section I impact PPL's reclaimed Ash Basin No. 3, an area considered grassland habitat. OT2B and DAMA impact a similar area of grassland habitat totaling 22.62 hectares (55.88 acres) and 22.3 hectares (55.10 acres), respectively. OT2A impacts the least area of grassland habitat.



Legend

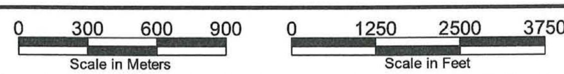
DA Modified Avoidance Alternative	Riverine Corridor
Old Trail 2A Alternative (61 Connector)	Hedgerow Corridor
Old Trail 2B Alternative (Stetler Ave. Interchange /15 Connector)	Strip Corridor
Major Forest Patch Network	Forest Interior Habitat
	Shamokin Dam Borough Boundary

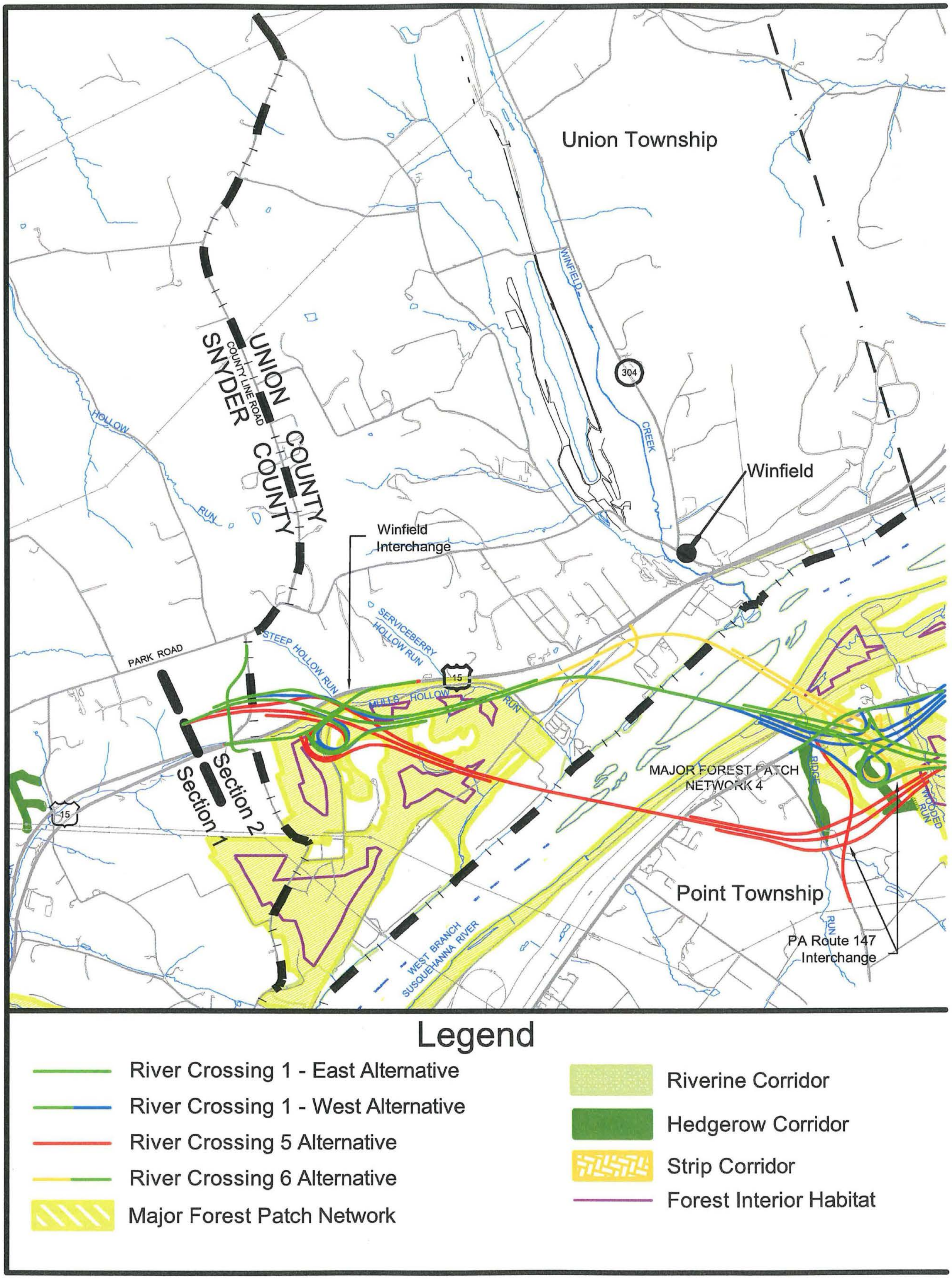


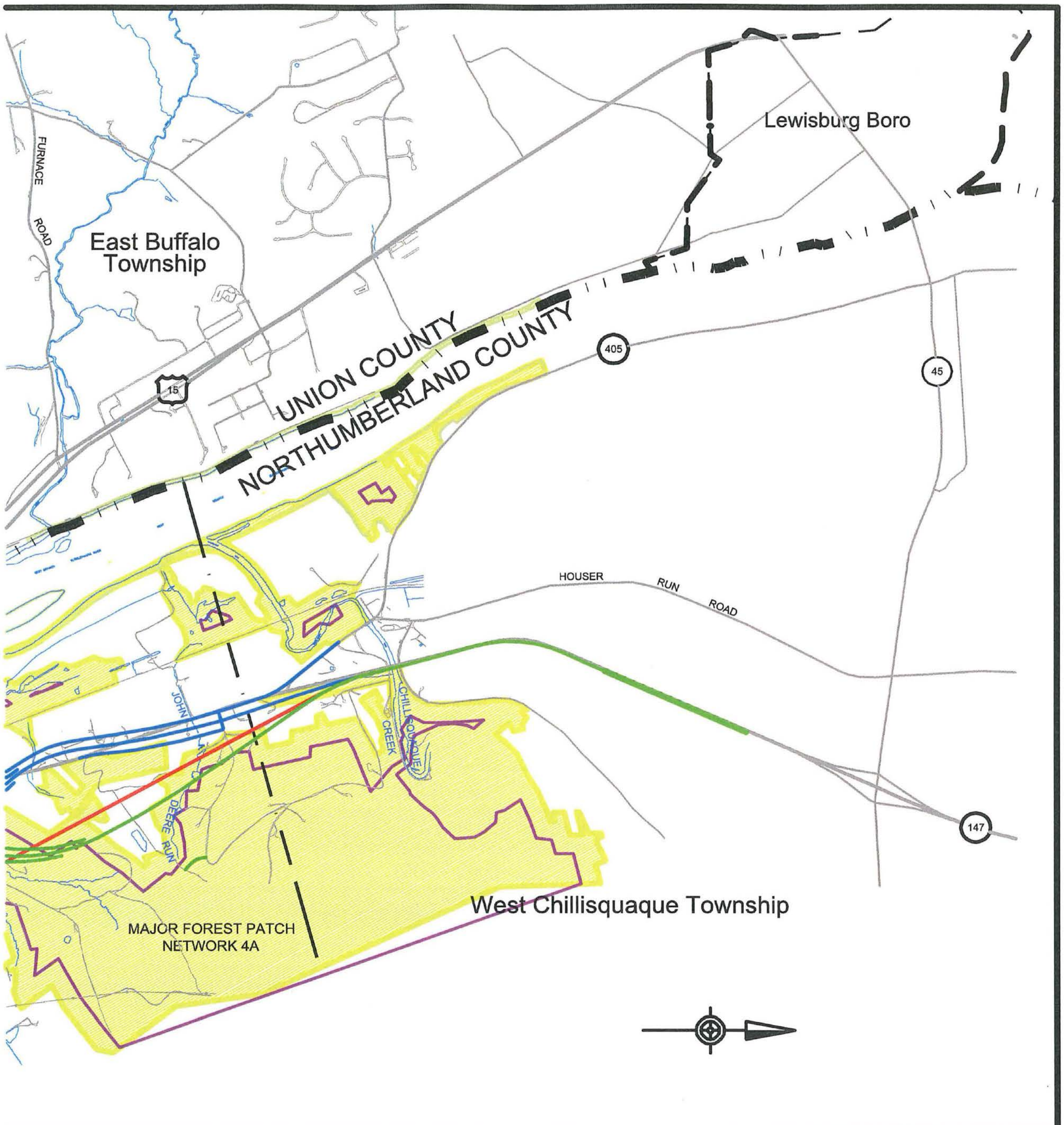
Central Susquehanna Valley Transportation Project

Figure IV-F-3

Section 1-
Landscape Features




Union Township
UNION COUNTY
SNYDER COUNTY
COUNTY LINE ROAD
WINFIELD
CREEK
304
Winfield
Winfield Interchange
PARK ROAD
STEEP HOLLOW RUN
SERVICEBERRY HOLLOW RUN
15
Section 2
Section 1
MAJOR FOREST PATCH NETWORK 4
Point Township
WEST BRANCH SUSQUEHANNA RIVER
PA Route 147 Interchange
HOLLOW
RUN
Legend
River Crossing 1 - East Alternative
River Crossing 1 - West Alternative
River Crossing 5 Alternative
River Crossing 6 Alternative
Major Forest Patch Network
Riverine Corridor
Hedgerow Corridor
Strip Corridor
Forest Interior Habitat



Central Susquehanna Valley Transportation Project

Figure IV-F-4

Section 2- Landscape Features

0 300 600 900 Scale in Meters

0 1250 2500 3750 Scale in Feet

TABLE IV-F-3
IMPACTS TO FOREST INTERIOR*

MAJOR FOREST PATCH NETWORK		SECTION 1		
		DAMA [HECTARES (ACRES)]	OT2A [HECTARES (ACRES)]	OT2B [HECTARES (ACRES)]
MFPN1	DIRECT	0.01 (0.01)	0.00 (0.00)	0.00 (0.00)
	INDIRECT	2.76 (6.83)	0.00 (0.00)	0.00 (0.00)
MFPN2	DIRECT	8.30 (20.51)	3.01 (7.45)	15.64 (38.64)
	INDIRECT	9.62 (23.76)	3.54 (8.74)	14.65 (36.18)
MFPN3	DIRECT	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
	INDIRECT	0.08 (0.19)	0.00 (0.00)	0.00 (0.00)
Non MFPN	DIRECT	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
	INDIRECT	0.03 (0.06)	0.00 (0.00)	0.00 (0.00)
TOTAL	**DIRECT**	**8.31 (20.52)**	**3.01 (7.45)**	**15.64 (38.64)**
	INDIRECT	**12.49 (30.84)**	**3.54 (8.74)**	**14.65 (36.18)**

MAJOR FOREST PATCH NETWORK		SECTION 2			
		RC1-E [HECTARES (ACRES)]	RC1-W [HECTARES (ACRES)]	RC5 [HECTARES (ACRES)]	RC6 [HECTARES (ACRES)]
MFPN2A	DIRECT	3.32 (8.21)	3.35 (8.28)	4.78 (11.81)	3.54 (8.75)
	INDIRECT	2.93 (7.25)	2.90 (7.18)	4.88 (12.07)	2.71 (6.70)
MFPN4	DIRECT	0.00 (0.00)	0.00 (0.00)	0.14 (0.35)	0.02 (0.05)
	INDIRECT	0.05 (0.02)	0.00 (0.00)	0.32 (0.79)	0.77 (1.91)
MFPN4A	DIRECT	11.32 (27.99)	0.26 (0.65)	12.01 (29.68)	10.85 (26.83)
	INDIRECT	25.36 (62.67)	6.09 (15.05)	25.45 (62.89)	19.52 (48.24)
Non MFPN	DIRECT	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
	INDIRECT	0.98 (2.43)	0.98 (2.43)	0.68 (1.67)	0.98 (2.43)
TOTAL	**DIRECT**	**14.64 (36.20)**	**3.61 (8.93)**	**16.93 (41.84)**	**14.41 (35.63)**
	INDIRECT	**29.32 (72.37)**	**9.97 (24.66)**	**31.33 (77.42)**	**23.98 (59.28)**

* Potential direct impacts to forest interior were determined by calculating the loss of forest interior habitat directly affected by each alternative. Indirect impacts were evaluated as the effects to interior habitat within 100 meters (330 feet) from the edge of each alternative footprint.

TABLE IV-F-4
IMPACTS TO WILDLIFE CORRIDORS

WILDLIFE CORRIDOR	SECTION 1		
	DAMA [NO./HECTARES (ACRES)]	OT2A [NO./HECTARES (ACRES)]	OT2B [NO./HECTARES (ACRES)]
Riverine	0/0.0 (0.0)	1/8.49 (21.23)	1/8.48 (20.96)
Hedgerow/Line	4/2.38 (5.89)	1/0.76 (1.88)	1/0.76 (1.68)
Strip	2/2.62 (6.50)	1/0.29 (0.72)	1/0.29 (0.72)

WILDLIFE CORRIDOR	SECTION 2			
	RC1-E [NO./HECTARES (ACRES)]	RC1-W [NO./HECTARES (ACRES)]	RC5 [NO./HECTARES (ACRES)]	RC6 [NO./HECTARES (ACRES)]
Riverine	2/3.30 (8.14)	2/3.02 (7.48)	1/1.46 (3.61)	2/3.00 (7.41)
Hedgerow/Line	1/0.75 (1.86)	2/0.87 (2.15)	2/1.37 (3.38)	1/0.69 (1.72)
Strip	0/0.0 (0.0)	0/0.0 (0.0)	0/0.0 (0.0)	0/0.0 (0.0)

d. Wildlife Habitat Value Impacts

Overall, wildlife habitat value impacts of the CSVT project are assessed according to wildlife habitat classification categories derived from the assessment of the terrestrial community based evaluation, wildlife evaluation, and landscape evaluation. Wildlife habitat classification categories are defined below.

- **Category 1 - Special Protection Wildlife Habitats**

  Special protection wildlife habitats are habitat types identified as possessing state or Federal listed rare, threatened, or endangered plant or animal species. These habitats are typically protected at the state and Federal levels due to the presence of threatened or endangered species. Species of management concern identified by the PGC, PF&BC, PA DCNR, or US FWS (i.e., snow shoe hare) may also be included in this category.

  It should be noted that coordination on federally-listed endangered species and protected habitat will be conducted in compliance with the Endangered Species Act (ESA) and coordinated with USFWS.

- **Category 2 - Locally Important Wildlife Habitats**

  Locally important wildlife habitats that represent quality wildlife habitat based on vegetative species composition and structure and additionally provide a major component in landscape function. Category 2 habitats represent a combination of the following:

1. sizeable areas containing interior habitat within community type networks;
2. quality habitats with relatively limited representation in the study area and/or locale;
3. habitats that contribute to increases in species diversity;
4. habitats that represent key landscape compartments that provide habitat connectivity among similar community types and other landscape compartments; and
5. relatively undisturbed areas with limited proximal development, encroachments, or permanent wildlife barriers.

- **Category 3 - General Wildlife Habitats**

  General habitats were based upon the following:

  1. habitats typically abundant and distributed throughout the overall landscape;
  2. habitats containing a diversity of species typically occurring within similar habitats throughout the area;
  3. relatively smaller community type patches with limited interior habitat; and
  4. areas moderately influenced by proximal human activities and/or minor encroachments.

- **Category 4 - Marginal Habitats**

  Marginal habitats are characterized by the following:

  1. low species diversity;
  2. absence of species of special concern;
  3. relatively small-sized habitat area (<5 acres);
  4. nonforested habitat patch; and
  5. a high human disturbance level adjacent to and within the habitat.

As a result, impacts reported by wildlife habitat classification category reflect the loss of habitat quality based upon evaluations of overall habitat diversity and abundance, potential wildlife usage, community distribution, and the degree of human influence. Figures IV-F-5 and IV-F-6 show the distribution of wildlife habitat classification categories throughout the study corridor along with alternative footprints. A brief description of the categories is also provided in the legend of Figure IV-F-5. Table IV-F-5 provides a summary of impacts by alternatives for wildlife habitat classification categories. Special Protection Wildlife Habitats within the study area are not anticipated to be present, and therefore, no impact is anticipated by any alternatives proposed for the CSVT project.

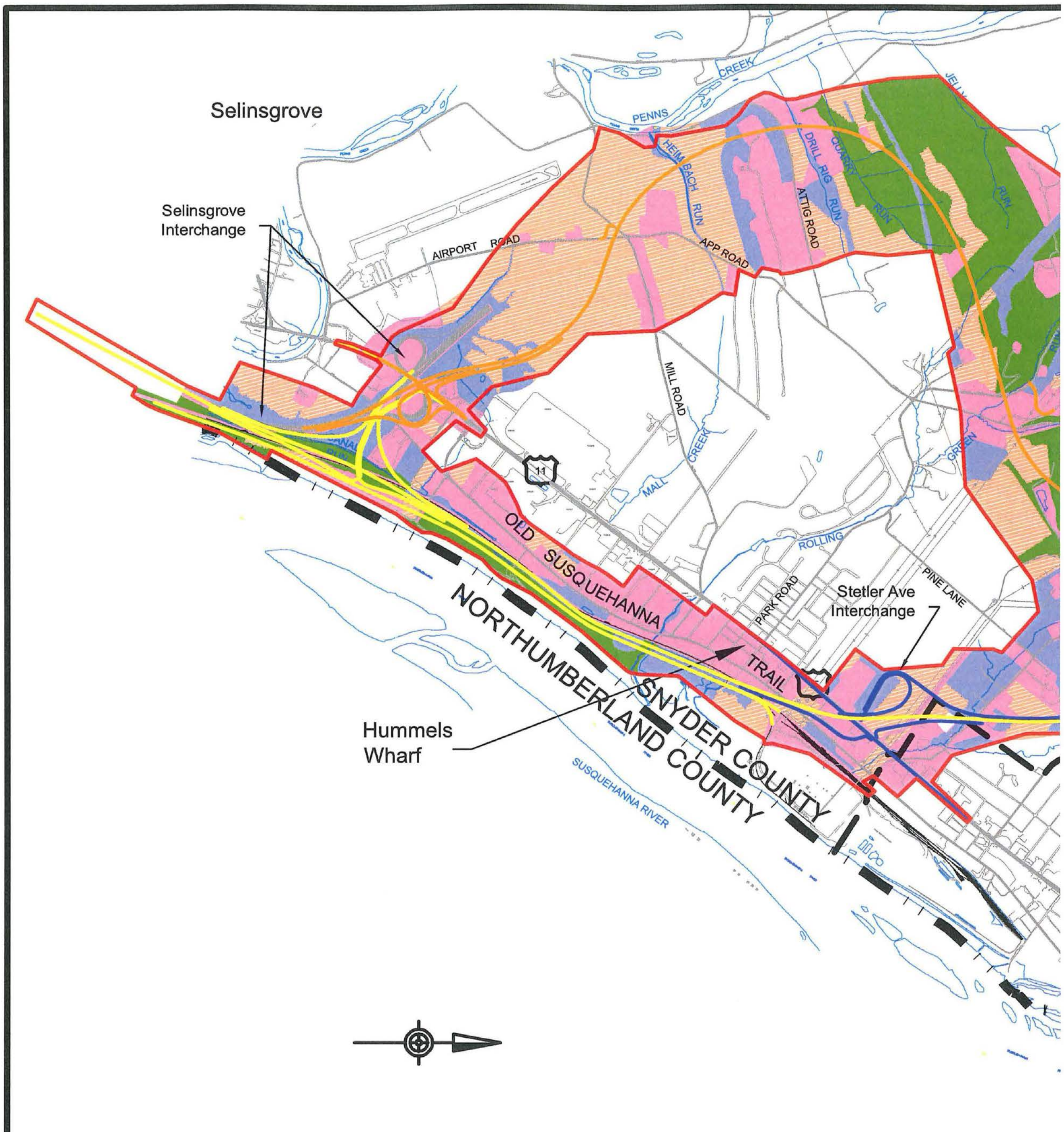
TABLE IV-F-5
WILDLIFE HABITAT CLASSIFICATION
IMPACT SUMMARY BY ALTERNATIVE

CATEGORY	SECTION 1		
	DAMA [HECTARES (ACRES)]	OT2A [HECTARES (ACRES)]	OT2B [HECTARES (ACRES)]
Special Protection Wildlife Habitats (Category 1)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Locally Important Wildlife Habitats (Category 2)	80.39 (198.64)	58.85 (145.41)	79.05 (195.32)
General Wildlife Habitats (Category 3)	47.07 (116.31)	46.66 (115.29)	45.03 (111.27)
Residual/Marginal Wildlife Habitats (Category 4)	57.46 (141.99)	24.13 (59.62)	27.76 (68.59)

CATEGORY	SECTION 2			
	RC1-E HECTARES (ACRES)	RC1-W HECTARES (ACRES)	RC5 HECTARES (ACRES)	RC6 HECTARES (ACRES)
Special Protection Wildlife Habitats (Category 1)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Locally Important Wildlife Habitats (Category 2)	62.88 (155.37)	44.38 (109.66)	48.39 (119.54)	64.40 (159.12)
General Wildlife Habitats (Category 3)	39.01 (96.40)	35.27 (87.15)	43.35 (107.12)	38.53 (95.22)
Residual/Marginal Wildlife Habitats (Category 4)	31.66 (78.23)	32.94 (81.40)	41.55 (102.68)	34.43 (85.08)

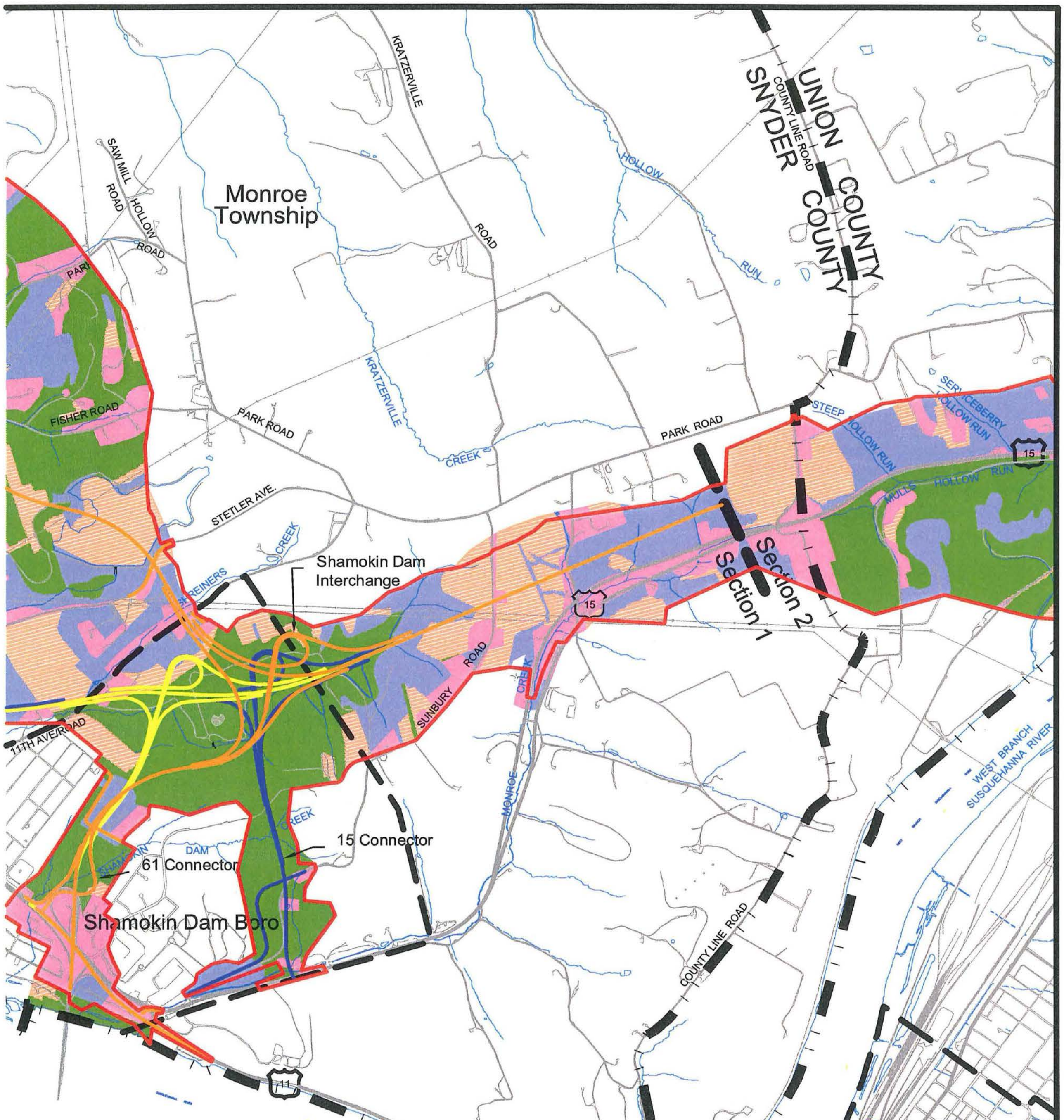
e. Threatened and Endangered Species

No threatened and endangered plant species preferred habitat or individuals have been confirmed in the project study corridor at the end of the 2002 field survey season. Annual surveys have been conducted since 1996. It is concluded that no impact to threatened and/or endangered plant species should occur as a result of the construction of any Build Alternative. However, the Pennsylvania Natural Diversity Inventory (PNDI) has requested that annual surveys be conducted to continue to search for plant species of concern. A late spring - summer survey was conducted in June 2002 and no protected species were found. A survey was conducted in the fall of 2002 to determine the presence of any potential fall appropriate survey species. The results of the fall 2002 survey did not identify the presence of any protected species. Potential habitat areas that have not been disturbed by new



Legend

- DA Modified Avoidance Alternative
- Old Trail 2A Alternative (61 Connector)
- Old Trail 2B Alternative (Stetler Ave. Interchange /15 Connector)
- Locally Important Wildlife Habitat (Category 2)
- General Wildlife Habitat (Category 3)
- Marginal Wildlife Habitat (Category 4)
- Developed and Barren Land
- Shamokin Dam Borough Boundary
- Phase II Study Corridor Boundary



Locally Important Wildlife Habitats(Category 2): Areas that represent quality wildlife habitat based on vegetative species composition/structure and provide important landscape functions.

General Wildlife Habitats(Category 3): Areas not distinguished as quality habitat because they are typical of habitats abundantly distributed throughout the landscape and/or limited in quality because of factors such as small size, lack of interior forest habitat, or level of human disturbance.

Marginal Wildlife Habitats(Category 4): Areas generally characterized by small size, low species diversity, and proximity to areas of high human disturbance.

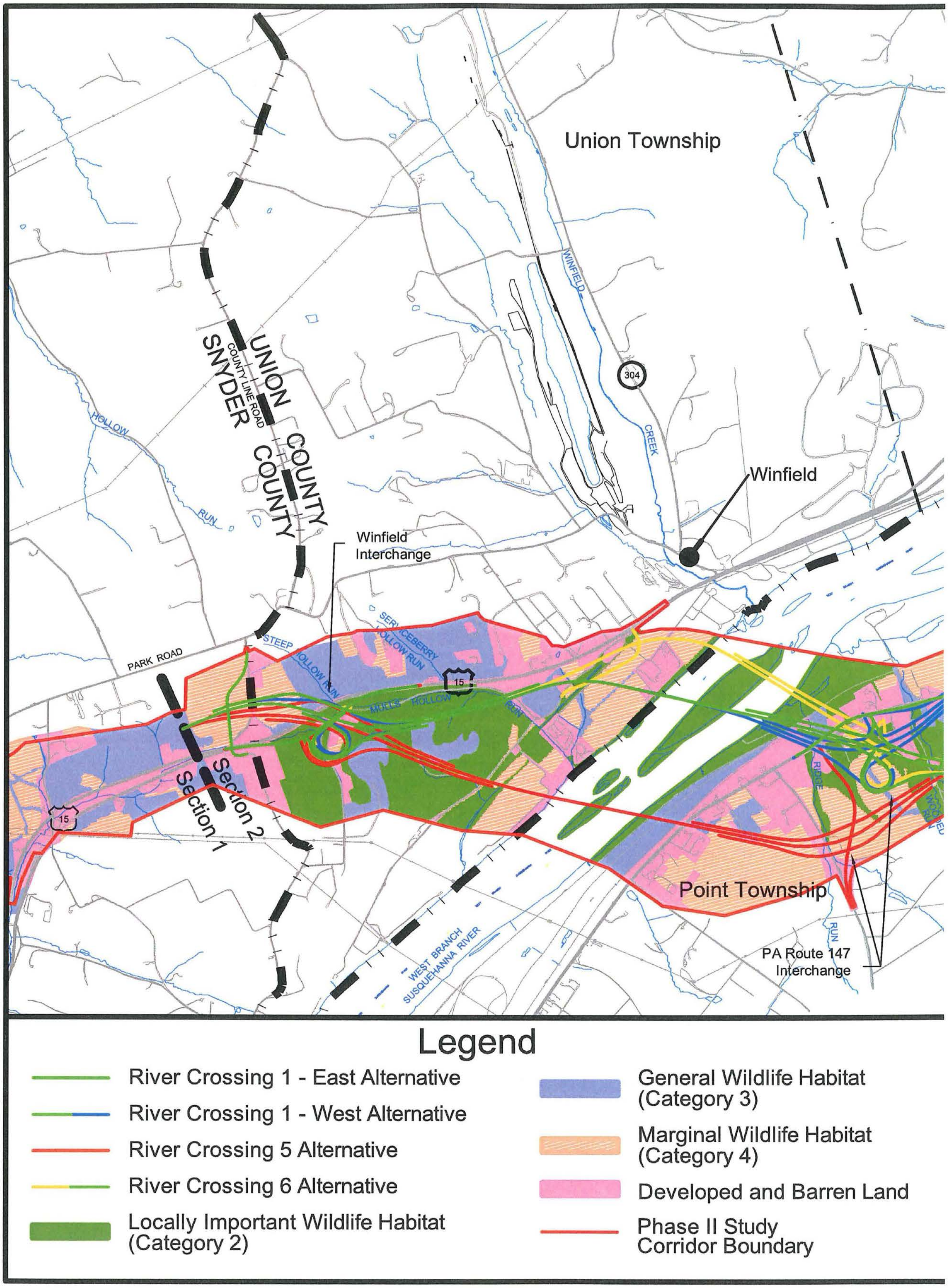
Central Susquehanna Valley Transportation Project

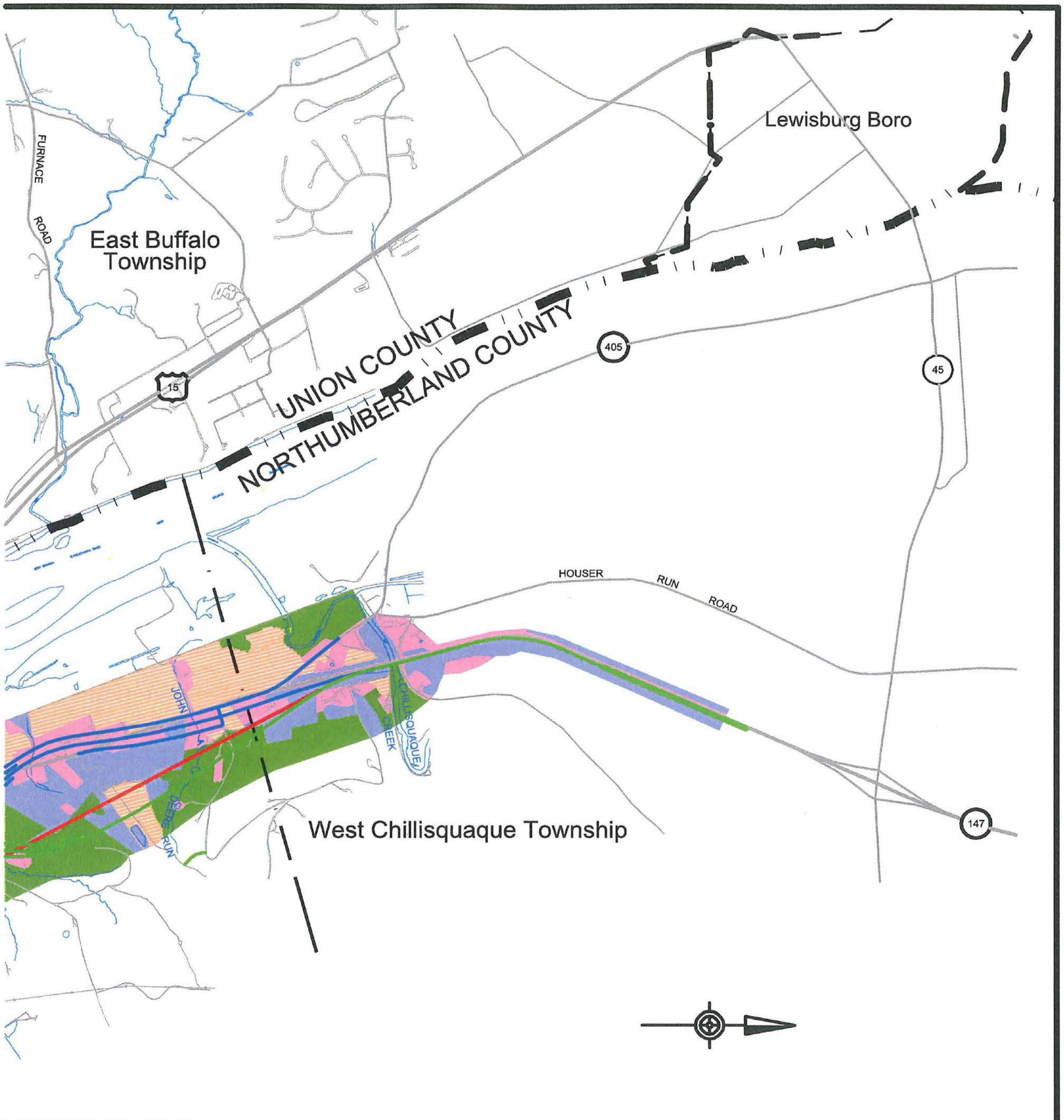
Figure IV-F-5

Section 1-Wildlife Habitat Classifications

0 300 600 900
Scale in Meters

0 1250 2500 3750
Scale in Feet


Union Township
UNION COUNTY
SNYDER COUNTY
COUNTY LINE ROAD
WINFIELD
CREEK
304
Winfield
Winfield Interchange
PARK ROAD
STEEP HOLLOW RUN
SERVICEBERRY HOLLOW RUN
MUDDY HOLLOW RUN
HOLLOW
RUN
15
Section 2
Section 1
WEST BRANCH SUSQUEHANNA RIVER
Point Township
RIDGE
RUN
PA Route 147 Interchange
Legend
River Crossing 1 - East Alternative
River Crossing 1 - West Alternative
River Crossing 5 Alternative
River Crossing 6 Alternative
Locally Important Wildlife Habitat (Category 2)
General Wildlife Habitat (Category 3)
Marginal Wildlife Habitat (Category 4)
Developed and Barren Land
Phase II Study Corridor Boundary



Locally Important Wildlife Habitats(Category 2): Areas that represent quality wildlife habitat based on vegetative species composition/structure and provide important landscape functions.

General Wildlife Habitats(Category 3): Areas not distinguished as quality habitat because they are typical of habitats abundantly distributed throughout the landscape and/or limited in quality because of factors such as small size, lack of interior forest habitat, or level of human disturbance.

Marginal Wildlife Habitats(Category 4): Areas generally characterized by small size, low species diversity, and proximity to areas of high human disturbance.

Central Susquehanna Valley Transportation Project

Figure IV-F-6

Section 2-Wildlife Habitat Classifications

0 300 600 900 Scale in Meters

0 1250 2500 3750 Scale in Feet

development will be revisited in the spring of 2003. Information regarding plants of concern is contained in Appendix Q.

Agency coordination revealed that the CSVT study area is within the known range of the Indiana Bat (*Myotis sodalis*), a Federal and State endangered species (see Coordination in Appendix B). A known hibernaculum (winter hibernating site) occurs in Mifflin County, Pennsylvania. The species leaves the hibernaculum and uses forested areas spring through fall for foraging and roosting. The project may potentially affect the bat due to loss of forest habitat.

An Indiana Bat survey was conducted in July 2001. None of the captured species were federally or state listed threatened, endangered, or candidate species. A letter received from the U.S. FWS dated April 2, 2002, concurs that the proposed CSVT Project is not likely to adversely affect Indiana bats or their habitat. This letter appears in Appendix B.

In August of 2002, PENNDOT received a letter from the Pennsylvania Fish and Boat Commission (PFBC) indicating that a species of concern, the yellow lampmussel (a rare freshwater mussel), was identified in the project area (see Appendix B). The yellow lampmussel is not currently listed as protected in Pennsylvania nor is it a federally listed endangered or threatened species, but the PFBC noted that it is a species of concern to them and may be listed for protection in the future. The PFBC noted that mussels have the potential to be adversely impacted through in-stream structures and associated construction activities, both temporary and permanent. Mussels are also vulnerable to various types of water pollution. As such, the PFBC requests that a mussel survey be completed within the zones of direct and indirect effects associated with both the Susquehanna River Bridge and the Chillisquaque Creek Bridge.

A meeting was held with representatives of the PFBC as well as representatives of the U.S. Army Corps of Engineers and the PA Department of Environmental Protection to discuss this request in January 2003. Coordination regarding the mussel survey request will continue.

No other State or Federal threatened or endangered animal species are known to occur in the study area (see Coordination in Appendix B).

Both the Bald Eagle (*Haliaeetus leucocephalus*) a federally threatened and state endangered species and the upland sandpiper (*Bartramia longicauda*) a state threatened species are known to occur in the project vicinity. However, neither species has been observed in the study area during field investigations. Prior to construction, Ash Basin 3 and the adjacent active pasture (AG2-5) will be surveyed each spring season for potential occurrence of the upland sandpiper. If the noted bird species are observed within the area then the PGC's State Ornithologist will be notified. During the field investigations, no Bald Eagle nest sites were noted. Future investigations will continue to survey for both species until construction.

Annual coordination efforts will be continued to update plant and animal threatened and endangered species information prior to construction to confirm the absence of threatened and endangered species, within the CSVT Study Area.

The threatened and endangered plant and animal species assessment is discussed in further detail, including a list of the appropriate field survey period for each species, in the Technical Memorandum.

f. Invasive and Noxious Plants in CSVT Study Area

A study was conducted to determine what invasive and/or noxious plants are present in the CSVT study area. A composite list of all plant species was developed from the 1998 vegetative community mapping data files. This list was compared to the most current resource available from the Pennsylvania Department of Conservation, Bureau of Forestry, Pennsylvania Natural Diversity Inventory (PNDI) entitled "Invasive Plants in Pennsylvania."

"Invasive plant" is defined by PNDI as a noxious environmental weed, pest or plant, that grows aggressively, spreads, and displaces other plants. Invasive plants tend to appear in disturbed ground, and the most aggressive can invade other ecosystems. The following 25 species were found in the CSVT study area, and they are on the current PNDI list of invasive species:

<u>Trees:</u>
Norway Maple (*Acer platanoides*)
Tree-of heaven (*Ailanthus altissima*)

<u>Shrubs:</u>
Japanese Barberry (*Berberis thunbergii*)
Autumn Olive (*Elaeagnus umbellata*)
Common Privet (*Ligustrum vulgare*)
Morrow's Honeysuckle (*Lonicera morrowii*)
Tartarian Honeysuckle (*Lonicera tatarica*)
Multiflora Rose (*Rosa multiflora*)

<u>Vines:</u>
Japanese Honeysuckle (*Lonicera japonica*)

<u>Flowers and Grasses:</u>
Garlic Mustard (*Alliaria petiolata*)
Canada Thistle (*Cirsium arvense*)
Bull Thistle (*Cirsium vulgare*)
Crown-vetch (*Coronilla varia*)
Day Lily (*Hemerocallis fulva*)
Dame's Rocket (*Hesperis matronalis*)
Purple Loosestrife (*Lythrum salicaria*)
Star-of-Bethlehem (*Ornithogallum umbellatum*)
Reed Canary Grass (*Phalaris arundinacea*)

Common Reed (*Phragmites australis*)
Japanese Knotweed (*Polygonum cuspidatum*)

g. Discussion of Alternatives

Table IV-F-6 provides a summary of impacts to vegetative community types, major forest patch networks, forest interior habitat, wildlife corridors, and wildlife habitat classifications.

h. Terrestrial Mitigation

Mitigation includes avoidance, minimization, restoration, replacement, and preservation measures. Unavoidable terrestrial impacts will be considered for mitigation and evaluated in terms of feasibility, relevancy, and reasonableness. In addition, FHWA and PENNDOT have agreed to utilizing an environmental monitor on the project.

i. Avoidance and Minimization

Total avoidance of terrestrial resources is not possible for any of the proposed build alternatives. As part of the mitigation efforts, steps to minimize unavoidable impacts to terrestrial resources will be considered during the final design and construction phase of the project. Minimization efforts would include reviews during final design and construction by a qualified environmental monitor. The environmental monitor's responsibilities would include overseeing terrestrial mitigation activities and issues during the final design and construction phase of the project to ensure implementation of mitigation goals and minimization of terrestrial impacts. Final design measures to be considered to minimize adverse impacts to terrestrial resources including Locally Important Wildlife Habitat (Category 2), General Wildlife Habitat (Category 3), and Marginal Wildlife Habitat (Category 4) include the following.

- Minor alignment shifts to minimize terrestrial habitat impacts.
- Final design modifications to stormwater management facilities.
- Document the locally important wildlife habitats for avoidance or minimization.
- The environmental monitor will be involved during design and construction to ensure that mitigation commitments are fulfilled.

TABLE IV-F-6
VEGETATION AND WILDLIFE IMPACT SUMMARY BY ALTERNATIVE

FEATURE	SECTION 1			SECTION 2			
	OLD TRAIL 2A	OLD TRAIL 2B	DA MODIFIED AVOIDANCE	RC1-E	RC1-W	RC5	RC6
Vegetative Community Types							
Agricultural Land (AG1-AG4)	21.40 (52.88)	24.68 (60.99)	46.54 (115.01)	29.87 (73.81)	32.00 (79.02)	40.82 (100.84)	31.98 (79.03)
Old Field Herbaceous Land (OF2, OF3)	29.23 (72.23)	33.35 (82.40)	35.30 (87.23)	8.78 (21.69)	7.68 (18.96)	10.68 (26.38)	9.40 (23.22)
Old Field Shrubland (OF1)	0.04 (0.09)	0.05 (0.12)	1.79 (4.42)	0.18 (0.45)	0.00 (0.00)	0.22 (0.53)	0.18 (0.45)
Old Field Equal Herbaceous Shrubland (OF4)	18.81 (46.49)	16.89 (41.74)	26.45 (65.37)	4.65 (11.50)	1.14 (2.81)	4.86 (12.01)	4.65 (11.50)
Oak Forest (F1, F2, F3, F4, F6, F7, SF1, SF2)	27.10 (66.97)	34.93 (86.34)	52.13 (128.84)	70.90 (175.32)	53.92 (133.36)	64.36 (159.02)	72.12 (178.25)
Oak Conifer Mixed Forest (F5, SF3, SF4)	3.64 (8.99)	12.38 (30.61)	16.75 (45.58)	12.08 (29.86)	11.31 (28.05)	6.29 (15.55)	11.66 (28.81)
Successional Conifer Forest (SF5)	1.47 (3.64)	1.47 (3.64)	1.97 (4.87)	0.08 (0.20)	0.08 (0.20)	0.08 (0.19)	0.08 (0.20)
Riverine Forest (F9)	18.36 (45.36)	18.33 (45.30)	0.02 (0.05)	4.52 (11.17)	4.26 (10.52)	2.29 (5.66)	4.58 (11.28)
Hedgerow Habitat (HR1, HR3, HR5, HR6)	0.95 (2.33)	1.25 (3.09)	1.85 (4.60)	1.24 (3.05)	1.16 (2.86)	2.58 (6.37)	1.09 (2.70)
Total Terrestrial Community Types	121.00 (298.98)	143.33 (354.23)	186.00 (463.81)	132.30 (327.05)	111.55 (275.78)	132.18 (326.55)	135.74 (335.44)
Total Wetlands	5.72 (14.13)	5.74 (14.19)	1.94 (4.79)	1.25 (3.10)	1.06 (2.62)	1.21 (2.98)	1.69 (4.18)
Major Forest Patch Network	20.24 (50.00)	38.64 (92.58)	59.25 (146.39)	59.20 (145.31)	40.72 (100.64)	46.65 (115.26)	59.29 (146.50)
Forest Interior Habitat (direct and indirect)	6.55 (16.19)	34.27 (84.66)	20.80 (51.36)	43.96 (108.57)	13.58 (33.59)	48.26 (119.26)	38.39 (94.91)
Wildlife Corridors							
Hedge -- *number / hectares (acres)*	1 / 0.76 (1.88)	1 / 0.76 (1.88)	4 / 2.38 (5.89)	1 / 0.75 (1.86)	2 / 0.87 (2.15)	2 / 1.37 (3.38)	1 / 0.69 (1.72)
Strip -- *number / hectares (acres)*	1 / 0.29 (0.72)	1 / 0.29 (0.72)	2 / 2.62 (6.50)	0 / 0.00 (0.00)	0 / 0.00 (0.00)	0 / 0.00 (0.00)	0 / 0.00 (0.00)
Riverine -- *number / hectares (acres)*	1 / 8.49 (21.23)	1 / 8.48 (20.96)	0 / 0.00 (0.00)	2 / 3.30 (8.14)	2 / 3.02 (7.48)	1 / 1.46 (3.61)	2 / 3.00 (7.40)
Wildlife Habitat Classifications							
Category 1 - Special Protection Wildlife Habitat	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Category 2 - Important Wildlife Habitat	58.85 (145.51)	79.05 (195.32)	80.39 (198.64)	62.88 (155.37)	43.70 (109.67)	48.39 (119.54)	64.40 (159.12)
Category 3 - General Wildlife Habitat	46.66 (115.29)	45.03 (111.27)	47.07 (116.31)	39.01 (96.40)	35.03 (87.15)	43.35 (107.12)	38.53 (95.22)
Category 4 - Marginal Wildlife Habitat	24.13 (59.62)	27.76 (68.59)	57.46 (141.99)	31.66 (78.23)	32.83 (81.39)	41.55 (102.68)	34.43 (85.08)

Note: Area reported in hectares (acres) unless otherwise noted.
Wetland area (delineated and surveyed) includes direct and indirect impacts.
Direct impacts reported for Forest Interior Habitat.

- Design vegetative clear zones along the edge of the roadway to allow for increased sight distance and reaction time by motorists to avoid animal collisions.
- Avoid use of concrete median barriers where safety is not adversely affected.
- Implement safety measures (such as deer warning signs) to minimize motorist conflicts with white-tailed deer.

Construction management measures to minimize impacts to terrestrial resources may include the following.

- A qualified environmental monitor will assure that clearing and disturbance remains within the right-of-way during construction. Areas to remain unaltered will be marked in the field prior to the clearing and grubbing phase. The environmental monitor will consider other wildlife habitat features that should be avoided, if possible, during the clearing stage. Approval will be granted by PENNDOT. Features may include large den trees or snags.
- PENNDOT and/or the environmental monitor will review all contractor proposed off-site areas required during construction, such as access roads, staging areas, waste disposal areas, and borrow areas.
- Revegetate staging areas to restore the disturbance with native species.

ii. Mitigation Measures

PENNDOT and FHWA are committed to exploring relevant, reasonable, and feasible mitigation measures to offset terrestrial impacts resulting from the project. The terrestrial mitigation proposal will be developed with respect to the following general conditions.

- Develop the Mitigation Proposal to be consistent with the Terrestrial Mitigation Policies of the FHWA and PENNDOT.
- Obtain potentially suitable areas for mitigation primarily through amicable (voluntary) easement agreements or acquisition.
- Develop a hierarchical approach to evaluate relevant mitigation opportunities within and adjacent to the study area.

A conceptual mitigation proposal is being developed to provide guidance and ensure the commitment of reasonable compensation for the unavoidable impacts of the project. Mitigation for natural resources, including wetlands, surface water resources, and terrestrial habitat is considered in this proposal. Mitigation commitments are being developed based on meetings with agency representatives occurring in April and July of 2001, January of 2002, and February and April 2003. Summaries of these meetings and field views held for the purpose of coordinating to develop mitigation commitments are listed in Section V.A.3 - Coordination with Environmental Resource Agencies. More detailed records of the coordination activities can be found in the Wetlands, Surface Water/Aquatic Resources, and Vegetation and Wildlife Technical Support Data.

The FHWA and PENNDOT are attempting to provide a total ecosystem approach to natural resource mitigation. This approach will provide replacement of wetlands and incorporate habitat mitigation, reconstruction/restoration of streams, enhancement of wetlands and terrestrial habitat, and preservation of existing wetlands, streams, and wildlife habitat in one location. The FHWA and PENNDOT are in the process of investigating alternative sites for the completion of the components of the proposal. The ultimate selection and development of the mitigation site or sites will also be coordinated with the natural resource agencies.

The conceptual mitigation proposal described in this Final EIS will be developed in more detail. Once a site (or sites) has been selected, a draft mitigation plan will be prepared. This draft plan will show the conceptual designs for wetland, stream, and terrestrial mitigation sites. This mitigation plan will not be finalized until after the Record of Decision (ROD).

The proposed work may include constructing a single resource area which would address the individual compensatory commitments at one site including:

- creating approximately 2.83 hectares (7 acres) of wetlands;
- restoring, enhancing, and/or reconstructing approximately 305 to 1,220 meters (1,000 to 4,000 linear feet) of stream;
- providing approximately 22.26 hectares (55 acres) of old field mitigation; and
- providing approximately 60.7 hectares (150 acres) of forestland mitigation.

The intention is to create a functioning, multiple habitat ecosystem which would be protected in perpetuity. The creation of a functioning ecosystem in one location, protected in perpetuity, is not standard practice or procedure. However, it has been determined that given the unique circumstances surrounding this project, such as 1) the potential availability of such a site that could accommodate the ecosystem approach, 2) the present owner of said site, 3) the potential availability of a future owner willing to commit to the maintenance of the site in perpetuity, 4) the potential for mitigating multiple impacts at the referenced site, and 5) the potential for the future development at the referenced site, the enhancement and protection of this potential site is an appropriate mitigative action for this project.

If it is not possible to complete the individual compensatory mitigation requirements at one site, then multiple sites in various locations would be investigated. Additionally, besides investigating alternative sites to implement the mitigation proposal, another option that may be considered is the provision of funding to existing conservation programs which are relevant to the appropriate terrestrial mitigation. This option may be evaluated if the single multi-functioning ecosystem option becomes unavailable.

Interest in land for the Terrestrial Mitigation Proposal will be obtained primarily through amicable agreements with landowners. **Land owners who would like to participate in the Terrestrial Mitigation Program should contact the CSVT Project Coordinator, PENNDOT District 3-0 at 1-888-878-2788.** The proposal would be developed with input from State and Federal natural resource agency representatives, and the future owner and leasee. PENNDOT and FHWA representatives will also participate in this effort.

iii. Alternate Mitigation Options

All mitigation options will be developed consistent with FHWA and PENNDOT terrestrial mitigation policies. Potential areas suitable for terrestrial mitigation are illustrated on the Figure entitled Areas Suitable for Participation in the Natural Resource Compensation Proposal in Appendix I. The following options will be pursued only in the event that a single site that meets the total ecosystem approach is not available.

a. Riparian/Riverine Communities

The mitigation effort is to reestablish and/or conserve the riverine/riparian corridor along the West and Main Branches of the Susquehanna River and island habitats to maintain habitat connectivity and wildlife movement and migration functions. Specific activities within the project area may include the following on properties owned or to be owned by the Commonwealth.

Reestablishment activities:

- Minimizing disturbance of the soil profile and provide suitable topsoil specifications to promote vegetation.

- Reestablishing original cross-sectional area of the floodplain.
- Implementing of a post-construction landscaping plan designed to reestablish the native riparian plant community and discourage invasive plant species.
- Incorporating roadway measures into the design to control runoff that may affect vegetative growth.

Conservation Activities:

- Preserving and/or enhancing riverine/riparian corridor habitat through easement agreements or ownership.

b. Large Forested Complexes

The mitigation effort includes enhancement and/or preservation of large forested complexes to maintain forest connectivity and provide forest interior habitat. Specific enhancement and/or preservation of forested complexes may include the following within the project area where reasonable. Property rights would be obtained through easement agreements.

- Reconnecting existing forested tracts through revegetation or active landscaping of gaps (nonforested areas).
- Conserving existing forested complexes through easements, enrollment in existing public programs (i.e. forest stewardship) or obtaining lands and transferring to public ownership.
- Revegetating with native species where applicable and feasible.
- Removing invasive species where active mitigation takes place.
- Planting native species to benefit wildlife.
- Contributing funding to a conservation organization which is specifically intended to preserve and manage large forested complexes close to the project impact area.
- Contributing funding to a state agency (i.e. PGC, DCNR) to obtain large forested areas for inclusion into a state public use system (i.e. State Game Lands, State Park) close to the project impact area.

c. Large Tracts of Old Field Habitat

The mitigation effort involves establishment and/or preservation of old field habitat approximately 16.1 hectares (40 acres) to provide habitat of suitable size and composition to support old field bird populations based on impacted species and maintain habitat diversity within the region.

Specific activities may include the following within the project area.

- Create old field habitat on private properties through existing conservation programs.
- Contribute funds to state or Federal agencies or other organizations to create old field habitat in the project vicinity.

The proposed efforts for terrestrial mitigation by section and alternative are as follows.

Section 1

DA Modified Avoidance

- Preservation and/or creation of approximately 22.3 hectares (55 acres) of old field habitat.
- Preservation, enhancement and/or reestablishment of approximately 60.7 hectares (150 acres) of forest, particularly F1, SF2, SF4 communities.

Old Trail 2A

- Preservation and/or restoration of approximately 8.5 hectares (21 acres) of riverine/riparian corridor habitat along the Susquehanna River.
- Preservation, enhancement, and/or reestablishment of approximately 20.2 hectares (50 acres) of forest land, particularly F1 and SF2 communities.
- Preservation and/or creation of approximately 20.2 hectares (50 acres) of old field habitats.

Old Trail 2B

- Preservation and/or restoration of approximately 8.5 hectares (21 acres) of riverine floodplain forest habitat along the Susquehanna River.

- Preservation, enhancement, and/or reestablishment of approximately 38.4 hectares (95 acres) of forest land, particularly F1 and SF4 communities.

- Preservation and/or creation of approximately 22.7 hectares (60 acres) of old field habitat.

Section 2

Similar mitigation plans would be applicable for each of the Section 2 alternatives due to their similarities in impacts and landscape position. All alternatives would involve preservation, enhancement or creation of forest complexes and preservation or reestablishment of riparian/riverine habitat.

RC1-E

- Preservation and/or restoration of approximately 3.3 hectares (10 acres) of riverine/ riparian corridor habitat along the Susquehanna River.

- Reestablishment or preservation of approximately 62.7 hectares (155 acres) of F1 and SF2 habitats.

RC1-W

- Preservation and/or restoration of approximately 4 hectares (10 acres) of riverine/ riparian corridor habitat along the Susquehanna River.

- Reestablishment and/or preservation of approximately 44.5 hectares (110 acres) of forest land, particularly F1 and SF2 communities.

RC5

- Preservation and/or restoration of approximately 2 hectares (5 acres) of riverine/riparian corridor habitat along the Susquehanna River.

- Reestablishment and/or preservation of approximately 48.6 hectares (120 acres) of forest land, particularly F1 and SF2 communities.

RC6

- Preservation and/or restoration of approximately 4 hectares (10 acres) of riverine/ riparian corridor habitat along the Susquehanna River.

- Reestablishment and/or preservation of approximately 64.8 hectares (160 acres) of forest land, particularly F1 and SF2 communities.

iv. Monitoring

FHWA and PENNDOT are committed to monitoring mitigation measures. The following provides appropriate options to ensure the success of the mitigation.

- Final design engineers coordinate with a qualified environmental monitor to provide input regarding minimization of terrestrial impacts.
- The environmental monitor oversees the terrestrial mitigation activities and issues during construction.
- Brief construction engineers and contractors about the sensitivity of terrestrial habitat issues to avoid unnecessary impacts during construction.
- If any plantings are required as part of the terrestrial mitigation package, the plantings will be monitored to ensure the vegetation becomes established.

i. Invasive and Noxious Plant Mitigation

The following mitigative measures are recommended to reduce the chances of spreading these species or allowing other invasive or noxious species to colonize in the CSVT highway construction area.

- All exposed soil areas, including staging areas, will be re-seeded with permanent cover at the earliest possible time, to reduce the chance of the introduction of any invasive and/or noxious species.
- All seed mix used for construction and staging areas will be restricted from containing any invasive or noxious weed seeds, as listed on the state list of invasive or noxious plant species.
- Invasive and/or noxious plants will not be used in landscaping plans.
- A Noxious Plant Control Plan, if required, will be developed in accordance with Pennsylvania's Seed Act and PENNDOT's Specifications, Publication 408. The development of this plan will be coordinated with the appropriate environmental agencies.

2. Wetland Impacts

Wetland impacts would occur from construction of any of the build alternatives for the CSVT project. The No-Build Alternative would have no impacts to wetlands in the project area. Impacts identified for the build alternatives include both direct and indirect impacts. Wetlands located within the right-of-way footprint of each of the alternatives were considered direct impacts. Wetlands located under any bridge crossings, including the river crossing structures, were considered direct impacts. Indirect impacts were determined using professional judgment to assess the likelihood that the hydrologic source of the wetland would be interrupted or reduced by an amount likely to impact the wetland. All remnants of directly impacted wetlands less than 0.001 acres in size were considered indirect impacts, regardless of hydrology. Table IV-F-7 summarizes the wetland impacts by alternatives.

More detailed information related to wetlands is located in the Technical Support Data. An index of the Technical Support Data is located in Section IX, Appendix A.

TABLE IV-F-7
WETLAND IMPACT SUMMARY TABLE

ALTERNATIVE SECTION 1	**DIRECT HECTARES (ACRES)**	**INDIRECT HECTARES (ACRES)**	**TOTAL HECTARES (ACRES)**
DAMA	1.84 (4.55)	0.10 (0.25)	**1.94 (4.79)**
OT2A	5.50 (13.59)	0.22 (0.54)	**5.72 (14.13)**
OT2B	5.41 (13.37)	0.33 (0.82)	**5.74 (14.19)**
ALTERNATIVE SECTION 2	**DIRECT HECTARES (ACRES)**	**INDIRECT HECTARES (ACRES)**	**TOTAL HECTARES (ACRES)**
RC1-E	1.25 (3.09)	0.003 (0.007)	**1.25 (3.10)**
RC1-W	1.06 (2.62)	0.00	**1.06 (2.62)**
RC5	1.20 (2.98)	0.0008 (0.002)	**1.21 (2.98)**
RC6	1.68 (4.15)	0.0098 (0.025)	**1.69 (4.18)**

The methodology used to evaluate wetlands and detailed wetland impact summary tables are provided for each project alternative in the Wetlands Technical Support Data. An index of the Technical Memoranda is provided in Appendix A. Each individual wetland impacted by the project alternatives can be found in the Tech Memorandum. Wetland Impact Summary Tables have been developed for the EIS. The Wetland Impact Summary Tables summarize the wetland impacts by different categories such as size, vegetative classification, and hydrogeomorphic (HGM) classification. The general distribution of the wetlands in the study area corridors is shown on Figures IV-F-7 and IV-F-8.

A Section 404 Permit Application and Section 404 (b)(1) Alternatives Analysis have been completed for the CSVT Project and are included in Appendix G. Additionally, the request for PA DEP 401 Water Quality Certification and a completed Environmental Assessment (EA) Form are contained in Appendix H.

The individual project alternatives impact different types of wetland areas, such as the predominantly forested flooded areas along the Susquehanna River, emergent riparian wetlands along the smaller tributaries, as well as saturated or flooded areas along the rolling hill terrain that lies above the headwater tributary hollows. Tables IV-F-8 and IV-F-9 provide a cross section of the different vegetative and functional impacts for each alternative.

All wetlands were evaluated separately from the vegetative classification and HGM type evaluation processes in order to determine if they met the criteria for Exceptional Value Wetlands and/or PA DEP Riverine Wetlands.

Section 2 includes impacts to wetlands associated with the riparian corridor of Wooded Run. Because Wooded Run contains naturally reproducing wild trout populations, all wetlands which are hydrologically connected to the stream are designated as **Exceptional Value wetlands** under PA DEP Regulations. Table IV-F-10 outlines the impact to **Exceptional Value wetlands** per Alternative.

In accordance with a request by PA DEP, those wetland areas located in and along and associated with stream courses have been identified as PA DEP riverine wetlands. Additional information regarding the evaluation of PA DEP riverine wetlands can be found in the Wetlands Technical Summary Memorandum (see Appendix A). PA DEP riverine wetland impacts are provided in Table IV-F-11.

TABLE IV-F-8
WETLAND IMPACTS BY VEGETATIVE CLASSIFICATION

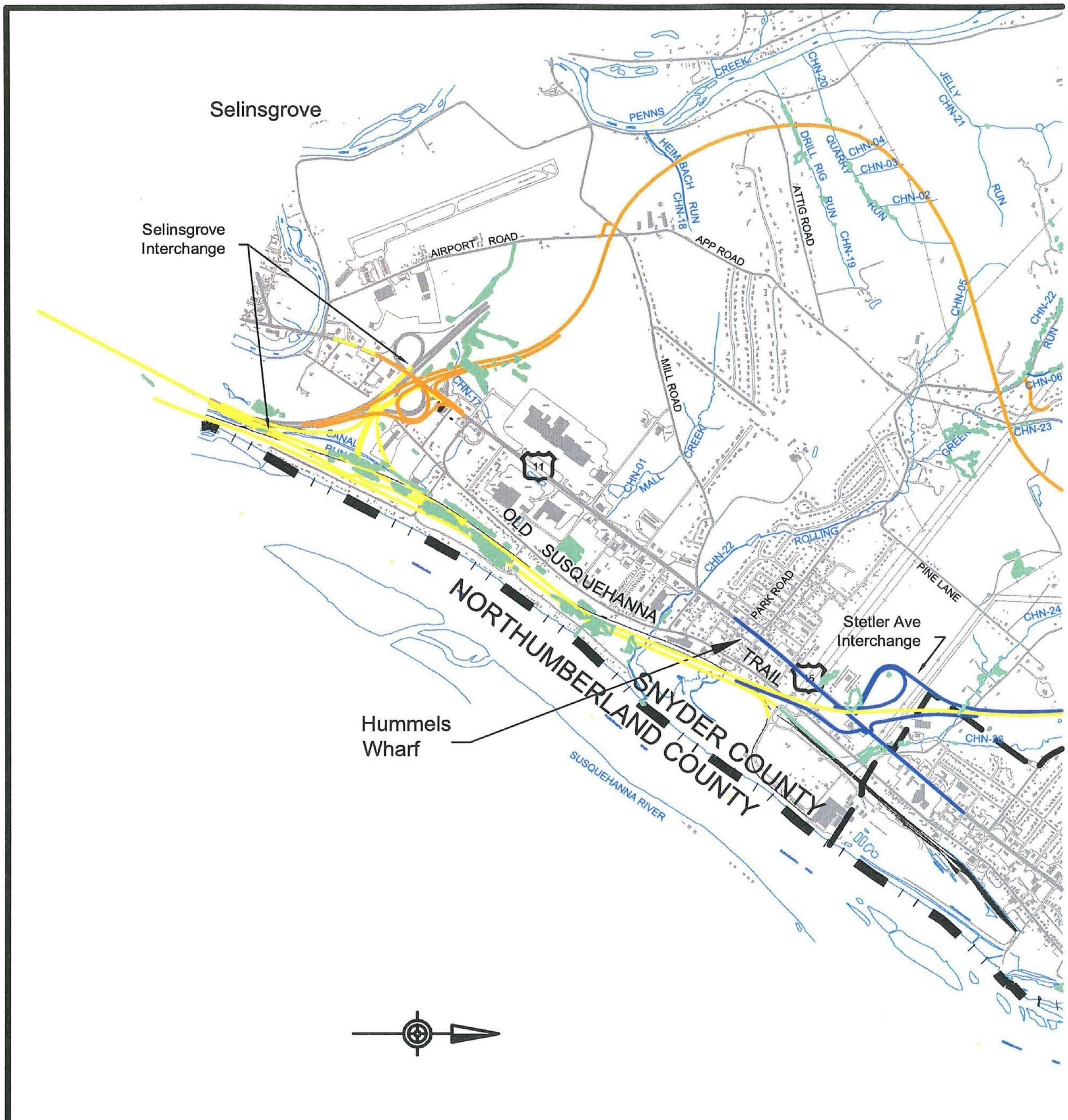
ALTERNATIVE	EMERGENT (PEM)	SCRUB/SHRUB (PSS)	FORESTED (PFO)	OPEN WATER (POW)
SECTION 1	HECTARES (ACRES)	HECTARES (ACRES)	HECTARES (ACRES)	HECTARES (ACRES)
DAMA	1.47 (3.63)	0.25 (0.62)	0.15 (0.39)	0.06 (0.15)
OT2A	1.33 (3.29)	0.45 (1.11)	3.38 (8.35)	0.56 (1.38)
OT2B	1.40 (3.46)	0.35 (0.87)	3.38 (8.35)	0.61 (1.51)
ALTERNATIVE	EMERGENT (PEM)	SCRUB/SHRUB (PSS)	FORESTED (PFO)	OPEN WATER (POW)
SECTION 2	HECTARES (ACRES)	HECTARES (ACRES)	HECTARES (ACRES)	HECTARES (ACRES)
RC1-E	0.99 (2.45)	0.05 (0.12)	0.00	0.21 (0.52)
RC1-W	1.00 (2.47)	0.05 (0.12)	0.00	0.01 (0.02)
RC5	0.48 (1.19)	0.29 (0.72)	0.21 (0.52)	0.23 (0.57)
RC6	1.19 (2.94)	0.04 (0.10)	0.25 (0.62)	0.21 (0.52)

a. Discussion of Alternatives

i. Section 1

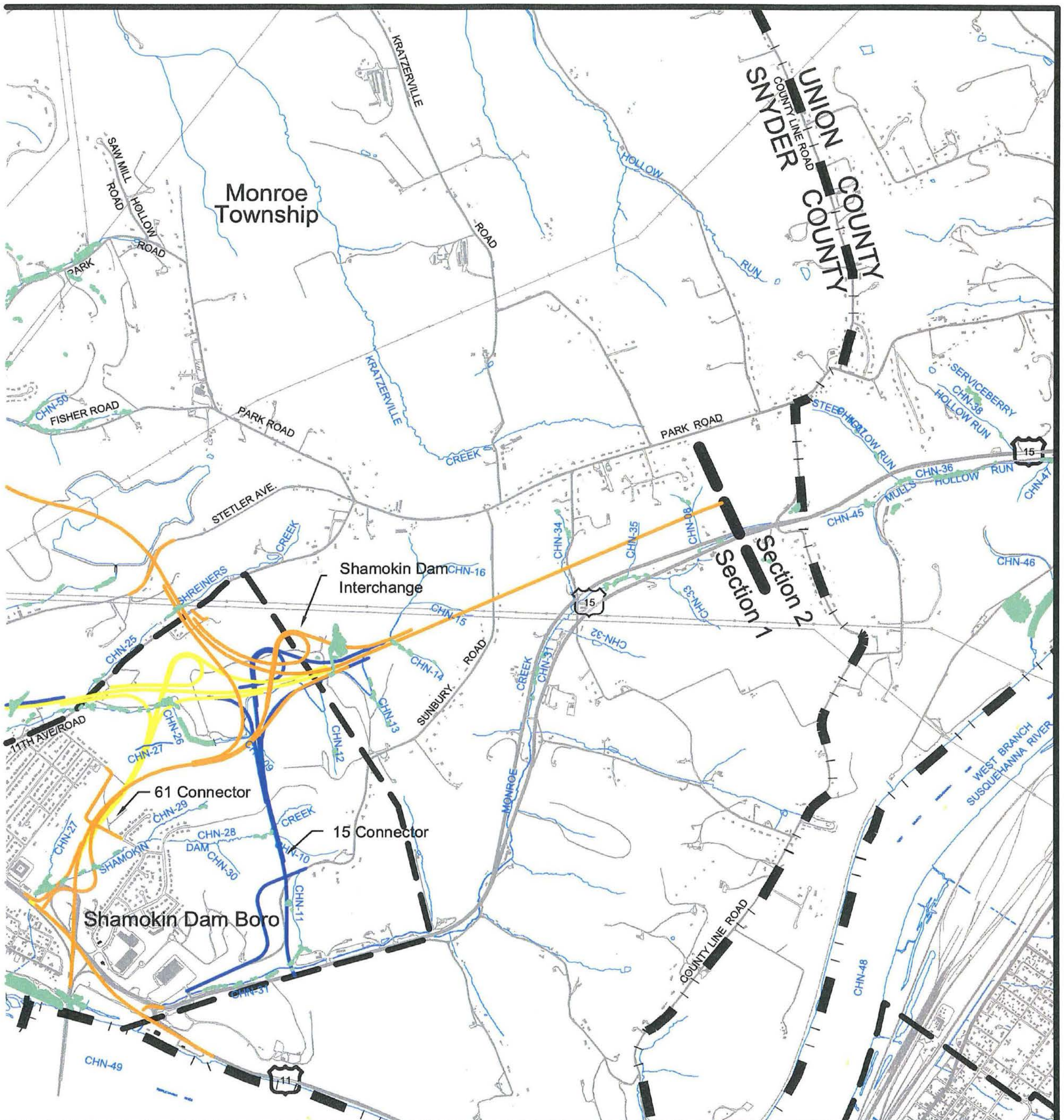
a. DAMA

DAMA Alternative in Section 1 impacts a total of 1.94 hectares (4.79 acres) of wetlands. Over 70% of the impact is to PEM wetland habitat. With respect to HFC type, the impacts are distributed over Hillside Saturated, Hillside Flooded, and Riparian Saturated systems. A large part of the impact [0.92 hectares (2.27 acres)] for this alternative occurs near the southern terminus of the project, in and around a wetland mitigation site constructed as part of the Susquehanna Valley Mall Project. This wetland is a large palustrine emergent system that typically contains standing water. This wetland has been observed to contain waterfowl during the year. The larger size and hydroperiod provide good habitat for other wildlife in the area. The surrounding wetlands consist mainly of Hillside Saturated



Legend

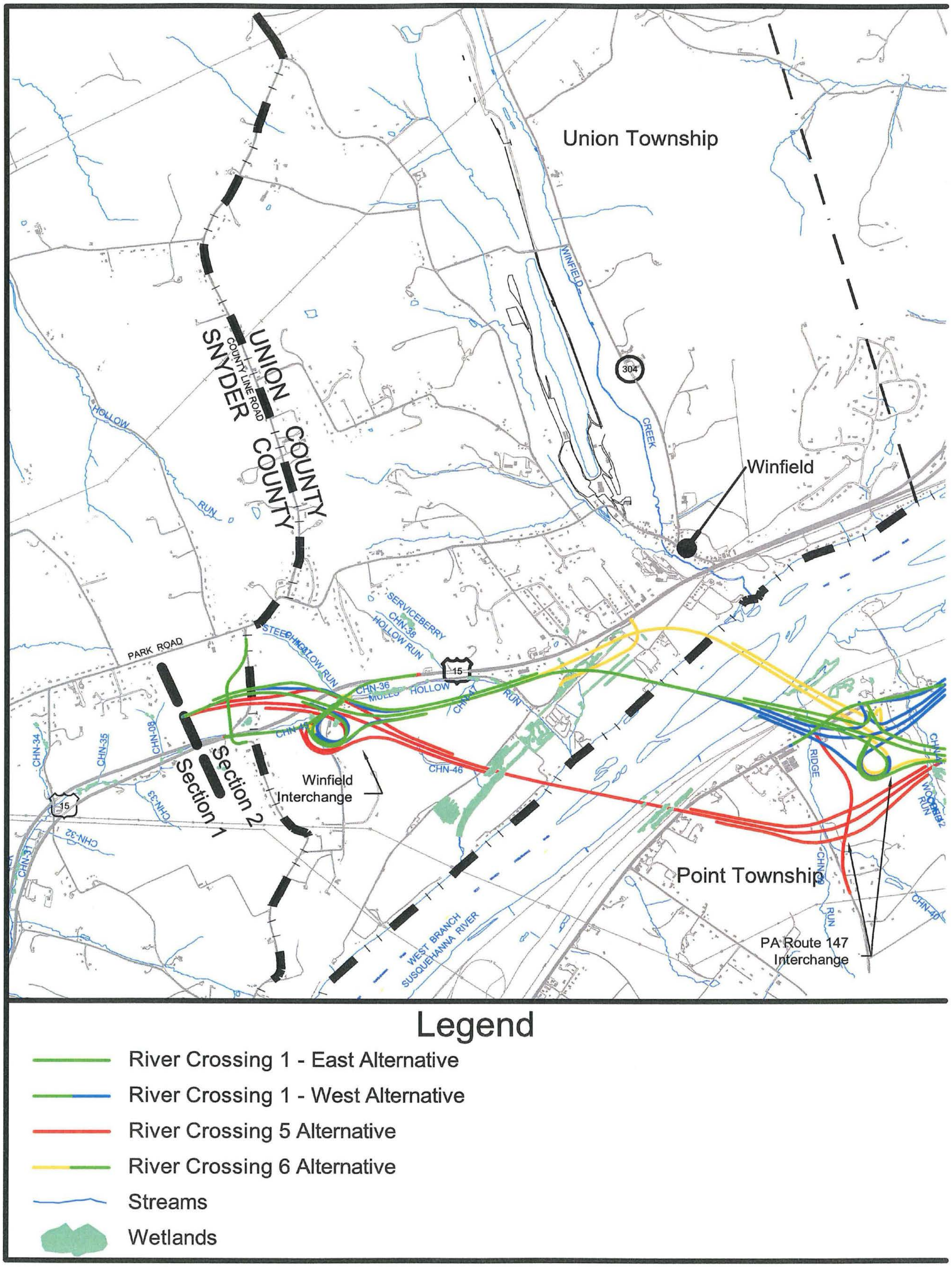
- DA Modified Avoidance Alternative
- Old Trail 2A Alternative (61 Connector)
- Old Trail 2B Alternative (Stetler Ave. Interchange /15 Connector)
- Streams
- Wetlands
- Shamokin Dam Borough Boundary

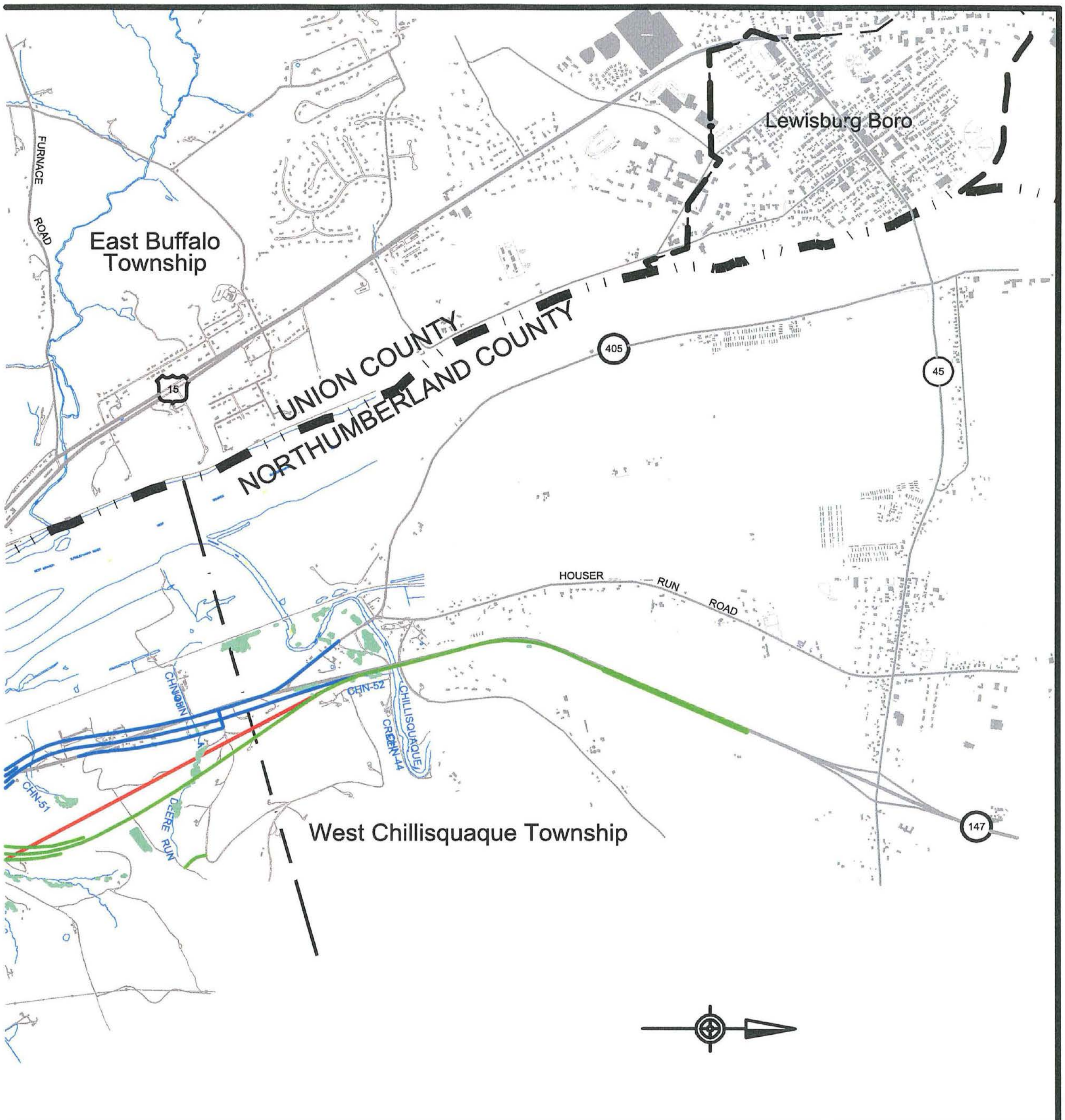


Central Susquehanna Valley Transportation Project

Figure IV-F-7

Section 1-
Streams and Wetlands


Union Township
Winfield
UNION COUNTY
SNYDER COUNTY
COUNTY LINE ROAD
PARK ROAD
WINFIELD
CREEK
304
15
SERVICEBERRY
CHN-38
HOLLOW RUN
CHN-36
HOLLOW
CHN-46
CHN-34
CHN-35
CHN-08
CHN-33
CHN-32
CHN-31
CHN-40
HOLLOW
RUN
RIDGE
RUN
Section 2
Section 1
Winfield
Interchange
Point Township
PA Route 147
Interchange
WEST BRANCH
SUSQUEHANNA RIVER
Legend
River Crossing 1 - East Alternative
River Crossing 1 - West Alternative
River Crossing 5 Alternative
River Crossing 6 Alternative
Streams
Wetlands



Central Susquehanna Valley Transportation Project

Figure IV-F-8

Section 2-
Streams and Wetlands

0 300 600 900 Scale in Meters

0 1250 2500 3750 Scale in Feet

TABLE IV-F-9
WETLAND IMPACTS
BY HYDROGEOMORPHIC CLASSIFICATION

		HILLSIDE SATURATED	HILLSIDE FLOODED	RIVERINE FLOODED	RIPARIAN SATURATED	RIVERINE PONDED	RIVERINE SATURATED	RIPARIAN FLOODED	LINER SYSTEMS	TOTAL
DA MOD	DIRECT	0.63 Ha. 1.55 Ac.	0.71 Ha. 1.75 Ac.	0.00 Ha. 0.00 Ac.	0.45 Ha. 1.10 Ac.	0.00 Ha. 0.00 Ac.	0.00 Ha. 0.00 Ac.	0.05 Ha. 0.13 Ac.	0.00 Ha. 0.00 Ac.	1.83 Ha. 4.54
	INDIRECT	0.04 Ha. 0.11 Ac.	0.01 Ha. 0.02 Ac.	0.00 Ha. 0.00 Ac.	0.04 Ha. 0.09 Ac.	0.0 Ha. 0.0 Ac.	0.00 Ha. 0.00 Ac.	0.01 Ha. 0.02 Ac.	0.00 Ha. 0.00 Ac.	0.20 Ha. 0.24 Ac.
	TOTAL	0.67 Ha. 1.66 Ac.	0.72 Ha. 1.78 Ac.	0.00 Ha. 0.00 Ac.	0.48 Ha. 1.19 Ac.	0.00 Ha. 0.00 Ac.	0.00 Ha. 0.00 Ac.	0.06 Ha. 0.02 Ac.	0.00 Ha. 0.00 Ac.	0.20 Ha. 0.24 Ac.
	NUMBER OF SYSTEMS	8	11	0	19	0	0	14	0	52
OLD TRAIL 2A	DIRECT	0.11 Ha. 0.26 Ac.	0.18 Ha. 0.44 Ac.	0.65 Ha. 1.59 Ac.	0.62 Ha. 1.54 Ac.	3.94 Ha. 9.72 Ac.	0.00 Ha. 0.00 Ac.	0.02 Ha. 0.04 Ac.	0.00 Ha. 0.00 Ac.	5.50 Ha. 13.59
	INDIRECT	0.02 Ha. 0.05 Ac.	0.00 Ha. 0.00 Ac.	0.03 Ha. 0.08 Ac.	0.3 Ha. 0.08 Ac.	0.13 Ha. 0.33 Ac.	0.00 Ha. 0.00 Ac.	0.00 Ha. 0.00 Ac.	0.00 Ha. 0.00 Ac.	0.22 Ha. 0.54 Ac.
	TOTAL	0.13 Ha. 0.31 Ac.	0.17 Ha. 0.44 Ac.	0.68 Ha. 1.67 Ac.	0.66 Ha. 1.62 Ac.	4.07 Ha. 10.06 Ac.	0.00 Ha. 0.00 Ac.	0.02 Ha. 0.04 Ac.	0.00 Ha. 0.00 Ac.	5.72 Ha. 14.14 Ac.
	NUMBER OF SYSTEMS	6	3	8	20	15	0	6	0	58
OLD TRAIL 2B	DIRECT	0.28 Ha. 0.69 Ac.	0.20 Ha. 0.50 Ac.	0.65 Ha. 1.60 Ac.	0.34 Ha. 0.85 Ac.	3.93 Ha. 9.72 Ac.	0.00 Ha. 0.00 Ac.	0.01 Ha. 0.01 Ac.	0.00 Ha. 0.00 Ac.	5.42 Ha. 13.38 Ac.
	INDIRECT	0.03 Ha. 0.07 Ac.	0.00 Ha. 0.00 Ac.	0.03 Ha. 0.08 Ac.	0.13 Ha. 0.32 Ac.	0.13 Ha. 0.33 Ac.	0.00 Ha. 0.00 Ac.	0.00 Ha. 0.00 Ac.	0.00 Ha. 0.00 Ac.	0.32 Ha. 0.81 Ac.
	TOTAL	0.31 Ha. 0.77 Ac.	0.20 Ha. 0.50 Ac.	0.68 Ha. 1.17 Ac.	0.47 Ha. 1.17 Ac.	4.07 Ha. 10.06 Ac.	0.00 Ha. 0.00 Ac.	0.01 Ha. 0.01 Ac.	0.00 Ha. 0.00 Ac.	5.74 Ha. 14.18 Ac.
	NUMBER OF SYSTEMS	10	3	8	17	15	0	4	0	57

Ha. = Hectares
Ac. = Acres

TABLE IV-F-10
IMPACTS TO EXCEPTIONAL VALUE WETLANDS FOR SECTION 2 ALTERNATIVES

ALTERNATIVE	IMPACT TO EV WETLANDS HECTARES (ACRES)
RC1-E	0.0002 (0.0005)
RC1-W	0.0017 (0.0042)
RC5	0.0468 (0.116)
RC6	0.0000

TABLE IV-F-11
IMPACTS TO PA DEP RIVERINE WETLANDS

ALTERNATIVE SECTION 1	DIRECT HECTARES (ACRES)	INDIRECT HECTARES (ACRES)	TOTAL HECTARES (ACRES)
DAMA	0.40 (0.99)	0.04 (0.01)	**0.44 (1.09)**
OT2A	0.42 (1.04)	0.03 (0.07)	**0.45 (1.11)**
OT2B	0.22 (0.54)	0.14 (0.35)	**0.36 (0.89)**
ALTERNATIVE SECTION 2	**DIRECT HECTARES (ACRES)**	**INDIRECT HECTARES (ACRES)**	**TOTAL HECTARES (ACRES)**
RC1-E	0.38 (0.94)	0.00	**0.38 (0.94)**
RC1-W	0.24 (0.59)	0.00	**0.24 (0.59)**
RC5	0.56 (1.38)	0.001 (0.002)	**0.56 (1.38)**
RC6	0.56 (1.38)	0.00	**0.56 (1.38)**

wetlands. The DAMA impacts 0.67 hectares (1.66 acres) of Hillside Saturated wetlands. Of the impacted Hillside Saturated wetlands, 1% (0.09 ha, 0.22 acres) contains a forested component. The majority of the affected Hillside Saturated wetlands are emergent systems. The dense vegetative cover in these Hillside Saturated wetlands provide sediment stabilization and filtration from surrounding upslope agricultural activities. Impacts to Hillside Flooded wetlands in the area of Ash Basin #3 also comprise a substantial portion of the impacts for the alternative, totaling 0.50 hectares (1.24 acres). The remainder of the wetland impacts of the alternative are mainly to small Riparian Saturated wetlands located along the small tributary stream hollows that drain the foothills. These wetlands contribute to the overall wildlife habitat for those species that use the stream corridors that exist in the landscape. These small riparian wetlands would also provide natural filtration for the runoff from the surrounding slopes and roadways.

b. OT2A

The OT2A Alternative in Section 1 impacts a total of 5.72 hectares (14.13 acres) of wetlands. Over 60% of the impacts are to PFO wetland habitat. Roughly 20% of the impacts are to PEM wetland habitat. The majority of the OT2A impacts [4.75 hectares (11.74 acres)] occur to Riverine Ponded and Riverine Flooded wetlands in the Canal area on the floodplain of the Susquehanna River. The wetlands in the Canal area are typically inundated and saturated during the winter and spring seasons of the year. The wetlands then dry out in the summer and fall seasons. In terms of their hydrogeomorphic characteristics, the impacted wetlands are grouped as River/Temporarily Ponded (RVP) or River/ Temporarily Flooded (RVF) wetlands. The wetlands impacted in this area of the floodplain of the Susquehanna River are jointly referred to as the "canal wetlands" due to their association with the old canal that historically ran along the river in this location. Of the 14.13 acres of wetlands impacted by this alternative, approximately 12 acres are canal wetlands.

The canal wetlands provide both biotic and abiotic functions. The position of these wetlands on the floodplain provides the opportunity for these wetlands to perform certain functions, such as flood flow alteration, sediment retention, nutrient removal, and provision of wildlife and aquatic habitat; however, the canal wetlands are not highly effective at performing these functions. This is due to the fact that the hydrologic regime of these wetlands does not involve a flow-through flooding regime. The hydrology of the canal wetlands is associated with the water table of the river. Field observations have correlated hydrology in the canal wetlands with the river stage. During the majority of the year when river elevations are at normal flow levels, the canal wetlands dry out. During the winter and spring when the river elevation rises, the canal wetlands fill with water. This hydrology is not the result of river water overtopping the banks and flooding the canal; the hydrologic input appears to result from the seasonal rise in groundwater elevation.

This lack of flow-through water characteristic limits the wetland's effectiveness at floodflow alteration and associated functions like sediment retention and nutrient removal.

In addition to the seasonal hydrology, the canal wetlands also contain low vegetative species diversity, mostly Silver Maple and Poison Ivy. The lack of year-round water and species diversity limits the effectiveness of these wetlands at providing wildlife and aquatic habitat.

The size of the canal wetlands also limits their effectiveness; the relatively small size coupled with the limited interaction with the river results in limited effectiveness for numerous functions, including flood flow alteration, nutrient removal, sediment retention, and wildlife habitat.

In summary, the canal wetlands do provide biotic and abiotic functions; however, their effectiveness at performing these functions is not high or significant.

The remainder of the wetlands impacted by this alternative consist mainly of Riparian Saturated and Riparian Flooded systems located along the tributary streams. The OT2A Alternative impacts 0.13 hectare (0.32 acres) of Hillside Saturated wetlands. Of the impacted Hillside Saturated systems, 2% (0.003 ha, 0.01 acre) contain a forested component. The majority of the Hillside Saturated systems are emergent wetlands.

c. OT2B

The OT2B Alternative in Section 1 impacts a total of 5.74 hectares (14.19 acres) of wetlands. Over 60% of the impacts are to PFO wetland habitat. Roughly 20% of the impacts are to PEM wetland habitat. The majority of the OT2B impacts [4.75 hectares (11.74 acres)] occur to Riverine Pondedand Riverine Flooded wetlands in the Canal area on the floodplain of the Susquehanna River. The impacted Canal area wetlands are the same as described above for the OT2A Alternative. Impacts to Hillside Flooded wetlands in the area of Ash Basin #3 also comprise a portion of the impacts for the alternative, totaling 0.20 hectares (0.49 acres). The remainder of the wetland impacts for the alternative are mainly to Riparian Saturated wetlands located along the tributary streams, along with some Hillside Saturated wetlands. The OT2B Alternative impacts 0.31 hectare (0.77 acres) of Hillside Saturated wetlands. Of the impacted Hillside Saturated systems, 2% (0.006 ha, 0.1 acre) contain a forested component. The majority of the Hillside Saturated system are emergent wetlands.

The wetlands in the canal area run longitudinally along the OT alternatives between the main stem Susquehanna River and existing Old Trail Road. Based upon the position of these alternative, the alternative would need to be located on a long bridge structure to avoid and/or minimize the impact to the wetlands in the canal area. A bridge structure of this length in this location is not considered a reasonable option to impacting these wetlands.

ii. Section 2

a. RC1-E

RC1-E Alternative impacts a total of 1.25 hectares (3.10 acres) of wetlands. Approximately 80% of the impacts for the alternative are to PEM wetland habitat. The wetland impacts consist mainly of impacts to Riverine Saturated and Riparian Saturated wetlands which are located along the river floodplain or the small tributary hollows. Along the west side of the river, this alternative crosses the Mulls Hollow area, impacting several small wetland pockets in this area. Most of these wetlands are limited in their functions by their small size. A large percentage of the impacts [0.42 hectares (1.04

acres)] occur at a groundwater discharge wetland, which is located between Seven Kitchens Road and the abandoned railroad grade. This wetland receives runoff input from the surrounding development. The low position of this wetland topographically and the dense vegetative cover provide a natural filter for groundwater. However, the surrounding residential development limits the opportunity of this wetland to provide substantial wildlife habitat. The RC1-E alternative impacts 0.19 hectare (0.47 acre) of Hillside Saturated wetlands, consisting of emergent, scrub shrub, and open water components.

On either side of the river this alternative crosses over several small tributary streams, including Mull's Hollow Run on the west, and Wooded Run, Ridge Run, and John Deere Run on the east. Associated with each stream crossing, there are direct impacts to the small riparian wetlands. Impacts also include 0.002 hectares (0.005 acres) to **Exceptional Value wetlands** located along Wooded Run.

b. RC1-W

RC1-W Alternative impacts a total of 1.06 hectares (2.62 acres) of wetlands. Approximately 95% of the impacts for the alternative are to PEM wetland habitat. The wetland impacts consist mainly to Riverine Saturated and Riparian Saturated wetlands which are located along the river floodplain or the small tributary hollows. As with RC1-E, along the west side of the river, this alternative crosses the Mulls Hollow area, impacting several small wetland pockets in this area. Most of these wetlands are limited in their functions by their smaller size. A large percentage of the impacts [0.42 hectares (1.04 acres)] occur at a groundwater discharge wetland, which is located between Seven Kitchens Road and the abandoned railroad grade. This wetland receives runoff input from the surrounding development. The low position of the wetland topographically and the dense vegetative cover provide a natural filter for groundwater. However, the surrounding residential development limits the opportunity of this wetland to provide substantial wildlife habitat. The RC1-W alternative impacts 0.15 hectare (0.37 acres) of Hillside Saturated systems that consist of emergent, scrub shrub, and open water wetlands.

West of the river this alternative crosses over Mull's Hollow Run, and east of the river, this alternative remains below S.R. 147, crossing over the lower reaches of several small tributary streams, including Wooded Run, Ridge Run, and John Deere Run. Associated with each stream crossing, there are direct impacts to the small riparian wetlands. Impacts also include 0.002 hectares (0.005 acres) to **Exceptional Value wetlands** located along Wooded Run.

c. RC5

RC5 impacts 1.21 hectares (2.98 acres) of wetlands. Approximately 40% of the impacts for the alternative are to PEM wetland habitat, and the remaining 60% of the impacts are distributed among PSS, PFO, and POW wetland habitats. The wetland impacts consist mainly of impacts to Riverine Saturated and Riparian Saturated wetlands which are located along the river floodplain or the small tributary streams along the eastern hillside above S.R. 147. The RC5 alternative impacts 0.07 hectare (0.17 acres) of Hillside Saturated wetlands. These wetlands consist of emergent and scrub shrub components.

RC5 is the only alternative that crosses over the southern (headwater) end of Mulls Hollow. The southern location minimizes impacts to the watercourse and subsequent wetlands of Mulls Hollow on the western side of the river. This alternative crosses several tributary streams on the eastern side of the river, Wooded Run, Ridge Run, and John Deere Run. Associated with each stream crossing, there are direct impacts to the small riparian wetlands. The crossing over Wooded Run impacts 0.05 hectares (0.12 acres) of **Exceptional Value wetlands**. These wetlands are also small palustrine emergent and scrub shrub wetlands located along the floodway of the stream.

d. RC6

RC6 impacts 1.69 hectares (4.18 acres) of wetlands. Approximately 70% of the impacts for the alternative are to PEM wetland habitat. The majority of the impacts associated with this alternative are to Riverine Saturated wetlands along the Susquehanna River floodplain. The remaining impacts consist mainly of impacts to Riparian Saturated wetlands which are located along the small tributary hollows. River floodplain impacts to a groundwater discharge wetland, which is located between Seven Kitchens Road and the abandoned railroad grade, account for 0.51 hectares (1.26 acres) of the impact for this alternative. Impacts to other wetlands located in the river floodplain include 0.25 hectares (1.62 acres) of impact to a large forested wetland on the eastern floodplain. The RC6 alternative impacts 0.19 hectare (0.47 acre) of Hillside Saturated wetlands. The Hillside Saturated wetlands affected consist of emergent, scrub shrub and open water compents.

On either side of the river this alternative crosses over several small tributary streams, including Mull's Hollow Run on the west, and Wooded Run, Ridge Run, and John Deere Run on the east. Associated with each stream crossing, there are direct impacts to the small riparian wetlands. This alternative does not impact wetlands associated with Wooded Run. The RC6 alternative impacts 0.19

hectare (0.47 acre) of Hillside Saturated wetlands. The Hillside Saturated wetlands consist of emergent, scrub shrub, and open water components.

b. Summary

For the CSVT project the No-Build Alternative would have no impacts to wetland resources. For the build alternatives, total wetland impacts per alternative range from 1.94 to 5.74 hectares (4.79 to 14.19 acres) for Section 1 and from 1.06 to 1.69 hectares (2.62 to 4.18 acres) for Section 2. Therefore, the potential extent of wetland impact for the project ranges from 3.00 to 7.43 hectares (7.41 to 18.37 acres). The DAMA and RC1-W alternative impacts the lowest total area of wetlands [3.00 hectares (7.41 acres)]. However, the other alternative combinations, with DAMA, result in similar wetland impact totals, around 3.15 to 3.63 hectares (7.79 to 8.97 acres).

The OT2A or 2B Alternatives impact the largest wetland area, 5.72 to 5.74 hectares (14.13 to 14.19 acres). OT2A and OT2B combined with the RC6 Alternative would impact the highest total area of wetlands [7.41-7.43 hectares (18.31-18.37 acres)]. However, the OT2A and OT2B Alternatives in combination with the various Section 2 alternatives create alternatives with similar wetland impacts ranging from 6.78 to 6.99 hectares (16.76 to 17.28 acres). The majority of the wetland impacts for the Old Trail alternatives occur in the Canal Area along the Susquehanna River floodplain.

In accordance with Executive Order 11990 (Protection of Wetlands, 1977) it has been determined that the following must apply in relation to new construction in wetlands:

1) there is no practicable alternative to such construction; and
2) the proposed action includes all practicable measure to minimize harm to wetlands which may result from such use.

All of the Build Alternatives under consideration affect wetland systems. In accordance with the Executive Order and the Clean Water Act, a Section 404 (b)(1) Alternatives Analysis has been completed. This analysis provides more detail related to the development of practicable alternatives and the avoidance and minimization measures to be implemented. There are no practicable alternatives that avoid wetlands. The 404 (b)(1) analysis is located in Appendix G. Additionally, documentation related to the Request for 401 Water Quality Certification from the PA Department of Environmental Protection is found in Appendix H.

The final design of the selected alternative will incorporate all practicable measures to minimize harm to wetlands.

In accordance with the 404(b)(1) guidelines, impacts to the Susquehanna River and other water resources need to be evaluated in conjunction with wetlands in an effort to identify the alternative with the minimum impact.

Wooded Run was identified in the CSVT surface water assessment studies as supporting wild trout. The Pennsylvania Wetland regulations, Chapter 105, identify wetlands located along the floodplain of a wild trout stream as Exceptional Value (EV) Wetlands. Therefore, for the CSVT project, the wetlands located along the floodplain of Wooded Run are designated as EV-wetlands.

In order to avoid and minimize impacts, a bridge crossing is proposed over Wooded Run and the EV-wetlands. A natural resource agency field view was conducted on February 11, 2002, to discuss the crossing issues. The natural resource agencies preferred the bridge structure span the Wooded Run floodplain and avoid direct impacts to the stream and wetlands. The details regarding the bridge span will be determined in the Final Design phase of the project. The future design of the Wooded Run crossing will be coordinated with the natural resource agencies.

c. Mitigation

The mitigation policy contained in the Council of Environmental Quality's National Environmental Policy Act regulations [40 CFR 1508.20 (a-e)] defines mitigation to include Avoidance, Minimization, Compensation, and Monitoring commitment. The development of each project alternative considered each type of mitigative measure.

i. Avoidance

The placement of any of the build alternatives results in unavoidable wetland impacts. Measures were implemented in the design of the alternatives to avoid impacts where practicable. Minor shifts in the alternatives were considered to avoid impacts.

ii. Minimization

Minimization measures implemented address both direct and indirect impacts from the project. Minimization measures include the following.

- Minimization of the width of the roadway footprint, where practicable, to reduce encroachments
- Implementation of a Stormwater Management Plan to avoid water quality impacts
- Development of special drainage methods to minimize indirect impacts would be considered on a case by case basis
- Implementation of an approved Erosion and Sedimentation Pollution Control Plan to avoid and minimize indirect impacts to adjacent wetland areas

iii. Compensation

Compensation for the impacted wetlands would be provided in the form of wetland replacement. Existing upland areas within the watershed would be converted to wetland habitats.

The construction of any of the build alternatives would result in unavoidable wetland impacts. In accordance with both state and federal regulations, wetland mitigation (in the form of wetland replacement) will be provided for the project impacts. As previously discussed, total wetland impacts per alternative range from 1.94 to 5.74 hectares (4.79 to 14.19 acres) for Section 1 and from 1.06 to 1.69 hectares (2.62 to 4.18 acres) for Section 2. The wetland mitigation requirement for the project was determined using standard regulatory replacement ratios which are shown below. The replacement ratios are as follows. Based upon the standard replacement ratios, the total wetland mitigation commitment for the project ranges from 3 approximately to 12 hectares (8 to 28 acres) as shown in Table IV-F12.

VEGETATIVE TYPE	REPLACEMENT RATIO
PFO	2 : 1
PSS	1.5 : 1
PEM	1 : 1

A conceptual mitigation proposal is being developed to provide guidance and ensure the commitment of reasonable compensation for the unavoidable impacts of the project. Mitigation for natural resources, including wetlands, surface water resources, and terrestrial habitat is considered in this proposal. Mitigation commitments are being developed based on meetings with agency representatives occurring in April and July of 2001, January of 2002, and February and April 2003. Summaries of

TABLE IV-F-12
WETLAND MITIGATION REQUIREMENT

ALTERNATIVE SECTION 1	TOTAL IMPACT HECTARES (ACRES)	MITIGATION REQUIREMENT HECTARES (ACRES)
DAMA	1.94 (4.79)	2.21 (5.46)
OT2A	5.72 (14.13)	9.33 (23.05)
OT2B	5.74 (14.19)	9.30 (22.98)
ALTERNATIVE SECTION 2	**TOTAL IMPACT HECTARES (ACRES)**	**MITIGATION REQUIREMENT HECTARES (ACRES)**
RC1-E	1.25 (3.10)	1.28 (3.16)
RC1-W	1.06 (2.62)	1.08 (2.67)
RC5	1.21 (2.98)	1.56 (3.85)
RC6	1.69 (4.18)	1.96 (4.84)

these meetings and field views held for the purpose of coordinating to develop mitigation commitments are listed in Section V.A.3 - Coordination with Environmental Resource Agencies. More detailed records of the coordination activities can be found in the Wetlands, Surface Water/Aquatic Resources, and Vegetation and Wildlife Technical Support Data.

The FHWA and PENNDOT are attempting to provide a total ecosystem approach to natural resource mitigation. This approach will provide replacement of wetlands and incorporate habitat mitigation, reconstruction/restoration of streams, enhancement of wetlands and terrestrial habitat, and preservation of existing wetlands, streams, and wildlife habitat in one location. The FHWA and PENNDOT are in the process of investigating alternative sites for the completion of the components of the proposal. The ultimate selection and development of the mitigation site or sites will also be coordinated with the natural resource agencies.

The conceptual mitigation proposal described in this Final EIS will be developed in more detail. Once a site or sites has been selected, a draft mitigation plan will be prepared. This draft plan will show the conceptual designs for wetland, stream, and terrestrial mitigation sites. This mitigation plan will not be finalized until after the Record of Decision (ROD).

The proposed work may include constructing a single resource area which would address the individual compensatory commitments at one site including:

- creating approximately 2.83 hectares (7 acres) of wetlands;
- restoring, enhancing, and/or reconstructing approximately 914.4 meters (3,000 linear feet) of stream;

- providing approximately 22.26 hectares (55 acres) of old field mitigation; and
- providing approximately 60.7 hectares (150 acres) of forestland mitigation.

The intention is to create a functioning, multiple habitat ecosystem which would be protected in perpetuity. The creation of a functioning ecosystem in one location, protected in perpetuity, is not standard practice or procedure. However, it has been determined that given the unique circumstances surrounding this project, such as 1) the potential availability of such a site that could accommodate the ecosystem approach, 2) the present owner of said site, 3) the potential availability of a future owner willing to commit to the maintenance of the site in perpetuity, 4) the potential for mitigating multiple impacts at the referenced site, and 5) the potential for the future development at the referenced site, the enhancement and protection of this potential site is an appropriate mitigative action for this project.

If it is not possible to complete the individual compensatory mitigation requirements at one site, then multiple sites in various locations would be investigated.

Section 2 wetland impacts are to be mitigated by the replacement wetlands already constructed at the John Vargo property adjacent to Warriors Run and PA Route 54 in Lewis Township, Northumberland County.

3. Impacts to Surface Water/Aquatic Resources

> More detailed information related to suface waters is located in the Technical Support Data. An index of the Technical Support Data is located in Section IX, Appendix A.

The construction of any of the proposed build alternatives for the CSVT project would result in impacts to surface water and aquatic resources within the project area. The No-Build Alternative would have no impacts to surface water and aquatic resources. Impacts to surface water and aquatic resources associated with transportation improvement projects can be categorized as construction or operational impacts. Construction impacts refer to the permanent and temporary disturbances of the resource due to the installation of crossing structures (i.e., bridges, culverts, etc.), relocation of the resource, or loss of the resource due to the alteration of its headwaters. Operational impacts refer to the effects of roadway maintenance activities and the altered hydrologic regime characteristics of the drainage basin. Operational impacts could result in the chronic reduction of water quality and/or physical aquatic habitat within a resource.

a. Construction Impacts

An assessment of potential direct impacts was completed for each highway alternative using preliminary engineering for the project. A summary of potential construction impacts by watercourse type is shown in Table IV-F-13. The stream locations are shown on Figures IV-F-7 and IV-F-8.

Perennial watercourses throughout the project area are characterized by the following habitat types.

- Resources possessing perennial flow, fin fish, and macroinvertebrate communities. These types of watercourses consist of the major rivers and higher order (larger) streams within the project area. These channels typically have a drainage area greater than 1.3 square kilometers (0.5 square miles) and generally range from 1.5 to 487 meters (5 feet to 1600 feet) in width.
- Resources possessing perennial flow during most years, macroinvertebrate communities and possibly supporting fin fish populations. These types of watercourses consist of moderately sized streams within the project area. These channels typically possess a drainage area between 1.3 and 0.65 square kilometers (0.5 and 0.25 square miles) and generally range from 1.2 to 1.5 meters (4 to 5 feet) in width.
- Resources possessing intermittent flow and macroinvertebrate communities. These types of watercourses consist of the small order drainages which are probably not capable of supporting fish communities due to the loss of flow seasonally. These channels typically posses a drainage area between 60 and 20 hectares (150 and 50 acres) and general range from 0.6 to 1.2 meters (2 to 4 feet) in width.

Intermittent or ephemeral watercourses throughout the project area are characterized by the following.

- Resources possessing intermittent/ephemeral flow and supporting fewer than two taxa of macroinvertebrates. These types of watercourses are characterized as the very small channels which contain flow only during storm events or runoff periods. These channels typically possess a drainage area of less than 20 hectares (50 acres) and are generally 0.6 meters (2 feet) in width.

Impacts to perennial watercourses which support macroinvertebrate and fish communities would occur at the following locations.

- Rolling Green Run
- Shreiners Creek

Potential Construction Impacts

Direct Impact of Aquatic Habitat	The area permanently disturbed by the installation of a permanent stream crossing structure, relocation, or alteration of headwaters
Temporary Impact of Aquatic Habitat	The area that would be temporarily disturbed by temporary stream crossings (coffer dams, causeways, etc.)
Water Quality Impairment	Water quality impairment related to sedimentation or accidental discharge of chemical substances associated with construction activities

Potential Operational Impacts

Highway Runoff	Vehicle operations, deicing agents, toxins, and particulates associated with routine roadway maintenance, accidental hazardous material spills
Stream Flow Regime Changes	Modification of existing land uses to highway pavement alters the hydrologic regime of a portion of the drainage area, changing flow volumes and flow paths
Increased Thermal Loading	Devegetation of portions of the drainage basin could increase the temperature of surface runoff to the receiving stream

- Shamokin Dam Creek
- Monroe Creek
- Mull's Hollow Run
- West Branch Susquehanna River
- Wooded Run
- Chillisquaque Creek

Potential direct impacts to surface water resources resulting from each of the Build Alternatives are shown in Table IV-F-14. Profile summaries of direct impacts incurred on surface water resources per highway alternative are included in Appendix L. A summary of the potential impacts is provided below. It should be noted that the proposed bridge lengths, number and location of piers, and the length, size and shape of culverts are preliminary and subject to revision and refinements in the next stage of design.

TABLE IV-F-13
SUMMARY OF POTENTIAL IMPACTS BY WATERCOURSE TYPE PER HIGHWAY ALTERNATIVE

ALTERNATIVE	TOTAL NUMBER OF RESOURCES IMPACTED	NUMBER OF DIRECT IMPACTS PER WATERCOURSE TYPE	
		PERENNIAL	INTERMITTENT/ EPHEMERAL
DAMA	20	17	3
OT2A	12	11	1
OT2B	15	12	3
RC1-E	10	8	2
RC1-W	11	8	3
RC-5	12	11	1
RC-6	10	8	2

(This summary presents the total number of individual resources impacted. Please note that some of these individual resources may have multiple crossings or direct impacts imparted on them by the highway alternative.)

i. Permanent Construction Impacts

This is a representation of the total length and surface area of existing watercourses directly impacted by the highway alternatives. This analysis was based upon the length of watercourse which is directly impacted by the proposed highway alternative. The total surface area of stream impacted represents the amount of watercourse surface area directly impacted by the proposed highway alternative. This analysis was developed utilizing the length of watercourse impacted multiplied by the channel width of the watercourse. This direct impact would be the result of a crossing structure (bridge/culvert), relocation, and/or permanent hydrologic alteration due to the headwaters of the watercourse being located in a cut section of the highway, or the headwaters arising within the footprint of the alternative. It is important to note that the length of stream impact reported for the West Branch Susquehanna River crossings represents the distance between the western and eastern river banks, inclusive of the island areas.

Given the limited amount of drainage area and limited nature of biological communities associated with a majority of the perennial watercourses, culverts are proposed for most crossings. Resources such as the West Branch Susquehanna River and Chillisquaque Creek would require bridge structures. A bridge structure is also proposed for Wooded Run.

TABLE IV-F-14
PERMANENT CONSTRUCTION IMPACTS TO SURFACE WATER RESOURCES PER HIGHWAY ALTERNATIVE

ALTERNATIVE	WETLANDS	WATERCOURSES												
		TOTAL # OF WATER-COURSE CROSSINGS	LENGTH METERS (FEET)	TOTAL PERMANENT CONSTRUCTION IMPACTS		BRIDGE CROSSINGS		CULVERT CROSSINGS		CHANNEL RELOCATIONS		HYDROLOGIC ALTERATIONS	
				NO.	LENGTH METERS (FEET)	NO.	LENGTH METERS (FEET)	NO.	LENGTH METERS (FEET)	NO.	LENGTH METERS (FEET)	NO.	LENGTH METERS (FEET)
SECTION 1													
DA MODIFIED Avoidance	1.94 Ha (4.79 ac)	16	2,294.1 (7,525)	23	5,012.4 (16,445)	2	121.9 (400)	14	2,172.2 (7,125)	3	1,804.9 (5,920.0)	4	914.6 (3,000)
OLD TRAIL 2A	5.72 Ha (14.13 ac)	14	2,256.1 (7,400)	18	4,197.1 (13,770)	0	0	14	2,256.1 (7,400)	4	1,942.1 (6,370)	0	0
OLD TRAIL 2B	5.74 Ha (14.19 ac)	14	2,090.0 (6,855)	19	4,555.2 (14,945)	0	0	14	2,090.0 (6,855)	2	1,631.1 (5,350)	3	835.2 (2,740)
SECTION 2													
River Crossing 1E	1.25 Ha (3.10 ac)	10	1,588.4 (5,210)	12	2,197.6 (7,210)	3	196.6 (645)	7	1,391.4 (4,565)	0	0	2	609.8 (2,000)
River Crossing 1 W	1.06 Ha (2.62 ac)	11	1,644.8 (5,395)	13	2,254.0 (7,395)	3	155.5 (510)	8	1,489.3 (4,885)	0	0	2	609.8 (2,000)
River Crossing 5	1.21 Ha. (2.98 ac.)	9	1,243.9 (4,080)	14	2,584.7 (8,480)	4	198.2 (650)	5	1,045.7 (3,430)	2	304.9 (1,000)	3	1,036 (3,400)
River Crossing 6	1.69 Ha (4.18 ac.)	10	1,471.0 (4,825)	12	2,080.3 (6,825)	3	167.7 (550)	7	1,303.0 (4,275)	0	0	2	609.8 (2,000)

ii. Temporary Construction Impacts

This is a representation of the total length of the watercourse temporarily impacted by the construction of the highway alternative. Typically, an additional 45.7 meters (150 feet) of temporary impacts were assessed at each proposed culvert and bridge crossing structure to account for disturbances due to coffer dams, causeways, temporary crossings, etc. which may occur during construction. Any impacts associated with these measures would be restored upon installation of the crossing structure.

Table IV-F-14 shows the permanent construction impacts to surface water resources resulting from stream relocations, hydrologic alterations, bridge crossings, and culvert crossings.

A major bridge crossing of the West Branch Susquehanna River would be required as a component of each Section 2 highway alternative. The West Branch throughout this section is under the direct influence of the pooled effect of the inflatable fabridam. Hence, despite the placement of various bridge crossing alternatives at different locations along the river, similar aquatic habitat and biological communities would be affected. A bridge structure of this magnitude would result in permanent direct impacts due to aerial crossing of the resource and placement of pier structures for the support of the structure, and temporary direct impacts from causeways installed for construction. The precise number, placement, geometry, and nature of these piers will be determined during the final design process.

The placement of pier structures would potentially influence recreational use within the river. Pier structures would pose potential hazards to boating, water skiing, jet skiing, and various other recreational activities within this section of the river. The West Branch Susquehanna River is a heavily utilized recreational resource within the region.

Based upon designs completed for the reconstruction of existing bridge structures over the West Branch Susquehanna River upstream of the project area, it is anticipated that staged rock causeways would be utilized for the construction of the selected bridge structure. The causeway would temporarily impact the bed of the river and the recreational uses of the river during the construction process due to the placement of rock material. The precise design and nature of the causeway would be completed during the final design process. A partial width (or staged) rock causeway is preferrable. If a full width causeway is determined to be needed during final design, coordination will be undertaken with the appropriate agencies and the required permits will be secured.

A summary of the surface water area impact resulting from construction of the West Branch Susquehanna River bridge is shown for the Section 2 alternatives in Table IV-F-15.

A new bridge crossing of the Chillisquaque Creek would be required with each of the Section 2 highway alternatives. Impacts to the Chillisquaque Creek would result from the replacement or rehabilitation of the existing bridge crossing along Route 147 and construction of a new bridge structure. The existing bridge crossing would be rehabilitated to carry southbound traffic as part of the transportation project. The new bridge structure would transport northbound traffic. The placement of pier structures to support the new structure is anticipated to occur upslope of the creek. No direct impacts to Chillisquaque Creek are anticipated from the placement of pier supports.

Wooded Run, a small watercourse which was identified as supporting naturally reproducing trout populations during field investigations, would be bridged by each of the Section 2 highway alternatives. The bridge structure would be required in the upper reaches in order to maintain a local access road to residences. Wooded Run flows adjacent to this local access route. A replacement or extension of the existing culvert at Route 147 would be required with the RC1-E, RC1-W, and RC-6 alternatives due to upgrades with the existing roadway.

In addition to direct impacts, temporary impacts would be associated with the installation of each stream crossing and reductions in water quality. The types and extent of temporary impacts would be quantified during the final design phase of the project. However, the discussion on mitigation

TABLE IV-F-15
SUMMARY OF WEST BRANCH SUSQUEHANNA RIVER BRIDGE STRUCTURE INFORMATION

ALTERNATIVE	NUMBER OF PIER LOCATIONS*	PIER LOCATIONS	TOTAL SURFACE AREA OF RIVER IMPACTED BY PIER PLACEMENT
RC1-E	9	6 Locations Within River/ 3 Locations On Island	1134.9 square meters (12,216 sq. ft.) [12 pier structures]
RC1-W	9	6 Locations Within River/ 3 Locations On Island	1134.9 square meters (12,216 sq. ft.) [12 pier structures]
RC5	7	6 Locations Within River/ 1 Location On Island	1134.9 square meters (12,216 sq. ft.) [12 pier structures]
RC6	7	6 Locations Within River/ 1 Location On Island	1134.9 square meters (12,216 sq. ft.) [12 pier structures]

* The placement of two pier structures (one at each bound lane) would be necessary at each pier location.

measures describes recommendations to minimize impacts (permanent, temporary, and reductions in water quality) to the surface water resources.

The aquatic habitat within a culvert or enclosure structure may be limited in supporting the typical aquatic biota inhabiting each resource. The reduction in aquatic habitat may be attributed to several factors including absence/lack of suitable substrate, reduced light levels, inadequate flow conditions (decreased depth/increased flow rates), and loss of production imports.

Bridge and culvert installation also have the potential to degrade the fluvial geomorphic and physical characteristics of a channel by altering the sediment and energy dynamics. These structures will be designed to maintain the existing fluvial geomorphic characteristics of the channel and its associated floodplain thus maintaining the available physical aquatic habitat, including riffle-pool complex areas. It is anticipated that fluvial geomorphic characteristics would be evaluated and incorporated into the Final Design of the proposed crossing structures. This would be accomplished by maintaining an effective channel cross-sectional area, maintaining sediment transport during low flow conditions, and incorporating grade control measures.

Additional concerns related to temporary impacts, which may result from highway construction in the areas of PPL Ash Basins No. 1, 2, and 3 were identified for Section 1 Alternatives. Specifically, an increased seepage of leachate from these basins into the bedrock aquifer and receiving surface waters is possible due to highway construction and the related loading of the ash basins and anticipated increased pore water pressure. Surface water resources potentially impacted by the leachate discharge vary by Section 1 highway alternatives.

Surface Water Resource	Highway Alternative	PP&L Ash Basin
Rolling Green Run	OT2A	Ash Basin No.1
Rolling Green Run	OT2B	Ash Basin No. 1
Shreiners Creek	OT2A	Ash Basin No. 3
Shreiners Creek	OT2B	Ash Basin No. 3
Shreiners Creek (CHN-24)	DAMA	Ash Basin No. 2
Shreiners Creek (CHN-26)	DAMA	Ash Basin No. 3

Reports prepared for the project cite historic ecological stream surveys determining that leachate discharges from the Ash Basin No. 3 had negatively impacted biological communities in the receiving stream. The diversity of macroinvertebrate communities was reported to have improved after leachate discharges had ceased following closure of the Ash Basin No. 3 in 1988. Accordingly, it is expected that if leachate were to discharge from any of the ash basins into receiving streams as a result of highway construction there would be an increased risk of negatively impacting aquatic biota. The leachate discharge would be anticipated during and after active highway construction. However, the duration of the induced seepage/discharge is predicted to be a transitory event lasting approximately three to six months and not a chronic long term condition. For more detailed information related to the ash basins see the SR 0015-088 PPL Ash Basin No. 1, Ash Basin No. 2, and Ash Basin No. 3 Technical Memorandum in the Waste Sites Technical Support File. Additional characterization and information related to the ash basins and groundwater impacts can be found in the Public and Private Water Supplies impact discussion (Section IV.G).

b. Operational Impacts

Operational impacts associated with pollutant loading, changes in flow, and increased thermal loading can be evaluated in an overview and comparative fashion by investigating changes in watershed characteristics associated with the various alternatives. The underlying premise of this approach to operational impact assessment is based on the recognition that two primary factors related to highway right-of-way affect changes to drainage basin characteristics.

1) the position of the highway crossing within the drainage basin

2) the relative area of the highway right-of-way in comparison to the total drainage basin

In general, a highway crossing in the upper section of a drainage basin would have a greater potential for operational impacts than a highway crossing in the lower portion of the basin. Likewise, a highway right-of-way area which constitutes 25% of the total drainage basin would have a greater potential for operational impacts than a right-of-way area which would constitute only 5% of the total drainage basin.

The larger perennial resources represent the major drainage basins located throughout the project area. Therefore, an analysis conducted on these resources would also account for potential operational impacts on the smaller perennial and intermittent tributaries which are located within that subbasin. Detailed results of the watershed analysis for the larger perennial resources are presented in the Surface Water and Aquatic Resources Technical Summary Memorandum (see Appendix A).

In consideration that the primary factors related to operational impact assessment are the position of the highway crossing in the drainage basin and the relative area of the highway right-of-way in comparison to the total basin, potential operational impacts due to highway alternatives in Section 1 are anticipated to be minimal. A comparison of the relative area of the highway right-of-way proposed to the total drainage area of the basin illustrates that the highway right-of-way associated with the proposed highway alternatives would constitute small percentages of the total basins crossed and amount of basin upslope.

Potential operational impacts due to highway alternatives in Section 2 are anticipated to be minimal for the West Branch Susquehanna River, Wooded Run, and Chillisquaque Creek. In the case of Mulls Hollow Run, the highway right-of-way would encompass a small portion of the total watershed. However, the disturbances would occur in the headwaters region of the basin, leaving only a small portion of watershed upslope of the highway right-of-way.

Highway runoff does have the potential to adversely affect the water quality and aquatic habitat of receiving surface water resources. Potential pollutants typically present in highway runoff include suspended particulate matter, heavy metals, toxic organic compounds, oil and grease, and nutrients. However the significance of these effects vary with the character of the highway facility, receiving water, and runoff event. Studies conducted by the Federal Highway Administration (1996) and Pennsylvania Fish and Boat Commission (1991) reported no apparent aquatic effects to receiving aquatic resources when evaluating runoff from rural (less than 30,000 average daily traffic) highway facilities. Preliminary traffic volumes projected for the year 2020 for the various highway alternatives are between 45,000 and 54,000 average daily traffic.

The Federal Highway Administration reports that a large percentage of the total storm pollutant load is contributed by a relatively small amount of hydrology during the initial stages of the storm event. These first flush effects are primarily associated with the transport of particulates from paved surfaces resulting in relatively high loadings of suspended pollutants. Most heavy metals and other toxicants in highway runoff tend to occur in the suspended load of the runoff according to the FHWA Report. In order to ameliorate the potential effects of highway runoff, specific and prudent mitigative measures will be implemented with the selected alternative. This would include implementation of effective erosion and sedimentation control and stormwater management measures. Potential mitigative measures would focus on best management practices including nonstructural measures (litter control, deicing chemical use management, pesticide/herbicide use management); and structural measures (vegetative controls [i.e., grass swales], wet detention basins, dry extended detention basins, infiltration systems, wetlands). The specific mitigative measures to be employed would be determined during the final design phase of the selected alternative, and could include grass-lined swales.

c. Mitigation Measures

Impacts to surface water quality and aquatic resources would occur with each of the proposed highway alternatives. Both construction and operational impacts associated with these alternatives would occur. Construction impacts would include:

- permanent impact of aquatic habitat from the installation of the crossing structure or alteration of the headwaters; and
- in-stream disturbances which occur during the installation of either crossing structure(s).

Operational impacts result from highway runoff which could chronically degrade the quality of the receiving water and the aquatic habitat.

In order to properly develop potential mitigation measures for surface water resources, three components of a mitigation strategy must be evaluated to offset the surface water impacts. The three components of the mitigation strategy include the following sequence of mitigation activities.

- avoidance
- minimization
- compensation

In addition, in accordance with PA DEP's Chapter 105 regulations, efforts will be made to repair, rehabilitate, and/or restore impacted waterways.

i. Avoidance

Based upon the combination of preliminary alternatives evaluated, all avoidance options have been considered. Total avoidance of aquatic resources is not possible given the project purpose and scope.

ii. Minimization

The minimization measures include both design and construction options designed to minimize construction and post-construction impacts associated with each resource crossing and potential operational impacts. The design minimization measures include the following.

- The consideration of bridges rather than culverts where practicable and feasible to reduce the direct loss of aquatic habitat. However, based upon the limited amount of drainage area and limited biological communities associated with a majority of the perennial watercourses, culvert structures are anticipated for most of these crossings.

- Proposed culvert crossing structures will employ fish passage strategies developed by PENNDOT, PF&BC, and PA DEP. The design of box culverts will include standardized construction details (i.e., BD632M or revisions thereto) including depression below streambed and baffle geometry to allow for fish passage.

- The separation of highway surface water runoff from the clean upslope runoff. The FHWA's Retention, Detention, and Overland Flow for Pollutant Removal from Highway Stormwater Runoff Manual, Volume II : Design Guidelines, November 1996, details the use of numerous effective measures to ameliorate the impacts of runoff including grass-lined channels to properly treat highway runoff. Collected runoff would be discharged from the grass-lined channels to the receiving stream or into a detention pond to allow for additional settling of pollutant. In addition, by separating the highway runoff from the upslope natural runoff, it would be possible to intercept accidental spills before polluting the receiving streams. Details regarding the design of all the highway runoff measures would be properly addressed in the final design phase of the project.

- The length of required stream relocations will be minimized to the extent possible. Where stream relocated are unavoidable, the most current methodologies including fluvial geomorphology, will be used to design the relocated stream.

A meeting to view the proposed stream crossing locations was held on February 11, 2002. The agency recommendations regarding stream crossings made at that meeting will be taken into consideration during Final Design.

Construction minimization measures include the following.

- Develop and implement an approved Erosion and Sedimentation Plan. Guidelines provided by the PA Department of Environmental Protection (DEP) and U.S. Department of Agriculture (USDA), Natural Resources Conservation Services (NRCS) will be followed for control of erosion and sedimentation.

- Conduct installation of structure during low-flow conditions.

- Use clean rock material and filter fabric for all erosion and sedimentation control measures, diversion channels, and causeways.

- Avoid or minimize the siting of construction within stream reaches. If siting within the stream reaches is absolutely necessary, clean rock causeways would be recommended to minimize sedimentation impacts to the stream.

- Locate all construction fueling stations outside of the reaches of the aquatic habitat to avoid any accidental discharge of toxic pollutants.

- Minimize the amount of area which would be devegetated to reduce the amount of sediment in the stream.

- After all structures are installed, restore all disturbed aquatic substrate and revegetate any disturbed riparian areas to the preconstruction condition, to the extent possible.

Consistent with regulator requirements, attempts to mitigate the potential effects of possible leachate resulting from proposed roadway construction over the PPL Ash Basins would involve the following specific surface water monitoring and remediation strategies.

- **Surface Water Monitoring Program** - Monitoring stations would be established in coordination with the PA Fish and Boat Commission and US EPA at representative points on the receiving surface water resources potentially impacted by the selected highway alternative. Aquatic investigations of these sampling points would be conducted on a monthly basis during preconstruction, active construction, and post construction. Each monthly investigation would include the collection of ambient water samples for laboratory analysis. Chemical parameters to be analyzed would be developed in consultation with the Pennsylvania Department of Environmental Protection, Pennsylvania Fish and Boat Commission and US EPA. Biological sampling of the inhabitant benthic macroinvertebrate communities would be conducted twice a year during preconstruction, active construction, and post construction to identify potential impacts, for a period of two years. It is anticipated that the macroinvertebrate sampling would use US EPA RBP methodologies during the respective spring and fall index periods. If possible, upstream sample locations and pre-construction sampling would provide control data for subsequent comparison during construction and post-construction.

- **Remediation Strategies** - As a means to collect and treat possible leachate that may be discharged, a temporary collection and treatment system(s) would be developed and implemented consistent with the Pennsylvania Department of Environmental Protection (PA DEP) requirements as a means to capture and treat possible leachate prior to discharge to the receiving stream(s). Such leachate collection methods may include use of dewatering (pumping) well(s) and wick drains. Consultation with geothecnical/ hydrogeological experts would be necessary to ascertain the probable locations of leachate discharge so that appropriate treatment(s) could be developed. Temporary active and/or passive treatment technologies would be applied within the capturing structure/basin to remediate impaired water quality conditions. The effluent from the treatment system(s) would also require routine monitoring/sampling consistent with PA DEP requirements to ensure that effluent limitations are being achieved and proper treatment accomplished. As post-construction leachate discharge is anticipated to diminish and would no longer be present, the need for collection and treatment would equally no longer be necessary.

iii. Compensation

The permanent construction impact of aquatic habitat associated with perennial resources would be mitigated through a compensatory plan developed with the natural resource regulatory agencies. A conceptual mitigation proposal is being developed to provide guidance and ensure the commitment of reasonable compensation for the unavoidable impacts of the project. Mitigation for natural resources, including wetlands, surface water resources, and terrestrial habitat is considered in this proposal. Mitigation commitments are being developed based on meetings with agency representatives occurring in April and July of 2001, January of 2002, and February and April 2003. Summaries of these meetings and field views held for the purpose of coordinating to develop mitigation commitments are listed in Section V.A.3 - Coordination with Environmental Resource Agencies. More detailed records of the coordination activities can be found in the Wetlands, Surface Water/Aquatic Resources, and Vegetation and Wildlife Technical Support Data.

The FHWA and PENNDOT are attempting to provide a total ecosystem approach to natural resource mitigation. This approach will provide replacement of wetlands and incorporate habitat mitigation, reconstruction/restoration of streams, enhancement of wetlands and terrestrial habitat, and preservation of existing wetlands, streams, and wildlife habitat in one location. The FHWA and PENNDOT are in the process of investigating alternative sites for the completion of the components of the proposal. The ultimate selection and development of the mitigation site or sites will also be coordinated with the natural resource agencies.

The conceptual mitigation proposal described in this Final EIS will be developed in more detail. Once a site or sites has been selected, a draft mitigation plan will be prepared. This draft plan will show the conceptual designs for wetland, stream, and terrestrial mitigation sites. This mitigation plan will not be finalized until after the Record of Decision (ROD).

The proposed work may include constructing a single resource area which would address the individual compensatory commitments at one site including:

- creating approximately 2.83 hectares (7 acres) of wetlands;
- restoring, enhancing, and/or reconstructing approximately 914.4 meters (3,000 linear feet) of stream;
- providing approximately 22.26 hectares (55 acres) of old field mitigation; and
- providing approximately 60.7 hectares (150 acres) of forestland mitigation.

The intention is to create a functioning, multiple habitat ecosystem which would be protected in perpetuity. The creation of a functioning ecosystem in one location, protected in perpetuity, is not standard practice or procedure. However, it has been determined that given the unique circumstances surrounding this project, such as 1) the potential availability of such a site that could accommodate the ecosystem approach, 2) the present owner of said site, 3) the potential availability of a future owner willing to commit to the maintenance of the site in perpetuity, 4) the potential for mitigating multiple impacts at the referenced site, and 5) the potential for the future development at the referenced site, the enhancement and protection of this potential site is an appropriate mitigative action for this project.

If it is not possible to complete the individual compensatory mitigation requirements at one site, then multiple sites in various locations would be investigated.

Additionally, the compensatory plan would include the following.

- Evaluation, design, and construction of crossing structures and in-stream improvements proposed with the new highway alternative which would ameliorate the effects of bedload deposition and subsequent required maintenance activities (also provide secondary benefits for in-stream aquatic habitat improvements).

- Coordination with the Pennsylvania Fish and Boat Commission (PFBC) and local public officials has occurred regarding the construction and location of a public boat ramp on the west side of the West Branch of the Susquehanna River. This proposed public access area is intended to mitigate for the impact of the new bridge piers (preliminary design indicates 6 new piers) to the fishing and boating uses of the river in this location. The ramp will provide river access for boating and/or fishing uses. The River Crossing No. 5 (RC5) location and other sites were investigated for potential ramp use. Based on preliminary evaluations, PFBC believes that RC5 is the optimal location because it provides greater boater safety due to fewer boating restrictions, such as low water and submerged rocks.

  Access to the proposed public boat access area will be developed in detail during Final Design. Also during Final Design, efforts will be made to minimize the number of bridge piers in the waterway. Coordination with the township will take place with respect to improving township roads that provide access to the site.

  Correspondence both in favor of and opposed to the proposed public boat ramp has been received during the review of the Draft EIS. Please see petitions and other correspondence in the Petitions, Form Letters and Additional Correspondence chapter of Section V.

4. Geology and Soils

Soil and geologic information pertaining to the study area was obtained primarily from the Pennsylvania Bureau of Topographic and Geologic Survey (Survey) and county-specific soil surveys published by the Soil Conservation Service. Information specific to sinkhole formation was obtained from the Survey, Eastern Indus-

> More detailed information related to geology and soils is located in the Technical Support Data. An index of the Technical Support Data is located in Section IX, Appendix A.

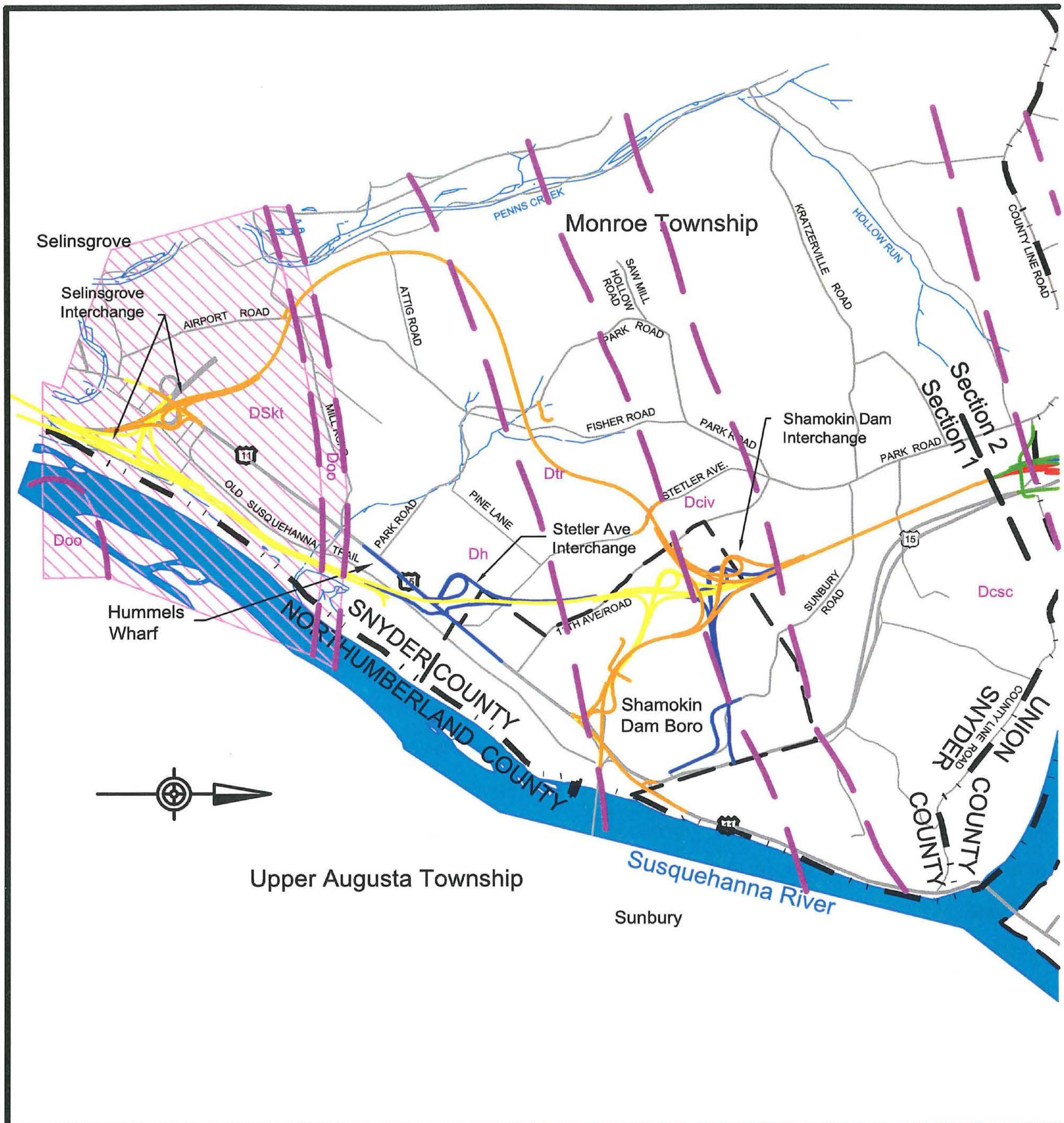
tries, Inc., and the Point Township Municipal Authority. Limited field investigations were also performed, primarily to locate and observe sinkhole features in Point Township. Construction of any of the CSVT build alternatives would have impacts to or be affected by the existing geology and soil conditions in the project area. The No-Build Alternative would have no impacts to geology and soils in the project area.

a. Impacts

In general, the alternatives in both sections traverse the countryside sub-perpendicular to regional strike of the geologic formations. This relationship has the tendency to minimize contact with any one formation. This is favorable in that construction efforts in carbonate terrain (i.e., limestone formations) will be kept to a minimum. A negative aspect is that multiple lithologic features will need to be considered, complicating construction engineering. Because the rocks have been folded and laterally shortened, multiple exposures of individual rock units will be encountered. A geologic map of the study area is provided in Figure IV-F-9.

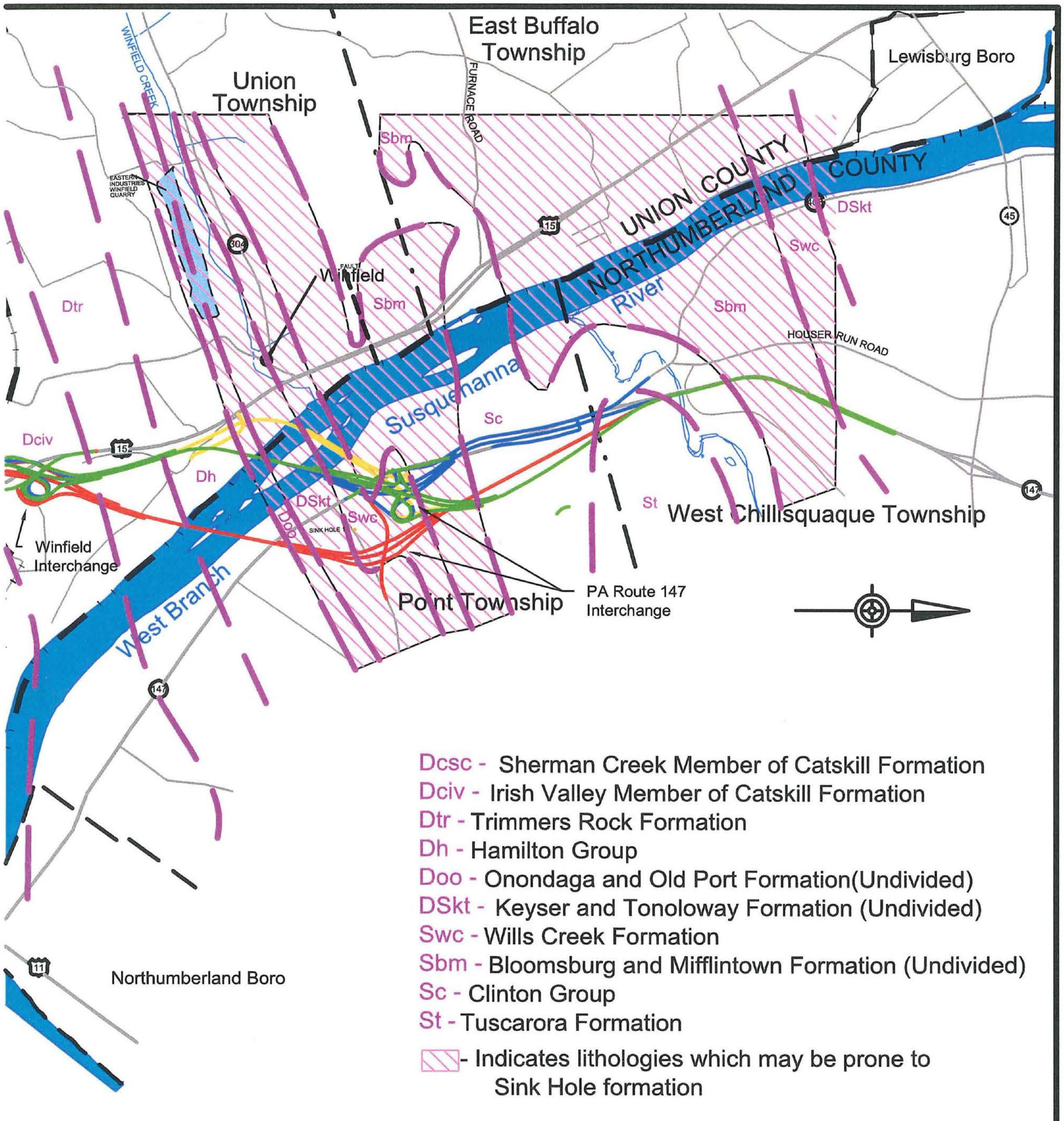
All seven alternatives traverse carbonate terrain which has the potential for sinkhole development. The Keyser-Tonoloway and Onondaga-Old Port Formations are composed primarily of limestone and therefore are most prone to sinkhole formations and solution features. The Wills Creek and Bloomsburg-Mifflintown Formations contain minor limestone units and are somewhat less susceptible. The Catskill, Trimmers Rock, and Tuscarora Formations, as well as the Hamilton and Clinton Groups, are not considered to be susceptible to sinkhole development. Aside from the obvious problems associated with sink holes and solution features both during and subsequent to road construction, it is also important to consider the extensive drainage system formed by interconnected conduits. Deicing salt, accidental releases, or spills could enter this subsurface drainage system via a sinkhole and quickly contaminate a wide area.

The different soil series and the engineering characteristics associated with each soil series encountered by the project alternatives are discussed in detail in the technical memorandum. One issue of concern related to the soils encountered should be noted, however. Locally, highly erodible soils would be encountered. Natural erosion is the process by which the land surface is altered by the physical actions of air, water, wind, gravity, or a material's chemical breakdown. Accelerated erosion occurs when man's activities cause the surface of the land to be worn away faster than it would have been by natural processes alone. Clearing and grubbing is one operation associated with road construction activities which could have the potential to accelerate soil erosion. Other activities, such as structure construction, stockpiling of soils, and the spreading of soils on the final grades also have the potential to create erosion.



Legend

- DA Modified Avoidance Alternative
- Old Trail 2A Alternative (61 Connector)
- Old Trail 2B Alternative (Stetler Ave. Interchange /15 Connector)
- River Crossing 1 - East Alternative
- River Crossing 1 - West Alternative
- River Crossing 5 Alternative
- River Crossing 6 Alternative
- Geologic Formation Limits



Central Susquehanna Valley Transportation Project

Figure IV-F-9

Geologic Formations Map

0 500 1000 1500 Scale in Meters

0 2000 4000 6000 Scale in Feet

Accelerated soil erosion could impact the quality, quantity, and stability of receiving water courses if not properly mitigated. In addition, accelerated soil erosion has the potential of causing ecological and physical damage to streams, rivers, lakes, and ponds. The close proximity of accelerated erosion to receiving water courses is an important consideration during the construction process. Section IV.F.3, Surface Water Resources, includes an assessment of sedimentation impacts for each proposed stream crossing. Mitigation measures are also presented to minimize the potential for soil erosion to reduce water quality impacts to streams.

The soil contacted by each alignment was evaluated from the erosion standpoint. Table IV-F-16 summarizes the area affected by each alignment according to erosion hazard rating.

TABLE IV-F-16
SUMMARY OF SOIL IMPACTS

Erosion Hazard	Hectares (Acres) Impacted						
	DAMA	OT2A	OT2B	RC1-E	RC1-W	RC5	RC6
Very Severe	25.71 (63.51)	12.23 (30.20)	19.90 (49.16)	13.12 (32.41)	5.67 (14)	21.14 (52.23)	13.02 (32.17)
Severe	48.80 (120.54)	24.72 (61.07)	29.46 (72.77)	40.48 (100.03)	47.46 (117.26)	45.04 (111.28)	39.89 (98.56)
Severe (Flood Prone)	0.59 (1.46)	24.95 (61.61)	29.94 (61.61)	2.93 (7.23)	2.91 (7.18)	0 (0)	8.92 (22.03)
Moderate	111.51 (275.43)	69.14 (170.78)	71.23 (175.93)	82.16 (203.01)	84.30 (208.31)	82.85 (204.72)	1.45 (3.59)
Slight	30.37 (75.02)	22.66 (55.97)	29.60 (73.12)	10.95 (27.06)	7.90 (19.51)	8.63 (21.33)	11.10 (27.42)
Pits, Quarries, and Urban Land	10.14 (25.04)	13.82 (34.13)	11.59 (28.63)	0 (0)	0 (0)	0 (0)	0 (0)

i. Section 1

a. DAMA

The existing cloverleaf area at the origin of DAMA is within the carbonate terrain of the Keyser-Tonoloway and Old Port-Onondaga Formations. A thorough investigation for the presence of solution features should be undertaken in this area prior to planning construction efforts. The potential for solution cavities should also be taken into account when designing storm water handling systems. The risk of aquifer impact by roadway runoff and accidental spills is inherent in carbonate terrain.

The DAMA then traverses the Hamilton Group in a south-north direction, west of the Monroe Manor residential development. As the alternative turns to the east, it enters a hilly area underlain by the Trimmers Rock Formation. The alternative is sub-parallel to the strike of the Trimmers Rock until it reaches the 61 Connector interchange area. Neither the Hamilton Group nor the Trimmers Rock Formation are anticipated to pose unusual complications to construction efforts.

The 61 Connector interchange area is situated in an area primarily underlain by the Irish Valley Member of the Catskill Formation. The DAMA then continues north-northwest through a region of low-relief hills underlain by the Sherman Creek Member of the Catskill Formation. Both of these members can exhibit poor cut-slope stability properties, especially in areas where the rock is weathered or fractured. Road cut slopes will be appropriately engineered where rocks of the Catskill Formation are encountered. DAMA terminates within the limits of the Sherman Creek Member at the northern end of Section 1.

The DAMA encounters a total of 71.86 hectares (177.56 acres) of soils with very severe to severe erosion hazard.

b. OT2A

Similar to DAMA, the OT2A Alternative originates in the carbonate terrain of the Keyser-Tonoloway and Old Port-Onondaga Formations. As such, the same precautions regarding the potential for solution cavity formation should be followed.

The alternative enters the area underlain by the Hamilton Group near the northern edge of Hummels Wharf, then crosses into a hilly area underlain by the Trimmers Rock Formation just west of Shamokin Dam. Neither of these rock units are expected to pose unusual problems relative to highway construction and maintenance.

From the 61 Connector interchange area northward, the OT2A Alternative follows the path described by DAMA. The alignment terminates against Section 2 within the area underlain by the Sherman Creek Member of the Catskill Formation. Geologic impacts with regard to the Irish Valley and Sherman Creek Members are discussed in the preceding section.

The OT2A impacts 59.39 hectares (146.74 acres) of soil classified as having very severe to severe erosion hazards.

c. OT2B

The OT2B Alternative is essentially identical to OT2A. The Stetler Avenue Interchange area between Hummels Wharf and Shamokin Dam is underlain by rocks of the Hamilton Group, which are not expected to pose exceptional construction or maintenance issues.

Construction of the 15 Connector, which extends west to east, may be complicated by the engineering features of the Irish Valley Member. This unit is reported to possess fair to poor cut-slope stability characteristics, particularly where the rock is weathered or fractured. The risk of rock slides on bedding planes may be increased in this area since the alternative is aligned parallel to the strike of the formation.

North of the 15 Connector Interchange, the OT2B Alternative follows the route described for the DAMA. Geologic impacts are described in the preceding DAMA discussion.

The OT2B also impacts 59.39 hectares (146.74 acres) of soil classified as having very severe to severe erosion hazards.

d. No-Build Alternative

The option of not proceeding with highway construction will have no effect on, and will not be affected by, geologic features or soil units in the study area.

ii. Section 2

a. RC1-E

RC1-E originates in a relatively hilly area underlain by the Catskill Formation. The contact between the Sherman Creek and Irish Valley Members is approximately 457 meters (1,500 feet) north of the beginning of the alignment. As the alternative continues north, it crosses a hill top underlain by the Trimmers Rock Formation then proceeds to the floodplain of the West Branch Susquehanna River which is underlain at this locale by rocks belonging to the Hamilton Group. Cut-slope stability in the Catskill Formation rocks is rated as fair to poor, especially in weathered and fractured rock. Appropriate precautions should be taken to ensure stable road cuts. There are no problematic features associated with the Trimmers Rock Formation or Hamilton Group rocks. However, since these units coincide with the floodplain of the river, the area should be investigated to determine depth to sound bedrock.

As the alternative turns to the northeast to cross the river, it passes into carbonate terrain underlain by the Keyser-Tonoloway and Old Port-Onondaga Formations. These formations underlie the alignment for the entire width of the river and should be thoroughly investigated for solution cavities. These features may be obscured by alluvial floodplain deposits.

On the east shore of the river, RC1-E encounters the Wills Creek and Bloomsburg-Mifflintown Formations. The presence of a minor fault near the east shore landing point of RC1-E is speculative. This fault has been mapped only on the west shore of the river, but there is interpretative evidence that the fault crosses the river and continues to the east. Both the Bloomsburg and Mifflintown Formations contain minor limestone layers. Therefore, areas underlain by these formations should be investigated for solution features. One sinkhole known to have formed during the flood of 1972 is located within the Wills Creek Formation. The sinkhole was located along the north side of Ridge Road in Point Township, Northumberland County, approximately 152 meters (500 feet) east of Mertz' Greenhouse. The township immediately filled the cavity with coarse rock. Currently, the location of the sink is marked by a slight depression. Several other large sinkholes are located further east along Ridge Road, but these are out of the study area.

As the alternative turns to the northwest towards Route 147, it crosses the foothills in front of Monroe Ridge. These hills are underlain by rocks belonging to the Clinton Group which are not likely to pose unusual difficulties to construction efforts. The alignment truncates the nose of Monroe Ridge at the Route 147 junction area. Monroe Ridge is formed by the Tuscarora Formation, a very hard quartzite with a characteristic joint system which results in the formation of large rectangular blocks of rock. Rock fall hazards may be a concern in cut areas.

A total of 56.52 hectares (139.67 acres) of soil with very severe to severe erodability ratings are encountered by RC1-E.

b. RC1-W

RC1-W is essentially identical to RC1-E, but joins Route 147 immediately upon crossing the river. Geology related considerations are the same as those described for RC1-E.

Impact to soils with very severe to severe erodability ratings total 56.03 hectares (138.44 acres).

c. RC5

RC5 is the southernmost alternative, crossing the West Branch of the Susquehanna River approximately 610 meters (2,000 feet) south of RC1-E. On the west side of the river, the alignment involves the Sherman Creek and Irish Valley Members of the Catskill Formation and the Trimmers

Rock Formation. These units, particularly the members of the Catskill Formation, are susceptible to cut-slope stability problems and should be carefully evaluated before cut design.

RC5 crosses the river at the contact between the Trimmers Rock Formation and the Hamilton Group. On the east shore landing, RC5 continues north-northeast in the Hamilton Group for approximately 457 meters (1,500 feet) before entering the carbonate terrain underlain by the Old Port-Onondaga and Keyser-Tonoloway Formations. RC5 then continues to the north through the Wills Creek and Bloomsburg-Mifflintown Formations before joining RC1-E. The Wills Creek and Bloomsburg-Mifflintown Formations can be prone to solution feature development in areas containing limestone units. It is important to note that the sinkhole along Ridge Road in the study area appears to occur within the Wills Creek Formation, suggesting that a limestone unit does occur in the Wills Creek at this locale. Therefore, it is imperative to thoroughly evaluate this area for sinkhole hazards. These carbonate formations are also valuable aquifers in the Point Township area. Provisions should be made to avoid impacting water quality and quantity.

Total impact to highly erodible soils involves 66.17 hectares (163.51 acres).

d. RC6

Alternative RC6 represents the northernmost river crossing alignment, diverging from alignment RC1-E in the Winfield area. The alignment continues northwest along existing US 15 before turning to the northeast, crossing the river approximately 305 meters (1,000 feet) northwest from RC1-E. Alternative RC6 is essentially identical to Alternative RC1-E from the beginning of Section 2 until their divergence in Winfield. Therefore, geologic impact considerations are similar to those described for Alternative RC1-E.

A total of 61.82 hectares (152.76 acres) of highly erodible soils will be impacted.

e. No-Build Alternative

The option of using the existing transportation infrastructure without modification will have no impact on and will not be affected by local geologic features or soil units.

b. Mitigation Measures - All Alternatives

A comprehensive geotechnical and soils testing program will be implemented on the alternative selected for construction during the final design phase to determine the actual physical characteristics of the soils to be disturbed. From this testing, soil thicknesses and suitable uses (as construction and embankment materials) will be determined. Erodability factors will also be determined from the testing program.

Erosion and sedimentation pollution control practices will be used to minimize impacts to receiving watercourses. A detailed Erosion and Sediment Pollution Control Plan (E&S Plan) will be prepared during final design efforts. These E&S Plans will be included in the National Pollutant Discharge Elimination System (NPDES) Permit(s) required by PA DEP. Guidelines provided by the PA Department of Environmental Protection (DEP) and U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) will be followed for control of erosion and sedimentation.

The geotechnical drilling program will also determine information related to the rock underlying the soil. The program will determine rock type, delineate contacts between formations, establish dip angles, and locate voids. All drill holes will be sealed on completion to prevent future problems.

The following design and construction considerations are also recommended.

- Alternatives that traverse areas underlain by limestone bedrock should be carefully investigated for the presence of solution features.
- Roadway boring coverage should be relatively dense in both the lateral and vertical dimensions to provide an adequate confidence level.
- Approved engineering methods should be used to address any solution features encountered during construction efforts.
- Stormwater detention structures should be designed and located so as to prevent aquifer degradation via sinkholes.
- Road cuts in all areas should be designed according to the characteristics of the local lithology.

G. PUBLIC/PRIVATE WATER SUPPLIES

Both public water services and domestic supply wells exist in the study area. Public water supplies include both groundwater and surface water sources. Based upon information acquired and reviewed, all private water supplies and the majority of public water supplies within the CSVT study area are obtained solely from groundwater sources. Construction of any of the CSVT build alternatives could result in impacts to public/private water supplies.

> More detailed information on the public/private water supplies is located in the Public/Private Water Supply Technical Support Data. An index of the Technical Support Data is located in Section IX, Appendix A.

Information pertaining to water supplies in the study area was obtained through correspondence with the Pennsylvania Department of Environmental Protection (PA DEP) and the Pennsylvania Department of Conservation and Natural Resources (PA DCNR). Officials representing affected municipalities were also contacted for water supply information, as were utility companies providing water supply and distribution services.

A total of 16 public supply wells, 3 institutional supply wells, 6 commercial supply wells, and 1 industrial supply well are located in the study area (see Figures IV-G-1 and IV-G-2). In addition, a total of 41 domestic/private supply wells were identified in the study area. It is important to note that the domestic/private water supply information may not be complete. This information was collected from PA DEP and PA DCNR. Since 1966, well drillers have been required to submit well reports that are kept on file by the PA DCNR. In some instances, however, these reports are not submitted or do not contain sufficient information.

The village of Hummels Wharf in Monroe Township and Shamokin Dam Borough are serviced by public water utility companies, as are some residents in Point Township, Northumberland County. In addition, individual residential developments and mobile home parks in the study area maintain and operate water supply wells for multi-unit use. Figures IV-G-1 and IV-G-2 depict areas served by public water companies.

The PA DEP has assigned an arbitrary well head protection area radius of 805 meters (0.5 mile) for municipal supply wells. However, the regulation of activities within these areas is the responsibility of the governing municipality. Based upon the information obtained from the PA DEP, none of the public water systems affected by the proposed alignments are currently involved in local well head protection programs.

1. Impacts

Table IV-G-1 summarizes the number of wells directly affected by each alternative. Alternative RC6 directly affects the most private supply wells.

Although no public supply wells are situated in take areas, it is important to realize that heavy construction efforts in the vicinity of a well can adversely affect both water quality and quantity. The

TABLE IV-G-1
SUMMARY OF AFFECTED WELLS

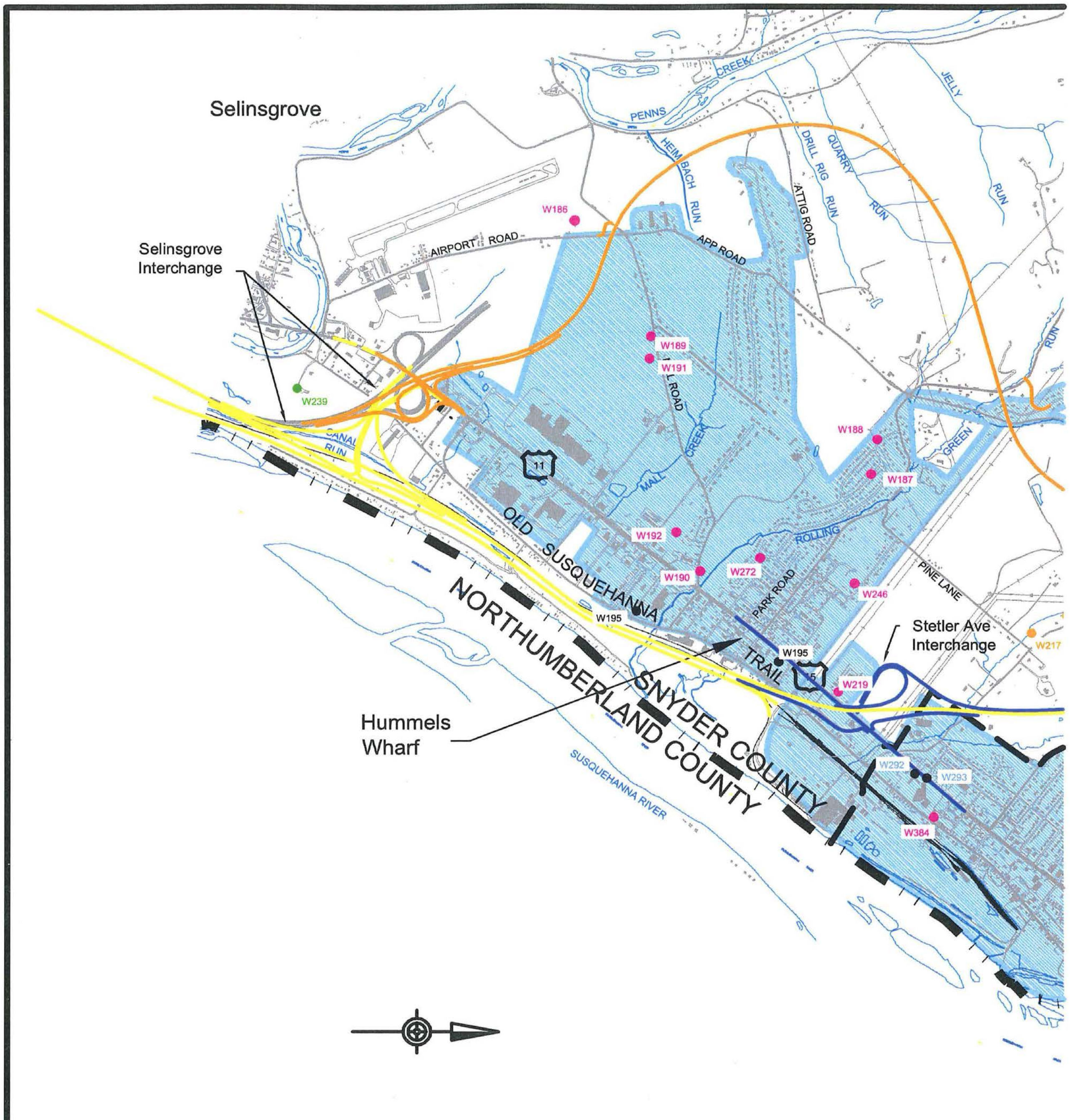
Alignment	Number of Private Wells in Take	Number of Public Wells in Take
DAMA	2	0*
OT2A	4	0*
OT2B	4	0
RC1-E	5	0
RC1-W	5	0
RC5	3	0
RC6	6	0

* A water tank owned by Shamokin Dam Borough is in the take area of the DAMA and OT2A Alternatives; however, based upon preliminary design, the tank will not be impacted. The disposition of the tank will be determined in Final Design.

same holds true for domestic supply wells. It is assumed that the dwellings serviced by those domestic wells in take areas will also be absorbed during right-of-way acquisition. However, domestic wells in close proximity to construction areas are susceptible to impact. Factors that may contribute to degraded water supplies include interception of the groundwater table in cut areas, introduction of sediments and other contaminants in karst (limestone) areas, surface runoff and sedimentation around well heads, entrainment of fine sediment as a result of blasting, and alteration of fractures or solution openings as a result of blasting. Furthermore, domestic wells may be more prone to roadway-related impacts as opposed to public supply wells due to the potential for relaxed construction standards employed by drilling contractors.

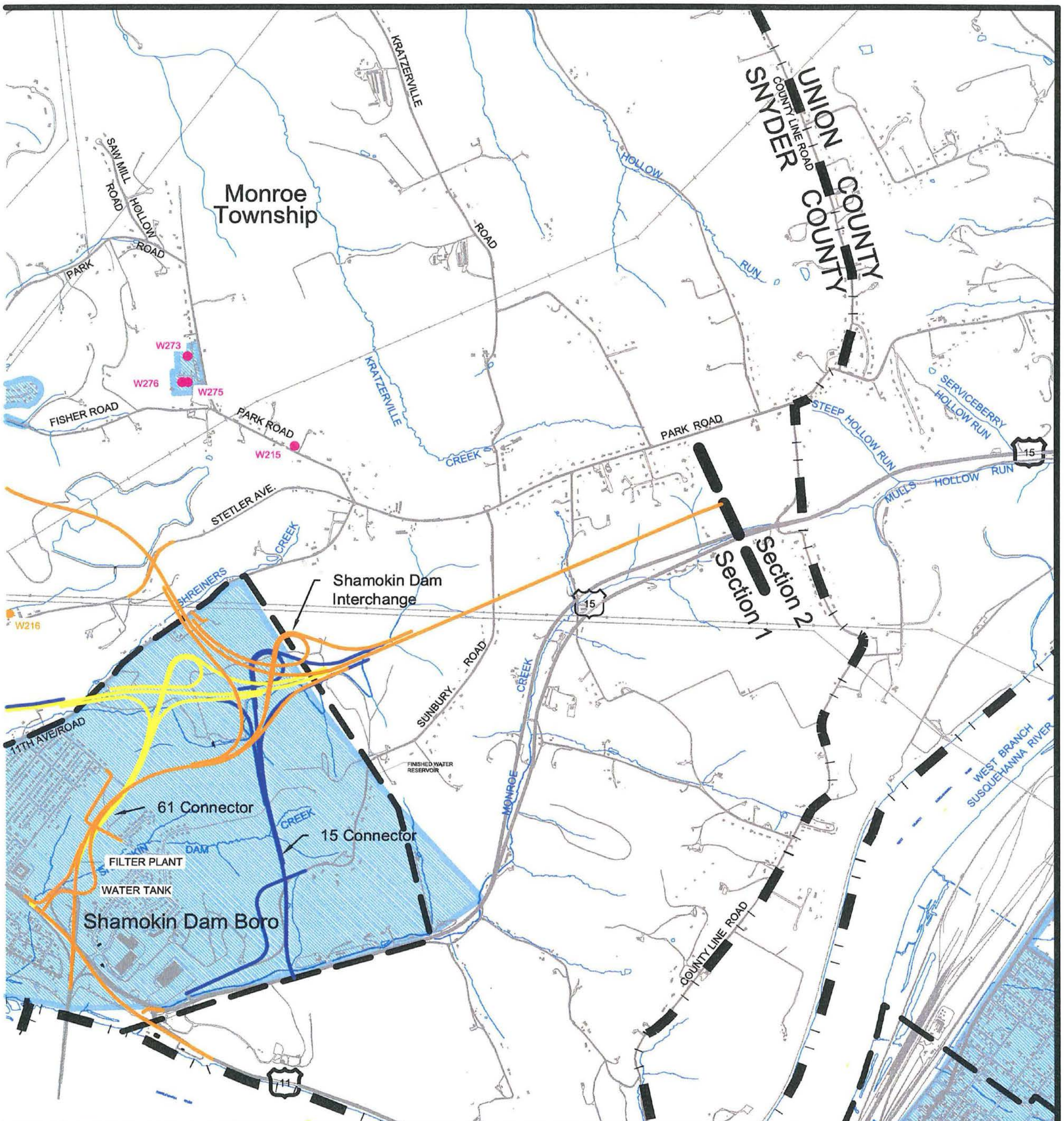
Even after construction is completed, the presence of the highway can still influence the groundwater supply by altering surface drainage and infiltration patterns. Particular areas of concern include the PPL Ash Basins in Section 1 and portions of Point Township in Section 2. Descriptions of the potential impacts are discussed below.

For Section 1 Alternatives, potential concerns have been identified regarding highway construction in the areas of the PPL Ash Basins. The ash basins were designed as residual waste disposal facilities for the PPL Sunbury Steam Electric Station. Constructed between 1949 and 1970, the ash basins were actively used to collect by-products of coal processing, such as fly ash and bottom ash, throughout portions of the late twentieth century. The construction of a highway on top of the saturated waste in the PPL Ash Basins presents temporary risks to groundwater quality. The fill



Legend

DA Modified Avoidance Alternative	Public Wells
Old Trail 2A Alternative (61 Connector)	Institutional Wells
Old Trail 2B Alternative (Stetler Ave. Interchange/15 Connector)	Commercial Wells
296 Supply Well Location	Industrial Wells
Public Water Service Areas	



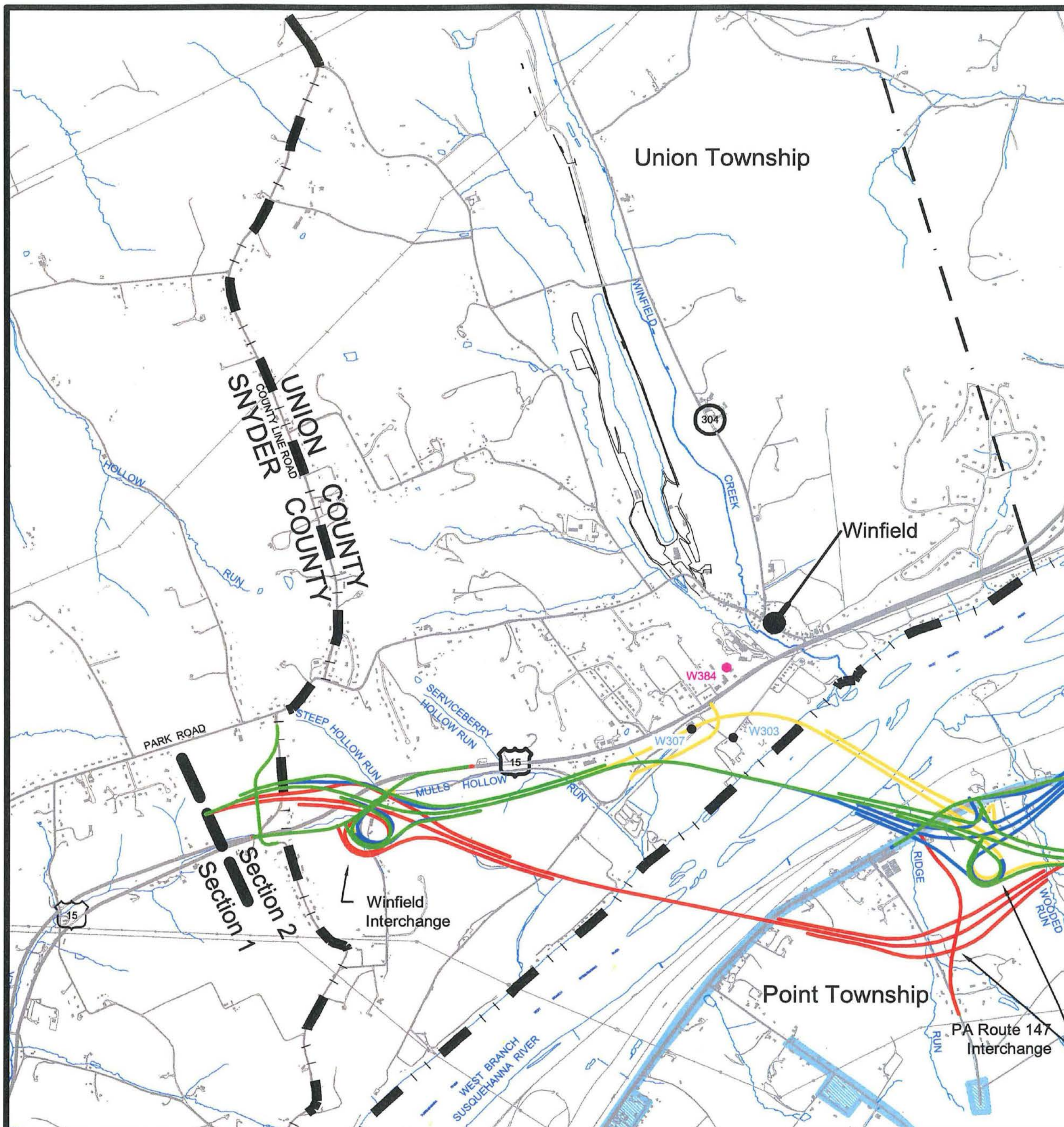
Central Susquehanna Valley Transportation Project

Figure IV-G-1

Section 1-
Water Supply Maps

0 300 600 900 Scale in Meters

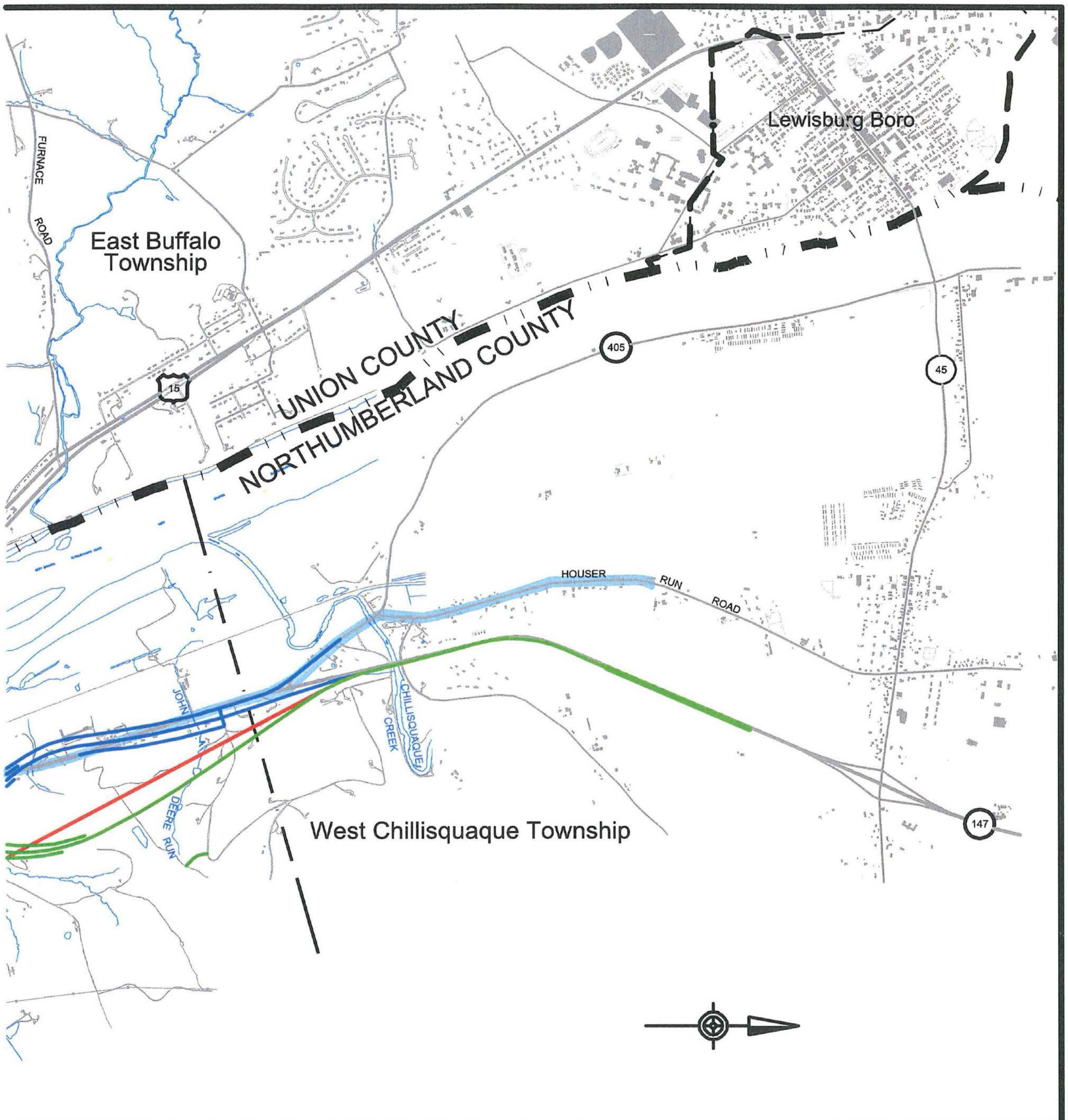
0 1250 2500 3750 Scale in Feet



Legend

- River Crossing 1 - East Alternative
- River Crossing 1 - West Alternative
- River Crossing 5 Alternative
- River Crossing 6 Alternative
- 296 Supply Well Location
- Public Water Service Areas

- Public Wells
- Institutional Wells
- Commercial Wells
- Industrial Wells



Central Susquehanna Valley Transportation Project

Figure IV-G-2

Section 2-
Water Supply Map

0 300 600 900 Scale in Meters
0 1250 2500 3750 Scale in Feet

and paving materials placed on the ash will weigh many tons, compressing the pore spaces in the ash and squeezing the water from it. This increased pressure will affect the rate and direction of water flowing from the ash basins. It is anticipated that the proposed construction over Ash Basins 2 and 3 has the potential to cause temporary degradation of the surrounding groundwater, but the effect should be minimal and would not pose a threat to public health. However, concern for safe residential water supply is paramount and several mitigation measures found in Section IV-G-2 are recommended to protect public health.

Reports prepared for the project indicate that the duration of induced seepage/discharge from the ash basins into the local groundwater supply is expected to be a transitory event lasting approximately three to six months and not an ongoing long-term condition. Detailed information related to the PPL Ash Basins can be found in the Waste Sites Technical Support File (SR 0015-088 PPL Ash Basin No. 1, Ash Basin No. 2, and Ash Basin No. 3 Technical Memorandum, September 1999, revised July 2000).

Additional concerns related to post-construction effects in areas underlain by a limestone aquifer have been identified in Section 2. A portion of Point Township is underlain by a rock unit named the Keyser-Tonoloway Formation. This formation is composed of limestone and is therefore susceptible to chemical dissolution and sinkhole occurrence. Sinkholes are a surface expression of what can be a vast underground network of interconnected caverns and conduits. This network can transmit huge quantities of groundwater and therefore can be a very important water supply. However, the characteristics which make limestone aquifers such an important resource also greatly increase the risk of widespread contamination. Sinkholes provide an open passage from the surface to the underground aquifer. Any pollutant which is introduced into a sinkhole can very quickly find its way into the interconnected network of caverns and conduits and affect the entire aquifer system.

a. Section 1

i. DAMA

No public supply wells are directly affected (i.e., in the footprint). The alternative also bisects two public water supply coverage areas. Two domestic supply wells are known to be situated within the take area of this alternative. Other domestic wells which are not recorded on the PA DCNR database may also exist. The DAMA crosses PPL Ash Basins No. 2 and No. 3. Construction over the ash basins present potential risks to local groundwater quality.

ii. OT2A

No public supply wells are directly affected by OT2A. Four domestic supply wells are also situated within the take area. Other domestic wells not appearing in the PA DCNR database may also exist within the take area for this alternative. The OT2A crosses PPL Ash Basins No. 1 and No. 3. Construction over the ash basins present potential risks to local groundwater quality.

iii. OT2B

Impacts to public water supply facilities incurred by the OT2B Alternative are identical to those identified for the OT2A Alternative. As previously noted, other domestic wells not listed in the PA DCNR database may exist. The OT2B crosses PPL Ash Basins No. 1 and No. 3. Construction over the ash basins present potential risks to local groundwater quality.

iv. No-Build Alternative

The No-Build Alternative will have no impact on existing public and domestic/private water supplies.

b. Section 2

i. RC1-E, RC1-W, and RC6

No public supply wells are directly affected by these alternatives. The impact areas of these alternatives involve a portion of the water distribution system servicing the Borough of Northumberland and part of Point Township, Northumberland County, to some degree. The system is operated by the Pennsylvania American Water Company which maintains a 12-inch diameter water main and ancillary laterals along existing PA Route 147 in Point Township. RC1-W parallels existing Route 147 for much of its length and would, therefore, pose the greatest impact to this water system. In addition, three domestic supply wells are located within the take areas of each alignment. Other domestic wells not included on the PA DCNR database may also exist in the corridor.

ii. RC5

Alternative RC5 impacts only one reported domestic well within the take area. No public water supply wells are affected. The 12-inch water main in Point Township, Northumberland County, owned by Pennsylvania American Water Company, is crossed at only one point. It is important to note, however, that of the four river crossing alternatives, Alternative RC5 involves the most contact with carbonate terrain. This is significant in Point Township due to the number of sinkholes in the area and past water supply issues. Although highway construction is unlikely to reduce the available water quantity, it is important to note that carbonate aquifers tend to have highly developed drainage systems.

iii. No-Build Alternative

The No-Build Alternative will not impact existing domestic or public water supplies in the study area.

2. Mitigation Measures

Heavy construction and surface disturbances associated with a highway project can greatly impact groundwater in a number of ways discussed earlier. Prior to construction during final design activities, PENNDOT will undertake a detailed assessment of potentially affected individual domestic and public supply wells to determine background water quality conditions. Monitoring for groundwater quality should be conducted in areas where potential concerns have been identified, including, but not limited to, areas in the vicinity of PPL Ash Basins and portions of Point Township underlain by a limestone aquifer. The data collected during this study will be used to assess potential future impacts to groundwater as a result of the construction of the selected alternative and to refine the proposed mitigation measures.

The primary goal with regard to mitigation measures for impacts to domestic wells and public water supplies is to ensure a continued supply of safe drinking water to affected residents. If impacts occur as a result of construction, PENNDOT will ensure the maintenance of existing water supplies for homes and properties not acquired as part of the right-of-way areas by any one of the following:

- Providing connections to public water systems;

- Redrilling existing wells to another water-producing zone at a greater depth within the same formation;
- Relocating a well within an adjacent water-producing formation undisturbed by construction activities;
- Providing water treatment; and
- Acquiring the property.

Various mitigative strategies for domestic wells and public water supplies are discussed by alternative in this section.

As a result of a recommendation made in the Draft EIS, a Groundwater Quality and Impact Monitoring Plan (October 2001) has been prepared. This plan is intended to provide the means to ensure the continued quality of groundwater in the areas of the Ash Basins. This Plan recommends consideration of the following steps.

1. Private (residential and commercial) water supply wells in vicinity of the Ash Basins will be confirmed.
2. A water supply system information letter will be developed and mailed informing well owners of the groundwater quality monitoring program and to get permission to inspect their water supply system.
3. A field view will be completed to verify the results of the well inventory and confirm that no additional private water supply wells were located within the area of interest.
4. As a means to establish and monitor background water quality, upgradient wells will be sampled.
5. A network of downgradient wells will be selected to be monitored so that possible degradation to groundwater quality due to roadway construction could be detected.
6. A sampling plan and schedule will be established for monitoring. Modification to this schedule can be made as sampling event results merit. No changes to the sampling schedule or locations will be made without PA DEP approval.
7. In order to detect possible degradation to groundwater quality that is clearly related to the ash basins, it is necessary to know baseline concentrations of the constituents analyzed.
8. A groundwater quality monitoring report will be issued for each monthly sampling event. This report will contain a summary of the analytical results of the sampling event and a

comparison to baseline conditions. The report will include a discussion regarding changes or trends on groundwater quality that could indicate degradation is occurring.

9. An abatement plan will be prepared and submitted to PA DEP, if the groundwater sampling shows the presence of groundwater degradation for one or more analytical constituents at one or more monitoring points and that any of the following standards are exceeded.

    - Statewide health standard (primary and secondary MCL)
    - The background standard for constituents
    - The risk-based standard for constituents

10. A contingency plan for providing an alternate supply of potable water to private well owners will be developed for use in the event groundwater is degraded and abatement is required. Such provisions will be inclusive of confirmatory groundwater sampling, availability of bottled water, alternatives for a replacement permanent water supply, and continued groundwater quality monitoring.

Specific recommendations are made regarding potential impacts to surface water quality as a result of loading of the ash basins. These recommendations include monitoring and/or treatment activities which would apply to all of the Section 1 Alternatives.

- Select representative surface water locations, leachate seeps, monitoring wells, and residential wells as applicable for monthly sampling and analysis at each ash basin for a minimum of one year prior to and after construction. The sampling effort will be increased to weekly intervals during construction. Analyze water samples for TAL inorganics, boron, pH, specific conductivity, temperature, and turbidity before, during and one year after highway construction.

- As a means to keep concentrations of metals below toxic limits, effluent and seepage discharges will be collected and routed into a collection, basin/structure or stormwater management basin associated with highway construction. The discharge from the collection basin can then be treated as necessary with active package treatment/or passive anoxic limestone drain pH adjustment system prior to discharge to the receiving stream.

- Settlement lagoons would be located within the highway construction area and dual use of stormwater detention facilities will be considered.

- Coordination with the Pennsylvania DEP and local agencies will be undertaken, when required, to discuss the rationale for and implementation of the proposed mitigation measures.

- Coordination with the public concerning waste management issues associated with the impact to the Ash Basins will be ongoing.

a. Section 1

i. DAMA

The DAMA Alternative has the potential for impacting both public and domestic water supplies. PENNDOT will provide for the continuation of water service to residents served by these utilities. Those domestic wells which are located within the take area of the alternative will be properly abandoned following PA DEP guidelines to prevent aquifer contamination. A contingency plan to address citizen complaints regarding water supply degradation will be implemented. Additionally, appropriate monitoring and treatment measures will be taken to mitigate impacts to groundwater quality in the areas surrounding PPL Ash Basins No. 2 and No. 3.

ii. OT2A and OT2B

Protecting well head areas of both public and private supply wells will also be considered for both alternatives to prevent degradation from construction area runoff. Those domestic supply wells which are in the take area of these alternatives will be properly abandoned to prevent aquifer contamination. A contingency plan to address citizen complaints regarding water supply degradation will be implemented. Additionally, appropriate monitoring and treatment measures will be taken to mitigate impacts to groundwater quality in the areas surrounding PPL Ash Basins No. 1 and No. 3.

b. Section 2

i. RC1-E, RC1-W, and RC6

These three alternatives follow similar routes, resulting in equally similar impacts to both domestic and public water supplies. Alternative RC1-W will have a greater impact on the public water supply infrastructure, however, since it parallels the route of a Pennsylvania American Water Company 12-inch main which supplies Northumberland and part of Point Township. All other river crossing alternatives intersect this main at only one point. The uninterrupted supply of water to Pennsylvania American customers will be provided for. All domestic wells within the take areas of these alternatives will be properly abandoned, and all wells in close proximity to the construction area will be protected from surface runoff. Residential complaints regarding water degradation should be anticipated. A contingency plan will be put into effect to efficiently address these concerns.

ii. RC5

Alternative RC5 has generated concern among the residents of Point Township, Northumberland County because of its route in relation to local geology. Sinkholes and swallow holes have been observed in this area, particularly along Ridge Road. Given the fact that public water service has been extended into parts of Point Township, the contingency plan for this alternative will include providing public service to affected residents. Special emphasis will be placed on properly abandoning domestic water wells in the take area to prevent contamination of the limestone aquifer. Domestic wells in close proximity to the construction area will be protected from surface runoff and sedimentation. Residential complaints concerning water well degradation should be anticipated in conjunction with this alternative.

In addition, the introduction of highway pollutants to the groundwater regime would be prevented by the design and incorporation of proper stormwater management controls. These plans would use a series of grass-lined channels, sediment traps, and detention/sedimentation basins which would, to varying degrees, reduce flow velocities, encourage sedimentation of solids, and provide the opportunity for biological treatment of waters prior to releasing flows to the downstream natural drainage system. The base of the grass-lined channels would consist of compacted clay soils to create an impervious bottom and layered with topsoil for the grass lining. By creating this feature, the likelihood of premature co-mingling of untreated highway runoff and natural upslope surface and groundwater discharges would be reduced. These measures would also provide a means of encapsulating or retaining pollutants in the event of a large, accidental spill along the highway.

H. CULTURAL RESOURCES

The potential cultural resources within the project study area include both prehistoric and historic archaeological sites, as well as above-ground historic resources. The term "historic resource" refers to any aboveground building, structure, district, or object. This distinguishes it from historic archaeological sites, which are below the ground surface. Cultural resources that may be potentially impacted by the proposed project were identified

More detailed information on the historic and archaeological resources in the project study area is located in the Cultural Resources Technical Support Data. An index of the Technical Support Data is located in Section IX, Appendix A.

and evaluated in compliance with Section 106 of the National Historic Preservation Act and its regulations, Executive Order 11593, the Archaeological and Historic Preservation Act, Commonwealth of Pennsylvania State Acts, and the Pennsylvania History Code. Construction of CSVT build alternatives would have impacts to cultural resources within the project area. The No-Build Alternative would have no impacts to cultural resources.

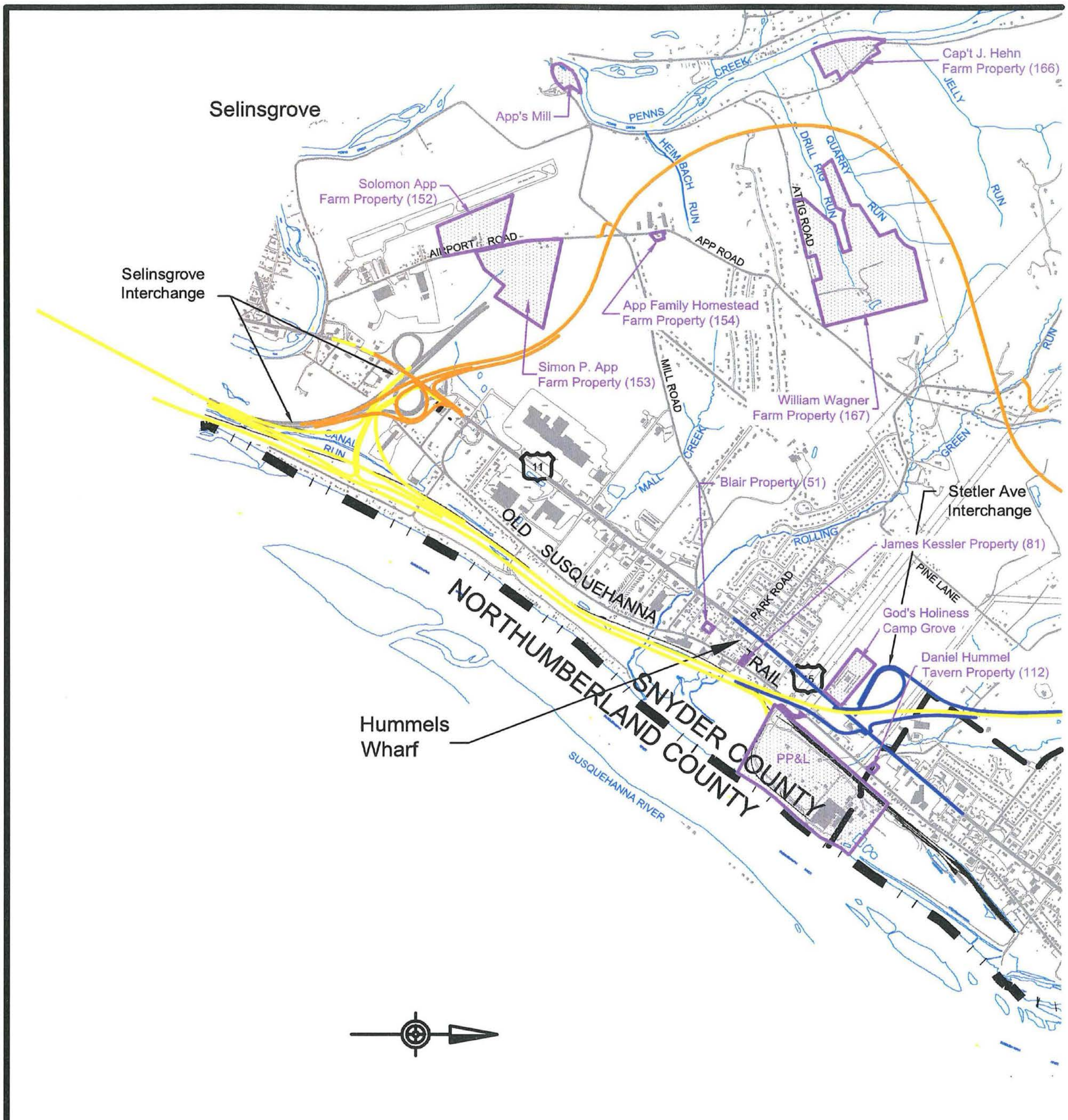
1. Historic Resources

Historic resource documentation for the project includes "A Historic Contexts and Summary of Historic Resources Windshield Survey Report", "Historic Resources Survey and Determination of Eligibility Report", and the "Determination of Effect Report" documents and the miscellaneous agency coordination materials contained in the project Technical Support Data.

The Eligibility Report evaluated the historic and architectural significance of 254 properties in the study corridors according to the criteria set forth in *National Register Bulletin 15*: "How to Apply the National Register Criteria for Evaluation" (National Park Service 1991a). Several village communities and rural areas were assessed for their potential to constitute historic districts and several transportation resources were also examined in the report. Four additional properties were surveyed following the completion of the Eligibility Report due to the enlargement of the study corridor. These properties were discussed in an addendum to the Eligibility Report. The recommendations outlined in the Eligibility Report and Addendum(s) concurred with by the State Historic Preservation Officer (SHPO) confirmed that 24 out of the 258 resources surveyed were either already deemed eligible for the National Register or met the eligibility criteria (see Correspondence in Appendix C). A list of previously determined eligible properties and properties deemed to be eligible on the basis of the current Historic Resources Survey is found in Table IV-H-1. The resources in Sections 1 and 2 are shown on Figures IV-H-1 and IV-H-2, respectively.

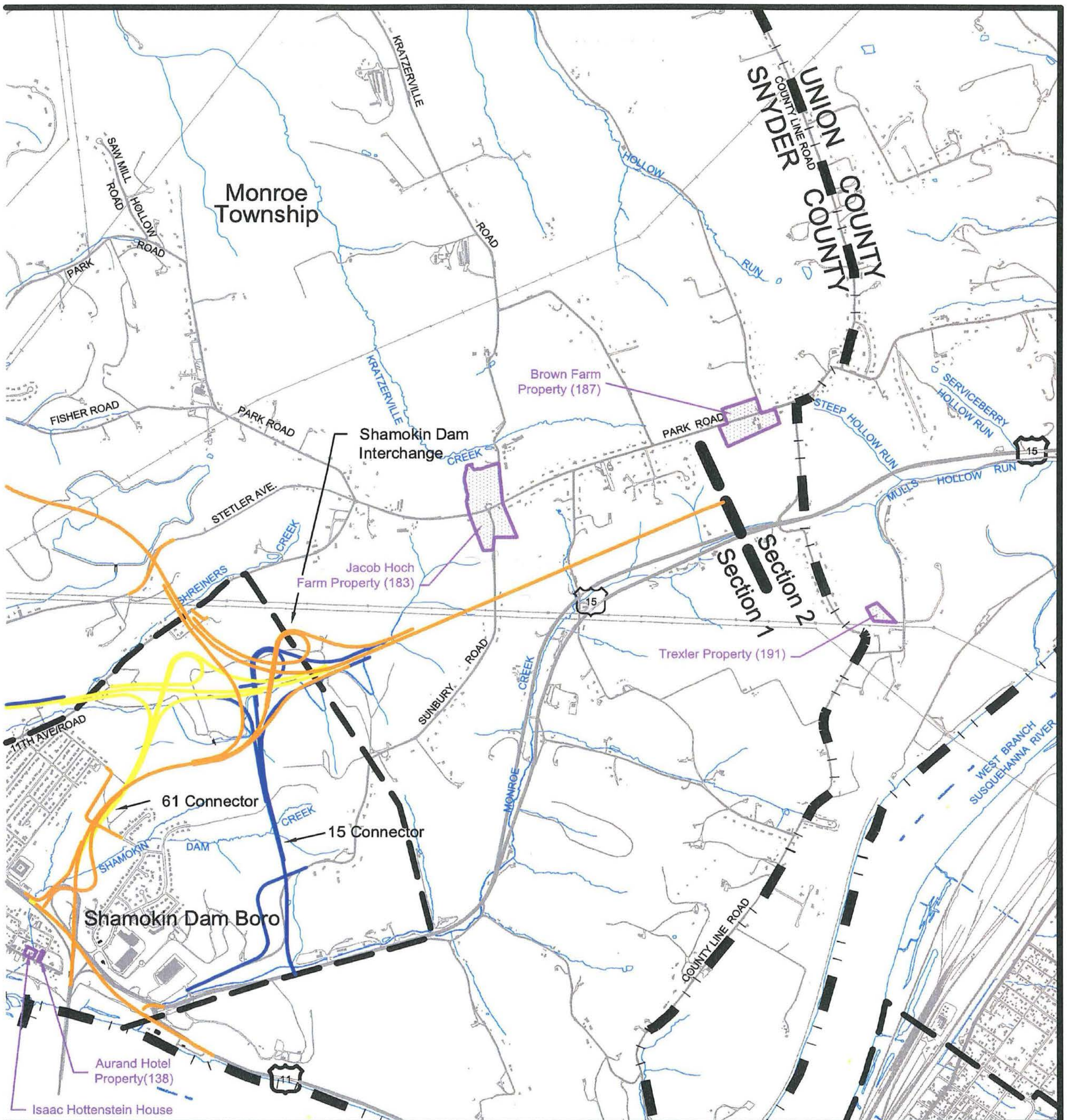
a. Impacts

None of the 24 properties in either Section 1 or Section 2 are directly impacted by any project alternative. In addition, a Determination of Effect Report for historic resources has been prepared and has undergone review by the State Historic Preservation Officer (SHPO). This report provides a detailed evaluation of the "effect" of the proposed alternatives on structures determined eligible for the National Register. Six of the alternatives evaluated in detail (OT2A, OT2B, RC1-West, RC1-East,



Legend

- DA Modified Avoidance Alternative
- Old Trail 2A Alternative (61 Connector)
- Old Trail 2B Alternative (Stetler Ave. Interchange/15 Connector)
- Eligible Historic Resources



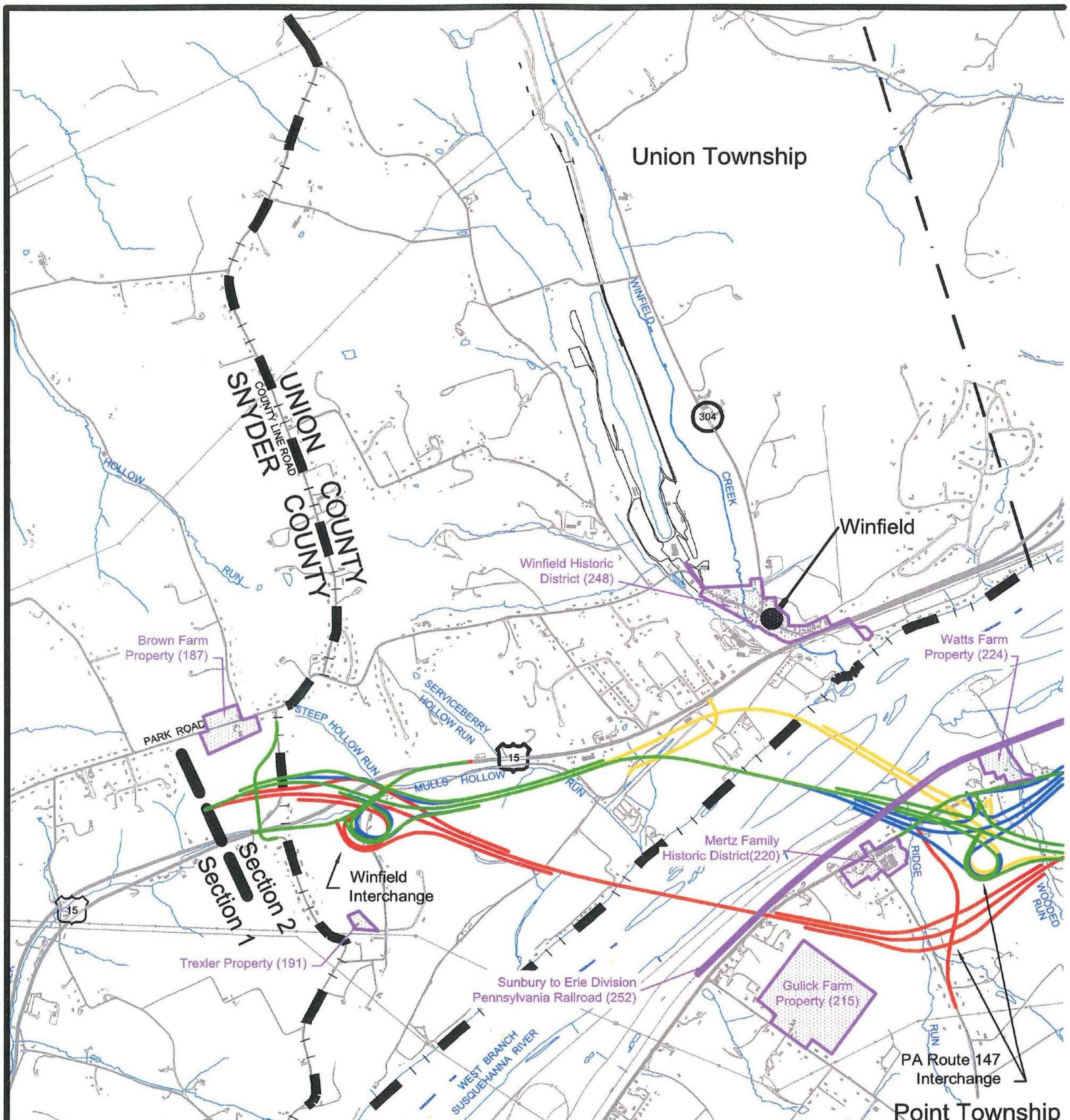
Central Susquehanna Valley Transportation Project

Figure IV-H-1

Section 1-Eligible Historic Property Locations

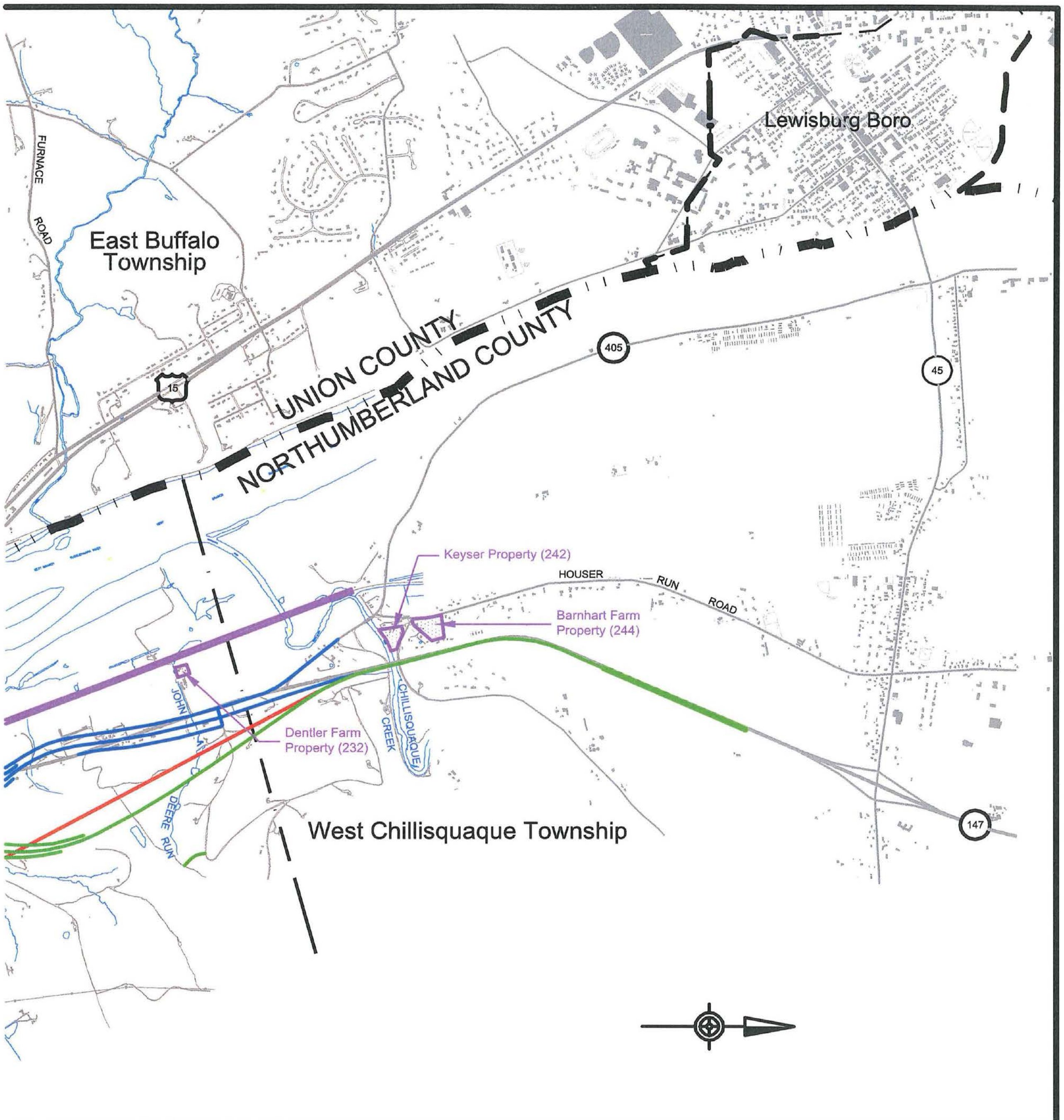
0 300 600 900 Scale in Meters

0 1250 2500 3750 Scale in Feet



Legend

- River Crossing 1 - East Alternative
- River Crossing 1 - West Alternative
- River Crossing 5 Alternative
- River Crossing 6 Alternative
- Eligible Historic Resources



Central Susquehanna Valley Transportation Project

Figure IV-H-2

Section 2-Eligible Historic Property Locations

0 300 600 900 Scale in Meters

0 1250 2500 3750 Scale in Feet

TABLE IV-H-1
NATIONAL REGISTER-ELIGIBLE HISTORIC RESOURCES

Number*	Name	Determination of Effect
51	Blair Property	No Historic Property Affected
81	James Kessler Property	No Historic Property Affected
*	Pennsylvania Power and Light — Sunbury Steam Electric Station	No Historic Property Affected
112	Daniel Hummel Tavern Property	No Historic Property Affected
*	God's Holiness Camp Grove	No Historic Property Affected
*	Isaac Hottenstein House	No Historic Property Affected
138	Aurand Hotel Property	No Historic Property Affected
152	Solomon App Farm Property	No Historic Property Affected
153	Simon P. App Farm Property	DAMA - No Adverse Effect — Potential visual effect mitigated by other modern intrusions. OT2A/2B - No Historic Property Affected
*	App's Mill	No Historic Property Affected
154	App Family Homestead Farm Property	No Historic Property Affected
166	Capt. J. Hehn Farm Property	No Historic Property Affected
167	William Wagner Farm Property	No Historic Property Affected
183	Jacob Hoch Farm Property	No Historic Property Affected
187	Brown Farm Property	No Historic Property Affected
191	Trexler Property	No Historic Property Affected
215	Gulick Farm Property	No Historic Property Affected
220	Mertz Family Historic District	No Historic Property Affected
224	Watts Farm Property	No Historic Property Affected
232	Dentler Farm Property	No Historic Property Affected
242	Keyser Property	No Historic Property Affected
244	Barnhart Farm Property	No Historic Property Affected
248	Winfield Historic District	No Historic Property Affected
252	Sunbury-to-Erie Division of the Pennsylvania Railroad	No Historic Property Affected

* Resources previously deemed eligible for the National Register were not assigned a resource number in the Determination of Eligibility Report.

RC5 and RC6) result in a finding of No Historic Property Affected for all 24 National Register eligible properties. One of the alternatives evaluated, the DAMA Alternative, results in a finding of No Adverse Effect to a National Register eligible property, the Simon P. App Farm Property (153) and a finding of No Historic Properties Affected for the remaining 23 eligible resources. The effect finding for each resource is presented in Table IV-H-1. None of the Section 1 Alternatives (DAMA, OT2A, OT2B) or Section 2 Alternatives (RC1-E, RC1-W, RC5, RC6) would have an adverse effect on any historic property. The SHPO has concurred with the findings of the Effect Report. Please refer to Appendix C.

Many comments were received on the Draft EIS in opposition to the DA Modified Avoidance (DAMA) Alternative. The opposition centers on the avoidance of the Simon P. App Farm Property, a property determined eligible for the National Register of Historic Places. As such, the property is afforded the protection of Section 4(f) of the U.S. Department of Transportation Act of 1966 (amended 1968). This Act states "The Secretary (of Transportation) may approve a transportation program or project requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge, or land of an historic site of national, state, or local significance (as determined by the federal, state, or local official having jurisdiction over the park, recreation area, refuge or site) only if:

- there is no prudent and feasible alternative to using that land; and
- the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife refuge, or historic site resulting from the use."

The Simon P. App farm was determined to be eligible for the National Register of Historic Places. As such, it is afforded the protection of Section 4(f).

Section 4(f) requires that a **feasible and prudent alternative that avoids the use** of Section 4(f) resources be selected as the Preferred Alternative, if such an avoidance alternative exists. Alternatives can be found to not be **feasible** only if they **cannot be constructed**. Alternatives can be found to not be **prudent** if they **do not meet the established project needs**, or if they would result in **unique problems** or environmental (natural and socioeconomic) impacts of an **extraordinary magnitude.**

The DAMA remains the Recommended Preferred Alternative in Section 1 because the information collected to date documents that it is a prudent and feasible alternative to the use of the Simon P. App farm. The impacts associated with the DAMA Alternative, as compared to the impacts of the DAM (Non-avoidance) Alternative do not rise to the level of "impacts of extraordinary magnitude". A comparison of these impacts is shown on Table III-14 on page III-103.

The avoidance of the App farm has created considerable controversy. Approximately 30% of the comment letters and testimony received on the CSVT project raised the App farm issue. As a result, PENNDOT coordinated further with FHWA, the agency responsible for making decisions on the eligibility and boundaries for historic properties. Due to the substantial controversy concerning the eligibility determination and boundaries of the App farm, FHWA elected to raise the questions of eligibility and boundaries with the Keeper of the National Register (Keeper), the individual delegated the authority by the U.S. Department of Interior, National Park Service to list properties and determine their eligibility for the National Register of Historic Places. The Keeper evaluated the information concerning the App Farm responded that the App farm and boundaries of the App farm met the eligibility requirements. This correspondence is included in Appendix C of the Final EIS.

Should conditions in the study area change at any point prior to the construction of the CSVT Project, the area of impact will be reevaluated. If conditions warrant, alignment modifications may be made to further reduce project impacts. This commitment is inclusive of the entire CSVT project area, including the avoidance of the Simon P. App Farm Property.

b. Mitigation

No mitigation measures are necessary since none of the project alternatives either directly impacts or has an Adverse Effect on any historic resource.

2. Archaeological Resources

A predictive model was created to assess the potential for prehistoric archaeological sites in the CSVT project area. A historic resource sensitivity map was developed to assess the potential for historic archaeological sites in the CSVT project area. Impacts to areas with potential for archaeological sites were calculated using GIS and represent land area within the Area of Potential Effect (APE) for each build alternative. The APE for archaeological resources is considered to be the area of potential ground disturbance related to construction activities for each proposed alternative, such as areas of cut-and-fill. GIS analysis of the predictive model and the historic resource sensitivity mapping showed that construction of any of the build alternatives would impact areas with high and very high potential for both prehistoric and historic archaeology. Additional research of Prehistoric Archaeological Site Survey (PASS) Files and records maintained by the Bureau of Historic Preservation (BHP) was conducted to identify impacts to known (previously recorded) prehistoric and historic archaeological sites. Potential impacts to prehistoric archaeology are discussed separately from those to historic archaeology.

a. Prehistoric Archaeological Resources

The development and verification of the predictive model used to assess the potential for prehistoric archaeological sites to be impacted by the CSVT Alternatives is discussed in detail in the Archaeological Predictive Model Development and Testing Report (November 1999).

The expected potential for resource impacts was augmented by the results of reconnaissance field investigations performed within the portions of the alternatives falling within the river floodplain. These investigations included preliminary geomorphological and archaeological studies utilizing backhoe trenches, sediment cores, expedient augering, walkover inspection, and limited archaeological unit excavation. These investigations focused upon the archaeological potential for deeply buried deposits within the floodplain environment.

The study area is characterized by the high-crested ridges and narrow valleys of the Appalachian Mountain Section of the Ridge and Valley physiographic province. The area is dominated by the wide, fertile floodplains and terraces of the rivers and major tributary streams. The uplands within the study area are typified by rolling valley floors and steep-sided, knife-edged mountains. The primary water resources within the project area are the Susquehanna River, the West Branch Susquehanna River, Penns Creek, Middle Creek, Chillisquaque Creek, Shamokin Creek, Buffalo Creek, and Warrior Run. Prehistoric occupation within the area generally focused within the lowlands adjoining these resources. Springs, ponds, and wetland/bogs, which are also found throughout the area, are of particular importance as upland water resources.

Of the 343 prehistoric archaeological sites recorded within the PASS files of the 7 quadrangle study area, 135 were identified as to a distinct cultural affiliation, ranging from Paleoindian to Historic-Contact, with the predominant occupation/use of the area apparently occurring within the Late/Terminal Archaic and Late Woodland periods. Recent finds within the region have underscored the high potential for buried deposits of Paleoindian/Early Archaic remains within the Susquehanna River floodplain. The occurrence of deeply buried early cultural remains and the high potential for village/camp sites within the study area are of considerable archaeological research significance and have a high cultural resource sensitivity within the model. According to the site data, the locations of sites are most commonly associated with lowland situations, such as floodplains, stream benches, islands, and terraces. Within the uplands, sites are predominantly associated with the more fertile, well-drained soils on benches, stream confluences, hill-tops, saddles, and stream terraces.

The site potential scores created by the CSVT Predictive Model have been divided into five classes: very low, low, moderate, high, and very high for use within the alternatives analysis. In general, areas of Very Low site potential would not require substantial archaeological testing because of steep slopes, standing water, or other surface disturbances. Archaeological sites may occur within the areas of low potential, but are expected to be sparse locations of limited extent and archaeological significance. Areas of moderate to very high potential have an increasing probability for intact, significant cultural remains (such as Archaic basecamps or Late Woodland villages/farmsteads).

The vicinity of the project area exhibits a very broad range of site potential, from very low within steep or isolated upland areas to very high within certain floodplain/terrace locations. The highest site potential areas are generally within close proximity to major water resources and/or certain attractive landforms, such as the well-drained soils within the river floodplain levees. The recorded site density within the immediate region is generally low within the uplands and very high within the lowland floodplain/terrace areas. There are several recorded archaeological sites within the APEs of the proposed project alternatives. Therefore, in addition to areas of high resource potential, project impacts to known or recorded prehistoric archaeological sites are expected. Based on the results of the predictive model and preliminary investigations, the potential for impacts to prehistoric archaeological sites within Section 1 and Section 2 of the project is discussed below for each of the proposed project alternatives.

i. Detailed Analysis for Section 1

The total surface area for each site potential class (very low to very high) is calculated for each alternative, and is presented in Table IV-H-2. As indicated in Table IV-H-2, the DAMA Alternative APE contains the least amount of high [6.0 hectares (14.8 acres)] and very high [0.3 hectare (0.8 acre)] prehistoric archaeological potential. In determining the alternative with the greatest impact, inspection of Table IV-H-2 indicates there are relatively minor differences between the OT2A and OT2B Alternative APEs regarding impacts to combined high and very high site potential locations [with surface areas ranging from 34.6 hectares (85.5 acres) to 33.3 hectares (82.2 acres), respectively]. The primary reason for the larger amount of high and very high potential area within the OT2A and OT2B Alternatives, in comparison to the DAMA Alternative, is the intersection of the OT2A and OT2B Alternatives with the river floodplain environment. Based on the preliminary archaeological and geomorphological investigations, there is a high potential for significant archaeological deposits within the deep alluvial deposits of this landform. The DAMA Alternative does not intersect significant areas exhibiting this potential.

The APE of the DAMA Alternative does intersect the mapped boundaries of two recorded archaeological sites, 36Sn3 and 36Sn43. In both cases, the portions of these sites effected by the DAMA Alternative appear to have been significantly disturbed by previous roadway construction and impacts to undisturbed portions of the site should be minimal.

The APE of the OT2A Alternative potentially impacts three previously recorded archaeological sites, 36Sn3, 36Sn43, and 36Sn199. Site 36Sn3 is a large Late Archaic and Late Woodland artifact

TABLE IV-H-2
SECTION 1 IMPACTS TO PREHISTORIC ARCHAEOLOGY IN HECTARES (ACRES)

Site Potential	None to Very Low	Low	Moderate	High	Very High
DAMA	87.39 (215.93)	66.42 (164.12)	62.83 (155.26)	6.04 (14.93)	0.33 (0.82)
OT2A	51.89 (128.23)	42.90 (106.00)	41.85 (103.44)	20.15 (49.79)	14.44 (35.69)
OT2B	70.97 (175.36)	48.92 (120.88)	37.27 (92.08)	19.14 (47.30)	14.11 (34.87)

scatter located within the high floodplain of the river. The APE of the OT2A Alternative intersects the eastern half of the site, which is apparently undisturbed. The true extent, nature, and function of the site are unknown. Site 36Sn43, a small lithic scatter of unknown cultural affiliation and purpose, is intersected by the APE of the OT2A Alternative. However, this area of the site has likely been significantly disturbed by previous road construction and significant impacts to the site are not expected. Site 36Sn199 is recorded as Terminal/Late Archaic, Late Woodland and Historic period artifacts eroding from the river bank. Because of this, the mapped boundaries of the site are probably underestimated and the site likely extends across/within the floodplain levee landform. This area is impacted by the APE of the OT2A Alternative, and it is expected that site remains related to 36Sn199 would be impacted.

The APE of the OT2B Alternative appears to impact sites 36Sn3 and 36Sn199 in a similar fashion to the impacts described for the OT2A Alternative. Within the area of these sites, the APEs of the two alternatives is approximately the same.

ii. Detailed Analysis for Section 2

The surface area for prehistoric archaeological site potential classes (very low to very high) is presented in Table IV-H-3 for each proposed alternative within Section 2. As indicated, the APEs of the RC1-E and RC1-W Alternatives contain the largest amounts of very high potential surface area for archaeological resources [3.8 hectares (9.3 acres) and 3.4 hectares (8.4 acres), respectively]. The RC6 Alternative has slightly less very high potential area, but overall the greatest combined high and very high potential surface area 8.8 hectares (21.8 acres). The alternative with the least impacts to areas of very high archaeological potential [1.1 hectares (2.8 acres)] is the RC5 Alternative, with a lower combined high and very high potential area of 4.5 hectares (11.0 acres). Based on the preliminary archaeological and geomorphological studies, the RC1-E and RC1-W Alternatives have a significantly greater potential for deeply buried archaeological remains with the river floodplain. The RC6

TABLE IV-H-3
SECTION 2 IMPACTS TO PREHISTORIC ARCHAEOLOGY IN HECTARES (ACRES)

Site Potential	None to Very Low	Low	Moderate	High	Very High
RC1-E	78.96 (195.13)	54.46 (134.58)	21.92 (54.18)	3.88 (9.59)	3.77 (9.31)
RC1-W	71.76 (177.31)	55.26 (136.56)	23.32 (57.62)	4.06 (10.03)	3.38 (8.35)
RC5	77.88 (192.44)	61.46 (151.88)	17.97 (44.40)	3.34 (8.25)	1.12 (2.77)
RC6	79.23 (195.77)	54.50 (134.67)	25.24 (62.36)	6.31 (15.59)	2.50 (6.19)

Alternative has somewhat less potential for such deposits. The RC5 Alternative has the least relative potential for deeply buried significant archaeological remains within the floodplain.

The RC1-E Alternative impacts three previously recorded sites, 36Nb22, 36Nb69, and 36Nb143. Site 36Nb22 is a large artifact scatter located on the river terrace. The impacts from RC1-E within this site are peripheral, along the northwestern edge of the mapped boundary. Site 36Nb69 is a Late Woodland site located on an island in the river. Although the previously recorded boundaries of the site do not extend within the RC1-E APE limits, recent investigations suggest that the site does exist within the alternative and would be impacted. Site 36Nb143 is reported to be a prehistoric and historic artifact scatter within a stream terrace location. This scatter may be related to site 36Nb35 located nearby on the edge of the floodplain. In addition, the RC1-E Alternative passes through a floodplain levee landform that has been reported to contain artifacts, but has not been recorded as a site within the site files.

The RC1-W Alternative also impacts the same three previously recorded sites as the RC1-E Alternative. However, the impact to Site 36Nb22 may be greater within RC1-W because the intersection is more central to the site area. As in Alternative RC1-E, the RC1-W Alternative impacts site 36Nb69 and 36Nb143, as well as a broad area of reported artifacts in the floodplain levee.

The RC5 Alternative impacts two previously recorded sites, 36Nb143 and 36Un16. Site 36Un16 is recorded as a Late/Terminal Archaic artifact scatter within the floodplain levee area of the river. The impacts to the site are along the northwest periphery of the mapped site boundaries.

The RC6 Alternative impacts three recorded sites, 36Nb69, 36Nb143, and 36Un15. Although the recorded boundaries of Site 36Nb69 do not extend within the RC6 Alternative APE, preliminary investigations indicate that the site does fall within the alternative and would be impacted. Site 36Un15 is recorded as an artifact scatter of Archaic through Woodland age (with a possible Paleoindian component) located within the river floodplain. The RC6 Alternative intersects the middle of the mapped site limits.

b. Historic Archaeological Resources

In order to assess the potential for encountering historical archaeological resources within the proposed alternatives, a historic archaeological sensitivity map was produced. The development of this map is discussed in detail in the Archaeological Technical Support Data File, which is available for review.

Basically, on the basis of the background research and historic context and historic resources survey, the relevant historic features in the project area were mapped and categorized according to three classes of historic archaeological resource potential ranging from 1 (low) to 3 (high). These three classes of potential are extremely relative in nature. The majority of the surface area within the project area has a very low historic archaeological potential because of the sparse nature of documented historic features across the rural landscape. Because of the possibility of undocumented historic features within these very low probability areas, there remains a potential for historic archaeological resources that would most likely be verified only by field investigations. Of significantly greater potential are those areas classed as exhibiting low to high potential for historic archaeological resources, as they are directly related to various documented historic features. These higher potential, feature related zones were ranked by relative potential from low to high depending upon the nature of the anticipated resources and associated documented features, the potential for preservation of the deposits and the relative research significance of the potential remains. In this way, there are several areas, primarily around historic settlements, which exhibit dense clusters of historic structures and features that create a broad expanse of moderate to high potential. Conversely, there are more limited and/or isolated areas associated with individual properties or features within which preserved archaeological remains would be of significance to the history of local settlement and development. The overlay of the ranked layers within the GIS resulted in a cumulative potential for encountering historic archaeological resources within each proposed alternative.

The combined overlay of the various historic archaeological sensitivity areas were used within the GIS to assess and compare the potential impacts of the APEs of the proposed project alternatives. Based on the results of the resource sensitivity mapping, the potential for impact to historic archaeological resources within Section 1 and Section 2 of the project is discussed below for each of the proposed project alternatives.

The historic settlement and development of the project study area has been strongly influenced by the terrain of the steep ridges and fertile rolling valleys of the Ridge and Valley landscape, with a primary focus around the Susquehanna River, its north and west branches and major tributaries. While the overall region has generally retained the agricultural character established in the earliest settlements of the late eighteenth and early nineteenth centuries, residential, industrial, and commercial development has historically clustered along the river edges, beginning with the earliest trading centers and "villages" to the "regional centers" and major transportation corridors/hubs of today. Historically, the social and economic development of the area has been shaped by its agricultural heritage and the opening of the regions resources by the construction of canals and railroads.

The historic Euro-American settlement within the project area generally begins in the early eighteenth century with the location of trading posts (stores) within the vicinity of several Native American villages/towns (most notably near present day Northumberland, Milton and Sunbury). During this time, the region was crossed by many historically documented trails and pathways, including the Catawissa Path, the Great Island Path, the Great Shamokin Path, the Penn's Creek Path, the Tuscarora Path, the Paxtang Path, the Tulpehocken Path, the Chillisquaque Path and the Great Warriors Path. These initial outposts were followed by a sparse scatter of early farmsteads and the construction of protective forts within the region (such as Fort Augusta at Sunbury). Permanent Euro-American settlement increased more significantly after the Revolutionary War, with the eventual formation of roadways(often constructed along the earlier trails and pathways), ferries, villages and commercial features, such as taverns, inns, stores, grist and saw mills, distilleries, tanneries and markets. There is very little documentation regarding the accurate locations of historic features established during this early settlement period. In rural areas, the possible locations of farmsteads associated with early settlers have been given moderate to high potentials. Within the areas of more urban/residential land use, the possible locations of early settlement may have less potential for preservation because of subsequent historic/modern development.

A major development in the study area occurred with the construction of the Susquehanna, North Branch and West Branch divisions of the Pennsylvania Main Line Canal between 1827 to 1835 (including the construction of the Shamokin Dam in 1829). The construction of the canals significantly influenced the development of market-based agriculture, coal, iron and lumber industries, and other small-scale commercial activities within the region. The historic mapping and documentation indicate that the effects of the canals are most significantly seen within the areas of villages and residences/ businesses along the canal path. In the project area, canal related features (generally documented residences and businesses) are most significant within the areas of Hummels Wharf, Shamokin Dam, and Chillisquaque. These features and the related areas along the canal have been assigned moderate to high potentials for historic archaeological remains. Although the canals themselves are historic features, it has been determined that the portions of the canals within the APEs of the proposed alternatives are not contributing elements to the canals eligibility for listing on the National Register of Historic Places. Because there is a potential for sealed deposits of historic artifacts (most likely deposited as trash into the canal either during the use of the canal or after abandonment of the canal), particularly within close proximity to the historic structures, the canals were given an overall moderate historic archaeological potential within the sensitivity mapping. The development of the historic iron works at Winfield, an area of generally high resource potential, was also facilitated by the transportation afforded by the canals.

Although the peak utilization of the canals was short-lived (approximately 1830 to 1860, with abandonment by 1901), the cultural and economic development stimulated by the advent of canal transport continued to flourish with the coming of the railroads to the region beginning in the 1850's. The railways often followed the pathways of the canals, further augmenting the growth of the established transportation centers. Residential and urban growth increased in the late nineteenth and early twentieth centuries in the communities along the western shore of the Susquehanna River (such as the residential communities of Hummels Wharf and Shamokin Dam), Winfield, Northumberland, and Chillisquaque. Historically mapped features within these areas, including the railway itself were generally given a moderate potential for related historic deposits. Individual properties with historic significance were given a higher potential. The eventual depletion of the mining and lumber resources within the region in the early twentieth century was somewhat coincident with the growing use of the automobile and the construction of major highway and roadway systems across the area. Early twentieth century roadways were given a low potential for historic archaeological remains.

The combined overlay of the various historic archaeological sensitivity areas were used within the GIS to assess and compare the potential impacts of the APEs of the proposed project alternatives. Based on the results of the resource sensitivity mapping, the potential for impact to historic archaeological resources within Section 1 and Section 2 of the project is discussed below for each of the proposed project alternatives.

i. Detailed Analysis for Section 1

The potential impacts upon historic archaeological resources are presented in Table IV-H-4, listed by potential surface area and by the number of moderate and high potential loci associated with historically mapped or extant structures/properties. As indicated in Table IV-H-4, there are only minor differences in the high potential surface areas of the three proposed alternatives within Section 1. However, the DAMA Alternative has significantly less area of moderate potential [11.8 hectares (29.2 acres)] for historic archaeological resources than the OT2A and OT2B Alternatives. The OT2B Alternative appears to have the greatest amount of impact to areas of both high [6.7 hectares (16.5 acres)] and combined high/moderate [36.5 hectares (90.1 acres)] potential. Impacts to potential historic archaeological loci, defined as discrete areas of potential located around mapped or extant features, are reflective of the nature of distribution of these features. The DAMA Alternative intersects more dispersed rural properties associated with existing or mapped structures, resulting in 6 moderate poten-

TABLE IV-H-4
SECTION 1 IMPACTS TO HISTORIC ARCHAEOLOGY IN HECTARES (ACRES)

Resource Potential	Low	Moderate	High	Potential Loci
DAMA	18.07 (44.64)	13.28 (32.83)	4.51 (11.14)	6 moderate 3 high (no sites)
OT2A	8.45 (20.88)	26.91 (66.49)	4.10 (10.10)	4 moderate 6 high (36Sn199)
OT2B	16.56 (40.92)	29.94 (73.98)	5.98 (14.78)	4 moderate 6 high (36Sn199)

tial loci and 3 high potential loci. The loci associated with the OT2A and OT2B Alternatives are generally similar, 4 moderate potential loci and 6 high potential loci, most being located within the vicinity of the Susquehanna Division canal, the Old Trail Road and other properties within the area of Hummels Wharf. The OT2A and OT2B Alternatives also have a higher potential for historic trash deposits within the abandoned canal, which intersects the APE of both alternatives for a length of approximately 1,800 m (5900 ft). In addition, the OT2A and OT2B Alternatives have a potential impact to the probable extent of an historic component within a previously recorded archaeological site, 36Sn199. This site is recorded as containing evidence of early historic remains (a "French Flint" gunflint) within the floodplain levee deposits, which will be equally impacted by both alternatives.

ii. Detailed Analysis for Section 2

A summary of the potential impacts to historic archaeological resources within the proposed alternatives in Section 2 of the project is presented in Table IV-H-5. As shown, the RC1-W Alternative has the greatest degree of impact to areas of high [1.2 hectares (3.0 ac)] and combined high/moderate [24.1 hectares (59.6 ac)] potential. The RC1-W Alternative also intersects the largest number of high potential loci (3). The least area of potential impact is found within the RC5 alternative, with a combined high/moderate resource potential area of 10.2 ha (25.2 ac). The RC5 alternative also intersects the lowest number of potential loci, with 7 moderate and 1 high potential location. The potential loci within the alternatives generally consist of historically mapped or existing farmsteads with a moderate potential for historic archaeological remains. All four of the proposed alternatives have a peripheral intersec-

TABLE IV-H-5
SECTION 2 IMPACTS TO HISTORIC ARCHAEOLOGY IN HECTARES (ACRES)

Resource Potential	Low	Moderate	High	Potential Loci
RC-1E	21.42 (52.92)	15.70 (38.80)	0.52 (1.28)	10 moderate 1 high (36Nb143)
RC1-W	22.90 (56.58)	22.91 (56.61)	1.22 (3.02)	11 moderate 3 high (36Nb143)
RC5	21.0 (51.89)	9.68 (23.91)	0.51 (1.26)	7 moderate 1 high (36Nb143)
RC6	25.32 (62.56)	16.79 (41.50)	0.56 (1.40)	10 moderate 1 high (36Nb143)

tion with a recorded archaeological site, 36Nb143, that is reported to have an historic component (resulting in a high potential for historic resources at this location).

c. Mitigation

i. Section 1

The Selected Alternative will be subjected to a complete Phase I archaeological survey for historic and prehistoric resources to identify sites eligible for the National Register. The results of the predictive model study will be used to guide the Phase I archaeological survey strategy.

Any potentially important prehistoric or historic archaeological sites which are discovered during the Phase I field testing of the preferred alignment within Section 1, will be subjected to Phase II testing. Criteria of Eligibility will be applied to determine whether the discovered site(s) are eligible for listing on the NR. If a site appears to be eligible for the NR, and its boundaries have been determined through the Phase II testing, it will be recommended that the design engineers attempt to avoid the site. If avoidance is not feasible, the Criteria of Effect and Adverse Effect will be applied, and a Phase III program to recover the information which renders the site significant will be developed. Consultation with the Federal Highway Administration (FHWA), the Pennsylvania State Historic Preservation Office (PA SHPO), and the Pennsylvania Department of Transportation (PENNDOT) will be undertaken to insure the satisfactory design and completion of archaeological studies through Data Recovery if necessary.

ii. Section 2

The mitigation of impacts by the Preferred Alternative to any known or discovered archaeological sites deemed eligible for listing in the NR would be developed in consultation with the PENNDOT, PA SHPO and FHWA. When possible, it is preferable to avoid or minimize the impacts to NR eligible resources by redesigning or shifting of the alignment. Should further mitigation measures be required, an appropriate Phase III data recovery plan would be developed and implemented.

A programmatic agreement between the FHWA and the Pennsylvania State Historic Preservation Officer (SHPO) has been prepared to guide the development of future archaeological investigations. This Programmatic Agreement is included in Appendix N. Future archaeological investigations will only be performed for the Preferred Alternative.

Additionally, coordination with Federally Recognized Tribes with ancestral ties to Pennsylvania is ongoing.

I. FLOODPLAINS

The National Flood Insurance Program (NFIP) was created by Congress through passage of the National Flood Insurance Act of 1968. The purpose of the NFIP is twofold: 1) to provide the general public the opportunity to obtain insurance coverage to cover flood damages to buildings and their contents; and 2) to reduce future flood damages by requiring the local regulation of new development in flood prone areas. The NFIP is administered by the Federal Insurance Administration (FIA), a division of the Federal Emergency Management Agency (FEMA).

> More detailed information on the floodplain analysis is located in the Floodplains Technical Support Data. An index of the Technical Support Data is located in Section IX, Appendix A.

The availability of flood insurance is contingent upon a community's participation in the NFIP. To participate, a community must enact regulations to control development activities within identified floodplain areas.

Flood prone areas are identified on maps provided to communities by the Federal Insurance Administration. Referred to as Special Flood Hazard Areas, these areas represent the extent of inundation which can be expected from a 100-year flood or base flood. A 100-year flood event has a one percent chance of being equaled or exceeded during any year. The identified floodplain is divided into two distinct zones or districts: a floodway; and a floodway fringe. The floodway is delineated for the purpose of keeping an area clear of obstruction to allow flood waters to freely discharge downstream. When floodways are identified, municipalities must include regulations which restrict any new development within floodways which would cause any increase in flood heights. There is no such restriction to development within the floodway fringe. Development may occur in the floodway fringe provided it complies with applicable elevation or flood proofing requirements.

The Federal Insurance Administration uses special criteria in delineating floodways. In an attempt to allow for some development in floodplains, the FIA decided to delineate floodways assuming that development may take place within floodway fringes to the extent that flood heights will be raised a maximum of one foot (the surcharge limit).

The local community with primary land use jurisdiction has the responsibility for enforcing the National Flood Insurance Program regulations through locally enacted ordinances. Within the CSVT study area, all of the municipalities in the study area are participating in the NFIP. The location and design of transportation facilities should consider floodplains in an effort to avoid or minimize encroachments into these sensitive areas.

It is the policy of the FHWA and PENNDOT to:

- prevent hazardous or incompatible use and development of floodplains;
- avoid longitudinal encroachments on floodplains where practicable;
- avoid significant encroachments on floodplains, where practicable;
- minimize adverse effects to base (100 year) floodplains;
- preserve the natural and beneficial floodplain values; and
- avoid support of incompatible floodplain development.

Compliance with the National Flood Insurance Program requirements involves using NFIP maps to determine if the proposed project encroaches on flood prone areas. If the proposed project lies within an identified floodplain area, the next step is to determine if the project is within the floodway or the floodway fringe.

The location of the proposed encroachment in the floodplain has a significant effect on the requirements for project development. Development outside the floodway fringe area is generally not covered by the NFIP floodplain regulations. Within the floodway fringe, encroachments are allowed provided certain criteria are met. Development within the regulatory floodway is only allowed if there is no resulting increase in flood elevations.

Thus, for communities where a regulatory floodway is defined, such as the communities in the CSVT study area, the build alternatives should be designed to exclude any encroachment on the floodway. The build alternatives, which essentially must avoid or span the floodway, must also limit the rise of the base flood (100-year flood profile) to one foot.

FEMA's flood maps for the municipalities in the study area were reviewed and the regulatory floodway and floodway fringe areas were located. FEMA mapping was collected for the following municipalities: Monroe Township, Snyder County; Shamokin Dam Borough, Snyder County; Upper Augusta Township, Northumberland County; City of Sunbury, Northumberland County; Union Township, Union County; East Buffalo Township, Union County; Northumberland Borough, Northumberland County; Point Township, Northumberland County; and West Chillisquaque Township, Northumberland County.

Regulatory floodways and extensive 100-year floodplain boundaries are identified for portions of the main stem Susquehanna River, the West Branch Susquehanna River, North Branch Susquehanna River, Penns Creek, and Chillisquaque Creek. These 100-year floodplain boundaries are shown on Figure IV-I-1. The regulatory floodways and 100-year floodplains are also shown in detail in Volume 2 (Map Volume) of the Draft EIS.

The alignments of the various alternatives studied in detail were superimposed on the floodplain mapping to determine the potential for encroachments on the regulatory floodway and the 100-year floodplains. These encroachment areas are also shown on Figure IV-I-1. The physical properties of these encroachments are discussed in the following analysis.

An analysis was also performed to identify if these encroachments on the 100-year floodplain are significant or non-significant. In accordance with 23 CFR 650, Subpart A (Location and Hydraulic Design of Encroachments on Floodplains), significant floodplain encroachments would involve one or more of the following construction or flood-related impacts.

- Significant potential for interruption or termination of a transportation facility which is needed for emergency vehicles or provides a community's only evacuation route
- Significant risk
- Significant adverse effect on natural and beneficial floodplain values

A risk assessment will be made to determine if there is the potential for property loss and risk to life during the service life of the highway attributable to flooding as a result of the encroachment. In addition to describing the location and extent of a floodplain encroachment and defining if the encroachment is "significant", the floodplain analysis also assesses the potential for incompatible floodplain development as a result of the proposed alternatives.

1. Impacts

The various alternatives studied in detail encroach on the floodplains in two different ways. Some alternatives require "transverse" crossings of watercourses (bridges, culverts) and encroach on the floodplain of the watercourse. Other alternatives involve "longitudinal" encroachments on floodplains. Longitudinal encroachments involve an alternative that runs parallel to a watercourse, encroaching on the boundaries of the 100-year floodplain, but not actually crossing the watercourse.

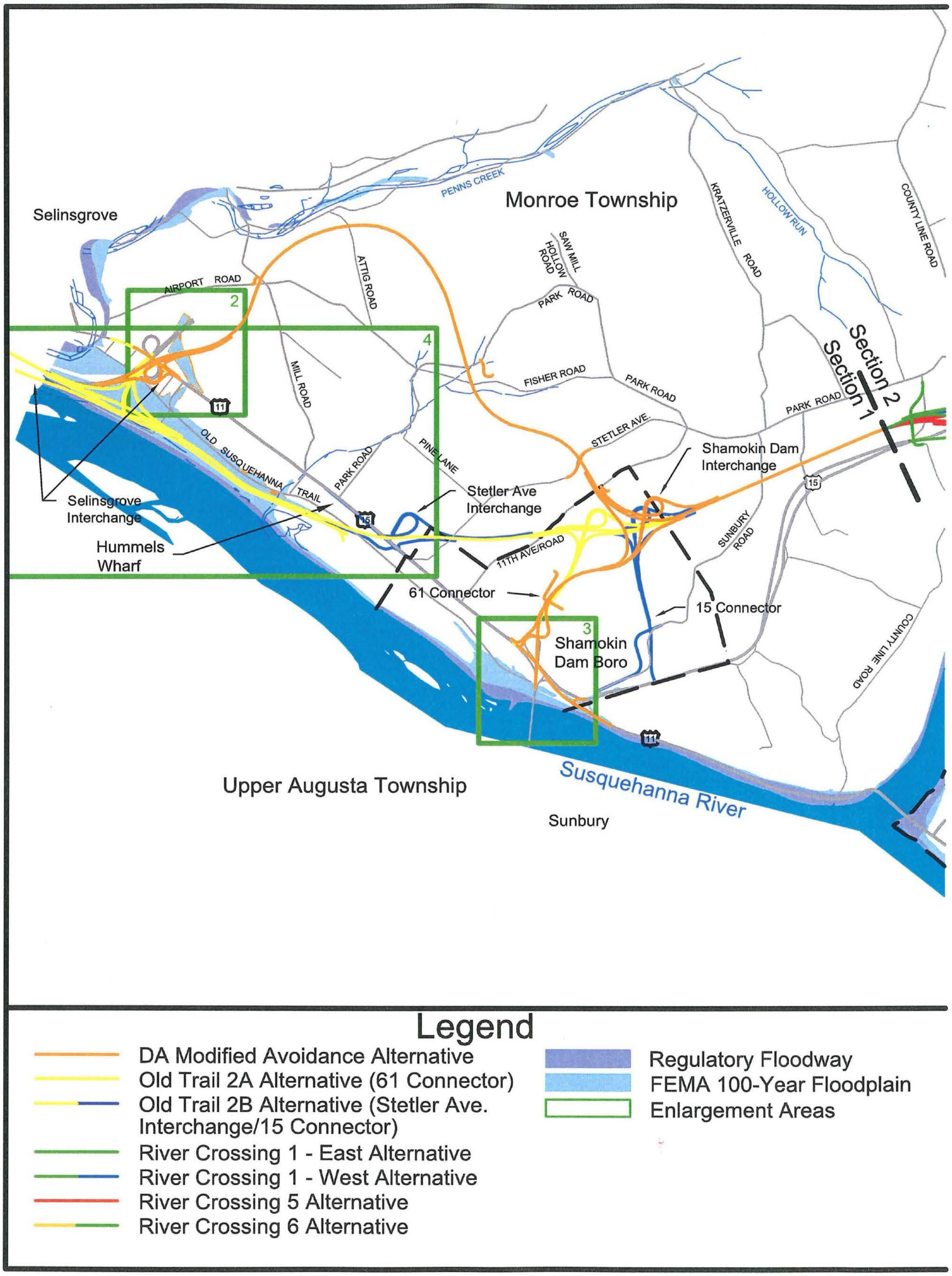
The No-Build Alternative would have no encroachment on regulatory floodways or the 100-year floodplain. The No-Build Alternative would create no additional flooding risks, would have no impact on natural and beneficial floodplain values, and would not promote incompatible floodplain development.

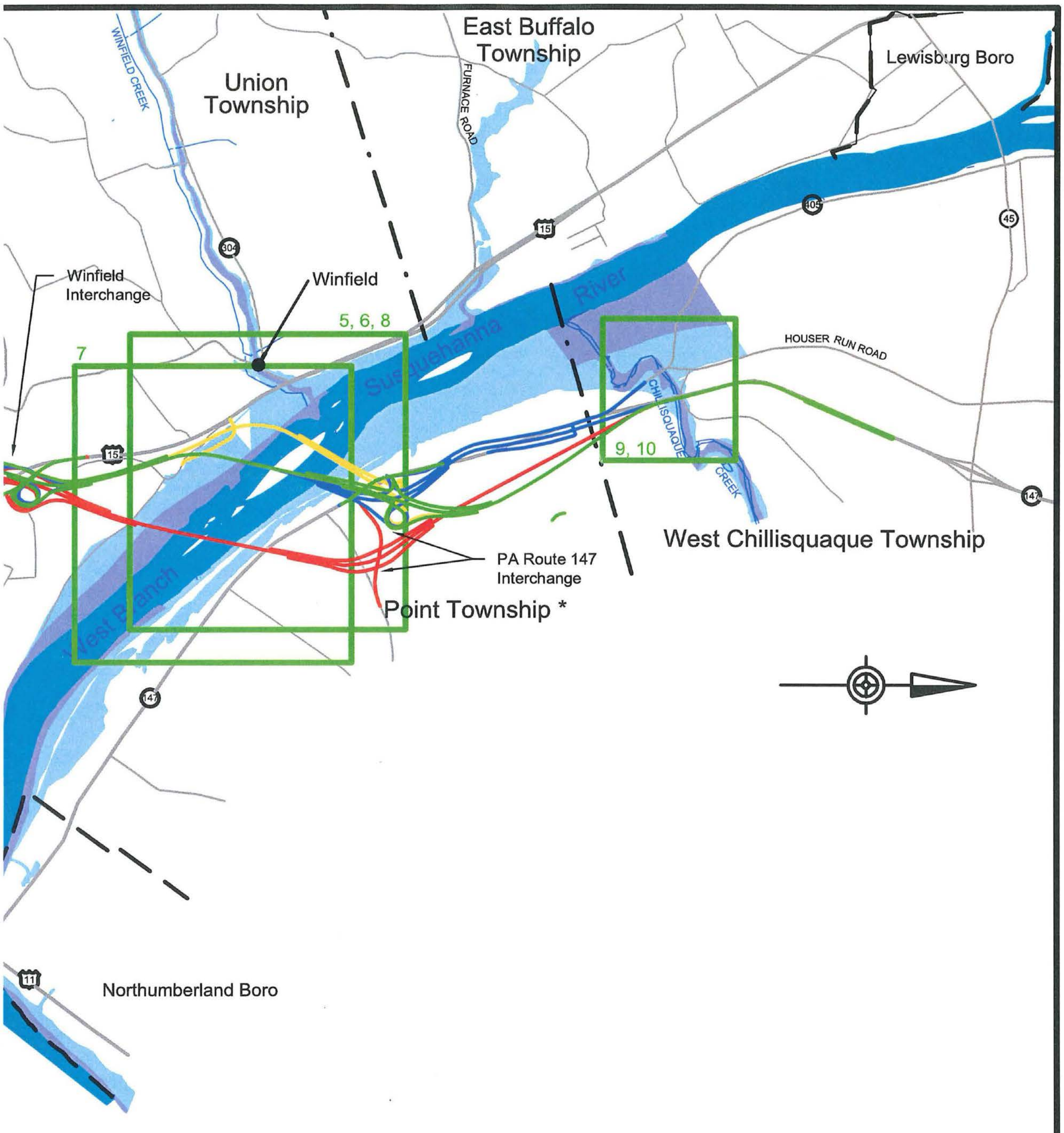
a. Section 1

i. DAMA

The construction of the DAMA Alternative would encroach on the 100-year floodplain of the main stem Susquehanna River in two locations. The DAMA encroaches on the 100-year floodplain of the main stem of the Susquehanna River just north of its southern terminus, the interchange between DAMA and existing US Routes 11/15. The floodplain width at this location is approximately 1,300 meters (4,265 feet). The encroachment includes the placement of a minimal amount of fill in the floodplain (see Figure IV-I-2). There is no encroachment on the regulatory floodway of the Susquehanna River at this location.

Based on the minimal amount of floodplain impact, a negligible rise in the existing water surface is anticipated at this location. Therefore, there is no potential for property loss or risk to life as a result of flooding at this location. No impacts on natural and beneficial floodplain values are anticipated due to increases in backwater flooding. There is no potential for the interruption or termination of a transpor-


Selinsgrove
Monroe Township
PENNS CREEK
KRATZERVILLE ROAD
HOLLOW RUN
COUNTY LINE ROAD
SAW MILL HOLLOW ROAD
AIRPORT ROAD
ATTIG ROAD
PARK ROAD
2
4
MILL ROAD
FISHER ROAD
PARK ROAD
Section 2
Section 1
PARK ROAD
STETLER AVE.
PINE LANE
OLD SUSQUEHANNA TRAIL
PARK ROAD
Shamokin Dam Interchange
Stetler Ave Interchange
Selinsgrove Interchange
Hummels Wharf
11TH AVE/ROAD
SUNBURY ROAD
61 Connector
15 Connector
3
Shamokin Dam Boro
COUNTY LINE ROAD
Upper Augusta Township
Susquehanna River
Sunbury
Legend
DA Modified Avoidance Alternative
Old Trail 2A Alternative (61 Connector)
Old Trail 2B Alternative (Stetler Ave. Interchange/15 Connector)
River Crossing 1 - East Alternative
River Crossing 1 - West Alternative
River Crossing 5 Alternative
River Crossing 6 Alternative
Regulatory Floodway
FEMA 100-Year Floodplain
Enlargement Areas



NOTE:
* The Flood Hazard Boundary Map/ Flood Insurance Rate Map for Point Township does not include mapping of a Regulatory Floodway.

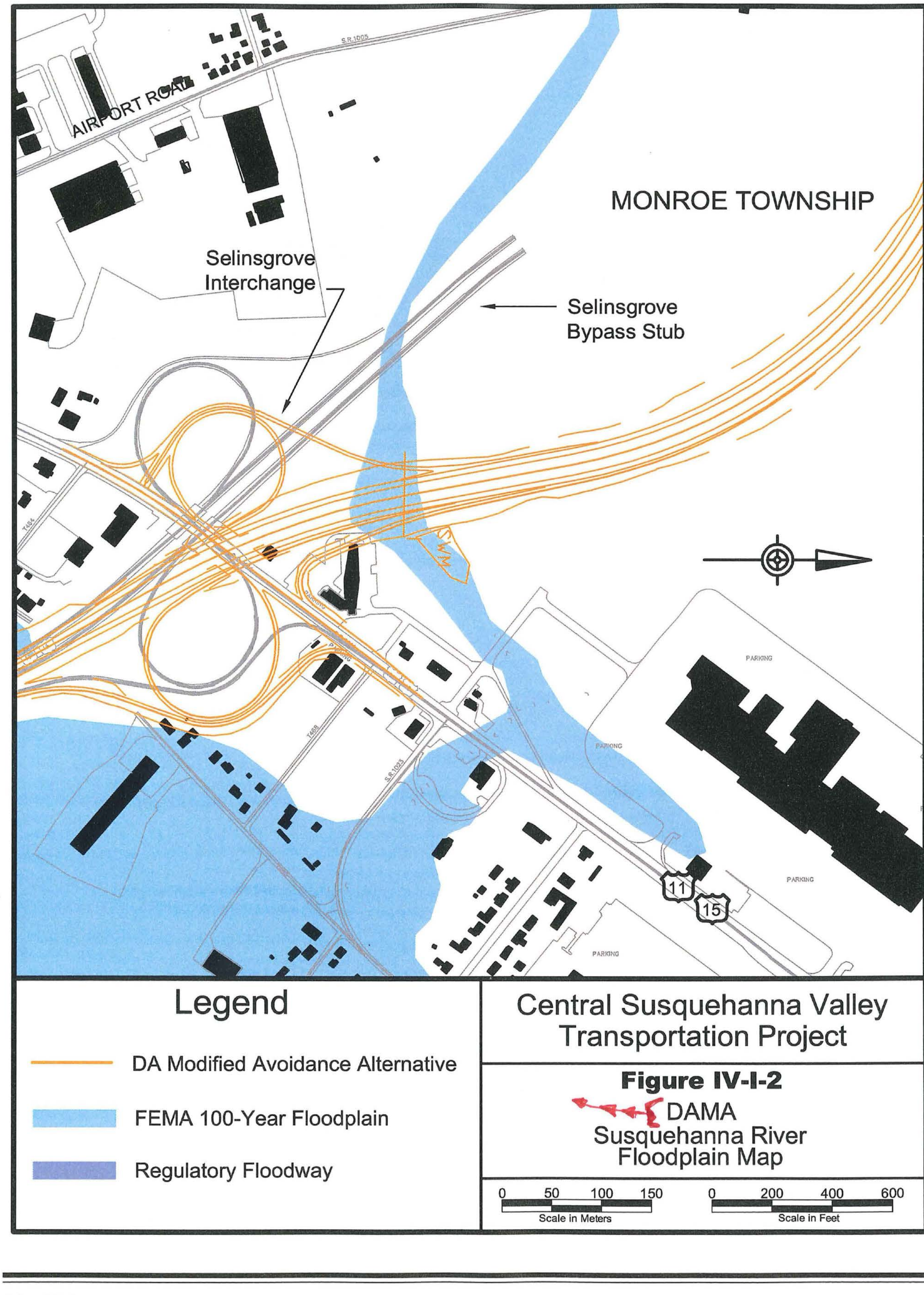
Central Susquehanna Valley Transportation Project

Figure IV-I-1

FEMA Floodplain Mapping

0 500 1000 1500 Scale in Meters

0 2000 4000 6000 Scale in Feet



Central Susquehanna Valley Transportation Project

Figure IV-I-2

DAMA
Susquehanna River
Floodplain Map

tation facility that is needed for emergency vehicles or provides the community's only evacuation route. Therefore, this encroachment is not a significant encroachment on the 100-year floodplain. Development inconsistent with local floodplain regulations is not anticipated at this location due to the construction of DAMA.

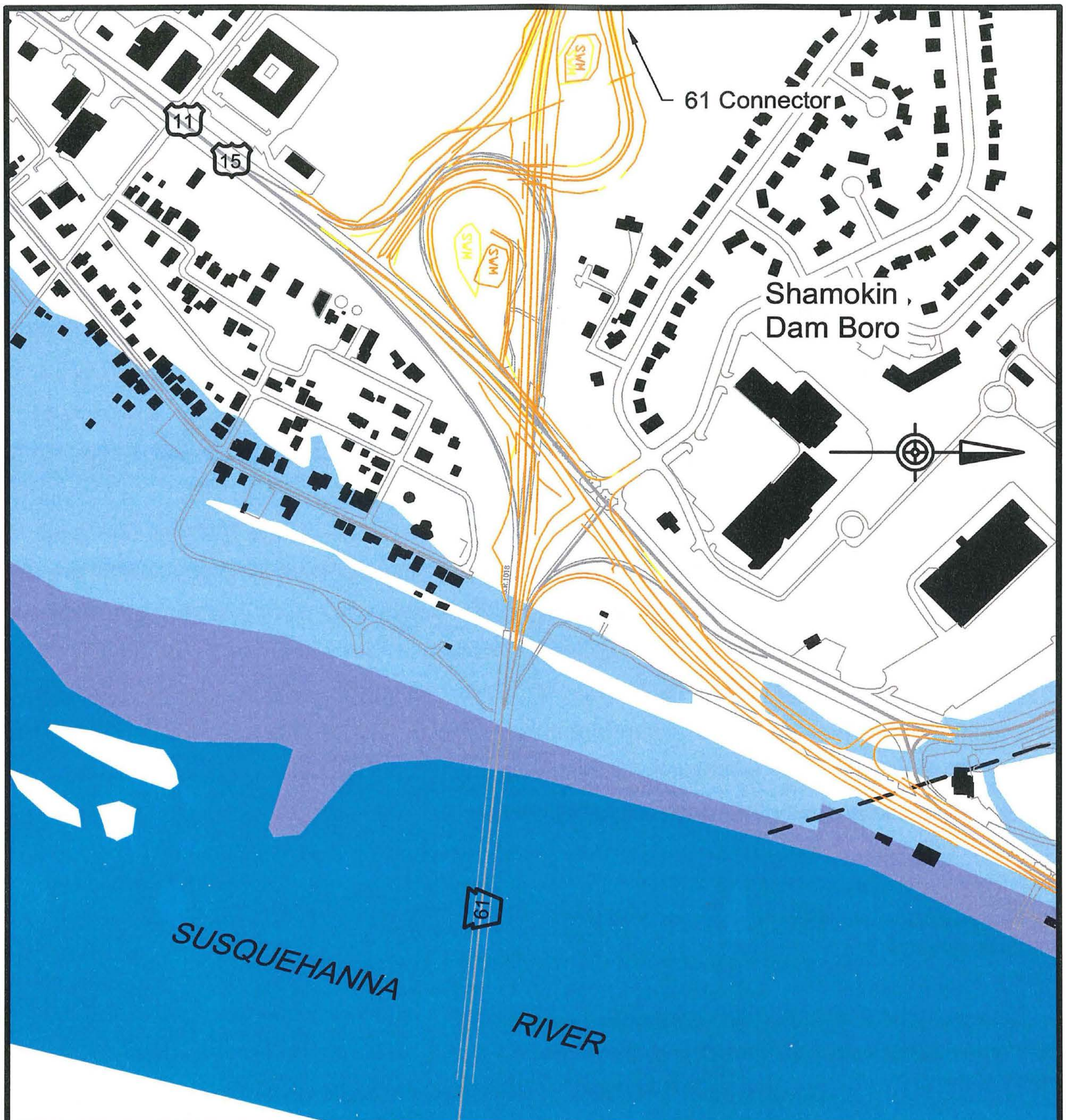
The DAMA also encroaches on the 100-year floodplain of the Susquehanna River at a second location, at the connection of the 61 Connector to the Veterans Memorial Bridge (see Figure IV-I-3). There is no encroachment on the regulatory floodway of the Susquehanna River at this location.

The interchange area for the 61 Connector to the Veterans Memorial Bridge is located outside of the 100-year floodplain, thus causing no impact to the 100-year water surface elevation. However, proceeding north on Route 11, beyond the location where Route 15 and Route 11 split, there is a small encroachment into the 100-year floodplain at the point where Route 11 rejoins the existing Route 11. Since the existing Route 11 is within the 100-year floodplain, this minor encroachment is unavoidable and therefore will have no cumulative impact at the bridge crossings.

Because the interchange area for the 61 Connector is outside of the 100-year floodplain, no rise in the base flood flows are anticipated at this location. Therefore, there is no potential for property loss or risk to life as a result of flooding at this location. No impacts on natural and beneficial floodplain values are anticipated due to increases in backwater flooding. There is no potential for the interruption or termination of a transportation facility that is needed for emergency vehicles or provides the community's only evacuation route. Therefore, this encroachment is not a significant encroachment on the 100-year floodplain. Development inconsistent with local floodplain regulations is not anticipated at this location due to the construction of DAMA.

ii. OT2A and OT2B

The intent of the Old Trail Alternatives is to develop a highway option that runs east of existing US Routes 11/15, between the existing highway and the Susquehanna River. In an effort to minimize the acquisition of homes in this area, PENNDOT has located the alternative just west of the river. The location of the Old Trail Alternatives in this area, however, necessitates a longitudinal encroachment on the 100-year floodplain of the Susquehanna River. The encroachment begins at the southern terminus of the facility, at the interchange between the new facility and existing US Routes 11/15 just north of Selinsgrove, and continues north for approximately 2,600 meters (8,530 feet) to an area near the existing power plant where the alignment begins to move to the west on its way to cross US Routes 11/15 (see Figure IV-I-4). This encroachment, which causes an increase in backwater (discussion follows), consists of the placement of 611,500 cubic meters (800,000 cubic yards covering an area of



Legend

- DA Modified Avoidance Alternative
- Old Trail 2A Alternative (61 Connector)
- FEMA 100-Year Floodplain
- Regulatory Floodway

Central Susquehanna Valley Transportation Project

Figure IV-I-3

DAMA and OT2A Susquehanna River Floodplain Map

0 50 100 150
Scale in Meters

0 200 400 600
Scale in Feet

approximately 58 acres with a fill that ranges from 4 meters [13 feet] to 12.5 meters [41 feet]) of fill material in the 100-year floodplain of the Susquehanna River.

As shown on Figure IV-I-4, the OT2A and OT2B Alternatives do not encroach on the regulatory floodway of the Susquehanna River.

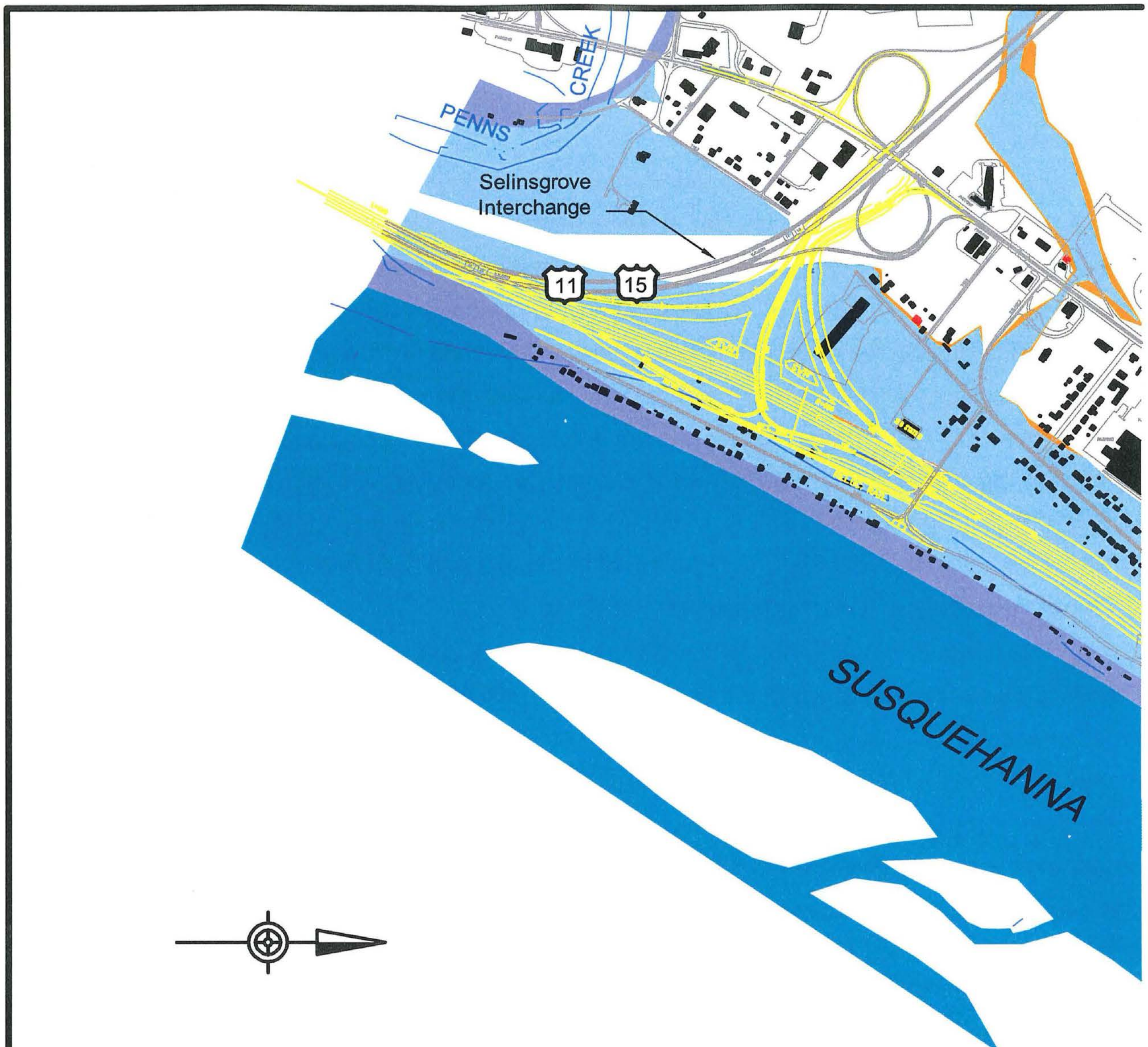
A hydraulic analysis was completed to determine what impact the proposed Old Trail Alternatives have on the 100-year floodwater surface elevation profile for the Susquehanna River in this location as a result of this encroachment. This analysis was completed by generating a baseline HEC-RAS model (US Army Corps of Engineers River Analysis System software) for the reach of the Susquehanna River in the project area for the existing condition and then modifying the model to reflect the proposed geometry for the Old Trail Alternatives. With the geometry of the proposed alternatives entered, the HEC-RAS program computed the resulting water surface elevations for a 100-year storm event with the proposed OT Alternatives in place. This model was created for an approximate 8.8-kilometer (5.5-mile) section of the river, with the downstream limit at the southern tip of Monroe Township and the upstream limit at the confluence of the main stem Susquehanna River and West Branch Susquehanna River, just north of Sunbury.

The result of this analysis is that the placement of fill in the 100-year floodplain of the river causes a rise in the water surface elevation of the 100-year flood event in the area where the encroachment occurs. The maximum rise in water surface elevation is 0.08 meter (0.27 feet or approximately 3¼ inches). This maximum rise in water surface elevation occurs near the southern end of the power plant along the river. This impact decreases upstream gradually until it dissipates at the confluence of the West and Main Branches of the Susquehanna River. Therefore, OT2A and OT2B will have no cumulative impact further upstream at the proposed river crossing location. The impact downstream of this encroachment is negligible.

This slight vertical rise in the 100-year flood water surface elevation changes the horizontal extent of the 100-year floodplain. The proposed modification of the 100-year floodplain caused by the encroachment of the Old Trail Alternatives on the floodplain is also shown on Figure IV-I-4.

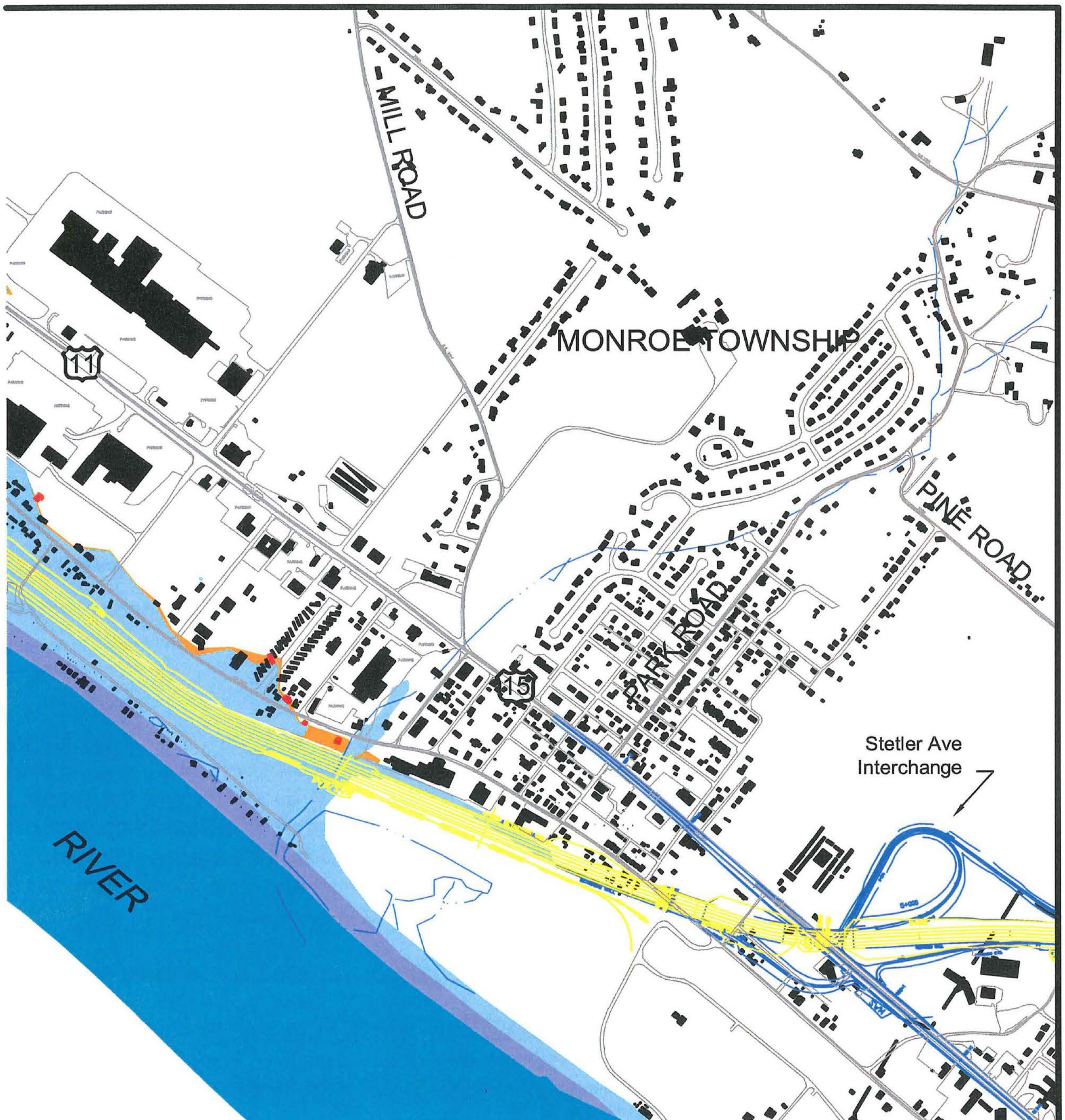
Table IV-I-1 shows the structures that are located in the existing 100-year floodplain as compared to the proposed condition. As shown in this table, five (5) residences, one (1) residential accessory structure, and one (1) pump station (non-operational) are the net additional impacts of the post-construction 100-year floodplain. The structures that are not currently in the existing 100-year floodplain, but would be in the proposed 100-year floodplain are shown in red on Figure IV-I-4.

As noted earlier in this section, FHWA and PENNDOT's policy is to avoid longitudinal encroachments, where practicable. However, it is virtually impossible to place a highway alignment between existing US Routes 11/15 and the Susquehanna River without a longitudinal encroachment on the floodplain. As a result, the project team has tried to minimize impacts to the floodplain while also minimizing residential and business acquisitions.



Legend

- Old Trail 2A Alternative (61 Connector)
- Old Trail 2B Alternative (Stetler Ave. Interchange/15 Connector)
- FEMA 100-Year Floodplain
- Regulatory Floodway
- Proposed 100 Year Floodplain
- Structures added to 100 Year Floodplain as a result of Proposed Old Trail Alternatives



Central Susquehanna Valley Transportation Project

Figure IV-I-4

OT2A and OT2B Susquehanna River Floodplain Map

0 100 200 300 Scale in Meters

0 400 800 1200 Scale in Feet

TABLE IV-I-1
CENTRAL SUSQUEHANNA VALLEY TRANSPORTATION PROJECT
100-YEAR FLOODPLAIN IMPACT SUMMARY
OLD TRAIL ALTERNATIVES

Structures in 100-Year Floodplain	Existing Condition	Post-Construction Condition	Difference
Residential	124	129	+5
Residential Accessory	61	62	+1
Commercial	5	5	0
Industrial	3	4	+1
Institutional	2	2	0
Total	195	202	

Preliminary hydraulic evaluations indicate that the proposed construction of the OT2A and OT2B Alternatives would not constitute a significant encroachment on the 100-year floodplain due to the following.

- The encroachment poses no new risk to life or property loss. Several homes and businesses are already within the 100-year floodplain of the Susquehanna River at this location. The addition of 5 homes into this 100-year floodplain and the proposed maximum vertical rise of 3¼ inches does not pose substantial (defined as potential for major property loss and/or risk to life) new risk. In addition, the increase in the resultant velocity at this encroachment location is not substantial and is not likely to create new or additional problems.

- The Old Trail Alternatives would be designed and constructed at an elevation that would put it above the 100-year flood elevation. Therefore, the new facility should be protected from flooding. As a result, there is little or no potential for interruption or termination of a transportation facility that is needed for emergency vehicles. In addition, the Old Trail Alternatives do not affect the community's vehicular evacuation route(s) in the event of an emergency.

- The Old Trail Alternatives would require the filling in of approximately 12 acres of wetlands in the floodplain of the Susquehanna River and the transformation of riverine forestlands to highway right-of-way. As discussed in Section IV.F.2 - Wetland Impacts, the impacted wetlands provide both biotic and abiotic functions. The position of these wetlands on the floodplain provides the opportunity for these wetlands to perform certain functions, such as flood flow alteration, sediment retention, nutrient removal, and provision of wildlife and aquatic habitat. However, these wetlands are not highly effective at performing these functions. This is due to the fact that the hydrologic regime of these wetlands does not involve a flow-through flooding regime. The hydrology of the canal wetlands is associated with the water table of the river. Field observations have correlated hydrology in the canal wetlands with the river stage. During the majority of the year when river elevations are at normal flow levels, the canal wetlands dry out. During the winter and spring when the river elevation rises, the canal wetlands fill with water. This hydrology is not the result of river water overtopping the banks and flooding the canal; the hydrologic input appears to result from the seasonal rise in groundwater elevation.

This lack of flow-through water characteristic limits the wetland's effectiveness at floodflow alternation and associated functions like sediment retention and nutrient removal.

In addition to the seasonal hydrology, the canal wetlands also contain low vegetative species diversity, mostly Silver Maple and Poison Ivy. The lack of year-round water and species diversity limits the effectiveness of these wetlands at providing wildlife and aquatic habitat.

The size of the canal wetlands also limits their effectiveness; the relatively small size coupled with the limited interaction with the river results in limited effectiveness for numerous functions, including flood flow alteration, nutrient removal, sediment retention, and wildlife habitat.

In summary, the canal wetlands do provide biotic and abiotic functions; however, their effectiveness at performing these functions is not high or significant.

As noted, the FHWA and PENNDOT have attempted to minimize the impacts of the Old Trail Alternatives on the floodplain and the wetlands in the floodplain by reducing the footprint as much as possible in this location. The intent would be to mitigate these wetland impacts in the same general location, if possible.

In conclusion, the Old Trail Alternatives would not constitute a significant floodplain encroachment because they do not result in significant adverse effects on natural and beneficial floodplain values. The wetlands in the floodplain certainly provide certain functions, but their effectiveness at performing the specific functions is limited.

- The encroachment does not support incompatible floodplain development. The proposed facility involves the construction of a limited access highway; therefore, construction will not occur within the right-of-way, and no access will be provided to areas adjacent to the Old Trail Alternatives with the exception of areas surrounding the proposed interchanges.

The OT2A Alternative also encroaches on the 100-year floodplain of the Susquehanna River at a second location, at the connection of the 61 Connector to the existing Veterans Memorial Bridge (see Figure IV-I-3). There is no encroachment on the regulatory floodway of the Susquehanna River at this location.

The interchange area for the 61 Connector to the Veterans Memorial Bridge is located outside of the 100-year floodplain, thus causing no impact to the 100-year water surface elevation. However, proceeding north on Route 11, beyond the location where Route 15 and Route 11 split, there is a small encroachment into the 100-year floodplain at the point where Route 11 rejoins the existing Route 11. Since the existing Route 11 is within the 100-year floodplain, this minor encroachment is unavoidable.

Based on the minimal amount of floodplain impacts, a negligible rise in the existing water surface is anticipated at this location. Therefore, there is no potential for property loss or risk to life as a result of flooding at this location. No impacts on natural and beneficial floodplain values are anticipated due to increases in backwater flooding. There is no potential for the interruption or termination of a transportation facility that is needed for emergency vehicles or provides the community's only evacuation route. Therefore, this encroachment is not a significant encroachment on the 100-year floodplain.

b. Section 2

All four Section 2 Alternatives, RC1-E, RC1-W, RC5, and RC6 involve a new crossing of the West Branch Susquehanna River. Each of these crossings encroaches on the regulatory floodway and 100-year floodplain of the West Branch Susquehanna River (see Figure IV-I-1).

This section of the West Branch Susquehanna River was modeled using HEC-RAS to determine the existing 100-year flood water surface profile. The HEC-RAS model was based upon the existing HEC-2 model used for the FEMA Flood Insurance Study (FIS). The model was then modified to include the preliminary design of each of the four river crossings in place, to determine the impact that each river crossing would have on the post-construction water surface elevation profile. For the purpose of floodplain impact evaluation, each river crossing was assumed to be a conventional steel, I-beam, multi-girder bridge with circular piers spaced at 76.2 meters (250 feet) along the roadway centerline. However, the precise number, placement, geometry, and nature of these piers will be determined during the final design process.

The preliminary design for each river crossing consists of two identical, parallel bridges (one for northbound traffic, one for southbound traffic) with each deck measuring 18.28 meters (60 feet) across and a separation of 12.92 meters (42.4 feet) between the two decks. The size and configuration of the piers for each crossing are the same. The piers are circular with a diameter of 11 meters (36 feet). The piers for the northbound and southbound bridges are aligned in such a manner so that they are lined up along the direction of river flow. Therefore, in relationship to the flow of water in the river, directly south of each southbound pier is a northbound pier of identical dimension. Each pier is centered under the bridge deck.

Due to the relatively small separation between the piers under the bridges (27.1 m [88.9 ft] for RC1-E, RC1-W and RC5 and 22.2 m [72.8 ft] for RC6) the calculations are based on the assumption that the river flow cannot fully expand between the piers. Therefore, each river crossing was modeled as if the structures are a single bridge.

Since the bridges will be designed to have adequate freeboard, the piers will be the only restriction to flow.

i. RC1-E and RC1-W

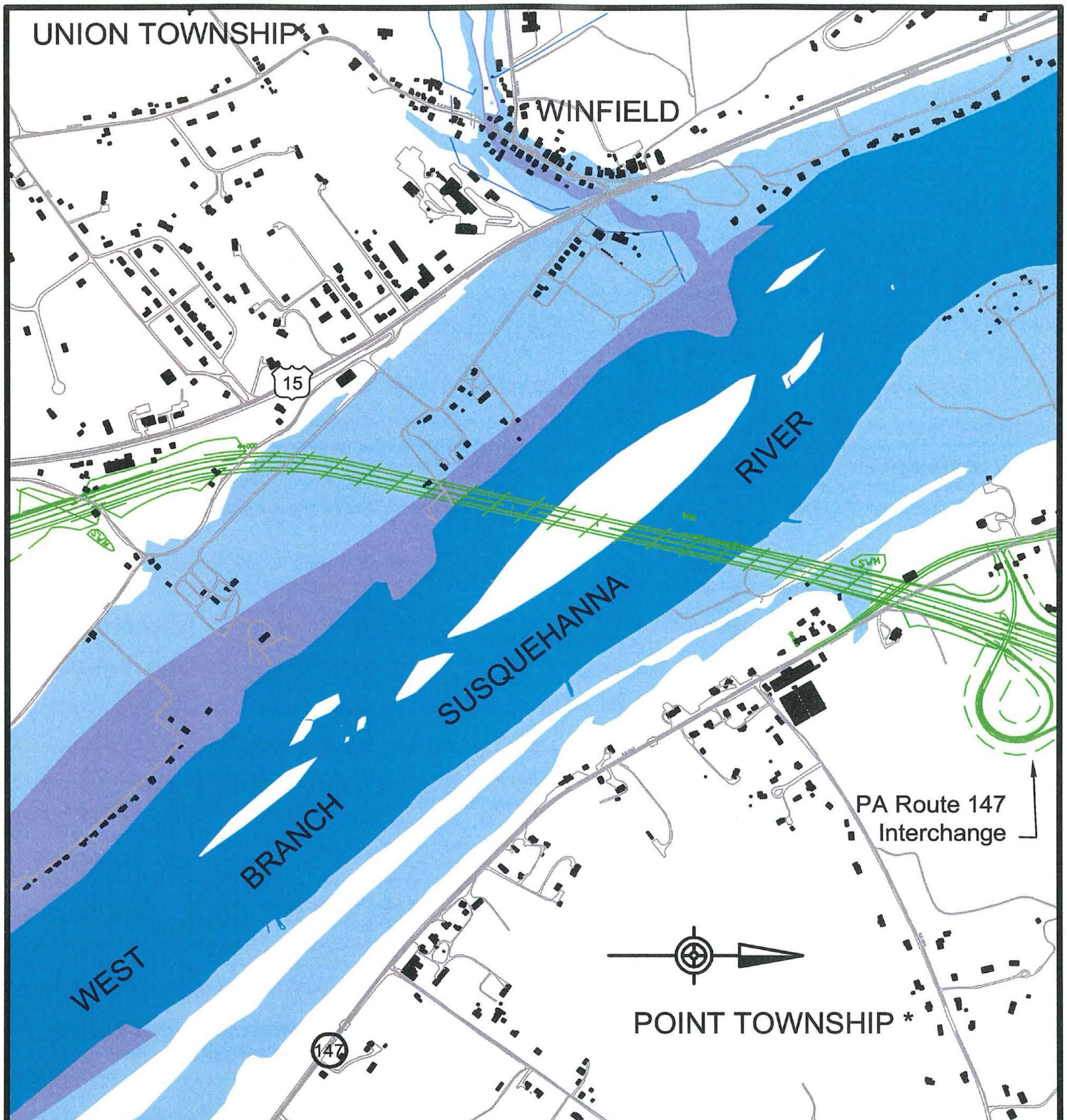
The impacts on the floodplain for RC1-E and RC1-W are the same since the bridges for these alternatives are identical (see Figures IV-I-5 and IV-I-6). The proposed structure is 1,620 meters (5,315 feet) long with 19 piers. Only the piers would encroach on the floodway and 100-year floodplain of the river in this location. The abutments on both sides of the river are out of the floodway and floodplain.

The resulting computations for RC1-E and RC1-W indicate that the bridge will cause a maximum rise in water surface elevation of 0.169 feet (2.1 inches) just upstream of the proposed crossing. That rise diminishes to 0.089 feet (1.1 inches) at the next upstream bridge structure, 4.4 miles upstream from the river crossing. At nearly 10 miles upstream, the water surface is just 0.023 feet (0.25 inch) higher than existing conditions. Because the bridge across the West Branch Susquehanna River is a localized restriction to flood flows, the RC1-E and RC1-W have a negligible impact to the water surface elevations downstream of the bridge.

ii. RC5

The proposed RC5 structure is 1,240 meters (4,069 feet) long with 15 piers (see Figure IV-I-7). Only the piers would encroach on the floodway and 100-year floodplain of the river in this location. The abutments on both sides of the river are out of the floodway and floodplain.

The resulting computations for RC5 indicate that the bridge will cause a maximum rise in water surface elevation of 0.148 feet (1.8 inches) just upstream of the proposed crossing. That rise diminishes to 0.071 feet (0.9 inches) at the next existing upstream bridge structure, 4.4 miles upstream. At nearly 10 miles upstream, the water surface is just 0.018 feet (0.22 inch) higher than existing conditions. Because the bridge across the West Branch Susquehanna River is a localized restriction to flood flows, the RC5 has a negligible impact to the water surface elevations downstream of the bridge.



Legend

- River Crossing 1 - East Alternative
- FEMA 100-Year Floodplain
- Regulatory Floodway

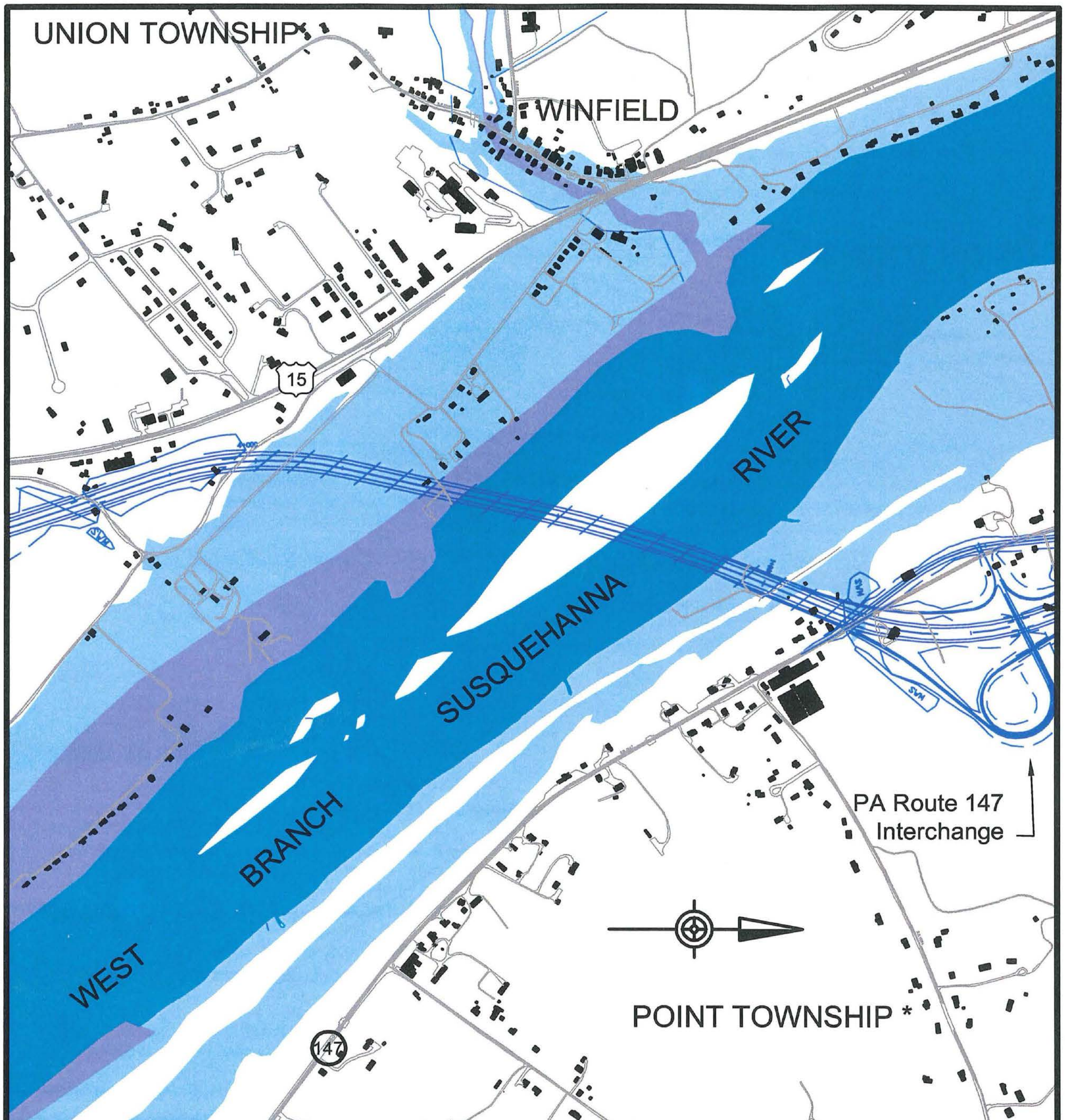
* NOTE: The FHBM/FIRM for Point Township does not include mapping for a Regulatory Floodway

Central Susquehanna Valley Transportation Project

Figure IV-I-5
RC1-E
West Branch Susquehanna River Floodplain Map

0 100 200 300
Scale in Meters

0 400 800 1200
Scale in Feet



Legend

- River Crossing 1 - West Alternative
- FEMA 100-Year Floodplain
- Regulatory Floodway

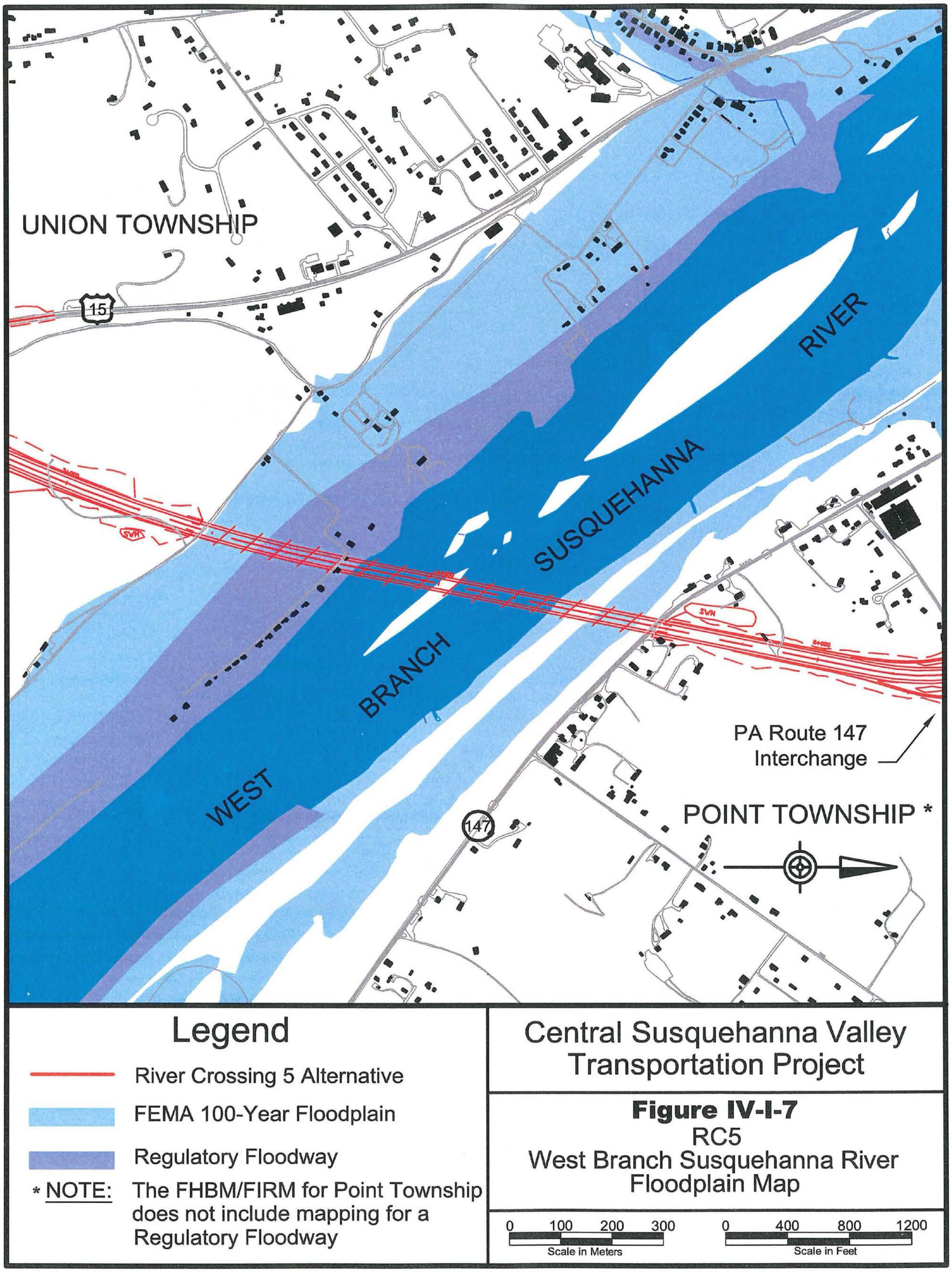
* NOTE: The FHBM/FIRM for Point Township does not include mapping for a Regulatory Floodway

Central Susquehanna Valley Transportation Project

Figure IV-I-6
RC1-W
West Branch Susquehanna River Floodplain Map

0 100 200 300
Scale in Meters

0 400 800 1200
Scale in Feet



Central Susquehanna Valley Transportation Project

Figure IV-I-7
RC5
West Branch Susquehanna River
Floodplain Map

iii. RC6

The proposed RC6 structure is 1,440 meters (4,725 feet) long with 17 piers. Only the piers would encroach on the floodway and 100-year floodplain of the river in this location. The abutments on both sides of the river are out of the floodway and floodplain (see Figure IV-I-8).

The resulting computations for RC6 indicate that the bridge will cause a maximum rise in water surface elevation of 0.142 feet (1.7 inches) just upstream of the proposed crossing. That rise diminishes to 0.075 feet (0.9 inches) at the next existing upstream bridge, 4.4 miles upstream. At nearly 10 miles upstream, the water surface is just 0.019 feet (0.23 inch) higher than existing conditions. Because the bridge across the West Branch of the Susquehanna River is a localized restriction to flood flows, the downstream impact of RC6 on the resultant water surface elevation is negligible.

iv. All Section 2 Alternatives

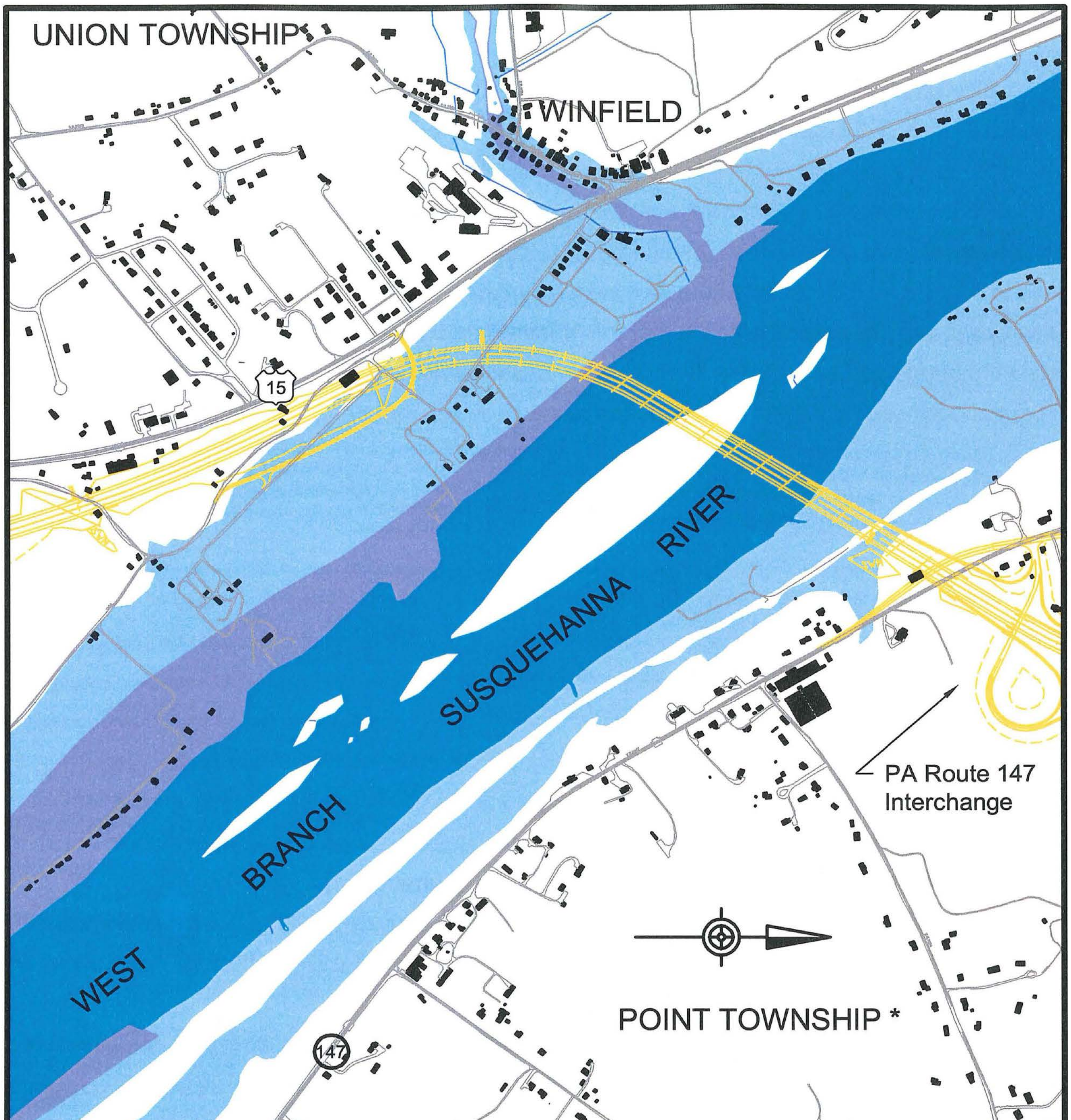
Preliminary hydraulic evaluations for each river crossing indicate that none of the proposed crossings at the proposed elevation would constitute a significant encroachment of the 100-year floodplain. No substantial increase in flooding risk or resultant flood velocities or impacts to natural and beneficial floodplain values are anticipated due to increases in backwater flooding. Development inconsistent with local floodplain regulations is not anticipated with any river crossing. Given that the proposed facility involves the construction of a limited access highway, incompatible floodplain development would not occur adjacent to the right-of-way. In addition, the proposed facility would not be the only evacuation route for the community in the event of an emergency.

Each of the proposed Section 2 Alternatives also requires a bridge over the Chillisquaque Creek (see Figure IV-I-9). The crossing of the Chillisquaque Creek is identical for each of the four Section 2 Alternatives (RC1-E, RC1-W, RC5, RC6).

The Chillisquaque Creek bridge crossing will be rebuilt in a location which will not encroach on the regulatory floodway and also will not cause any significant increase to the 100-year flood profile.

No rise in the existing water surface is anticipated at this location. Therefore, there is no potential for property loss or risk to life as a result of flooding at this location. No impacts on the natural and beneficial floodplain values are anticipated in this location. There is no potential for the encroachment to interrupt or terminate the service of a transportation facility that is needed for emergency vehicles or provides the community's only evacuation route. Therefore, this encroachment is not a significant encroachment on the floodplain. Development inconsistent with local floodplain regulations is not anticipated at this location due to the construction of any Section 2 Alternative.

None of the proposed crossings of the West Branch Susquehanna River or the proposed crossings of the Chillesquaque Creek will cause any new properties to be located in the floodplain.



Legend

River Crossing 6 Alternative

FEMA 100-Year Floodplain

Regulatory Floodway

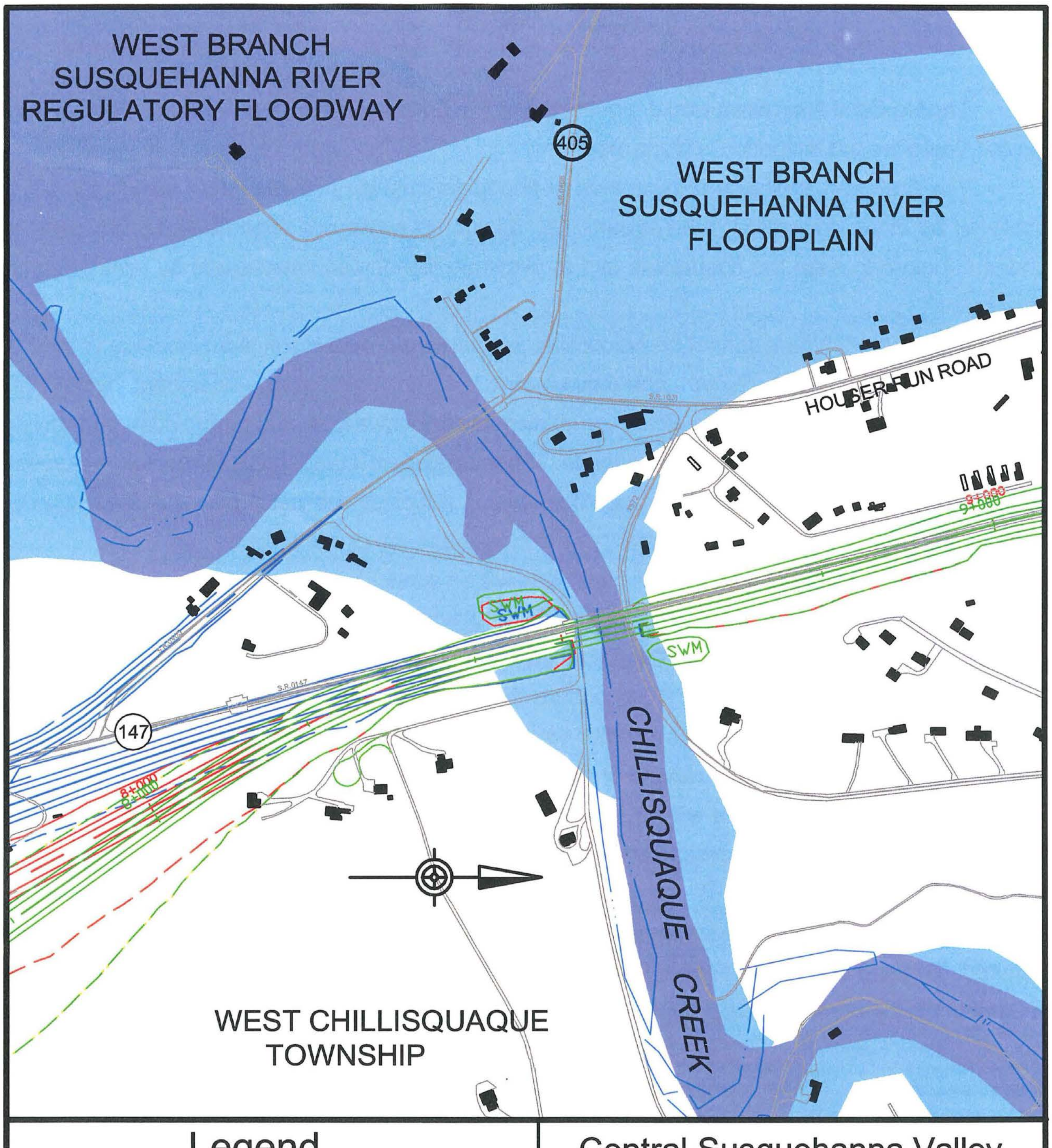
* NOTE: The FHBM/FIRM for Point Township does not include mapping for a Regulatory Floodway

Central Susquehanna Valley Transportation Project

Figure IV-I-8
RC6
West Branch Susquehanna River
Floodplain Map

0 100 200 300
Scale in Meters

0 400 800 1200
Scale in Feet



Legend

- River Crossing 1 - East Alternative
- River Crossing 1 - West Alternative
- River Crossing 5 Alternative
- River Crossing 6 Alternative
- FEMA 100-Year Floodplain
- Regulatory Floodway

Central Susquehanna Valley Transportation Project

Figure IV-I-9

RC1-E, RC1-W, RC5, and RC6
Chillisquaque Creek
Floodplain Map

0 50 100 150
Scale in Meters

0 200 400 600
Scale in Feet

2. Mitigation

The No-Build Alternative would require no encroachments on FEMA-delineated 100-year floodplains. Therefore, no mitigation is warranted.

The preferred approach to mitigation of floodplain impacts is avoidance. Avoidance can be achieved by either not crossing the stream (i.e., design an avoidance alignment), by enlarging the bridge structure to span the floodplains and to eliminate fill encroachments, and by minimizing pier placement.

If an encroachment cannot be practicably avoided and would result in an increase of the 100-year flood elevation, an appropriate corrective measure (occasional flowage easement, hydraulically equal compensated area or hydraulically equal dispersed floodway) should be provided or a revision of the floodway data and maps should be made. Minimum Federal standards limit surcharge increases to 0.3 meters (1 foot), provided that hazardous water velocities are not produced. This standard applies to the encroachments (both transverse and longitudinal) of this project.

Detailed hydrologic and hydraulic analyses will be conducted during final design for floodplain encroachments and for drainage areas greater than 1.3 square kilometers (0.5 square miles) associated with the Preferred Alternative. This information will be used to finalize the design in accordance with 23 CFR, Part 650, 115 and 117, to ensure that these facilities will be of sufficient capacity to accommodate the design year storm. With structures designed to accommodate the design year storm, no substantial impacts on natural or beneficial floodplain values are anticipated.

Roadway embankments will be mulched and seeded to preserve the natural and beneficial floodplain values. During final design, efforts will be taken to minimize any encroachments on the 100-year floodplain.

For each of the crossings, approval by the PA DEP and the US Army Corps of Engineers is required. This approval will be applied for during final design by a Joint Permit application as described in Section IV.R, Permits. PA DEP approval will also be required for the construction of all obstructions, including piers, within floodplains. Any construction within the floodplains will be in compliance with Executive Order No. 11988, Floodplain Management, dated May 24, 1977; FEMA regulations; and all Federal, State, and local regulations. The transportation agencies will also coordinate with FEMA during final design to provide it with the information needed for map revisions, if necessary.

J. WASTE SITES

A Preliminary Area Reconnaissance (PAR), Initial Site Assessment (ISA), and a Preliminary Site Investigation (PSI) were conducted in order to evaluate potentially hazardous waste and environmentally sensitive materials within the project study area. These studies were completed in accordance with the PENNDOT "Waste Site Evaluation Procedures for the Highway Project Development Process," May 1993 and updated June 1999 (Publication 281).

> More detailed information related to the waste evaluation is located in the Technical Support Data. An index of the Technical Support Data is located in Section IX, Appendix A.

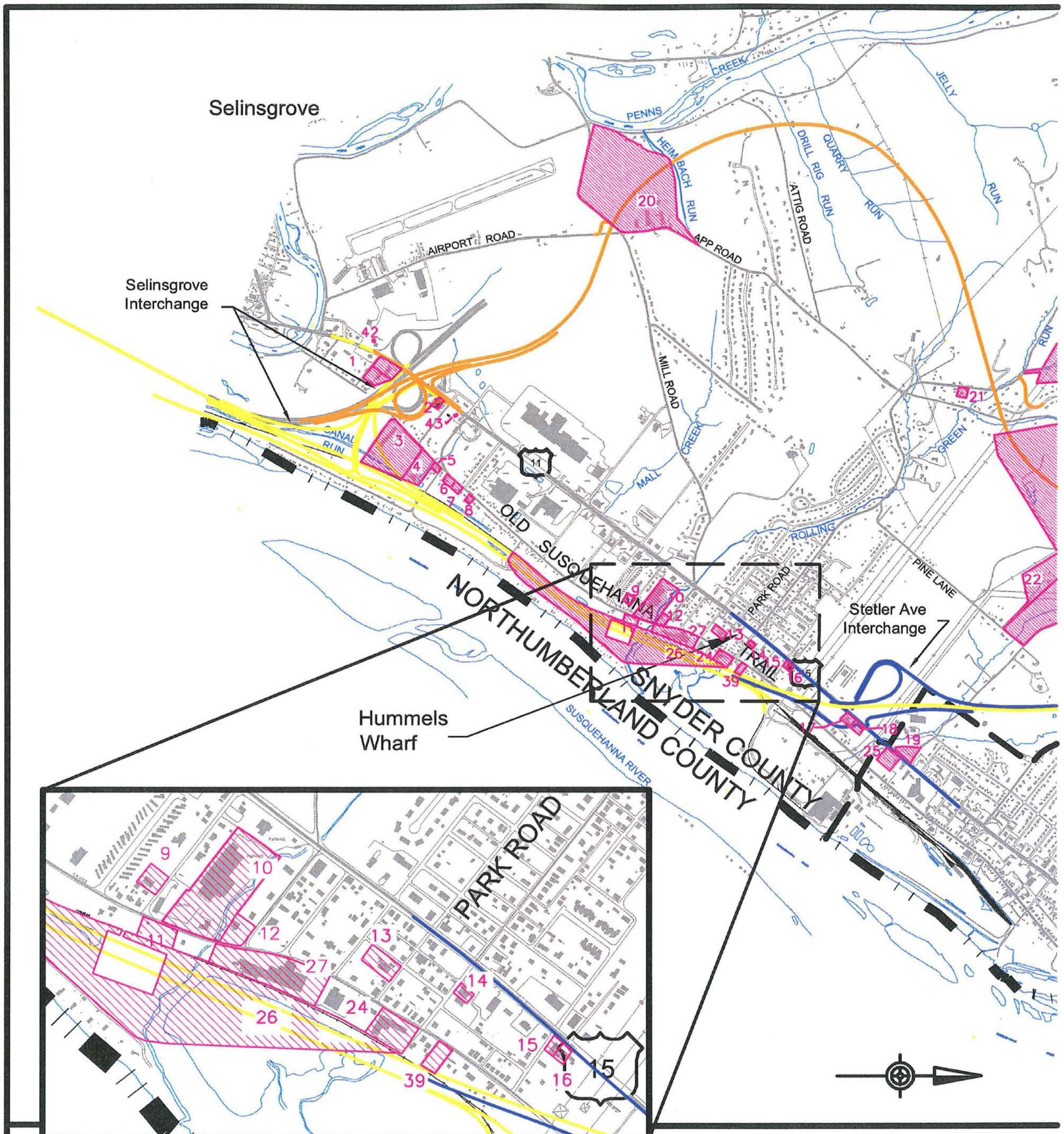
The PAR phase of the study was completed in 1995 and 1996 through records searches, historical aerial photographs, field surveys, and correspondence with local and State agencies. Based on the information obtained during the PAR, 239 sites warranted further investigation; however only PAR sites within the refined corridors were investigated at the ISA level. Within the refined corridors, forty-five (45) sites were investigated at the ISA level, and all of these sites are shown on Figures IV-J-1 and IV-J-2. Only seventeen (17) of the ISA sites and are located within the study corridors of the alternatives studied in detail and may require additional investigation if they will be impacted.

The ISA site reconnaissance focused on areas of concern like underground storage tanks (USTs), above ground storage tanks (ASTs), waste disposal areas, stained soils, air emission sources, electrical transformers, railroad tracks, and other potential areas of concern. At this time, PSI efforts have been completed at four ISA sites.

1. Impacts

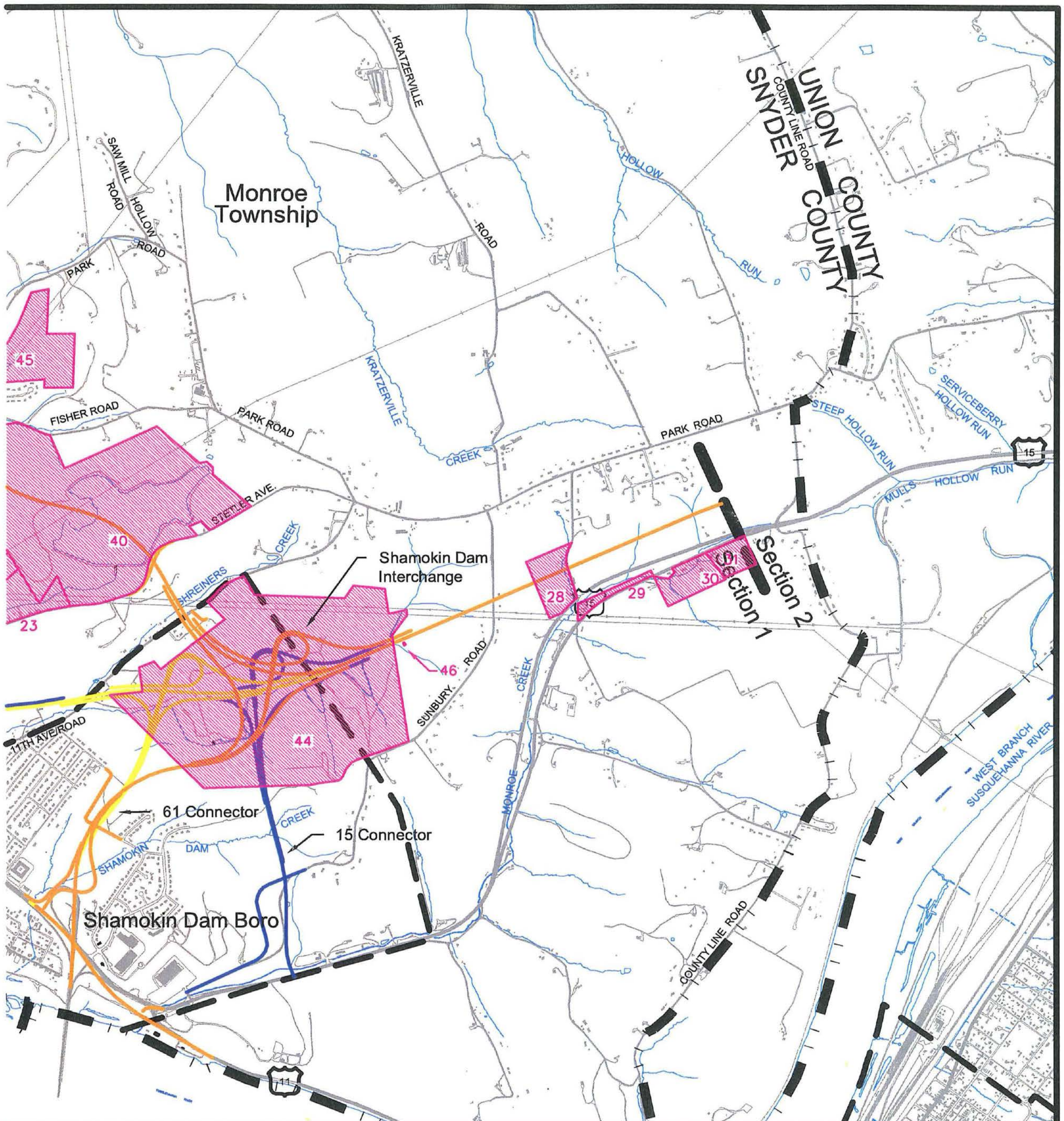
Seventeen (17) ISA sites that require further investigation are located throughout the project area and will be impacted by one or more design alternatives. A summary of waste-related impacts for each alternative is presented in Table IV-J-1. Sites that were investigated at the ISA level and determined to not have a waste-related concern are not included in the tables. Of the 17 impacted sites, nine are sites with UST concerns, three are sites with leachate concerns from ash basins, three are sites with AST concerns, and two are sites with dumping concerns. Potential concern, impacts and recommended remediation for the ISA sites within Section 1 can be found in Table IV-J-2; similarly the ISA sites in Section 2 can be found in Table IV-J-3. Tables IV-J-2 and IV-J-3 include ISA number, the site name, potential concern, potential impacts, and recommended remediation measures.

These waste-related concerns may impact the transportation improvement project in several ways including UST/AST removal, contaminated soil disposal and remediation, and contaminated surface water or groundwater remediation as well as removal of waste materials residing on the acquired properties that may require collection and disposal or recycling at an approved facility. Addition-



Legend

- DA Modified Avoidance Alternative
- Old Trail 2A Alternative (61 Connector)
- Old Trail 2B Alternative (Stetler Ave. Interchange/15 Connector)
- Potential Waste Sites Investigated



Central Susquehanna Valley Transportation Project

Figure IV-J-1

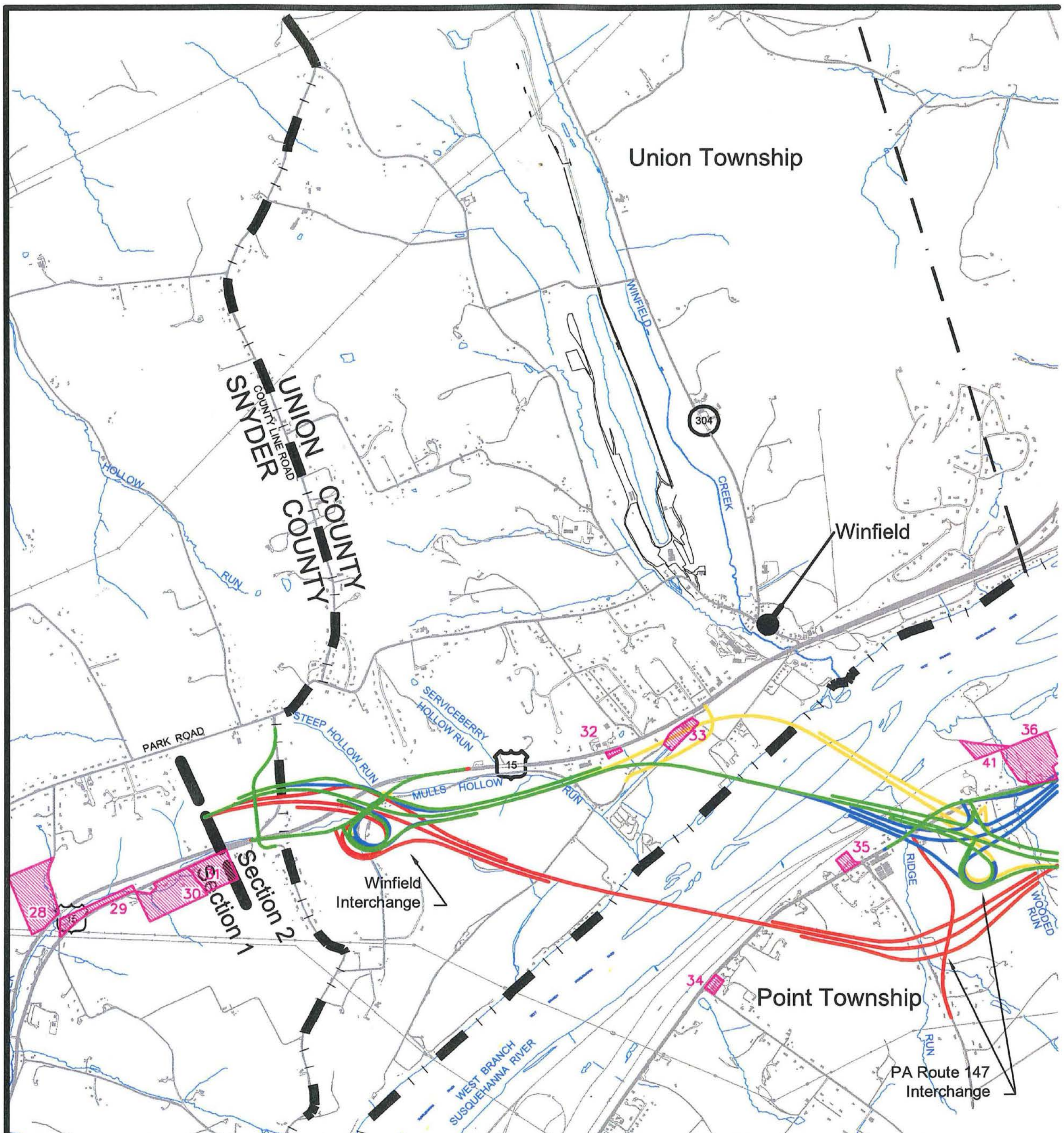
Section 1- Potential Waste Sites

0	300	600	900

Scale in Meters

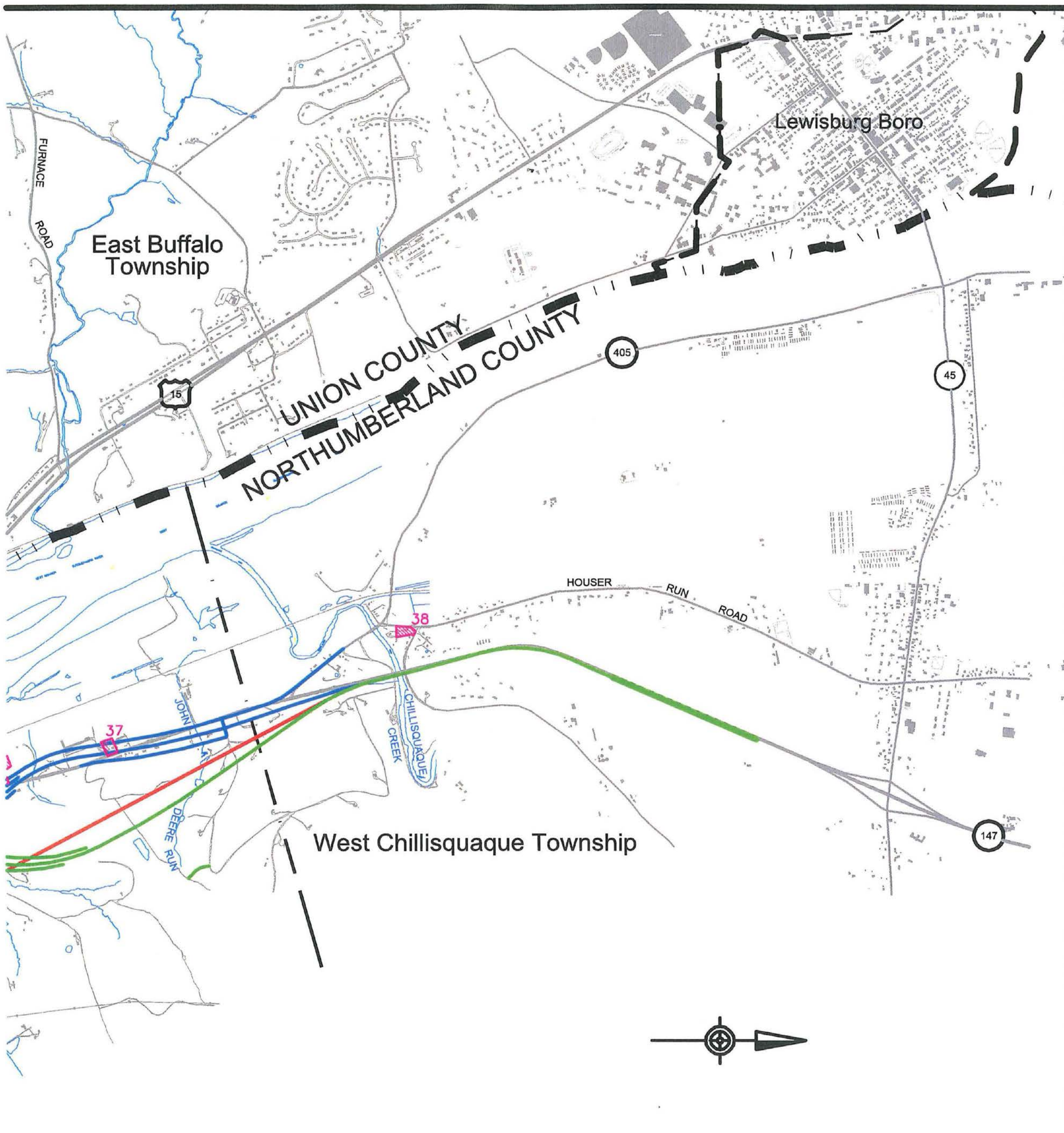
0	1250	2500	3750

Scale in Feet



Legend

- River Crossing 1 - East Alternative
- River Crossing 1 - West Alternative
- River Crossing 5 Alternative
- River Crossing 6 Alternative
- Potential Waste Sites Investigated



Central Susquehanna Valley Transportation Project

IV-J-2

Section 2- Potential Waste Sites

0 300 600 900 Scale in Meters

0 1250 2500 3750 Scale in Feet

TABLE IV-J-1
WASTE RELATED IMPACTS

Alternative Name	ISA Sites	Waste-Related Impacts Within the Alternative Footprint
Section 1		
DAMA	9	5
OT2A	12	5
OTB	17	10
Section 2		
RC1-E	2	1
RC1-W	3	3
RC5	0	0
RC6	3	2

ally, some structures were noted to contain obvious signs of asbestos-containing material (ACM) and some structures may contain lead-based paint. The asbestos issue should be addressed during the right-of-way acquisition process. If structures acquired by PENNDOT will not be demolished, then lead-based paint in these structures should be investigated.

Construction of any combination of build alternatives from Section 1 and Section 2 would impact potential waste sites and necessitate clean-up of contamination, thereby improving the existing conditions. The No-Build Alternative, however, would impact no waste sites and would require no clean-up of existing contamination. Thus, the No-Build scenario presents no advantage over build alternatives and could even be considered to have negative impacts, since the existing potential hazards would remain and possibly worsen if remediation was not completed.

Remediation and/or the in-place management of impacted soils and groundwater is also considered a positive impact. Improving the environment may also positively reduce the risk of human health concerns associated with the contaminants.

2. Mitigation Measures

Waste sites impacting an alternative will have to be mitigated at some point during the transportation improvement project. Actual intrusive testing of sites and remediation efforts will be undertaken in accordance with PA DEP requirements. Areas of miscellaneous dumping (i.e. aluminum cans, glass, municipal waste) will be appropriately recycled or disposed at an acceptable facility. Addition-

TABLE IV-J-2
SECTION 1 WASTE SITE IMPACTS AND MITIGATION MEASURES

No.	Site Name	Potential Concern	Potential Impact	Recommendations
DA Modified Avoidance				
2	Class A Auto	1 heating oil UST	Soil/groundwater contamination if release of product occurs	Geophysics, soil borings, sampling, and analysis
40	PP&L Ash Basin #2	Leachate from basin	Surface and groundwater contamination	Sample and analysis monthly surface water, leachate seeps ... *
43	Auto Credit	2 USTs, ASTs, previous USTs removed prior to guidelines	Soil/groundwater contamination if release of product occurs	Geophysics, soil borings, sampling, and analysis
44	PP&L Ash Basin #3	Leachate from basin	Surface and groundwater contamination	Sample and analysis monthly surface water, leachate seeps ... *
46	Tax ID No 12-05-146	Previous dumping	Soil contamination	Shallow soil borings, sampling, and analysis
Old Trail 2A				
3	Wildland Floral Supply & Rollins Leasing Corp.	2 ASTs, one dispenser with underground product line, stained soil	Soil contamination if uncontrolled release of product occurs	Shallow soil borings, sampling, and analysis
26	PP&L Ash Basin #1	Leachate from basin	Surface and groundwater contamination	Sample and analysis monthly surface water, leachate seeps ... *
39	Vacant Parking Lot (Tax ID No 12-11-298)	Possibly an abandoned UST	Soil/groundwater contamination if release of product occurs	Geophysics, soil borings, sampling, and analysis
44	PP&L Ash Basin #3	Leachate from basin	Surface and groundwater contamination	Sample and analysis monthly surface water, leachate seeps ... *
46	Tax ID No 12-05-146	Previous dumping	Soil contamination	Shallow soil borings, sampling, and analysis
Old Trail 2B				
3	Wildland Floral Supply & Rollins Leasing Corp.	2 ASTs, 1 dispenser with associated underground product line, stained soil	Soil contamination if uncontrolled release of product occurs	Shallow soil borings, sampling, and analysis
15	Hummel's Texaco	2 USTs and possibly 3 other USTs identified during geophysical survey	Soil/groundwater contamination if release of product occurs	Test pitting, soil boring, sampling, and analysis
16	Rental Stop/Sunbury Sewing	2 partially buried ASTs (500 gallon heating oil tanks)	Soil/groundwater contamination if release of product occurs	Shallow soil borings, sampling, and analysis
17	Pulse Fitness/Country Edition (Formerly Real French Cleaners)	Previous USTs, 2 ASTs (contents unknown)	Soil/groundwater contamination if release of product occurs	Need UST closure documentation, possibly soil borings and sampling analysis
18	Mull's Auto Sales	USTs reportedly removed, 2 ASTs	Soil/groundwater contamination if release of product occurs	Need UST closure documentation, geophysics, possibly soil borings, and sampling and analysis
25	Budget Bakery	Possible UST (GPR identified signature)	Soil/groundwater contamination if release of product occurs	Test pitting, possibly sampling and analysis
26	PP&L Ash Basin #1	Leachate from basin	Surface and groundwater contamination	Sample and analysis monthly surface water, leachate seeps ... *
39	Vacant Parking Lot (Tax ID No 12-11-298)	Possibly an abandoned UST	Soil/groundwater contamination if release of product occurs	Geophysics, soil borings, sampling, and analysis
44	PP&L Ash Basin #3	Leachate from basin	Surface and groundwater contamination	Sample and analysis monthly surface water, leachate seeps ... *
46	Tax ID No 12-05-146	Previous dumping	Soil contamination	Shallow soil borings, sampling, and analysis

ally, buildings that will be demolished will be inspected by a certified inspector for asbestos containing materials. If present, asbestos will be removed, handled, and disposed of properly. Buildings that will be acquired and not demolished will be inspected for lead-based paint if the structure was built prior to 1978.

TABLE IV-J-3
SECTION 2 WASTE SITE IMPACTS AND MITIGATION MEASURES

No.	Site name	Potential concern	Potential impact	Recommendations
River Crossing 1 East				
32	US Cargo (formerly Bucher's Used Cars)	AST, floor drain to septic system; unknown previous waste handling practices and previous land uses	Soil contamination	Shallow soil borings, sampling, and analysis
River Crossing 1 West				
32	US Cargo (formerly Bucher's Used Cars)	AST, floor drain to septic system; unknown previous waste handling practices and previous land uses	Soil contamination	Shallow soil borings, sampling, and analysis
36	Kohl's Market	Previous USTs	Soil/groundwater contamination if release of product occurs	Geophysics, soil borings, sampling, and analysis
37	C&G Rabbitry	Previous UST	Soil/groundwater contamination if release of product occurs	Soil borings, sampling , and analysis
River Crossing 5				
There were no waste-related impacts identified.				
River Crossing 6				
32	US Cargo (formerly Bucher's Used Cars)	AST, floor drain to septic system; unknown previous waste handling practices and previous land uses	Soil contamination	Shallow soil borings, sampling, and analysis
33	Winfield Auction Center	Previous dumping	Soil contamination	Shallow soil borings, sampling, and analysis

* Sample and analyze monthly surface water, leachate seeps, monitoring wells and residential well samples; and effluent and seepage discharges should be collected and routed into basin/structure (i.e. an active package treatment or passive anoxic limestone drain pH adjustment system) prior to discharge to the receiving stream. More detailed information regarding the ash basin(s) can be found in the Surface Water/Aquatic Resources section as well as the Public/Private Water Supply section (Sections IV.F.3 and IV.G).

More specific mitigation measures can be found in Tables IV-J-2 and IV-J-3 for each ISA site located within the footprint of each alternative studied in detail.

K. ENERGY

The CSVT Project will cause changes in energy usage in the project area. Changes will occur both for the new highway and for the existing roadway system (including US Routes 11/15, US Route 11, US Route 15, PA Route 147, and PA Route 61). Energy usage estimates were calculated using CORSIM, a micro-simulation software package developed by FHWA. CORSIM generates measures of effectiveness for all of the individual vehicles (autos and trucks) in the system and sums them up by roadway segment. Results are reported in liters (gallons) of fuel consumption for each alternative at 2030 PM peak hour volumes.

> More detailed information on energy analysis is located in the Energy Technical Support Data. An index of the Technical Support Data is located in Section IX, Appendix A.

The Section 1 and Section 2 alternatives and their various combinations produce different totals for fuel consumption on the new highway, but only the Section 1 alternatives produce changes in fuel consumption for the existing roadways. The variation in roadway length between the DAMA Alternative and the Old Trail Alternatives, as well as the difference in interchange/connector locations between the two Old Trail alternatives produce changes in traffic volumes and travel times on the existing roadway system that the Section 2 alternatives do not.

As a consequence of updating the traffic projections to the new design year of 2030, it was determined that the fuel consumption calculations presented in the Draft EIS were incorrect. The fuel consumption figures shown in Tables IV-K-1 through IV-K-3 have been verified as accurate.

Table IV-K-1 summarizes the fuel consumption for the existing roadways within the study area for the three Section 1 alternatives as well as for the No-Build Alternative.

Table IV-K-2 summarizes consumption for the new highway for the three Section 1 alternatives in combination with the four Section 2 alternatives.

Table IV-K-3 summarizes the total fuel consumption of each build alternative combination. Totals include both the energy consumption for the new highway and the energy consumption for the existing roadway system resulting from the Section 1 alternative used.

Both build alternatives in the Old Trail (OT2A and OT2B) Family (existing roadways combined with the new CSVT highway) will result in energy usage increases over the No-Build Alternative (existing roadways), which results in 11,739 liters (3,101 gallons) of fuel consumption during the PM peak hour. However, the DAMA alternative yields slightly higher energy usage than the No-Build scenario and both the OT scenarios; this is due to the overall length of the DAMA alternative. Under the build scenarios, vehicles are traveling greater distances at greater speeds on the new highway, and therefore are expending slightly more energy. The OT2B and RC5 Alternative would result in the lowest consumption of fuel, totaling 11,807 liters (3,119 gallons). The DAMA and RC5 Alternative would result in the highest consumption of fuel, totaling 13,520 liters (3,572 gallons). In general, OT2B Alternatives result in the lowest energy usage figures for the project area, while the DAMA and OT2A Alternative result in higher energy usage figures. This is mainly due to the fact that more vehicles are using the new highway under the DAMA and OT2A alternatives than under the OT2B alternative, and as stated earlier, DAMA will yield higher energy consumption results than the OT2A Alternative (and OT2B Alternative) because the freeway of DAMA is longer than the other two alternatives. The total energy

TABLE IV-K-1
TOTAL FUEL CONSUMPTION
EXISTING ROADWAY
LITERS (GALLONS) FOR PM PEAK HOUR TRAFFIC

	Section 1 Alternatives (Year 2030)			
	No-Build	DAMA	OT2A	OT2B
US Route 11/15 (Selinsgrove to Split)	5,339 (1,410)	2,464 (651)	3,091 (816)	2,195 (580)
US Route 11-Split to East of PA Route 147	2,276 (601)	1,007 (266)	900 (238)	1,002 (265)
US Route 15-Split to North of Winfield	2,376 (628)	801 (212)	700 (185)	712 (188)
PA Route 147-US Route 11 to Chillisquaque	1,747 (462)	652 (172)	646 (171)	736 (194)
TOTAL	**11,739 (3,101)**	**4,923 (1,301)**	**5,337 (1,410)**	**4,645 (1,227)**

TABLE IV-K-2
TOTAL FUEL CONSUMPTION
NEW CSVT HIGHWAY
LITERS (GALLONS) FOR PM PEAK HOUR TRAFFIC

	Section 2 Alternatives (Year 2030)			
Section 1 Alternatives (Year 2030)	RC1-E	RC1-W	RC5	RC6
DAMA	8,462 (2,236)	8,460 (2,235)	8,597 (2,271)	8,404 (2,220)
OT2A	6,810 (1,799)	6,730 (1,778)	6,783 (1,792)	6,730 (1,778)
OT2B	7,253 (1,916)	7,298 (1,928)	7,162 (1,892)	7,272 (1,921)

TABLE IV-K-3
TOTAL FUEL CONSUMPTION
FOR EXISTING ROADWAYS AND NEW CSVT HIGHWAY
LITERS (GALLONS) FOR PM PEAK HOUR TRAFFIC

	Section 2 Alternatives (Year 2030)			
Section 1 Alternatives (Year 2030)	RC1-E	RC1-W	RC5	RC6
DAMA	13,387 (3,537)	13,383 (3,536)	13,520 (3,572)	13,327 (3,521)
OT2A	12,147 (3,209)	12,067 (3,188)	12,120 (3,202)	12,067 (3,188)
OT2B	11,898 (3,143)	11,943 (3,155)	11,807 (3,119)	11,917 (3,148)

consumption figures for the existing roadways in combination with the new CSVT highway for all build alternatives are relatively similar, and all build scenarios provide only a marginal increase in energy usage in comparison to the total energy consumption figures for all existing roadways in the No-Build Alternative.

L. SECONDARY AND CUMULATIVE IMPACTS

1. Introduction

> More detailed information on the anticipated secondary and cumulative impacts of the proposed project is located in the Secondary and Cumulative Impacts Technical Support Data. An index of the Technical Support Data is located in Section IX, Appendix A.

Project implementation introduces the potential for secondary and cumulative impacts. These potential secondary and cumulative impacts are generally more difficult to predict and are usually less quantifiable than direct, or even indirect, project impacts. Secondary and cumulative impacts of transportation infrastructure improvement projects are typically recognized as land development activities that otherwise would not occur without the increased accessibility brought about by the proposed improvement project. As such, it is logical to conclude that construction of any of the CSVT build alternatives has the potential to introduce secondary and cumulative impacts, while the No-Build Alternative will not have secondary or cumulative impacts. While secondary and cumulative impacts can be negative, a well designed transportation project, combined with local growth management controls, may accommodate housing or business displacements and a reasonable portion of the area's growth with limited impact on sensitive environmental features.

Guidelines prepared by the Council on Environmental Quality (CEQ) for implementing NEPA broadly define secondary effects as those that are "...caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable" (40 CFR 1508.8). More specifically, secondary impacts involve increased development pressures that lead to development of property that may not occur without the increased accessibility brought by the transportation system improvement or development that occurs on a quicker schedule than without the transportation improvement. The development of the property must be determined to be directly related to the proposed improvement, not dependent on the actions of others, such as provision of water or sewer service or a rezoning.

The CEQ guidelines define cumulative impacts as those "...impacts which result from the incremental consequences of an action when added to other past and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time" (40 CFR 1508.7). Cumulative impacts differ from secondary impacts in that they can lead to development of property brought by the transportation system improvement only when combined with actions by others, such as provision of water or sewer service or a rezoning. Cumulative impacts can also include unrelated activities of others in the immediate project area that may affect the resources impacted by the project or larger scale projects over a broader region whose impacts can be demonstrated to affect project area resources (i.e. have a demonstrable effect in the project area).

2. Past Actions

Since the CEQ guidelines include "incremental consequences when added to other past...actions...," this section summarizes past actions by others as reflected in historic development patterns and trends. This section, therefore, provides a context of regional development patterns within which the secondary and cumulative impacts of the project will be part. The analysis was completed by reviewing past activities as presented elsewhere in the EIS, interviews with PENNDOT officials, and inspections of 1949/50; 1969/70; and 1995 aerial photography of the project area.

Routes 11/15 replaced the Old Trail as the primary route through Hummels Wharf and Shamokin Dam in 1944. The three-lane roadway was widened to four lanes in 1959. A Selinsgrove/Shamokin Dam bypass was designed in the early 1970's, but only the Selinsgrove section was completed in 1977.

Given the above history of the local transportation system, the 1949/50 aerial photograph shown in Figures IV-L-1 and IV-L-2 show regional development along the three-lane Routes 11/15. As seen on the photographs, development along Routes 11/15 is very limited, with the PPL facility by far the largest feature on the landscape. The only development along Routes 11/15 between Selinsgrove and Hummels Wharf appears to be a drive-in theatre on the east side of the road. Residential development in Hummels Wharf is much greater than that in Shamokin Dam, as the borough was limited to the east side of Routes 11/15 in 1950. Other features of note along the roadway include God's Holiness Campground and the cemetery north of Shamokin Dam. The remainder of the project area is predominantly agricultural, with a number of woodlots also present. There is no indication of the residential subdivisions currently found throughout Monroe Township.

The 1970 photograph in Figures IV-L-3 and IV-L-4 reflect extensive development that took place in the 1950's and 1960's and the widening of Routes 11/15 that took place in 1959. The development that took place in Section 1 included the following.

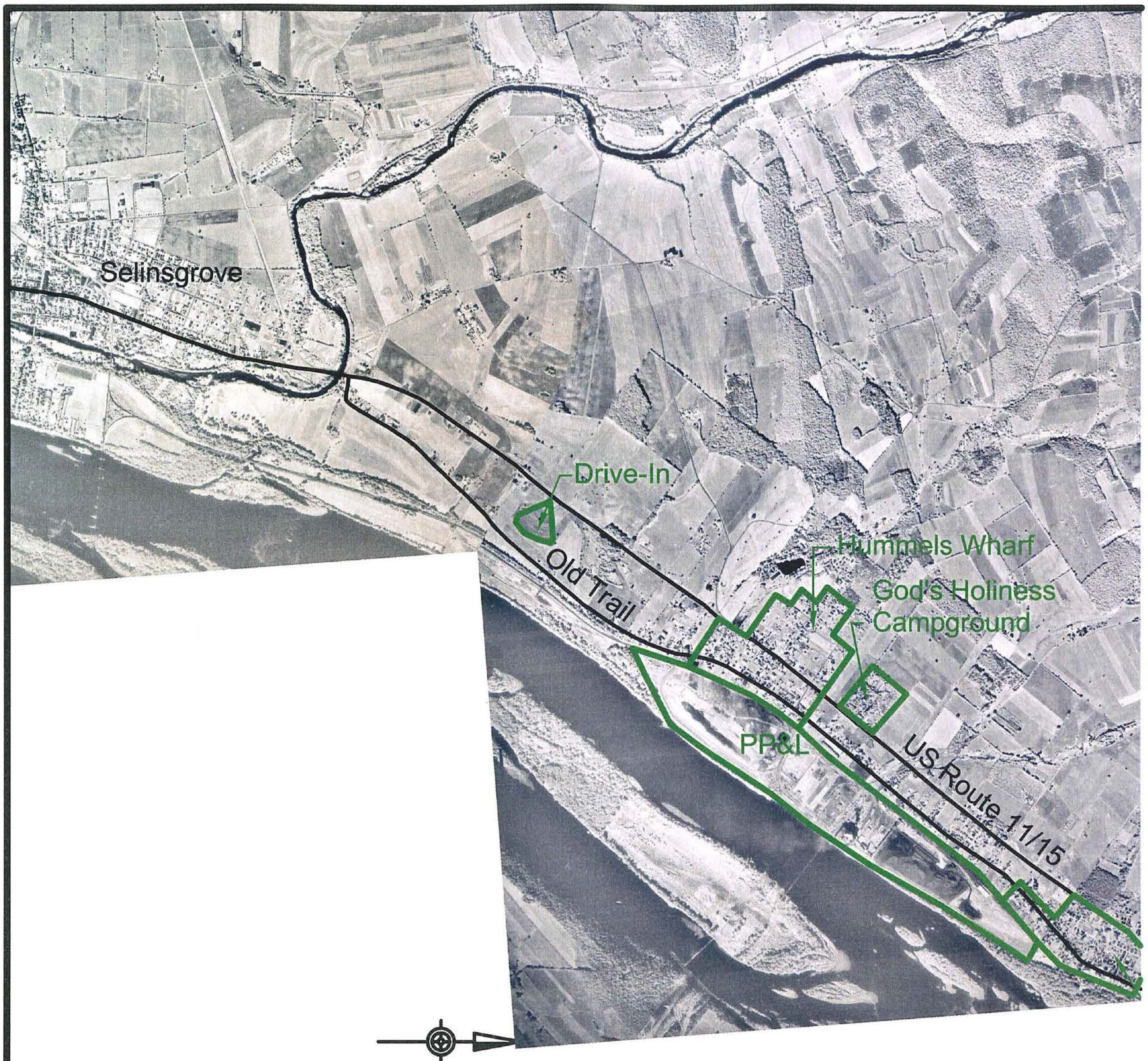
- Selinsgrove Airport
- Commercial development along Routes 11/15 east of the airport
- Construction of the Wildland Floral building and adjacent commercial/industrial buildings
- Commercial/Industrial development north of the drive-in theatre
- Completion of one mobile home park and construction of another north of the theatre
- Completion of the country club south of Hummels Wharf
- Expansion of Hummels Wharf on the west side of Routes 11/15
- Commercial development at the south end of Shamokin Dam
- Completion of much of the Gunter development in Shamokin Dam
- Completion of the strip commercial center at Orchard Hills and 15-20 homes in the residential part of the subdivision
- Other residential and commercial growth west of Routes 11/15 in Shamokin Dam

Development in Section 2 during the 1950's and 1960's was limited to construction of the Agway facility and quarry at Winfield. In addition, the northern end of Northumberland Borough saw substantial residential development during the period.

While a detailed analysis of all the reasons for the development that occurred during the 1950's and 1960's is beyond the scope of this project, a preliminary analysis indicates that the growth is likely the cumulative effect of the provision of public wastewater facilities in 1959, the widening of Routes 11/15, and other related activities. The growth appears to be closely tied to the availability of public sewer service during the period, as the wastewater facilities were constructed from Shamokin Dam, through Hummels Wharf, to the treatment facilities in Selinsgrove. Therefore, while most of the development occurred along the road that was widened in the middle of the time period, the development activities identified above end at the northern extent of the public sewer service boundary.

Although there were a number of smaller projects during the period, the subdivisions and land developments depicted on Figures IV-L-1 through IV-L-4 constitute most of the residential and commercial or industrial development that occurred between 1950 and 1970 in the general study area. This development activity accounted for approximately 26.3 hectares (65 acres) of residential development and 105.2 hectares (260 acres) of commercial/industrial growth in Monroe Township; 113.3 hectares (280 acres) of residential development in Shamokin Dam; and 48.6 hectares (120 acres) of commercial/industrial development in Union Township during this period. A review of the locations where this development occured from the 1950 photograph reveals that almost all of this development resulted from a conversion of agricultural lands to these other uses.

The 1995 photographs in Figures IV-L-5 and IV-L-6 reflect extensive development that took place in the 1970's, 1980's, and early 1990's, including the completion of the Selinsgrove Bypass in 1977. The development that took place in Section 1 included the following.



Legend

Development Node

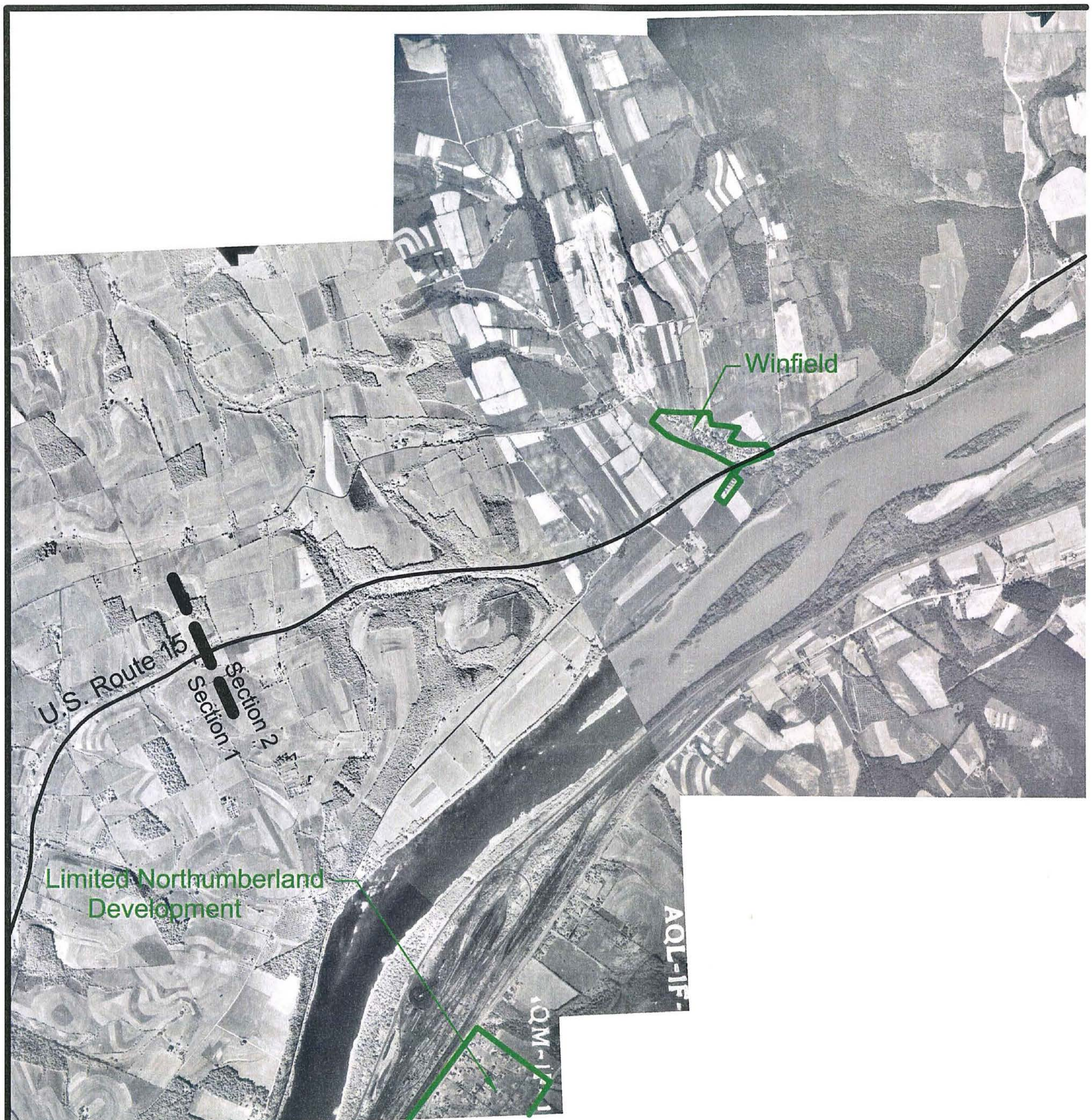
Central Susquehanna Valley Transportation Project

Figure IV-L-1

Section 1 -
1950 Project Area
Development

0 300 600 900
Scale in Meters

0 1250 2500 3750
Scale in Feet



Legend

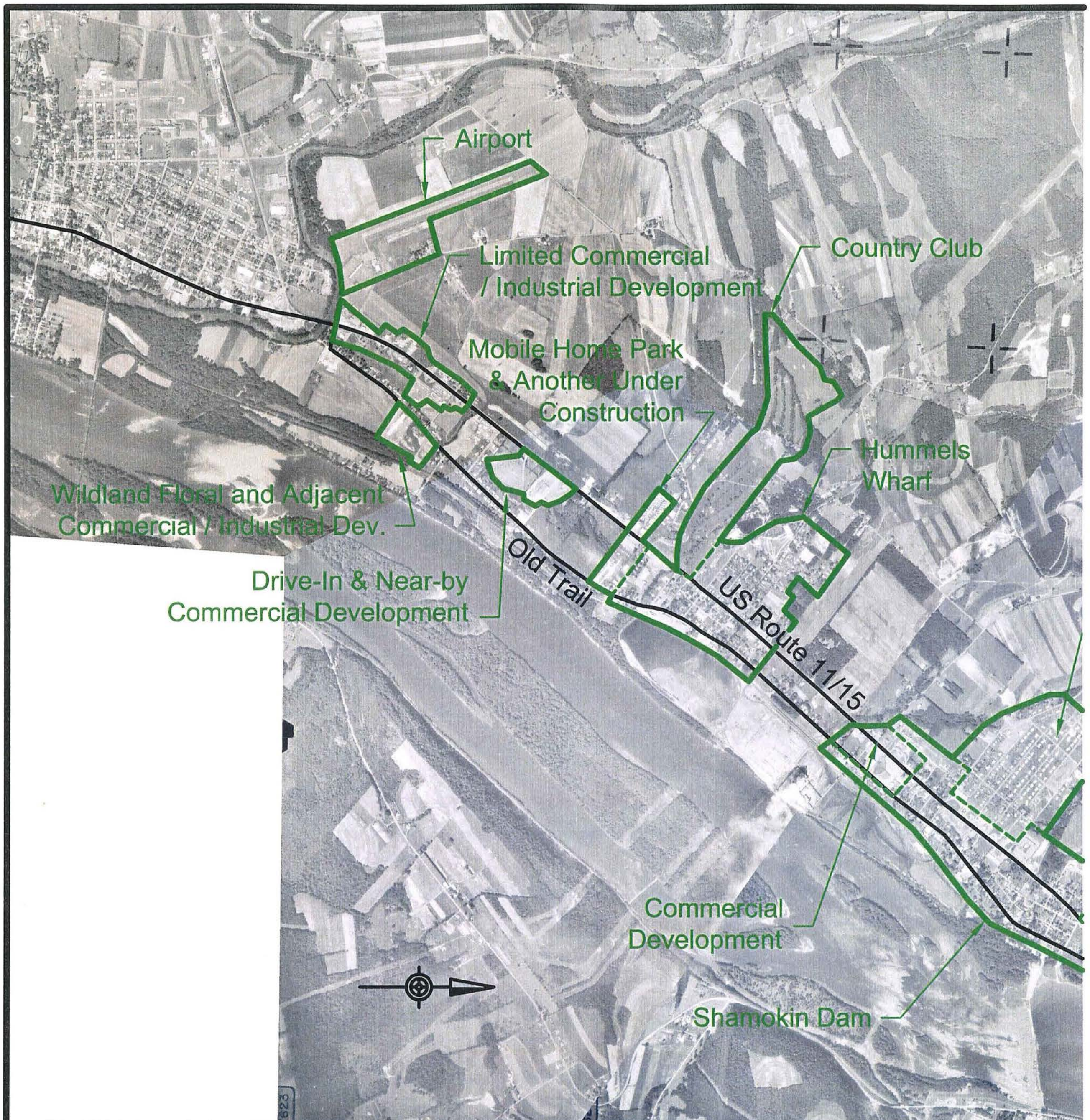
Development Node

Central Susquehanna Valley Transportation Project

Figure IV-L-2

Section 2 -
1950 Project Area
Development

0 300 600 900 Scale in Meters
0 1250 2500 3750 Scale in Feet



Legend

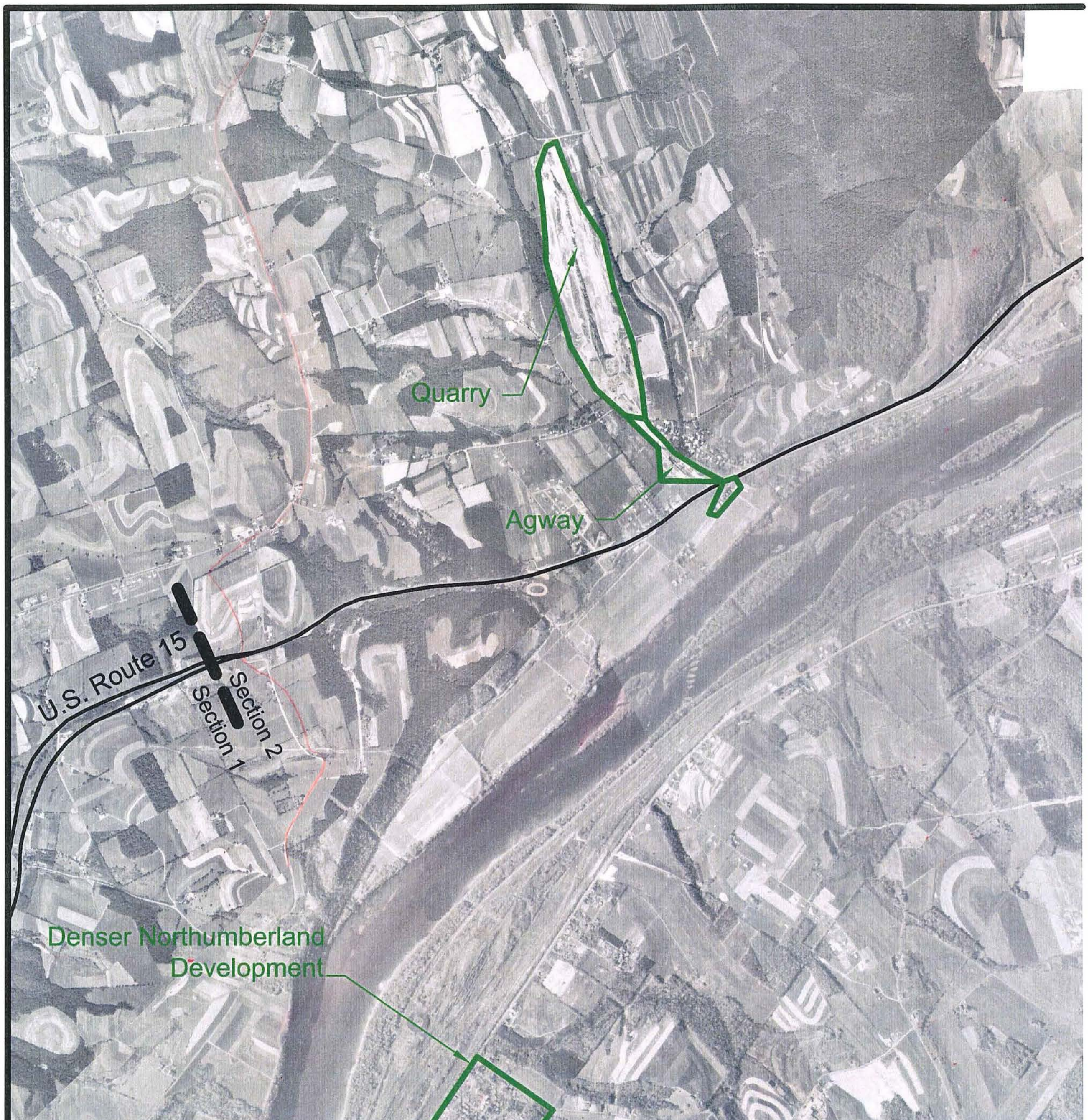
Development Node

Central Susquehanna Valley
Transportation Project

Figure IV-L-3
Section 1 -
1970 Project Area
Development

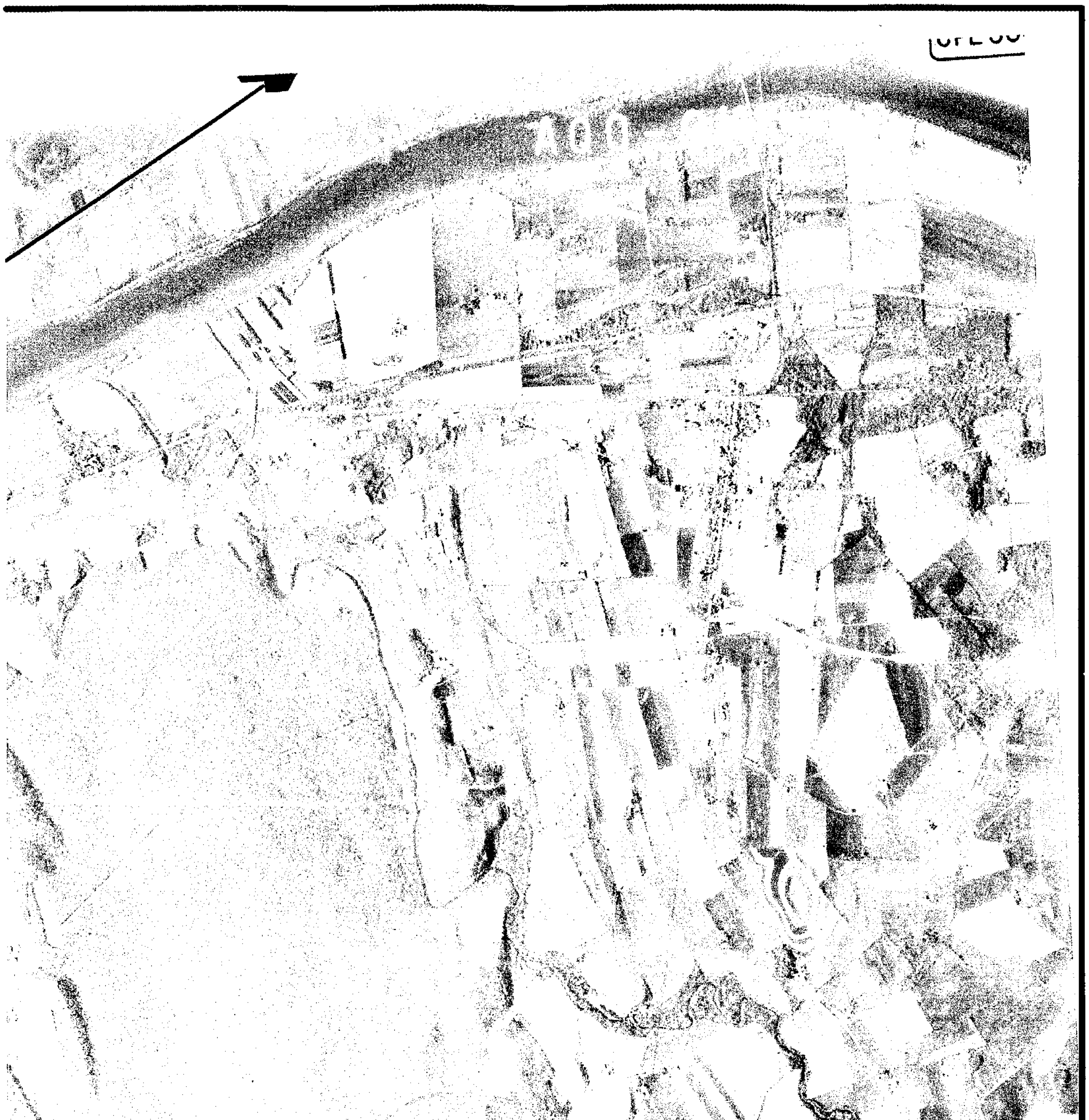
0 300 600 900
Scale in Meters

0 1250 2500 3750
Scale in Feet



Legend

Development Node

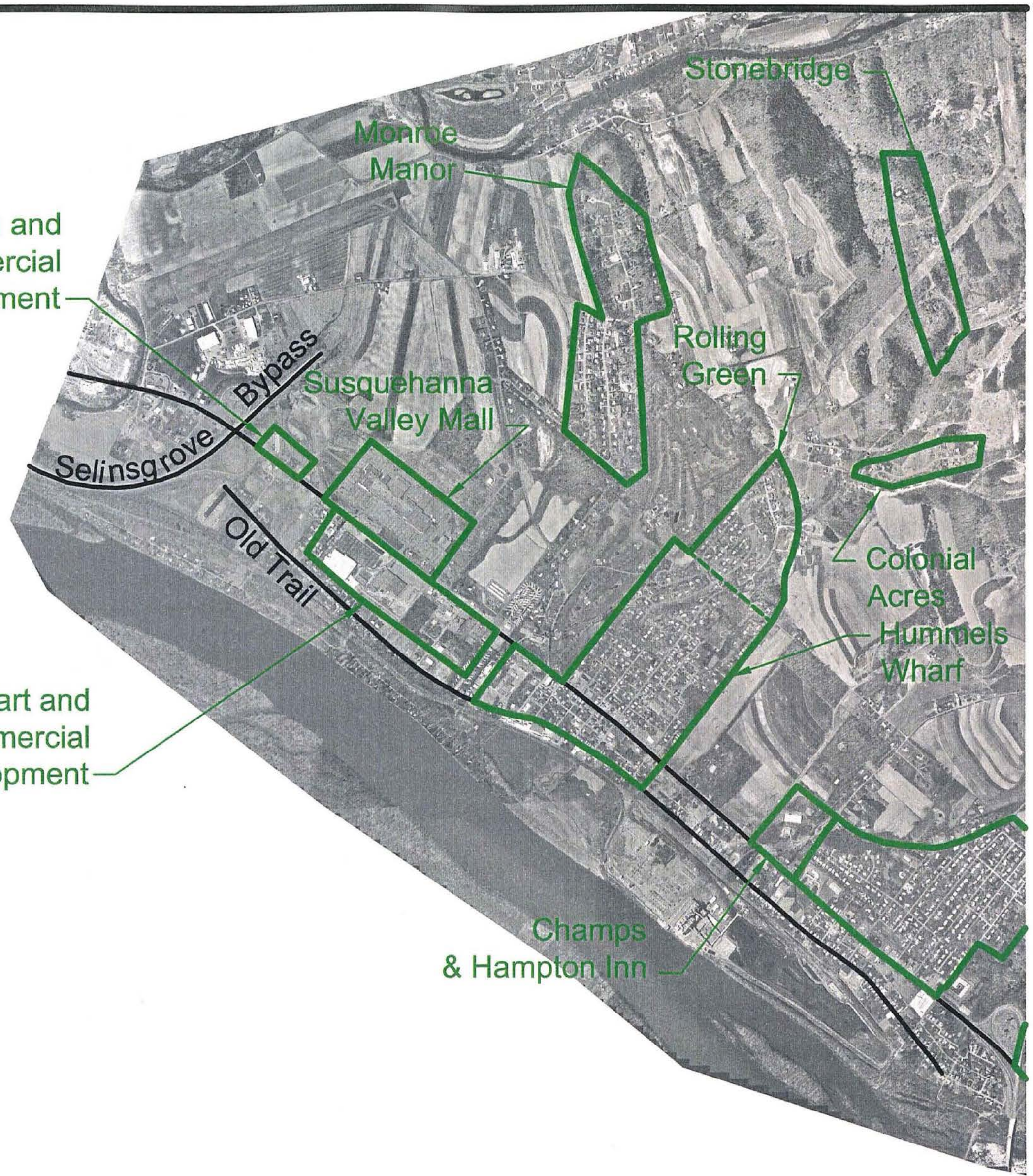


Central Susquehanna Valley
Transportation Project

Figure IV-L-4
Section 2 -
1970 Project Area
Development

0 300 600 900
Scale in Meters

0 1250 2500 3750
Scale in Feet



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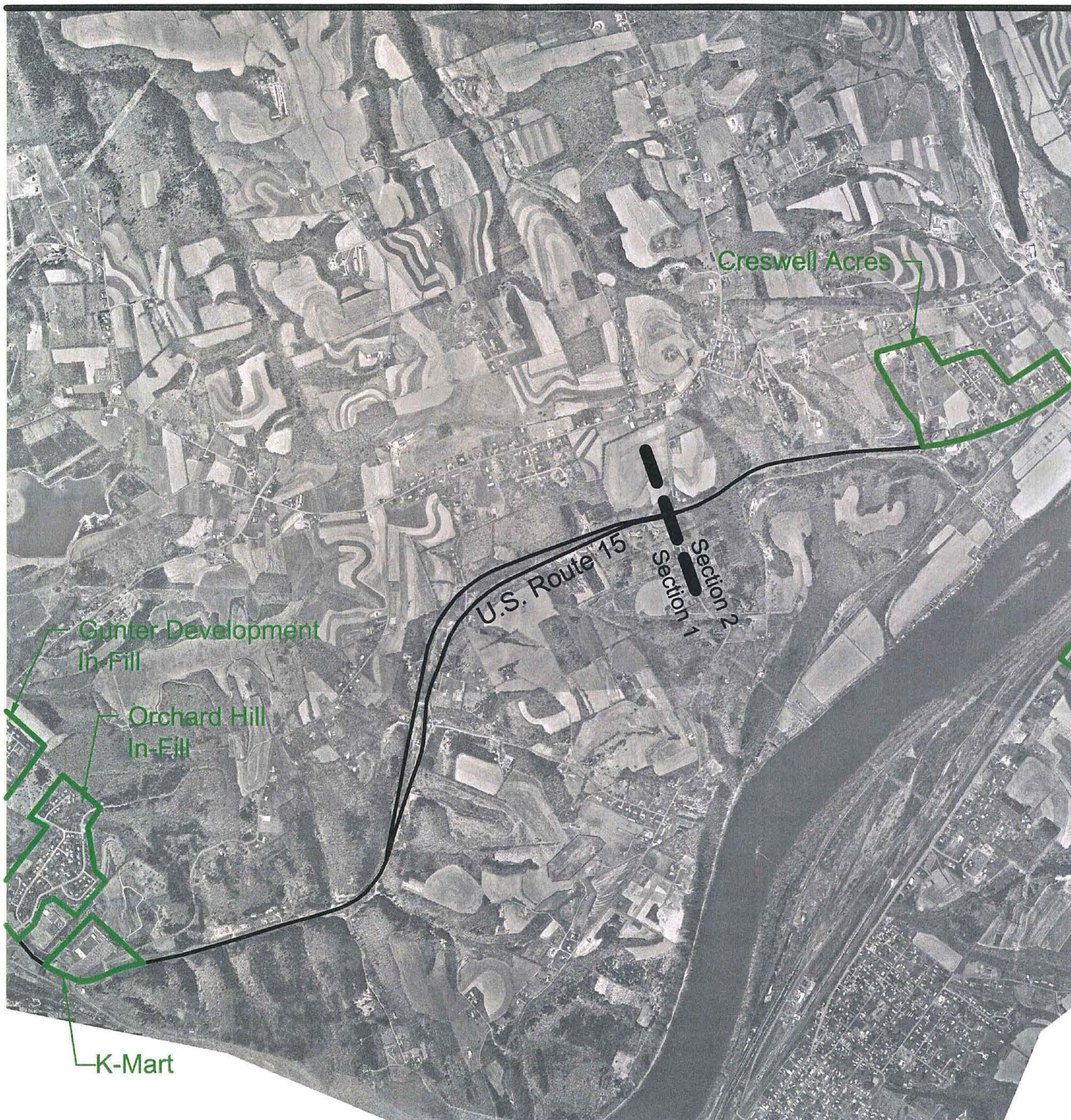
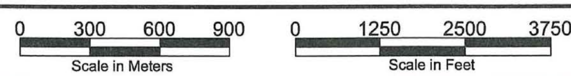
Development Node

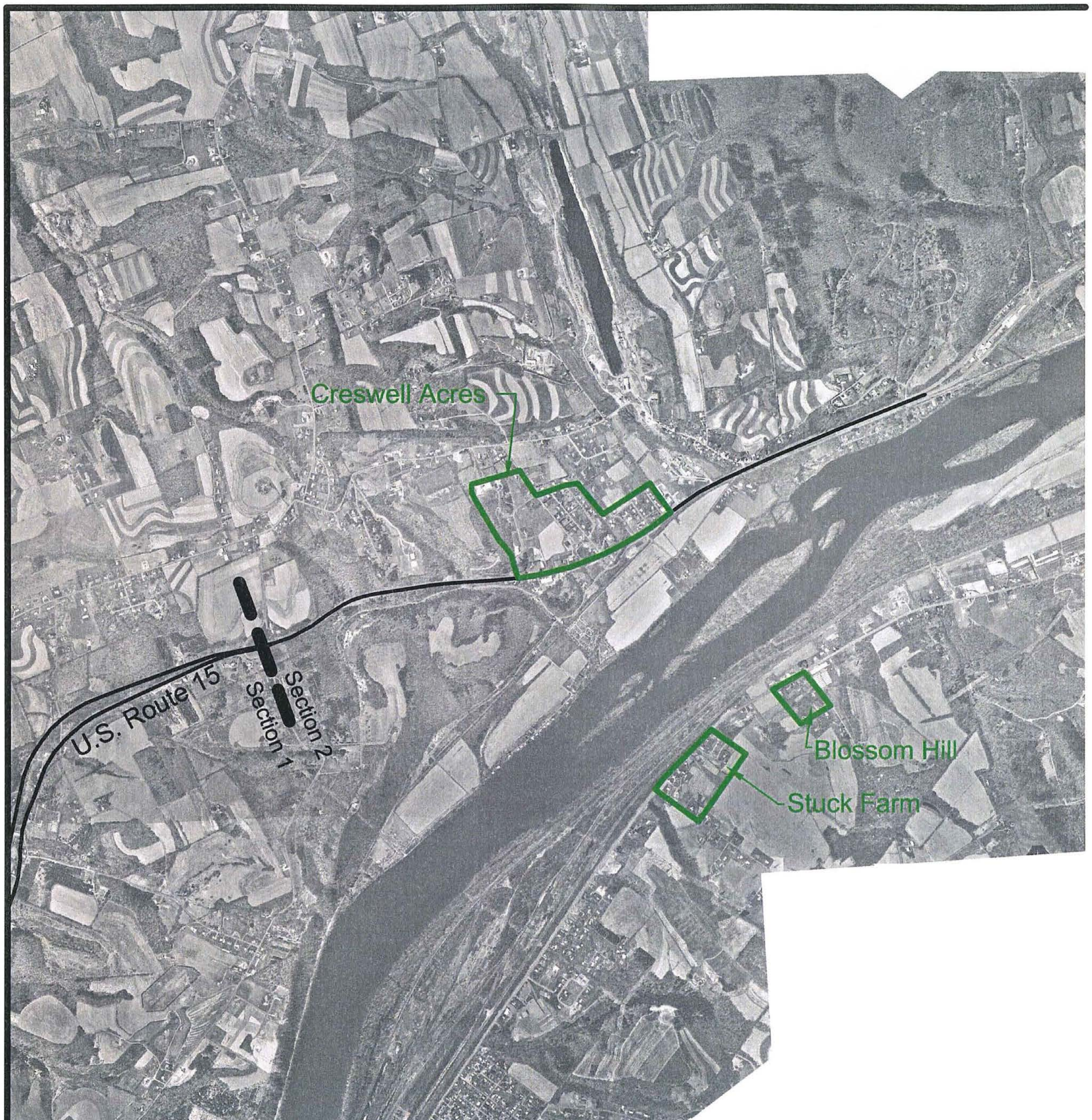


Central Susquehanna Valley Transportation Project

Figure IV-L-5

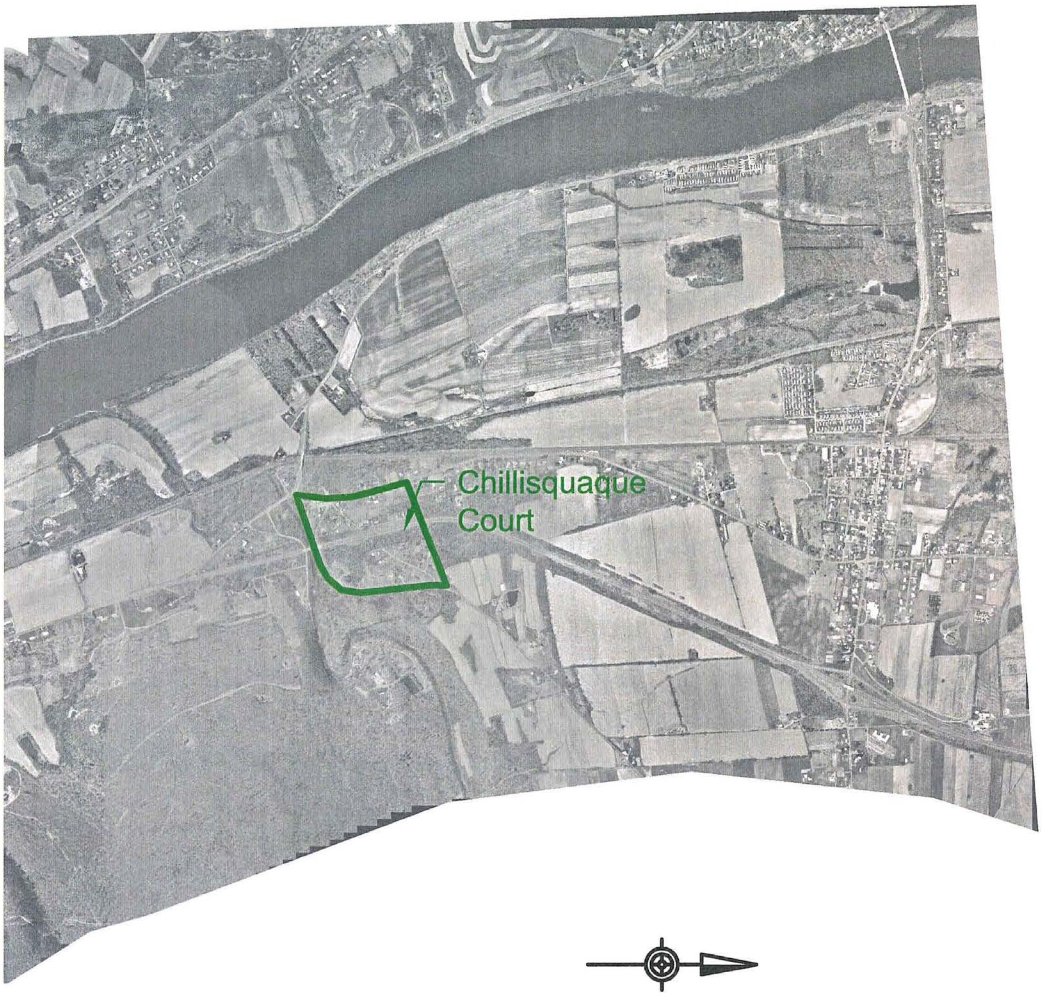
Section 1 - 1995 Project Area Development





Legend

Development Node



Central Susquehanna Valley Transportation Project

Figure IV-L-6

Section 2 -
1995 Project Area Development

- Susquehanna Valley Mall (1978)
- Comfort Inn and adjacent commercial development
- Walmart and adjacent commercial development
- Champs indoor soccer complex and the Hampton Inn
- In-fill development in the Gunter and Orchard Hills subdivision
- Kmart
- Development of the Monroe Manor, Rolling Green, Colonial Acres, and Stonebridge residential subdivisions

Development in Section 2 during the 1970's, 1980's, and early 1990's focused on the development of the Cresswell Acres subdivision south of Winfield and the Stuck Farm, Blossom Hill, and Chillisquaque Court subdivisions in Point Township. The greenhouses and other small comercial facilities near the intersection of Route 147 and Ridge Road were also constructed during this period.

It is clear that the most significant development activities during the past 30 years include the Susquehanna Valley Mall and adjacent commercial development and the residential growth that has occurred throughout Monroe, Union, and Point Townships and Shamokin Dam Borough. According to the 1986 Monroe Township Comprehensive Plan, the 1970's were, by far, the largest period of residential growth for the township. Like the growth that occurred during the 1960's and 1970's, the development is likely the cumulative effect of the completion of the Selinsgrove Bypass, expanded availability of water and sewer service, zoning implementation (1987 in Shamokin Dam and Monroe Township), and other related actions. It appears that the Susquehanna Valley Mall and adjacent commercial development can be tied fairly closely to its proximity to the Selinsgrove Bypass, while the residential development that occurred during the period may have some ties to the improved roadway, but is more closely tied to the expanded availability of public water and/or sewer service.

Although there were a number of smaller projects during the period, the subdivisions and land developments depicted on Figures IV-L-3 through IV-L-6 constitute most of the residential and commercial or industrial development that occurred between 1970 and 1995 in the general study area. This development activity accounted for approximately 111.3 hectares (275 acres) of residential development and 44.5 hectares (110 acres) of commercial/industrial growth in Monroe Township; 16.2 hectares (40 acres) of commercial development in Shamokin Dam; 38.4 hectares (95 acres) of residential development in Union Township; and 18.2 hectares (45 acres) of residential development in Point Township during this period. A review of the locations where this development occurred from the 1970 photograph reveals that almost all of this development resulted from a conversion of agricultural lands to these other uses.

By comparing the two time periods (1950-1970 and 1970-1995), the average development activity in a 20 to 25 year timeframe in Monroe Township appears to be within the 131.5 to 155.8-hectare (325 to 385-acre) range. Similarly, Shamokin Dam's average development rate in this period decreased dramatically from 113.3 hectares (280 acres) during the 1950's and 1960's to approximately 16.2 hectares (40 acres) in the 1970's and 1980's. Union Township also saw a drop from 48.6 hectares (120 acres) of commercial/industrial development to very little development activity. Point Township, on the other hand, saw an increase from little development to 56.6 hectares (140 acres) of residential development during the latter time period.

3. Actions by Others

Coordination with PENNDOT; Northumberland, Snyder, and Union County Planning Commission staffs; and the U.S. Army Corps of Engineers (U.S. ACOE) identified regional flood control projects as actions by others (U.S. ACOE) that may cause cumulative impacts to the project areas floodplains. Specifically, these projects include levee projects in Athens, Duryea, Wyoming Valley, (Wilkes-Barre), Danville, Bloomsburg (potential project) and Lock Haven and the Tioga Hammond and Cowanesque Dams. At the request of the Northumberland, Snyder, and Union County Commissioners, the U.S. ACOE conducted a cumulative study of these projects in the CSVT project area.

Based on the US ACOE's work, the net result of the aforementioned flood control and flood protection projects is as follows:

- Northumberland and Snyder Counties will see no increase in 100-year flood stages.
- Sunbury and Shamokin Dam will see an increase of 0.4 feet for recurrence of an Agnes Event.
- Riverside Borough, Point Township, and Northumberland Borough will see a decrease of 0.7', 0.8', and 0.8', respectively, for recurrence on an Agnes event.

Given the U.S. ACOE's conclusions, the regional flood control projects do not add to the 100-year floodplain impacts of the alternatives. Therefore, the floodplain impacts are limited to the direct impacts as discussed in Section IV.I.

In addition to the COE activities, PENNDOT has several regional projects that have the potential to impact local resources and therefore are to be considered in the cumulative effect analysis.

- Addition of two lanes to the Two on Four Section of Route 147 north of Northumberland
- Design is underway for widening the confined section of Route 15 through Lewisburg in proximity to the Route 45 intersection
- The 1997 resurfacing and widening from 10-foot to 12-foot lanes of the "Golden Strip"

None of these projects are expected to have associated secondary growth impacts. The Lewisburg and Golden Strip improvements are safety improvements that will not provide the access improvements typically needed to result in growth inducement. These projects are both in urbanized areas and will have limited natural resource impacts as summarized in the Categorical Exclusion Evaluations (CEE) completed for the projects. The Two on Four improvements will be completed almost entirely within existing right-of-way on a limited access facility and will also have limited growth-related impacts. This project is in a more rural setting than the other PENNDOT projects and does have associated wetland and stream impacts. These impacts are described in the CEE for the project and the necessary mitigation is addressed in the DEP permit for the project.

A review of the Population and Employment Projections Technical Memorandum and communications with each of the study area municipalities has resulted in a summary of the residential subdivisions and commercial/industrial land development plans that have been approved, but not completed to date. The only exceptions to this rule are the Fisher farm property and Indian Ridge (God's Holiness Campground) projects, which have surpassed the speculative stage by receiving sewage facility planning module approval and the holding of a rezoning hearing, respectively. Projects listed in the Technical Memorandum as "very speculative" have not been identified here as likely sites for future development. The subdivisions and developments within the project area that are seen as foreseeable in the planning period are shown on Figure IV-A-7 and are summarized in Table IV-L-1. Some residential subdivisions and land developments that are outside the project area and have no relationship to the

TABLE IV-L-1
HOUSING PROJECTIONS AND PLANNED RESIDENTIAL DEVELOPMENT

	MONROE TWP	SHAMOKIN DAM	UNION TWP	POINT TWP
Proposed Residential Lots Inside SCIAs	707[1]	75[2]	0	110[3]
Proposed Residential Lots Outside SCIAs	45[4]	0	13[5]	60[6]
Total Planned Residential Lots	752	75	13	170
Projected 2000-2030 Housing Demand	336	0	246	591
Housing Deficit	0	0	233	421

[1] Includes the Fisher Farm and Indian Village Assoc. planned subdivisions
[2] Includes the Brocius and Golden Gate planned subdivisions
[3] Includes the Chadwicks planned subdivision
[4] Includes the Park Ridge and Monroe Meadows planned subdivisions
[5] Includes the Winfield Estates and Winfield Acres planned subdivisions
[6] Includes the Ridge Point planned subdivision

proposed improvements are included in Table IV-L-1 and identified in the Technical Memorandum, but are not shown on Figure IV-A-7.

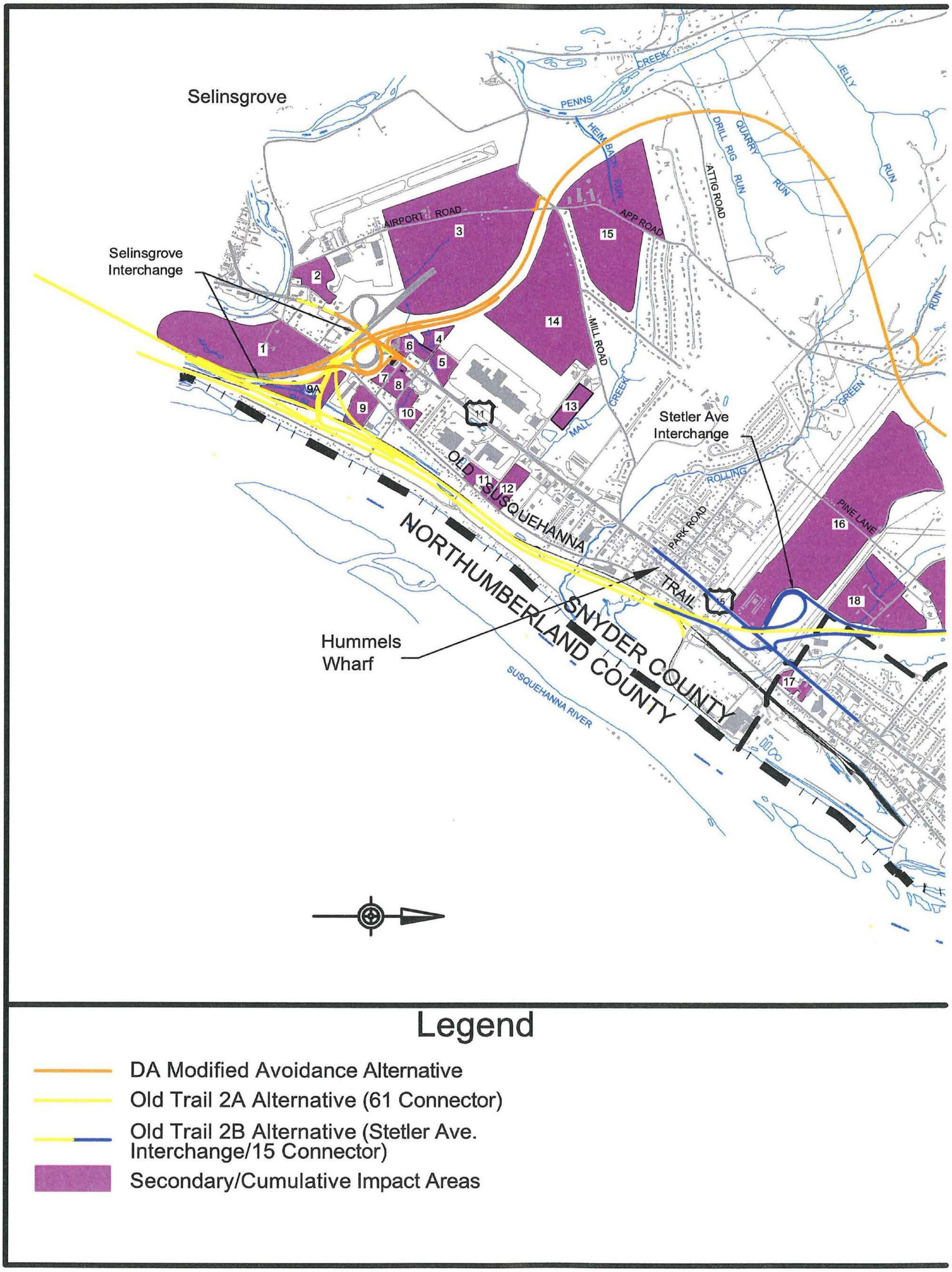
4. Project Secondary Impacts

Secondary/cumulative impact areas (SCIAs) were identified through a review of the existing county and municipal planning documents, study area mapping, and field reconnaissance. The status of the existing planning documents currently in effect in the study area municipalities is discussed on Pages IV-49 through IV-53. Figures IV-L-7 and IV-L-8 show the locations of all identified SCIAs. To be identified and then analyzed, an area must not be extensively developed and actively used; must not be comprised predominately of a significant development constraint such as floodplains or steep slopes; and must be in close proximity to an access point of the proposed roadway (typically within sight of the roadway and/or within one to two minutes of travel time from an interchange). These criteria are needed so that development itself is viable within the areas identified and so the connection between increased development potential and the transportation system improvements can be adequately justified.

The portion of these areas likely to develop within 30 years is very difficult to predict. Therefore, the analysis involves the projection of the amount of residential growth anticipated for the planning period, the amount of projected growth expected to occur within already approved subdivisions, and the amount of this growth that can be accommodated within the SCIAs without impacting key resources including wetlands, floodplains, agricultural security areas, and historic sites. Land cover types of the areas not including these key resources is also presented so the types of land cover most likely to be converted to urbanized uses can be identified.

The growth projections have been arrived at by reviewing the population projections contained within the "Population and Employment Projections Technical Memorandum." The population projections are converted to housing demand by dividing the number of projected new residents by the average number of persons per housing unit in each municipality (based on 2000 Census Bureau data). The housing demand is then converted to an area requirement by assuming average 0.4 hectares (1.0 acres) lots for areas in municipalities with sewer service, 0.2 hectares (0.5 acres) lots in areas of suburban municipalities with public sewer service, and 0.1 hectares (0.25 acres) lots within Shamokin Dam. A summary of the projections is presented in Table IV-L-2.

Table IV-L-3 summarizes the existing conditions in each SCIA and identifies potential impacts as either secondary, cumulative, or both for each project alignment alternative. Secondary impacts are identified if sewer and water service are available or low density development is expected in accordance with current zoning.


Selinsgrove
Selinsgrove Interchange
Stetler Ave Interchange
Hummels Wharf
PENNS CREEK
HEIM BACK RUN
DRILL RIG RUN
QUARRY RUN
ATTIG ROAD
JELLY RUN
AIRPORT ROAD
APP ROAD
MILL ROAD
MALL CREEK
OLD SUSQUEHANNA TRAIL
PARK ROAD
ROLLING GREEN RUN
PINE LANE
SNYDER COUNTY
NORTHUMBERLAND COUNTY
SUSQUEHANNA RIVER
1
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9A
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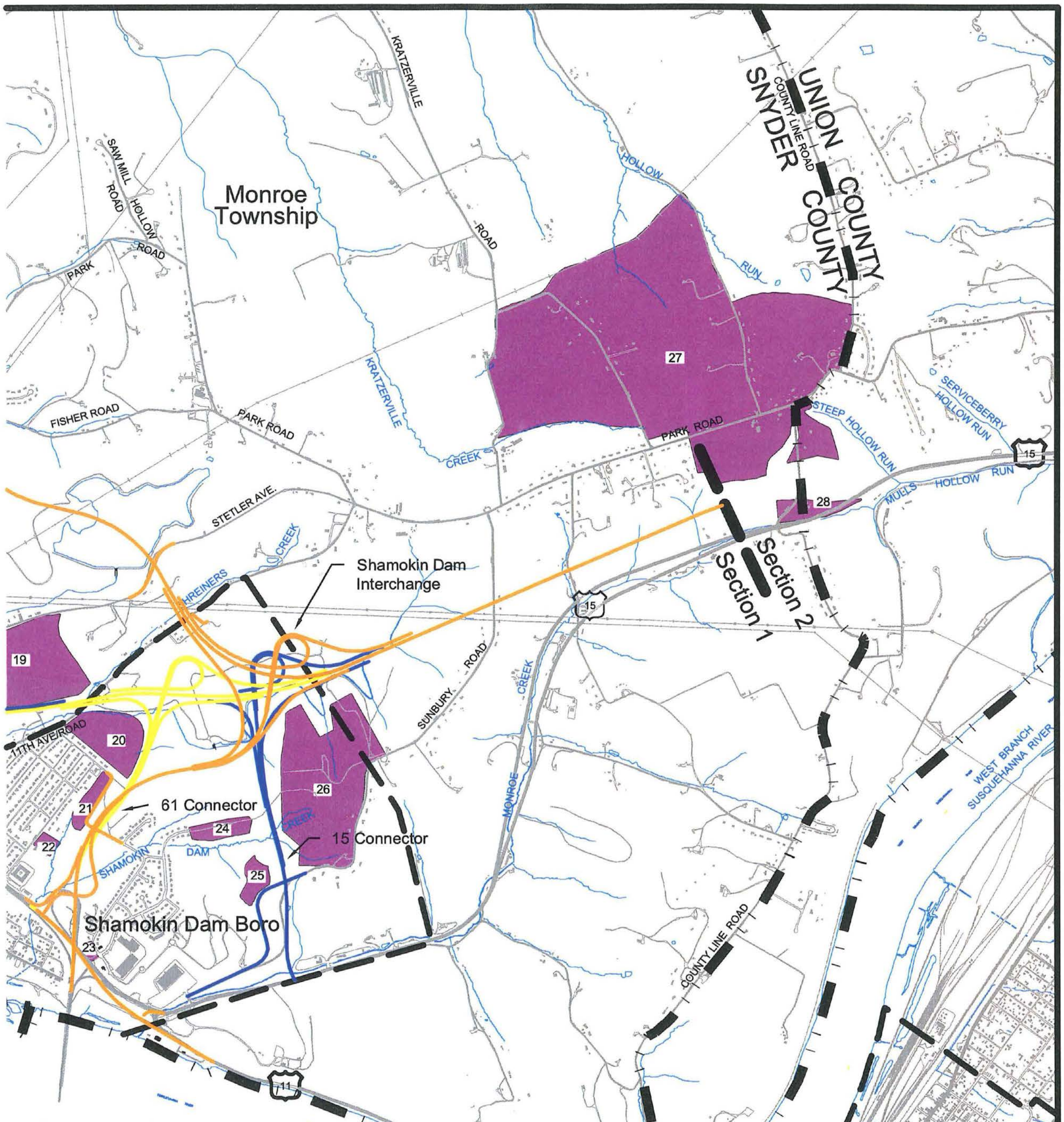
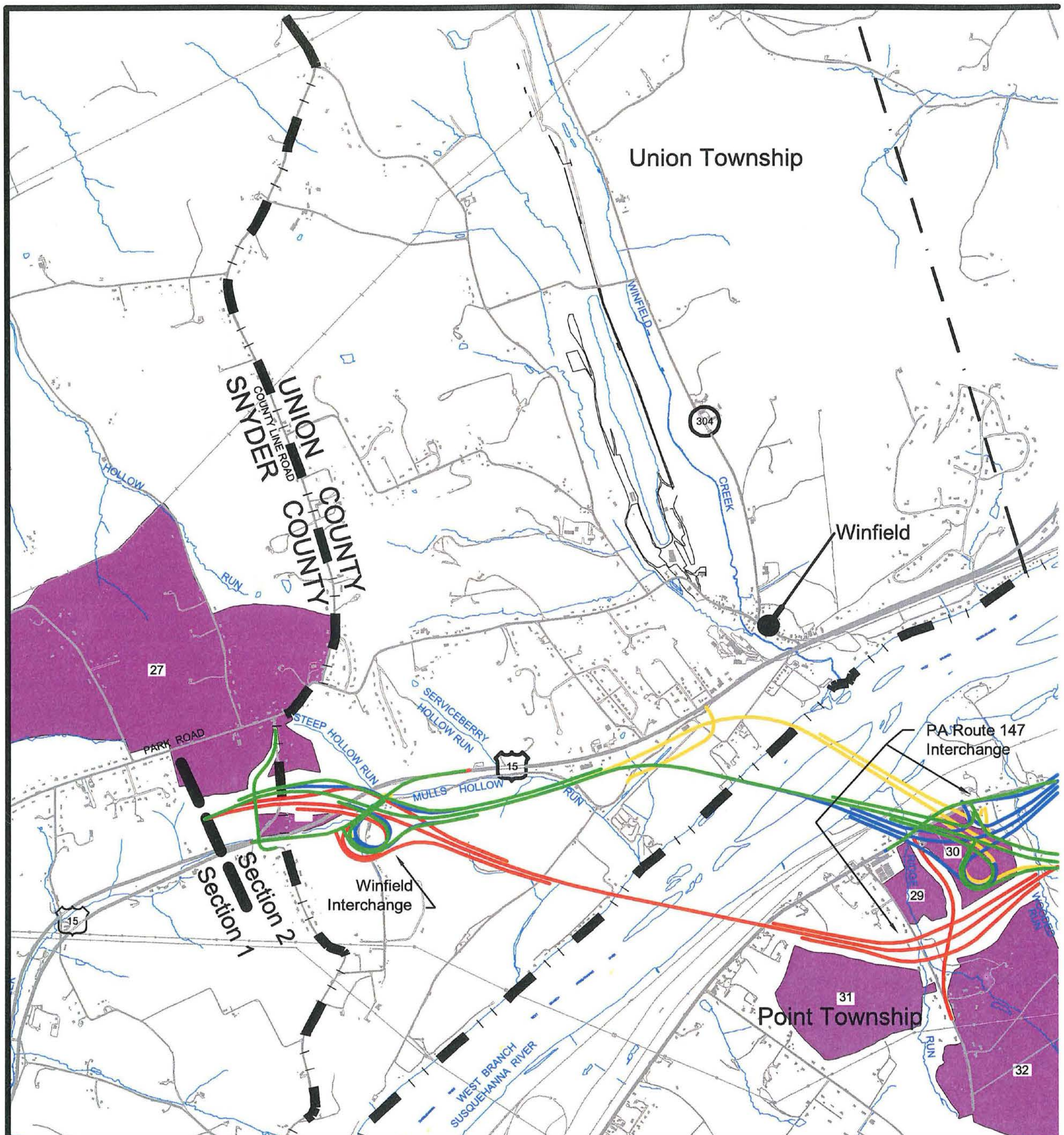
Legend
DA Modified Avoidance Alternative
Old Trail 2A Alternative (61 Connector)
Old Trail 2B Alternative (Stetler Ave. Interchange/15 Connector)
Secondary/Cumulative Impact Areas



Central Susquehanna Valley Transportation Project

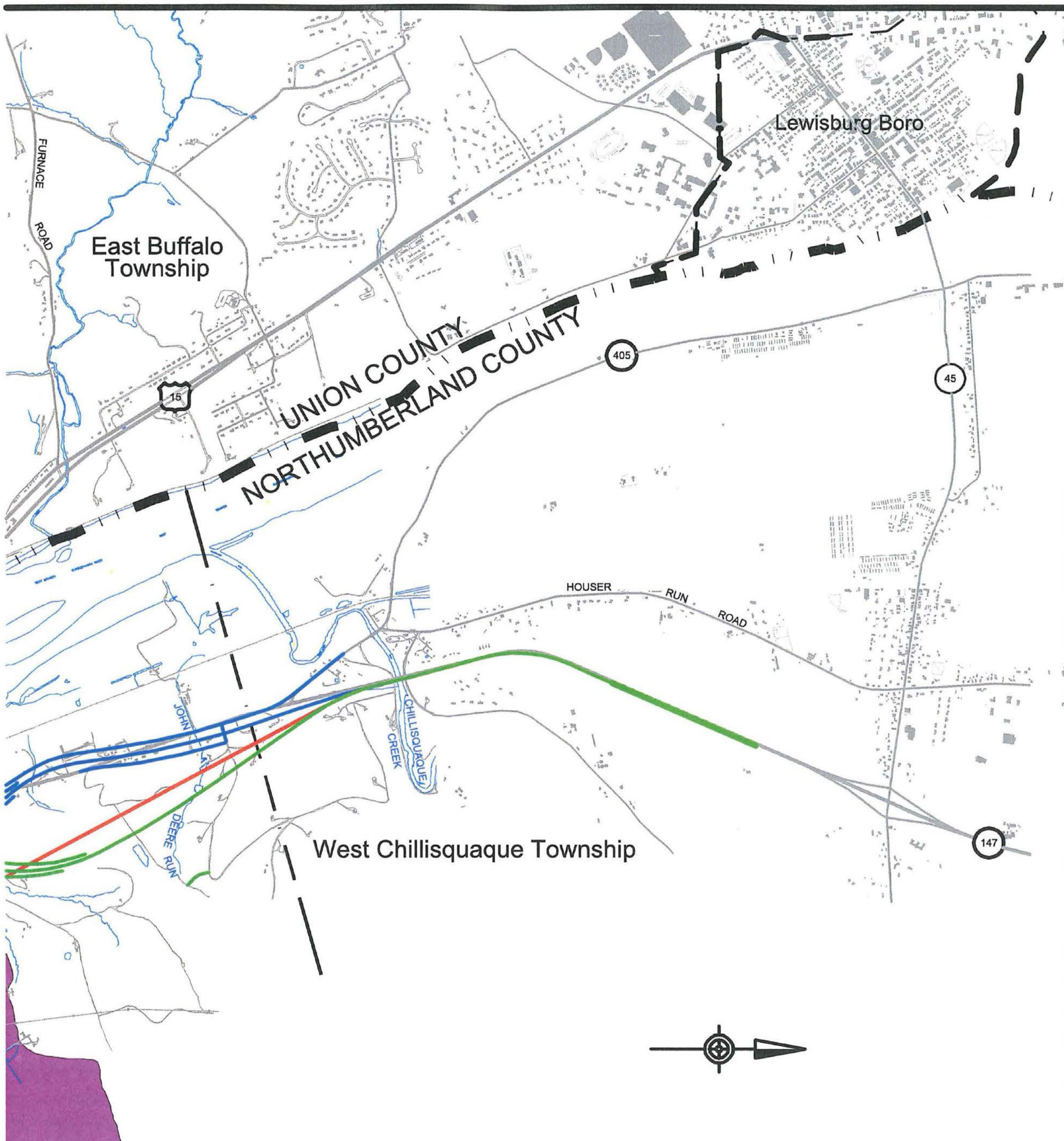
Figure IV-L-7
Section 1 - Secondary/Cumulative Impact Areas

0 300 600 900 Scale in Meters
0 1250 2500 3750 Scale in Feet



Legend

- River Crossing 1 - East Alternative
- River Crossing 1 - West Alternative
- River Crossing 5 Alternative
- River Crossing 6 Alternative
- Secondary/Cumulative Impact Areas



Central Susquehanna Valley Transportation Project

Figure IV-L-8
Section 2 -
Secondary/Cumulative
Impact Areas

0 300 600 900 Scale in Meters
0 1250 2500 3750 Scale in Feet

TABLE IV-L-2
POPULATION PROJECTIONS AND HOUSING AREA DEMANDS

MUNICIPALITY	PROJECTED GROWTH 2000-2030	PERSONS/ HOUSING UNIT 2000	PROJECTED HOUSING UNIT DEMAND 2000-2030	PROJECTED DENSITY* UNITS PER HA (ACRES)	PROJECTED AREA DEMAND 2000-2030 HECTARES (ACRES)
Monroe	806	2.4	336	5 (2)	67.2 (168)
Shamokin Dam	-137	2.2	0	10 (4)	0 (0)
Union	639	2.6	246	2.5 (1)	98.4 (246)
Point	1,536	2.6	591	2.5 (1)	236.4 (591)

* 0.4-hectare (1.0-acre) avg. lots assumed for areas predominately unsewered, 0.2-hectare (.5-acre) avg. lots assumed for sewered areas except the more dense Shamokin Dam Borough with 0.1-hectare (.25-acre) avg. lots.

The OT2B Alternative has the greatest amount of land identified as susceptible to secondary development in Section 1 due to the additional interchange associated with this alternative. However, the amount of actual development projected to occur is not expected to be affected by the selection of any of the Section 1 alternatives.

Based on the information provided previously in this section, all of Monroe Township's future residential growth could easily be accommodated within the planned subdivision of the Fisher farm and Indian Village Associates property. Since neither of these projects are related to the proposed improvements but constitute actions of others in close proximity to the project, the impacts are cumulative, rather than secondary. Therefore, impacts to resources are covered in the following section.

Shamokin Dam has no projected population increase for the planning period and the only existing planned subdivisions are within the footprint of the 61 Connector. Therefore, no secondary or cumulative impacts are anticipated within the borough limits.

Very little land in Union Township is projected to be susceptible to secondary impacts resulting from the Section 2 alternatives. However, unlike the past five decades, significant residential growth is projected for the township (see Table IV-L-1). If this development does occur, it is most likely to be located some distance and bear little relationship to the proposed improvements. Therefore, a qualitative review of potential impacts is included in the cumulative impact section.

Similar to Union Township, Point Township is projected to have substantial population growth within the next 30 years. The only planned development that may occur in the SCIAs is the Chadwicks project, which may be partially impacted depending on the alternative chosen. If fully constructed as planned, up to 110 dwelling units would be constructed on the property and could be considered a

TABLE IV-L-3
SECONDARY/CUMULATIVE IMPACT AREAS

Area	Total Area Hectares (Acres)	Constrained Area* Hectares (Acres)	Unconstrained Area Hectares (Acres)	Comments	Potential Impact	Applicable Alternatives
1	26.4 (65.2)	26.4 (65.2)	0.0 (0.0)	entirely within 100-year floodplain - dropped from analysis	None	
2	3.7 (9.2)	0.0 (0.0)	3.7 (9.2)	grassy area may convert to industry	Secondary	DAMA, OT2A, OT2B
3	53.1 (131.3)	21.1 (52.1)	32.0 (79.2)	productive agriculture may convert to industry & residential - historic properties, wetlands, and agricultural security areas may be impacted	Cumulative	DAMA, OT2A, OT2B
4	1.5 (3.5)	0.5 (1.3)	1.0 (2.2)	old field may convert to commercial with some possible wetland impacts	Secondary	DAMA, OT2A, OT2B
5	2.0 (5.0)	1.2 (3.0)	0.8 (2.0)	old field may convert to commercial with some possible stream and undelineated wetland impacts	Secondary	DAMA, OT2A, OT2B
6	1.9 (4.8)	0.3 (0.7)	1.6 (4.1)	Comfort Inn & old field may convert to other commercial use with some possible stream and undelineated wetland impacts	Secondary	DAMA, OT2A, OT2B
7	0.8 (2.0)	0.0 (0.0)	0.8 (2.0)	cornfield may convert to commercial use	Secondary	DAMA, OT2A, OT2B
8	1.7 (4.2)	0.9 (2.2)	0.8 (2.0)	cornfield may convert to commercial use	Secondary	DAMA, OT2A, OT2B
9	2.9 (7.2)	2.9 (7.2)	0.0 (0.0)	entirely within 100-year floodplain - dropped from analysis	None	
9a	4.7 (11.6)	4.7 (11.6)	0.0 (0.0)	entirely within 100-year floodplain - dropped from analysis	None	
10	2.2 (5.4)	1.8 (4.4)	0.4 (1.0)	grassy area may convert to commercial use with possible floodplain impacts	Secondary	DAMA, OT2A, OT2B
11	1.9 (4.8)	1.9 (4.8)	0.0 (0.0)	agriculture & old field may convert to residential use with possible floodplain impacts	Secondary	DAMA, OT2A, OT2B
12	2.8 (6.8)	2.8 (6.8)	0.0 (0.0)	agriculture & forested areas may convert to commercial use with possible floodplain & wetland impacts	Secondary	DAMA, OT2A, OT2B
13	2.8 (6.8)	0.0 (0.0)	2.8 (6.8)	old field may convert to commercial use	Secondary	DAMA, OT2A, OT2B
14	30.1 (74.4)	0.0 (0.0)	30.1 (74.4)	agriculture & forested areas may convert to commercial and residential use with possible ag security area and wetland impacts	Secondary	DAMA
15	34.6 (85.6)	0.2 (0.6)	34.4 (85.0)	agricultural area may convert to residential use with possible historic district and ag security area impacts	Secondary	DAMA
16	50.7 (125.4)	3.5 (8.7)	47.2 (116.7)	God's Holiness Campground, agricultural and forest areas may convert to commercial use with possible historic resource, wetland and ag security area impacts	Secondary/ Cumulative	OT2B
17	1.4 (3.6)	0.0 (0.0)	1.4 (3.6)	McDonalds & commercial areas may convert to other commercial uses	Secondary	OT2B
18	13.9 (34.4)	0.2 (0.6)	13.7 (33.8)	forested area may convert to residential use with rezoning - possible wetland & ag security area impacts	Cumulative	OT2B

* Amount of property constrained for development by presence of: floodplains; steep slopes; wetlands; and known historic sites.

TABLE IV-L-3
SECONDARY/CUMULATIVE IMPACT AREAS

Area	Total Area Hectares (Acres)	Constrained Area* Hectares (Acres)	Unconstrained Area Hectares (Acres)	Comments	Potential Impact	Applicable Alternatives
19	18.5 (45.8)	0.0 (0.1)	18.5 (45.7)	grassy area may convert to low density residential use with rezoning - possible ag security area impacts	Cumulative	OT2B
20	8.5 (21.1)	0.0 (0.0)	8.5 (21.1)	agricultural & forested area may convert to residential use with rezoning	Cumulative	DAMA, OT2A
21	2.4 (5.9)	0.00 (0.0)	2.4 (5.9)	forest and old field may convert to residential use	Secondary	DAMA, OT2A
22	0.8 (2.2)	0.0 (0.0)	0.8 (2.2)	grassy area may convert to residential use	Secondary	DAMA, OT2A
23	0.5 (1.3)	0.0 (0.0)	0.5 (1.3)	grassy area may convert to residential use	Secondary	DAMA, OT2A
24	2.7 (6.6)	0.0 (0.0)	2.7 (6.6)	forested area may convert to residential use	Secondary	DAMA, OT2A, OT2B
25	2.2 (5.5)	0.0 (0.0)	2.2 (5.5)	forested area may convert to low density residential use	Secondary	OT2B
26	33.5 (82.7)	0.0 (0.1)	33.5 (82.6)	agricultural & forested area may convert to residential use with small portion rezoned - possible wetland impacts	Secondary/ Cumulative	OT2B
27	167.1 (412.8)	4.6 (11.5)	162.5 (401.3)	agricultural, forested, & residential area may convert to more residential use with portion rezoned - possible historic resource & ag security area impacts	Secondary/ Cumulative	RC1-W, RC1-E, RC5, RC6
28	3.3 (8.2)	0.1 (0.1)	3.2 (8.1)	old field and forested area may convert to any use (unzoned) - possible wetland impacts	Secondary	RC1-W, RC1-E, RC5, RC6
29	7.5 (18.5)	0.1 (0.1)	7.4 (18.4)	agricultural area may convert to high density residential use with provision of sewer/water service - possible ag security area impacts	Secondary/ Cumulative	RC1-W, RC1-E, RC5, RC6
30	13.8 (34.0)	0.0 (0.0)	13.8 (34.0)	site of planned Chadwick's subdivision - development independent of project	None	
31	31.8 (78.8)	15.7 (38.7)	16.1 (40.1)	agricultural area may convert to high density residential use with provision of sewer/water service - possible historic resource & ag security area impacts	Cumulative	RC1-W, RC1-E, RC5, RC6
32	95.3 (235.5)	0.7 (1.8)	94.6 (233.7)	agricultural area may convert to residential use with rezoning - possible ag security area impacts	Cumulative	RC1-W, RC1-E, RC5, RC6

* Amount of property constrained for development by presence of: floodplains; steep slopes; wetlands; and known historic sites.

secondary impact. If so, this 25.9-hectare (64-acre) property development would constitute the conversion of approximately 22.2 hectares (55 acres) of agricultural lands, with the balance being deciduous forest land. While a detailed wetland delineation has not been conducted, no wetlands have been identified to date on the property. The property is not currently in an ASA. There are three other SCIAs in Point Township that, if provided with public water and sewer, could accommodate substantial future residential development as cumulative impacts of the project. The potential impacts of this development is addressed in the cumulative impact section.

5. Project Cumulative Impacts

Cumulative impacts are indicated if actions by others are needed, such as utility extensions, to develop in accordance with zoning or if utilities are available, but a rezoning from low density development (such as agriculture) would be required prior to extensive development of the SCIA. Cumulative impacts may also include actions of others that may not have a relationship to the project, but impact resources in the study area. In some cases, impacts are identified as secondary or cumulative in Table IV-L-2 if there are multiple development scenarios possible for the SCIA.

As indicated in Section IV.4, the development of the Fisher and Indian Village Associates properties in Monroe Township could comfortably accommodate the residential development projected for the township for the next 30 years. As such, the potential environmental impacts of these properties should reasonably approximate the project's actual secondary and cumulative impacts in the township.

The Fisher tract, which constitutes 13 hectares (32 acres), is currently agricultural and determined to be eligible for the National Register of Historic Places. Wetlands were delineated on the property as part of the project (see Figure IV-F-7). The extent of the wetlands is limited and contained within a single drainageway, so impacts would likely be avoided and any minor wetland crossing mitigated in accordance with the necessary permit.

The property is within the township's agricultural security area (ASA) and the proposed development will impact 13 hectares (32 acres) of the Monroe Township ASA. This impact to one parcel out of the seventy-two currently in the Monroe Township equals less than one-half of one percent of the total Monroe Township ASA. The Maryland-Pennsylvania Railroad case set the precedent that the ASA law (Act 43) must be interpreted in a manner that will preserve the economic viability of farming throughout the ASA. Pennsylvania Act 43, Agricultural Area Security Law, requires that an ASA be reevaluated if ten percent of the original acreage is lost or the overall size reduced below 101.2 hectares (250 acres). Using this threshold as the minimum area where the economic viability of the ASA as a whole may be threatened, the development of the Fisher Farm is not expected to threaten the economic viability of farming throughout the ASA.

Given the above analysis, the cumulative impacts of the potential development of the Fisher farm should be limited to the conversion of the agricultural land, loss of a small portion of the Monroe Township ASA, and loss of the historic resource.

A zoning hearing was held in November 2001, and there has reportedly been regular communications between the developer and Monroe Township regarding the development of the God's Holiness Campground to include 250 residential units and 41,340 square meters (445,000 square feet) of retail space. Therefore, this project is included here as a foreseeable cumulative impact to the area. A review of the mapping contained throughout the EIS indicates that the property is predominantly agricultural and has a small amount of wetland along Route 11. None of the property is contained in an ASA. Due to the limited extent of wetlands, impacts are likely to be avoided and any minor impacts mitigated in accordance with the necessary permit. God's Holiness Campground has been found to be eligible for the National Register of Historic Places. Given these conditions, the cumulative impact of the development of this property involves the conversion of an undetermined amount of agricultural land, a smaller portion of woodland, and the loss of a historic resource.

As indicated in the previous section, there is a substantial amount of projected residential development for Union Township (approximately 233 units) that are anticipated to be developed at some distance from the proposed improvements. Since there is a low number of planned lots in the township at this time, it is not possible to predict the exact location of the future development. However, given the lack of public sewer service in the township, it is reasonable to assume that the development will be at fairly low density, approximately one dwelling unit per 0.4 hectare (1 acre). Therefore, the extent of the development should be approximately 95 hectares (233 acres). The township is a mix of agricultural and forested land use types, so the conversion is expected to be from a mix of these two uses. Wetland and other natural resource impacts should be avoidable at the anticipated low densities. If all of the development were to occur within the township's various ASA properties, the impact would equate to 11.2 percent of the Union Township ASA. However, it is unlikely that 90 percent or more of the future development of the township will occur in ASA properties. Therefore, it is expected the actual impact will constitute much less than the ten percent threshold presented above for the economic viability of the ASA so the viability should be maintained.

The cumulative impacts related to the project in Point Township are expected to be focused in SCIAs 29, 30, and 32. These SCIAs constitute 134.7 hectares (332.8 acres) that, based on secondary sources and limited field investigations, lack wetlands and are predominately agricultural. The Gulick Farm Property, found to be eligible for the National Register of Historic Places, would be impacted by the development of SCIA 31.

If these Point Township SCIAs develop at the density of the adjacent Chadwicks planned subdivision, these properties could accommodate approximately 565 dwelling units, significantly more than the 421-unit future demand identified in Table IV-L-1. Therefore, it is reasonable to project that all of the township's housing for the next 30 years could be constructed within the Chadwicks and Ridge Point subdivisions and SCIAs 29, 30, and 32. If this proves to be the case, ASA impacts could be as much as 44.8 hectares (110.7 acres), constituting a maximum of 3.5 percent of the township's ASA properties. Therefore, following the threshold for economic viability presented previously, development over the next 30 years should allow the ASA to remain viable throughout the planning period. Since the subdivision of SCIAs 29, 30, and 32 have not yet been developed, and since some of the future development could be located in other portions of the township, the exact impacts to the resources presented herein may be slightly more or less than presented here, but the impacts contained herein should reasonably resemble the actual impacts.

6. Summary of Secondary and Cumulative Impacts

Once again, it is impossible to definitively locate specific areas for future development beyond the already planned subdivisions identified in this document and the associated Technical Memorandum. Therefore, where it is anticipated that already planned subdivisions cannot accommodate projected growth, an approach has been taken that locates those lands subjected to increased development pressure related to the proposed transportation improvements and/or those areas impacted by actions by others in the general project area. Non-subdivision related impacts to resources caused by actions of others that are not related to the CSVT Project have been determined to be minor in nature and are discussed in detail in the EIS the COE prepared for the Wyoming Valley Levee Raising Project, and PENNDOT CEEs for the regional roadway projects described in Section IV.L.3.

Development in Monroe Township over the next 30 years is expected to occur at a rate similar to that of the past five decades. Shamokin Dam is not projected to experience substantial development during the planning period. Conversely, Union Township, which did not grow substantially over the past two or three decades, is expected to accommodate approximately 250 new dwelling units on approximately 95 hectares (233 acres). Point Township is also projected to grow at a rate approximately twice that of the past two decades, focused primarily on residential subdivisions. The higher growth rates projected for Union and Point Townships are not a result of the proposed transportation improvements, but rather other factors such as the provision of sewer and/or water capacity and the continued suburbanization of Lewisburg, Northumberland, and Sunbury.

To summarize the projected secondary impacts related to the proposed improvements, they are expected to be limited to the conversion of approximately 22.2 hectares (55 acres) of agricultural land in Point Township and four hectares (10 acres) of forested land. Since the actual location of future development cannot be pinpointed at this time, the actual impacts may vary and may be found within the other SCIAs listed in Table IV-L-3. If so, the secondary impacts should still be limited to relatively minor conversions of agricultural land; potential small percentage impacts to municipal ASAs; potential historic resource losses; and minimal wetland impacts that are likely to be mitigated in accordance with the necessary permits.

Summarizing the projected cumulative impacts with a relationship to the proposed project, they are expected to include the conversion of approximately 250 hectares (620 acres) of agricultural land in the three municipalities projected to experience cumulative impacts. The conversion rate is similar to that which has occurred during the past five decades. Minor forest land impacts are also expected. Similarly, wetland impacts are expected to be minor and mitigated in accordance with the necessary permits. Historic resources may be lost in Monroe and Point Townships. ASA impacts are expected to be very small in Monroe and Point Townships, and less than a ten percent viability threshold in Union Township. Once again, since the actual location of future development cannot be pinpointed at this time, the actual impacts may vary and may be found within the other SCIAs listed in Table IV-L-3 or in areas that have yet to be identified. If so, the cumulative impacts should still be limited to relatively minor conversions of agricultural land; potential small percentage impacts to municipal ASAs; potential historic resource losses; and minimal wetland impacts that are likely to be mitigated in accordance with the necessary permits.

7. Mitigation Measures

The proposed transportation system improvements are not projected to cause substantial increases in the growth of the study area, but rather affect the distribution of growth over the planning period. In addition, the analysis has shown that adequate area is available in proximity to the proposed interchanges so growth can be accommodated without impacting wetlands, floodplains, or historic resources. Therefore, extensive mitigation is not warranted. In fact, by directing future growth into the same municipalities that would experience property acquisition for rights-of-way, thereby losing property tax revenues, the losses should be remunerated over the long-term by increasing the property value of currently vacant lands.

M. TRAFFIC AND TRANSPORTATION NETWORK

Major roadway improvements, such as those proposed as part of the CSVT project, affect connecting local roadways. These impacts result from temporary traffic diversions during construction activities and permanent diversions once the facility is opened. This section addresses the impacts related to the different alternatives and possible mitigation measures to assure safety and prevent congestion on the local roadways.

More detailed information on the impacts of the project on the traffic and transportation network is located in the Traffic Technical Support Data. An index of the Technical Support Data is located in Section IX, Appendix A.

1. Methodology

Traffic counts were taken in 1995 and confirmed by origin/destination surveys conducted in December 1995 and August 1996. Additional traffic counts were taken in mid 1999 and in July 2001. Traffic count data was collected by vehicle type. Vehicles are classified by type so that the effects of truck traffic can be analyzed separately as well as a part of the total vehicle stream. In the Draft EIS, traffic volumes were projected to the year 2020 using a spreadsheet "Build-Up" Model and the year 1995 existing traffic volumes as a base. The most current available traffic data was used for the Phase II Alternatives in the Final EIS; the July 2001 traffic counts were used as the base and the future traffic volumes were projected to the updated design year of 2030 using the latest demographic data (updated in 2002) available including the 2000 census data.

The methodology used in this analysis involved the identification of elements of traffic growth anticipated to occur between the updated traffic counts in 2001 and the current design year of 2030, and the assignment of new trips added to the roadway network and determination of future levels of service for the various combinations of improvement alternatives. Detailed data regarding municipal and county population projections, employment projections, and household size projections were documented. Based upon census data, projected population totals were calculated for the years 2020 and 2030. Data compiled from the 1990 census was used to project 2020 while 2000 census data was utilized for 2030 projections. Please see Table IV-M-1 for a summary of the updated demographic data.

The total population for the study area in 2000 was 71,876. When compared to the 2000 census data, the projected population for 2020 (based on the 1990 census data) increased by approximately 14,800 while the 2030 projections (based on the 2000 census data) only increased by approxi-

TABLE IV-M-1
POPULATION AND EMPLOYMENT TRENDS

	Total Study Area Population (people)	Total Study Area Employment (employees)
Year 1990 Census	71,877	N/A*
Year 2000 Census	71,876	41,080
Year 2020 Projection	86,700	44,974
Year 2030 Projection	79,133	50,130
Projected growth 2000 to 2020	14,824	3,894
Projected growth 2000 to 2030	7,257	9,050
Difference between 2020 and 2030	-7,567	5,156

* Data not available.

mately 7,250. This results in a difference in population of approximately 7,550 persons between the 2020 and 2030 projections. Employment totals increase by nine and one half and 22 percent for the projections for the years 2020 and 2030, respectively, when compared to year 2000. Overall, an increase from the year 2000 of approximately 3,900 jobs is expected in the year 2020 projections; whereas 9,000 jobs are anticipated in the year 2030 projections.

Logs of planned and projected development proposals, current zoning regulations, and comprehensive plans were reviewed. Projections of population and employment along with household size were compared to planned development proposals to develop detailed future development projections. A detailed assessment of new trips added to the study area roadway network was then developed using trip generation equations compiled and edited by the Institute of Transportation Engineers in the publication *Trip Generation, 6th Edition.*

Prior analysis for the Central Susquehanna Valley Transportation Study was conducted using the Institute of Transportation Engineers Trip Generation Handbook 5th Edition. The most recent version, Institute of Transportation Engineers Trip Generation Handbook 6th Edition was used to conduct the current analysis. A decrease in the trip generation rates from the 5th Edition to the 6th Edition meant the number of trips generated from future growth was less than it would have been if the rates in the 5th edition were used. The projected number of new trips created by the expected local development is 5,307 morning peak hour trips and 8,321 evening peak hour trips.

The estimated traffic generated by the growth projections is assigned to the existing roadway network based upon the findings of the origin-destination survey and travel time studies conducted as part of this project. For the various alternatives under study, estimates of the traffic diverting to the

CSVT Roadway were based upon a comparison of travel times between the existing roadway system and the new roadway.

Projected traffic volumes were determined for the original design year 2020 for the morning and evening peak hours assuming the different combinations of roadway improvements and alternative interchange locations. The year 2020 volumes were computed by increasing the existing (year 1995) traffic with a one percent annual background growth rate (to account for development outside of the study area) and then adding the additional traffic generated by the identified developments and the undefined growth areas.

The projected traffic volumes for the updated design year 2030 were calculated in much the same way as the traffic volumes for the 2020 design year with some differences. The year 2030 projected traffic volumes were computed by using the year 2001 existing traffic volumes as a base and then increasing only the through traffic volumes by applying an annual background growth rate of 1.5 percent for autos and three percent for trucks. The local, regional and through traffic volumes were determined from the results of the origin-destination study, and the annual growth rates were calculated from the observed differences between the traffic counts conducted in 1995 and 2001. The additional traffic volumes generated by the identified developments and undefined growth areas were then layered onto the existing and background growth traffic volumes, thus completing the calculation of the total design year 2030 traffic volumes.

The most recent traffic data available are the year 2001 existing traffic volumes and the year 2030 projected traffic volumes. They are shown in the following graphics (Figures IV-M-1 through IV-M-10 in this section) and are used as the basis for the summaries of Level of Service (LOS) and the measures of effectiveness that are presented (in this section). In summary, the traffic analysis of the Phase II Alternatives was completed using the July 2001 existing traffic volumes and the design year 2030 projected traffic volumes.

In addition to the projection of future traffic volumes, capacity analyses were also performed on the year 2001 existing and year 2030 future roadway systems for the alternatives studied in detail and the No-Build Alternative. The capacity analysis generated a Level of Service (LOS) for each intersection and interchange. The LOS is a qualitative measure describing operational conditions within a traffic stream and the perception of the condition by motorists. Six levels of service (A through F) exist with A being the best and F being the worst. The definitions of these different LOS's can be found on Table IV-M-2. Generally, as the actual traffic volumes increase, the LOS decreases with LOS E indicating a facility near capacity and LOS F indicating a facility that is over capacity.

The level of service analyses conducted for the 2020 projections based on the 1996 traffic studies used version 2.4 of the Highway Capacity Software that were based on the procedures enumerated in the 1994 Highway Capacity Manual. The updated analyses for the 2030 projections, which are based on the 2001 traffic studies and shown in this section, were conducted using the Highway

Capacity Software 2000, which is based on the procedures enumerated in the 2000 Highway Capacity Manual.

The most significant difference in these 1994 and 2000 Highway Capacity Manuals is in the calculation of delay at intersections. For the 1994 Highway Capacity Manual, delay was calculated for stopped delay. Stopped delay is the amount of time a vehicle is stopped due to an intersection. The 2000 Highway Capacity Manual revised the delay calculations to total delay. Total delay includes the time delay associated with braking on the approach to an intersection. This is a more comprehensive approach to the assessment of delays at intersections. Because of this change in the estimation of delay, the level of service thresholds were also changed. Again, the HCM 2000 level of service definitions are shown in Table IV-M-2.

LOS's were determined for the build alternatives and for the existing network of roadways (US Routes 11/15, US Route 11, US Route 15, PA Route 147) as a measure of the effectiveness of the different alternatives.

2. Alternative Combinations

The effectiveness of the different build alternatives at reducing congestion is related to how the build alternatives interface with the existing system. This interface with the existing system is accomplished through interchanges between the new facility and the existing system. In addition, for the CSVT Project, new connecting roadways from the existing system to the new facility also enhance the accessibility of the new facility. In Section 2 of the study area all of the build alternatives have two interchanges. These interchanges are located at similar locations for all alternatives. On the west side of the West Branch Susquehanna River all four build alternatives in Section 2 (RC1-E, RC1-W, RC5, and RC6) interchange with existing US Route 15 just south of Winfield. On the east side of the river all four build alternatives in Section 2 have an interchange that accesses PA Route 147 just south of the existing intersection between PA Route 147 and PA Route 405. As a result of the similar interchange locations, all of the Section 2 Build Alternatives have similar impacts on the future transportation network. However, in Section 1, there are differences in the ways the different alternatives interface with the existing system. Therefore, the three Section 1 Alternatives (DAMA, OT2A, and OT2B) have different traffic impacts on the future transportation network.

The following discussion describes the traffic impacts associated with the alternatives studied in detail. The different Section 1 Alternatives are discussed in combination with the Section 2 Alternatives to provide an overall idea of the impacts of the entire new facility on the traffic and transportation network.

TABLE IV-M-2
DEFINITIONS OF LEVEL OF SERVICE*

Level of Service (LOS)	Definition**	Expected Delay (sec)	
		Signalized Intersections	Unsignalized Intersections
A	Represents free flow. Individual motorists are unaffected by the presence of other vehicles on the roadway. The individual can select speed and maneuver (pass a slower vehicle) without interference from other vehicles.	0.0 to 10.0	0.0 to 10.0
B	Represents slightly less freedom to maneuver. The presence of other motorists in the traffic stream is now noticeable, but desired speeds can still be selected freely and maneuverability is now impeded occasionally.	10.1 to 20.0	10.1 to 15.0
C	Represents stable flow. Motorists now become significantly affected by interactions with others in the traffic stream. The selection of speed is influenced by others and maneuverability is achieved through careful decisions. However, overall traffic flow is still relatively smooth.	20.1 to 35.0	15.1 to 25.0
D	Represents occasional unstable flow. Speed and freedom to maneuver are restricted. Any additional traffic causes operational problems at this level.	35.1 to 55.0	25.1 to 35.0
E	Represents unstable flow. Breakdowns occur with increasing frequency. Operating conditions are at or near full capacity level. Speeds are typically reduced. Passing opportunities and gaps in traffic are infrequent.	55.1 to 80.0	35.1 to 50.0
F	Also represents unstable flow. Traffic flow is normally forced or broken down. This condition exists when the amount of traffic approaching a section along the roadway exceeds the amount which can pass through it. Long queues form at such locations. Stop and go waves also form within the queue. In many cases, however, traffic downstream from the point of congestion operates adequately, but backups or delays occur for other upstream vehicles.	> 80.0	> 50.0

* Level of service defined in 2000 Highway Capacity Manual (HCM 2000) published by the Transportation Research Board.
**Desireable levels of service:
Rural Areas = LOS A – LOS C
Urban Areas = LOS A – LOS D
Undesireable levels of service:
Rural Areas = LOS D, E, and F
Urban Areas = LOS E and F

a. Section 1 (DAMA)/Section 2 (All Alternatives)

This combination alternative begins at the northern end of the Selinsgrove Bypass and travels west of existing US Routes 11/15. The DAMA then continues north, crosses US Route 15 and the West Branch of the Susquehanna River south of Winfield, then joins with PA Route 147 on the east side of the river. The new highway will bypass Shamokin Dam and Northumberland Boroughs. This alternative has full movement interchanges at existing US Routes 11/15 near Selinsgrove, at the proposed PA Route 61 Connector, at existing US Route 15 near Winfield, and with existing PA Route 147 (or relocated Ridge Road) south of PA Route 405. There will also be a full movement interchange at existing US Routes 11/15 and the 61 Connector near the Veterans Memorial Bridge. The 61 Connector will allow traffic from Sunbury and Route 61 to directly access the new roadway via the Veterans Memorial Bridge.

b. Section 1 (OT2A)/Section 2 (All Alternatives)

This combination alternative also begins at the northern end of the Selinsgrove Bypass and travels north on the east side of existing US Routes 11/15, between the Susquehanna River and existing US Routes 11/15. OT2A continues north along the river until it crosses existing US Routes 11/15 in the vicinity of Stetler Avenue. From there, the new roadway continues north on an alignment similar to DAMA. This alternative has full movement interchanges at existing US Routes 11/15 near Selinsgrove, at the future PA Route 61 Connector, at existing US Route 15 near Winfield, and with existing PA Route 147 (or relocated Ridge Road) south of PA Route 405. There will also be a full movement interchange at existing US Routes 11/15 and the PA Route 61 Connector near the Veterans Memorial Bridge.

Although the mainline alignment is in a different location, the OT2A Alternative has interchange locations similar to the DAMA Alternative. As a result, these two Section 1 Alternatives have similar impact on the transportation network.

c. Section 1 (OT2B)/Section 2 (All Alternatives)

This combination alternative follows an alignment between existing US Routes 11/15 and the Susquehanna River, similar to OT2A. The difference in this alternative occurs in its connection to the existing roadway network. The OT2B Alternative does not connect back to the existing system by way of the PA Route 61 Connector. This alternative provides for a new interchange on existing US Routes 11/15 where the alternative crosses the existing network, in the vicinity of Stetler Avenue. At this location there will be a full movement interchange with existing US Routes 11/15. From there, the new alternative continues north on an alignment similar to DAMA and OT2A. However, north of the Stetler Avenue Interchange there will be a full movement interchange with the Route 15 Connector. The Route 15 Connector provides access from the new expressway to existing US Route 15 just north of the US Route 11/US Route 15 split. Thus, in summary, this alternative has full movement interchanges at existing US Routes 11/15 near Selinsgrove, with existing US Routes 11/15 near Stetler Avenue, at the future Route 15 Connector, at existing US Route 15 near Winfield, and with existing PA Route 147 (or relocated Ridge Road) south of PA Route 405.

For the OT2B Alternative, traffic originating in Sunbury and heading northbound will access the new expressway by using the Veterans Memorial Bridge, existing US Routes 11/15 north to US Route 15, US Route 15 to the 15 Connector, and the 15 Connector to the new facility. Sunbury traffic heading southbound will access the new expressway by using the Veterans Memorial Bridge to existing US Routes 11/15 and US Routes 11/15 south to the Stetler Avenue Interchange. Because there is no direct connector to PA Route 61 and Sunbury, traffic crossing the Veterans Memorial Bridge must make a series of turns on the existing roadway system in order to access the OT2B Alternative. As a result, the OT2B Alternative will not be as effective in removing traffic from the existing roadways as the DAMA and OT2A Alternatives, which both have direct access to the bridge via the Route 61 Connector.

3. Impacts

a. Future Traffic Volumes

The 2001 existing traffic volumes for the system are on average 20 percent greater than the traffic volumes that were counted in 1995. This equates to a 3 percent annual increase. Between the years of 1995 and 2020, the traffic volumes were projected to increase at a much greater rate. The previous traffic projections for design year 2020 showed that the traffic volumes were expected to grow 133 percent over the 25 years (1995 through 2020). This equates to a 5% annual increase. The year 2000 census data showed that the population and the resulting development did not increase as greatly as originally anticipated. New development trips to the network for the design year 2020 traffic volumes were projected using the 5th Edition of the ITE *Trip Generation Manual*. For the updated design year 2030, new development trips to the network were projected using the 6th Edition of the same manual.

Population growth and traffic volume increases are not directly proportional. Even though population growth slowed, traffic continued to increase at a slightly slower rate because employment continued to increase as projected in the Draft EIS, and through traffic increased faster than projected in the Draft EIS (1.5% per year as opposed to 1% per year). As a result, the year 2030 projected traffic volumes are approximately 13 percent more than the year 2020 projected traffic volumes, and the year 2030 projected traffic volumes are approximately 120 percent greater than the 2001 existing traffic volumes, which equates to an approximate 4 percent annual increase. Thus, the separation of through and local traffic, especially truck traffic, and improvements to the current transportation network are necessary.

i. No-Build Alternatives

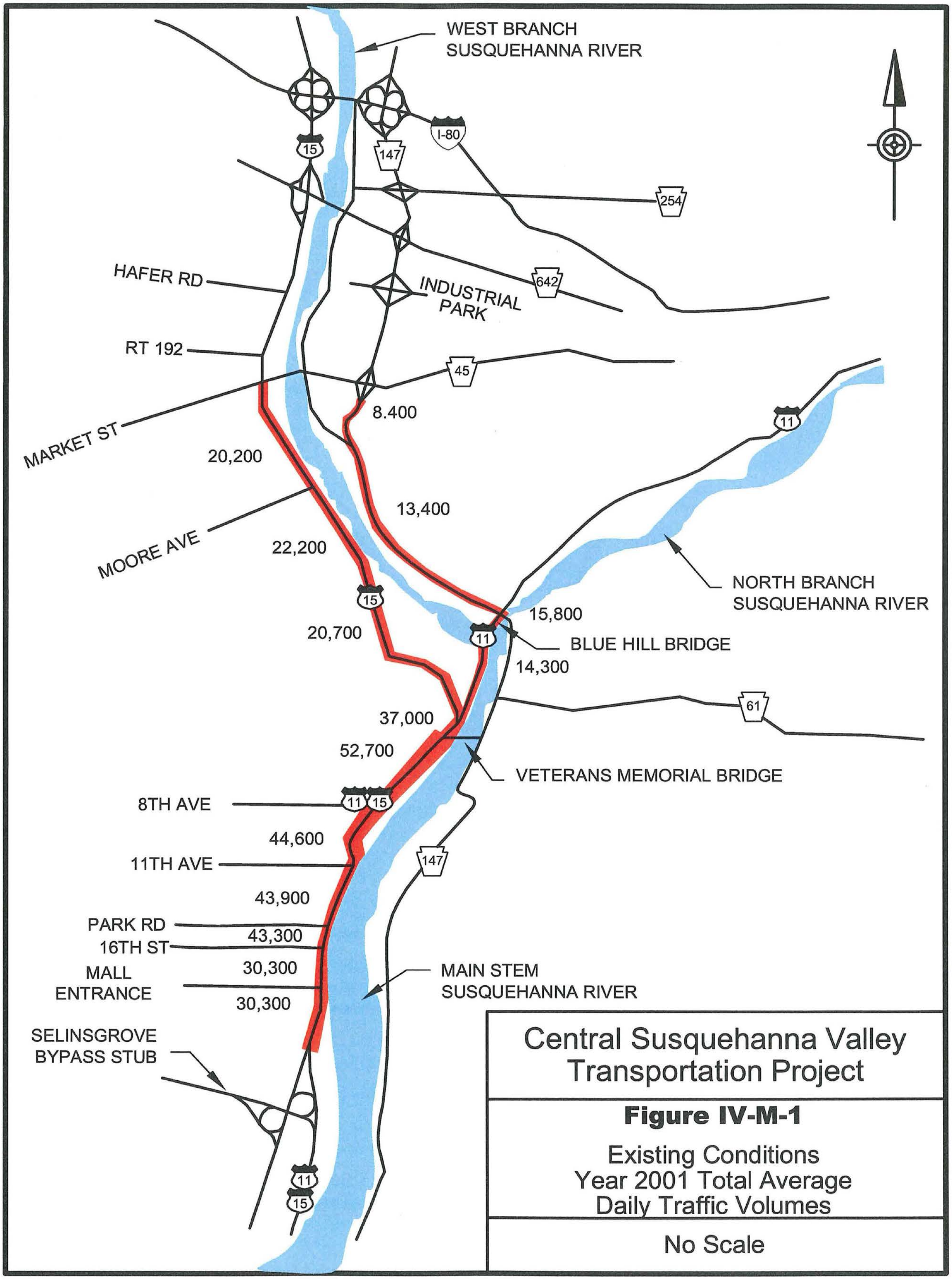
Regardless of whether any roadway improvements are made to the transportation network, traffic will increase on the study area roadways. The 2030 No-Build Alternative, compared to 2001 existing daily traffic volumes (see Figures IV-M-1 and IV-M-2), shows that traffic will increase between 82 percent and 160 percent on US Routes 11/15 and US Route 15. Figure IV-M-3 shows the Year 2030 No-Build Alternative Average Daily Traffic Volumes for the major existing roadways (US Routes 11/15, US Route 15, US Route 11, and PA Route 147).

Overall traffic will increase on the study area roadways, but truck traffic is expected to increase at an even greater rate. The year 2030 projected truck traffic volumes are predicted to be 101 percent to 217 percent greater than the existing (2001) truck traffic volumes on US Routes 11/15 and US Route 15. Figure IV-M-4 shows the year 2030 No-Build Alternative Average Daily Truck Traffic Volumes for the major existing roadways (US Routes 11/15, US Route 15, US Route 11, and PA Route 147).

ii. Section 1 (DAMA/OT2A)/Section 2 (All Alternatives)

The DAMA and OT2A Alternatives in Section 1 interface with the existing system in a similar manner (i.e., the interchanges are in the same locations). As a result, their effect on the transportation network is the same.

The DAMA and OT2A Alternatives are expected to reduce 2030 traffic volumes along US Routes 11/15 in the Shamokin Dam area approximately 1 percent to 36 percent below existing (2001) traffic volume levels. Sections of US Route 11, US Route 15, and PA Route 147 are expected to experience reductions of about 5 percent to 82 percent from the No-Build Alternative; but this still equates to increases of up to 91 percent over existing (2001) traffic volumes (south of proposed CSVT roadway). North of the proposed CSVT roadway an increase of 257 percent occurs along PA Route 147, and is due to the traffic volume shift from US Route 15 to PA Route 147 because of the planned improvements along PA Route 147. The CSVT Roadway is expected to carry about 58,500 vehicles a day south of the 61 Connector and about 54,000 vehicles per day north of the 61 Connector. Figure IV-M-5 and Figure IV-M-6 show the Average Daily Traffic Volumes and the Average Daily Truck Traffic volumes for the DAMA Alternative while the same information for the OT2A Alternative is displayed in Figure IV-M-7 and Figure IV-M-8.

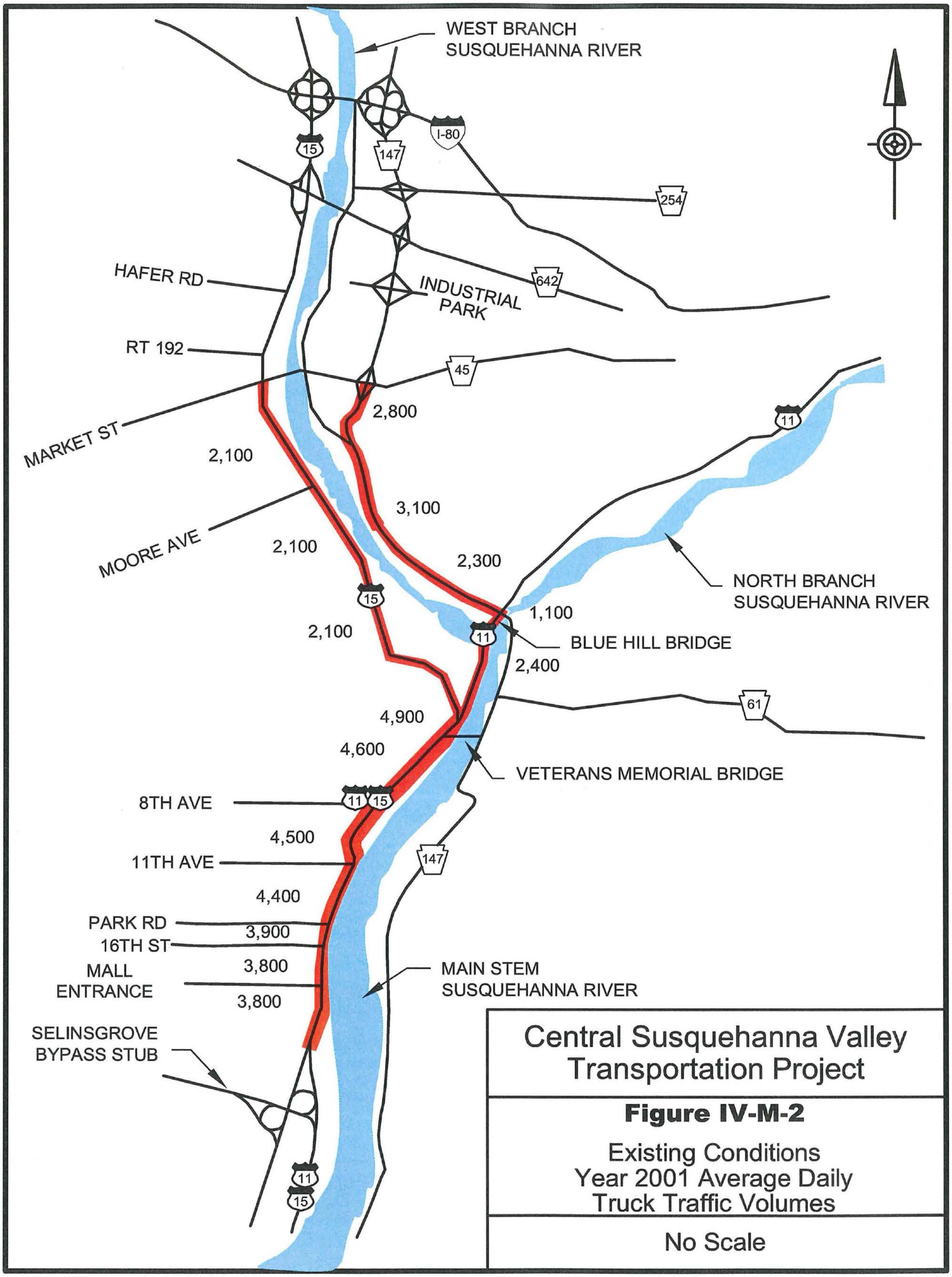


Central Susquehanna Valley Transportation Project

Figure IV-M-1

Existing Conditions
Year 2001 Total Average
Daily Traffic Volumes

No Scale

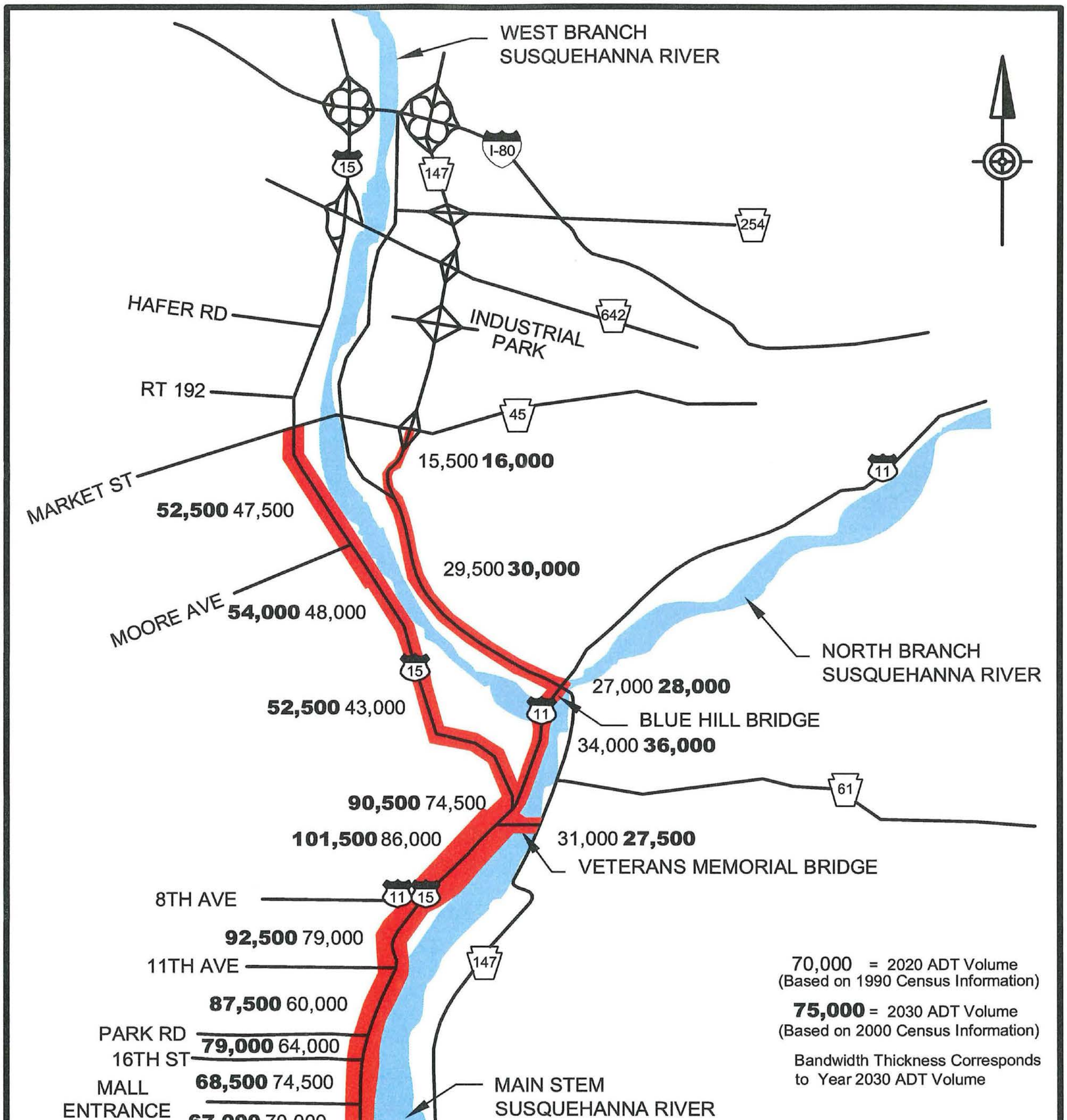


Central Susquehanna Valley Transportation Project

Figure IV-M-2

Existing Conditions
Year 2001 Average Daily
Truck Traffic Volumes

No Scale

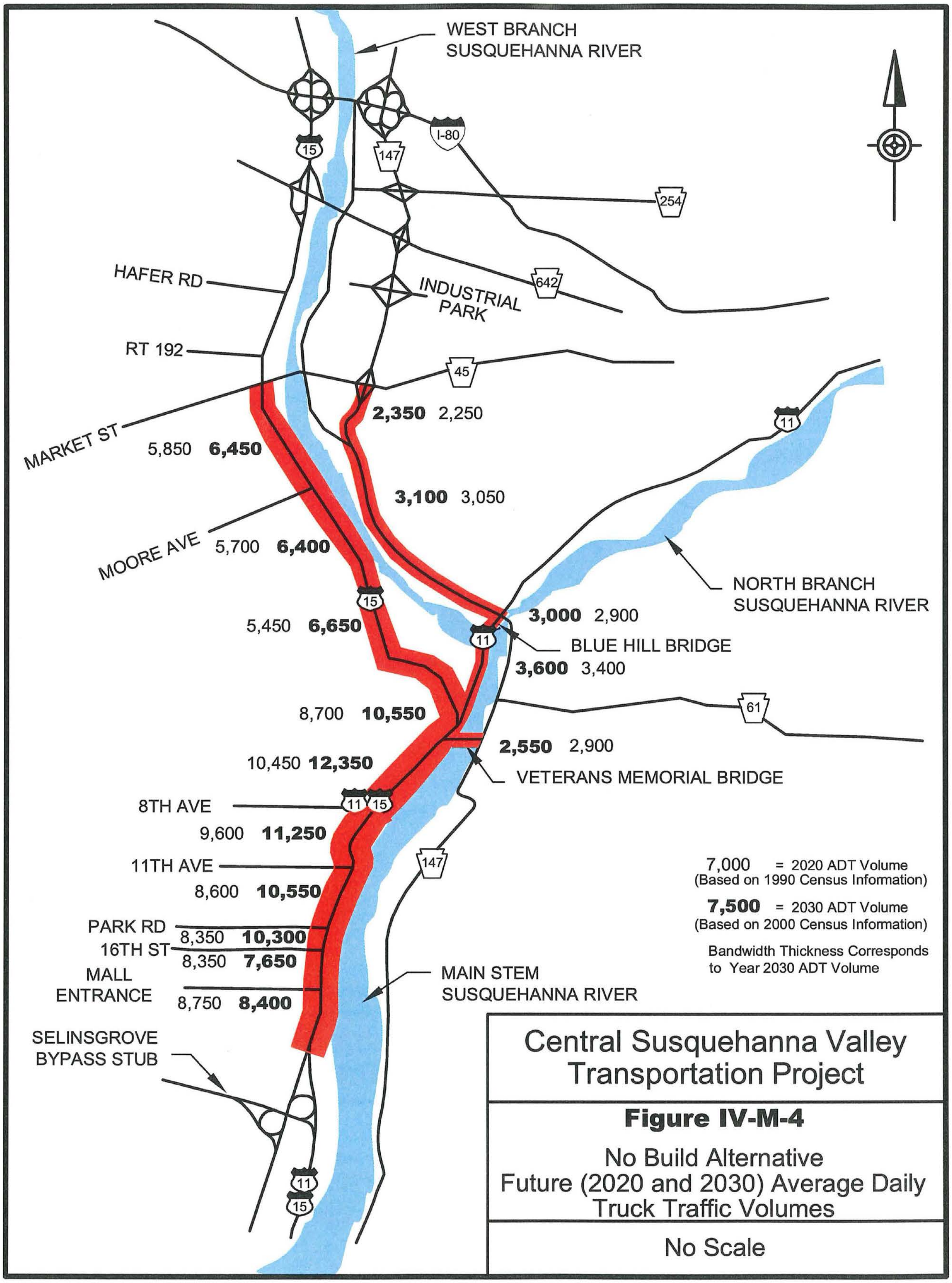


Central Susquehanna Valley Transportation Project

Figure IV-M-3

No Build Alternative
Future (2020 and 2030) Total Average Daily Traffic Volumes

No Scale

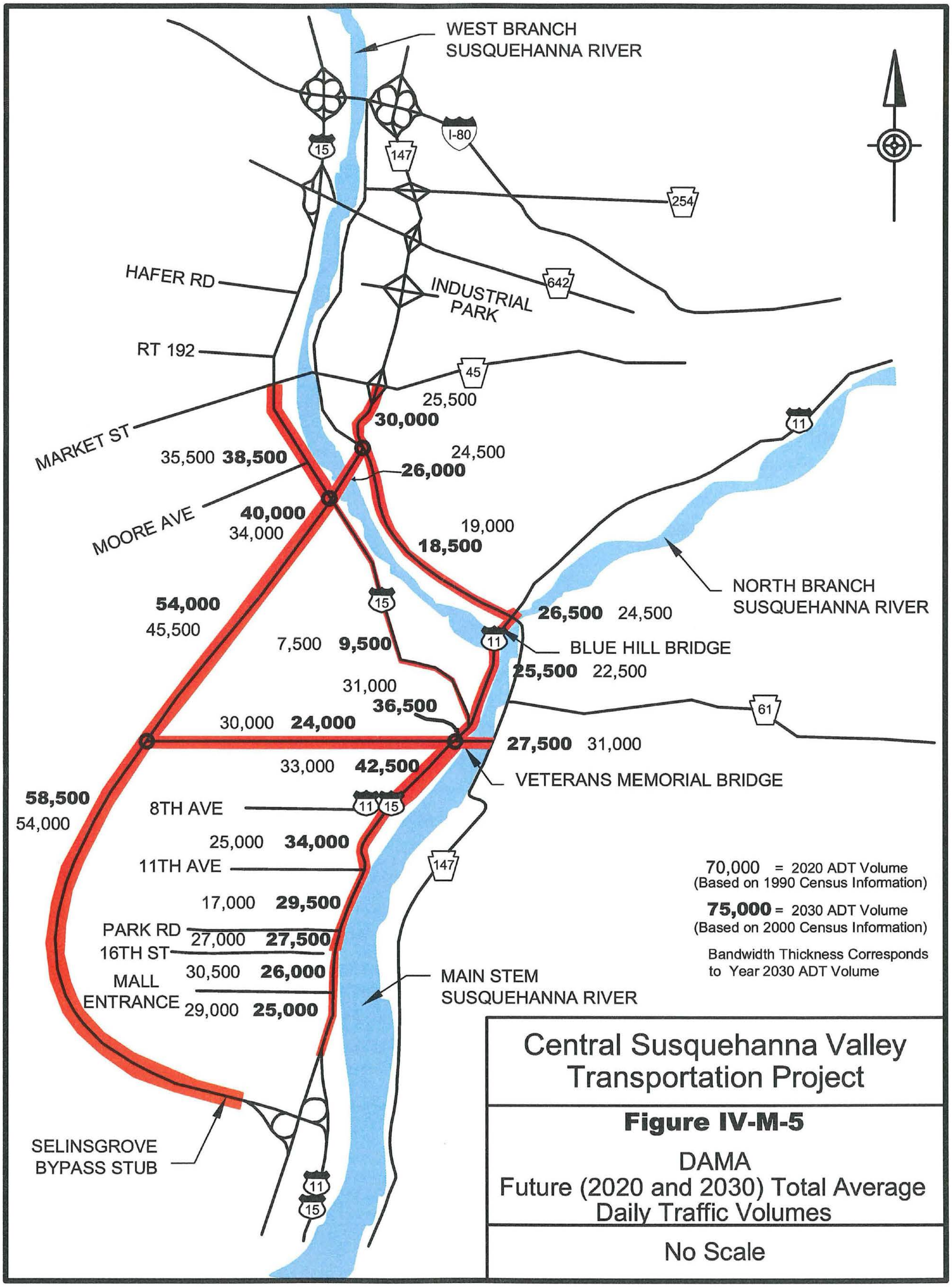


Central Susquehanna Valley Transportation Project

Figure IV-M-4

No Build Alternative
Future (2020 and 2030) Average Daily Truck Traffic Volumes

No Scale

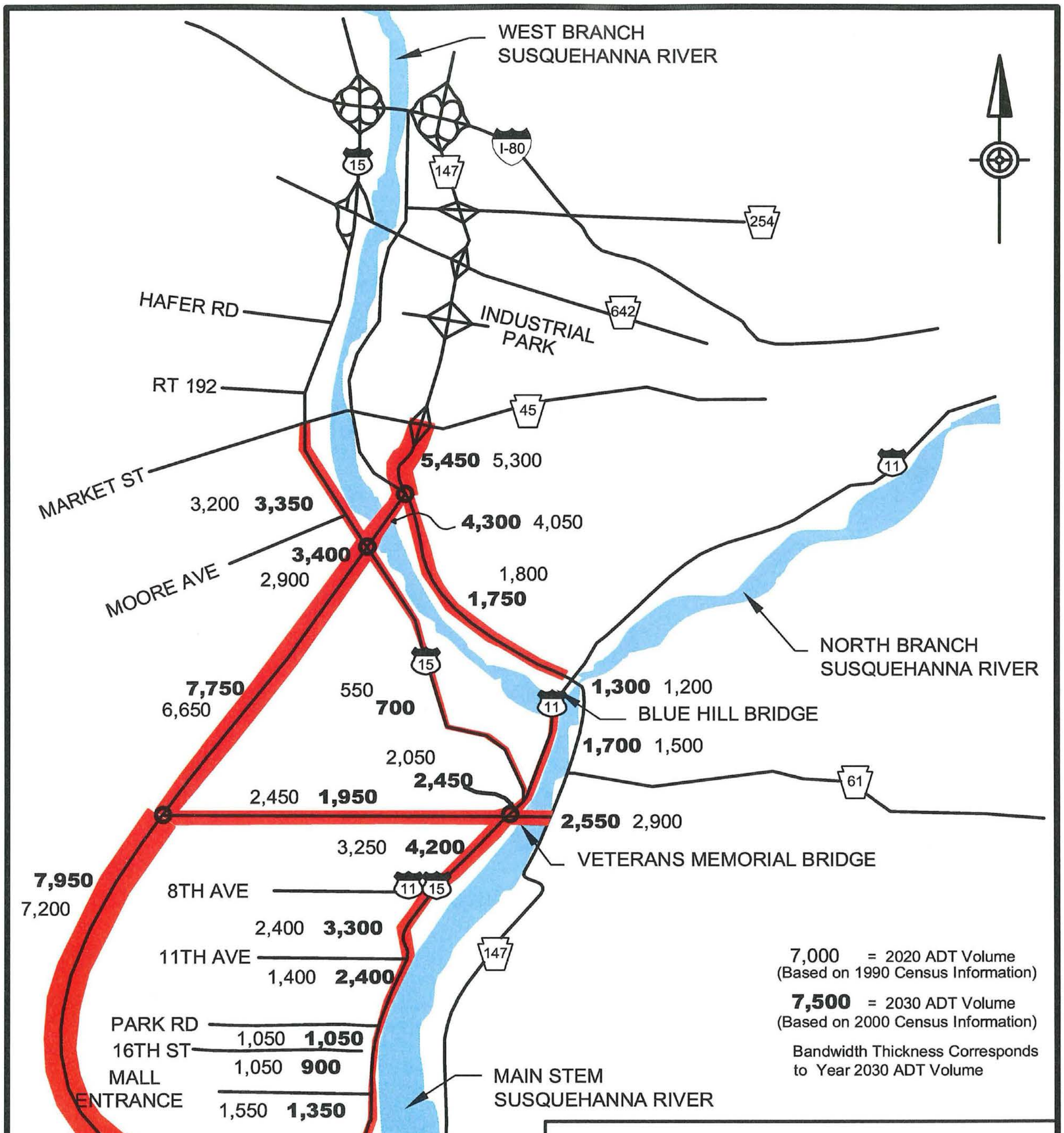


Central Susquehanna Valley Transportation Project

Figure IV-M-5

DAMA
Future (2020 and 2030) Total Average Daily Traffic Volumes

No Scale

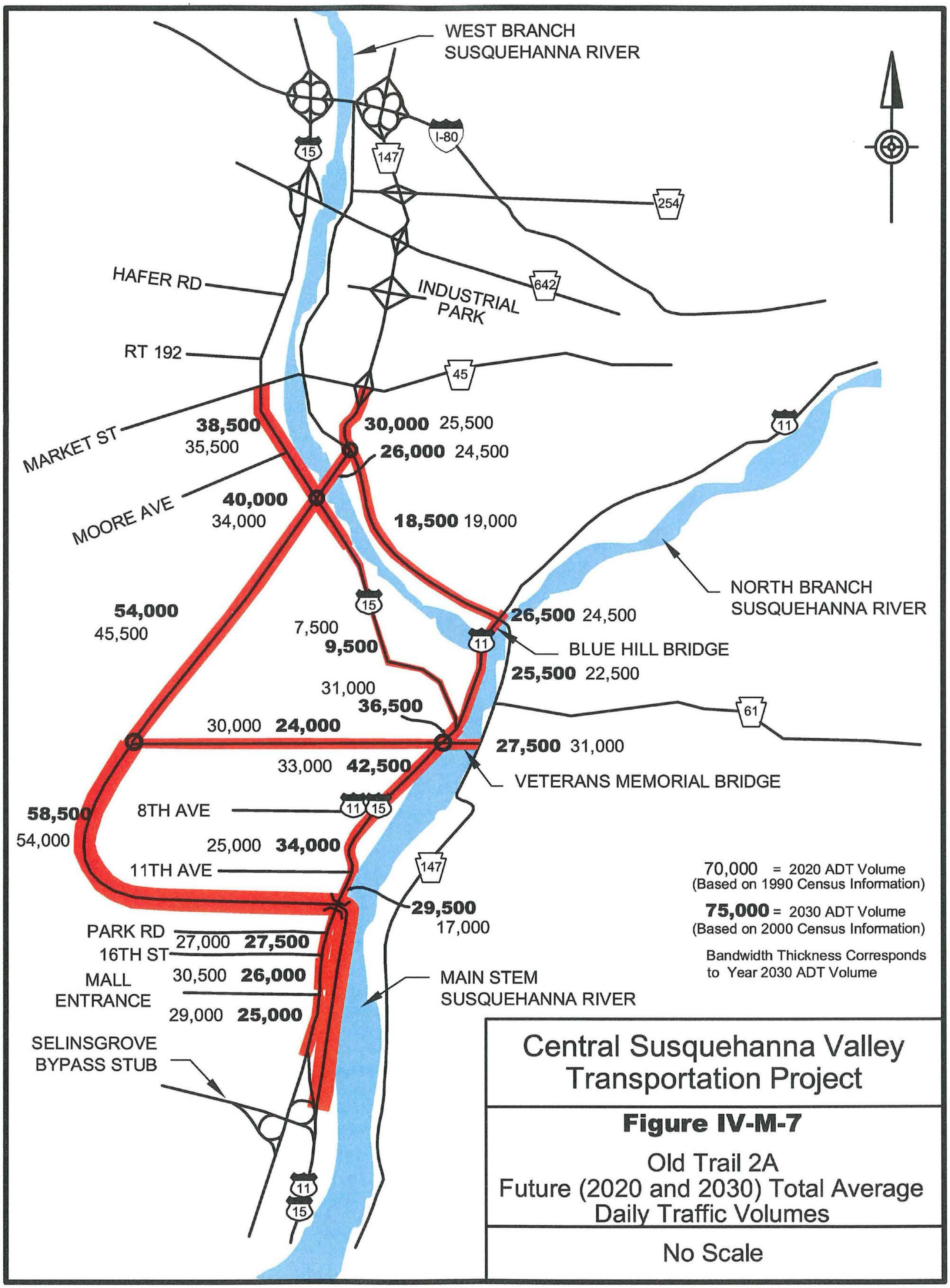


Central Susquehanna Valley Transportation Project

Figure IV-M-6

DAMA
Future (2020 and 2030) Average Daily Truck Traffic Volumes

No Scale

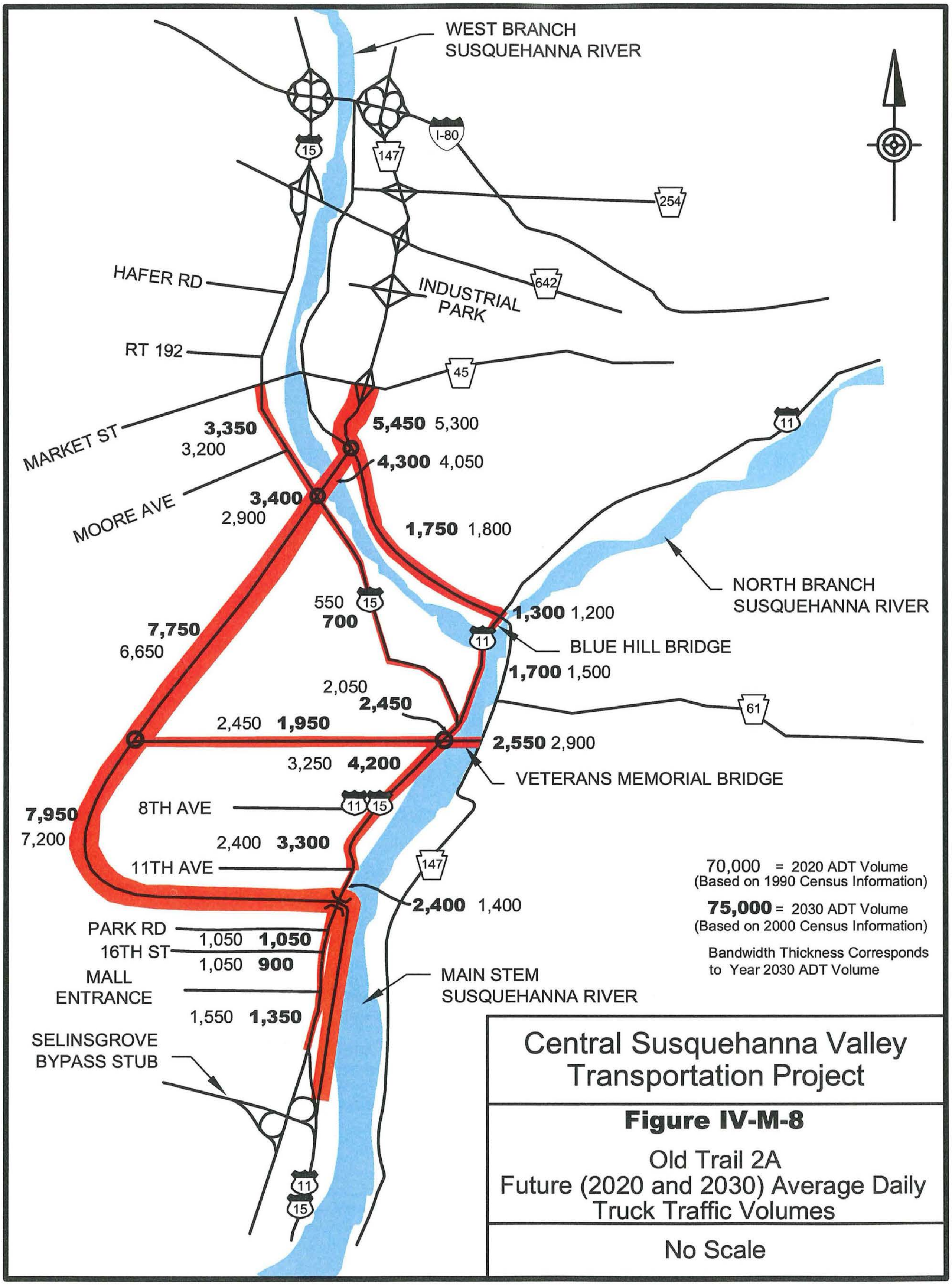


Central Susquehanna Valley Transportation Project

Figure IV-M-7

Old Trail 2A
Future (2020 and 2030) Total Average Daily Traffic Volumes

No Scale



Central Susquehanna Valley Transportation Project

Figure IV-M-8

Old Trail 2A
Future (2020 and 2030) Average Daily Truck Traffic Volumes

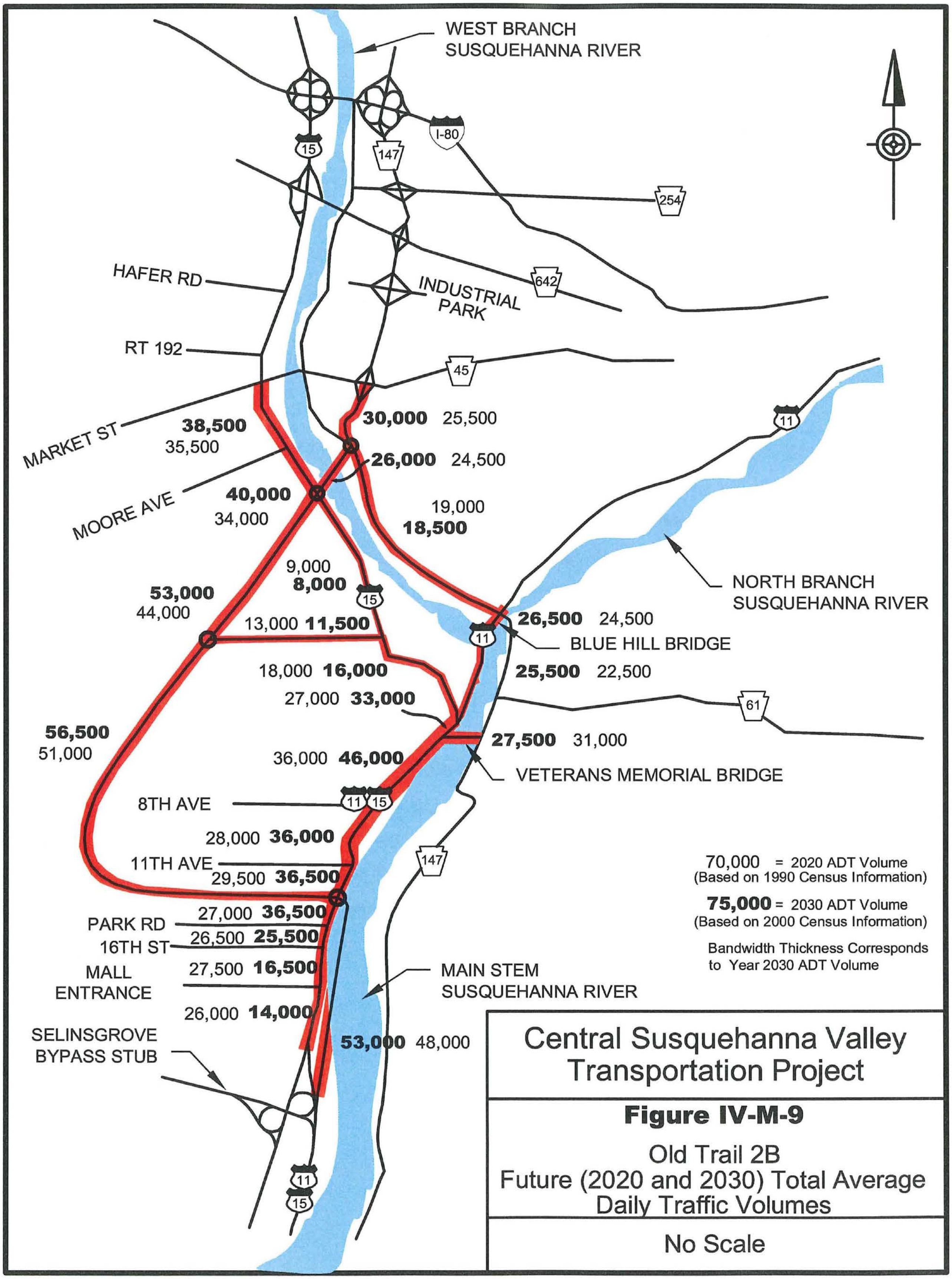
No Scale

Reductions in truck traffic are projected for the DAMA and OT2A Alternatives; decreases in truck traffic between 47 percent and 90 percent are anticipated along US Routes 11/15 and US Route 15 when compared to No-Build estimates. Truck traffic along US Route 11 and PA Route 147 (south of the proposed CSVT roadway) for the DAMA and OT2A Alternatives would experience reductions of up to 57 percent compared to the No-Build Alternative projected truck volumes (and 132 percent increase in truck volumes on PA Route 147 north of the proposed CSVT roadway). In general, truck traffic along the existing roadway system for the DAMA and OT2A Alternatives is estimated to be slightly less than the truck traffic under the OT2B Alternative.

iii. Section 1 (OT2B)/Section 2 (All Alternatives)

In the year 2030, traffic volume reductions (from year 2030 No-Build) on the existing roadway system as a result of the OT2B Alternative range between 26 percent and 79 percent on US Routes 11/15 and US Route 15. In general, traffic volumes on the roadways will be significantly lower than the No-Build Alternative and somewhat lower than existing (2001) conditions, but slightly higher than the DAMA or OT2A Alternatives. US Route 11 and PA Route 147 (south of the proposed CSVT roadway) are expected to have similar reductions in traffic volumes as with the DAMA and OT2A Alternatives, or approximately a 5 percent to 38 percent decrease over No-Build conditions. Figure IV-M-9 shows the Average Daily Traffic Volumes for the OT2B Alternative.

Reductions in truck traffic are also projected for the OT2B Alternative; decreases in truck traffic between 47 percent and 91 percent are anticipated along US Routes 11/15 and US Route 15 when compared to No-Build estimates. Truck traffic along US Route 11 and PA Route 147 (south of the proposed CSVT roadway) for the OT2B Alternative would be similar to the DAMA and OT2A Alternatives with reductions up to 57 percent compared to the No-Build Alternative projected truck volumes. In general, truck traffic along the existing roadway system for the OT2B Alternative is estimated to be slightly higher than for the DAMA Alternative or the OT2A Alternative. Figure IV-M-10 depicts the OT2B Alternative Average Daily Truck Traffic Volumes.

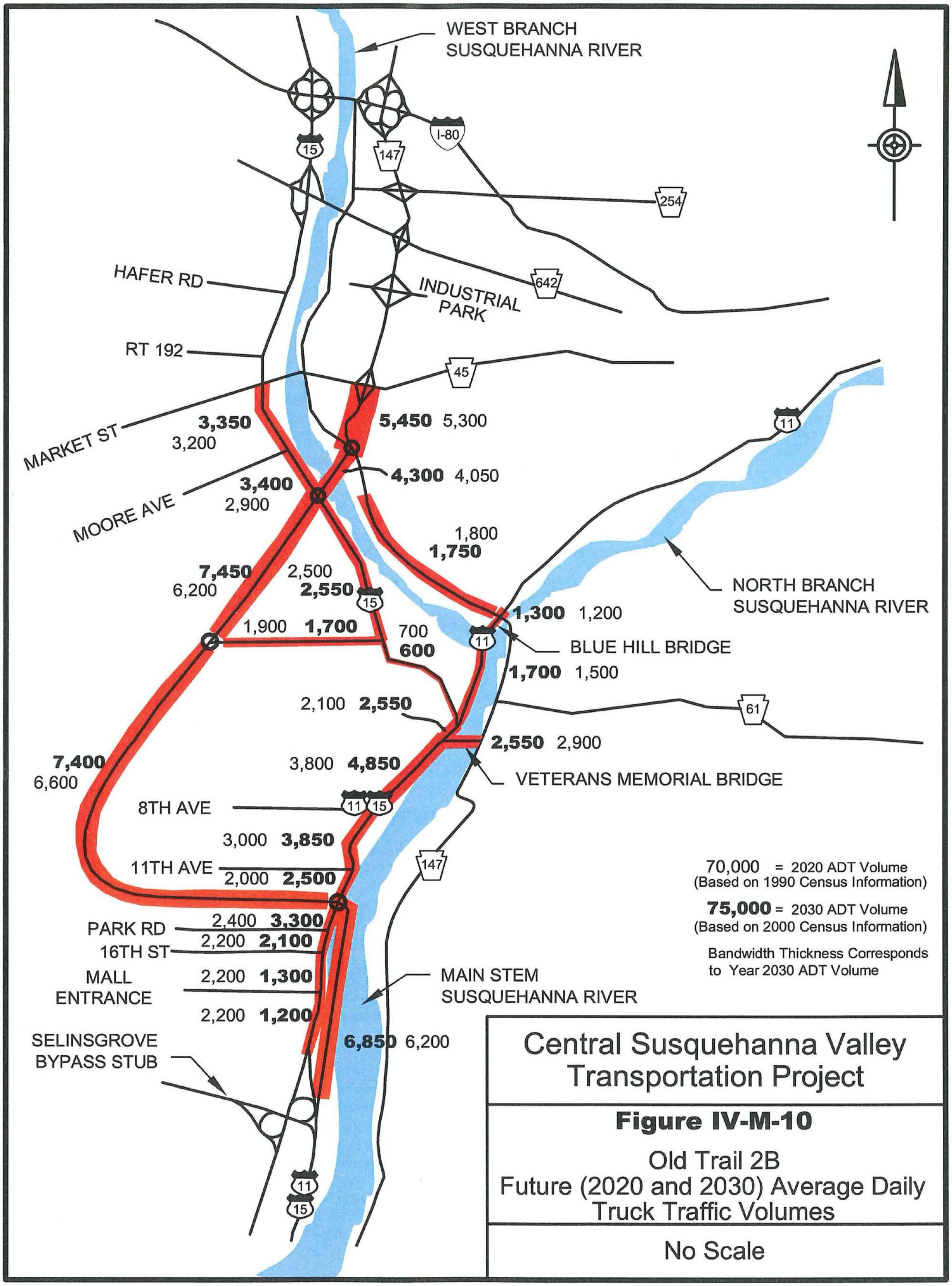


Central Susquehanna Valley
Transportation Project

Figure IV-M-9

Old Trail 2B
Future (2020 and 2030) Total Average
Daily Traffic Volumes

No Scale



Central Susquehanna Valley Transportation Project

Figure IV-M-10

Old Trail 2B
Future (2020 and 2030) Average Daily Truck Traffic Volumes

No Scale

b. Levels of Service (LOS)/Capacity Analysis

i. No-Build Alternative

Without improvements to the roadway network, traffic congestion on the area roadways can be expected to worsen based upon the increase in projected traffic. A detailed capacity analysis of the No-Build Alternative shows that a total of 14 signalized intersections will operate in year 2030 at undesirable levels of service (up from one intersection in 2001) during the evening peak hour. Table IV-M-3 shows a summary of signalized intersection levels of service for existing (2001) and No-Build Alternative conditions.

ii. Section 1 (DAMA/OT2A)/Section 2 (All Alternatives)

The reductions in truck traffic as well as overall traffic are expected to improve traffic operations at several of the study area signalized intersections. Fourteen of the 17 signalized intersections are projected to operate at acceptable levels of service (Level of Service D or better in urban areas, and Level of Service C or better in rural areas) during the evening peak hour. Table IV-M-3 summarizes the levels of service for study area intersections for the DAMA and OT2A Alternatives in comparison to existing (2001) and No-Build Alternative conditions. As shown in Table IV-M-4, levels of service for the various CSVT roadway interchanges are projected to operate with desirable levels of service.

iii. Section 1 (OT2B)/Section 2 (All Alternatives)

Overall, the reductions in total vehicles as well as heavy vehicles on the existing roadways are expected to improve the operation of several of the study area intersections. As seen in Table IV-M-3, 13 of the 17 study area intersections are projected to operate at acceptable levels of service (Level of Service D or better in urban areas, and Level of Service C or better in rural areas) for the OT2B Alternative. The CSVT roadway interchanges are expected to operate at desirable levels of service, as shown in Table IV-M-4.

TABLE IV-M-3
OVERALL INTERSECTION LEVELS OF SERVICE**
EVENING PEAK HOUR
EXISTING CONDITIONS, 2030 NO-BUILD, AND 2030 BUILD CONDITIONS

Signalized Intersection	Existing 2001	No-Build 2030	Build (DAMA/OT2A) Year 2030	Build (OT2B) Year 2030
Water St. (US 11) & Duke St. (PA 147N)	D(54)*	F(104)	C(30)	F(91)
King Street (PA 147S) & Shikellamy Avenue	C(25)	C(31)	C(32)	C(32)
Water St. (US 11) & King St. (PA 147S)	C(23)	F(145)	F(148)	F(148)
US 15 & Hafer Road	B(18)	D(44)	B(18)	B(16)
US 15 & PA 192	C(33)	F(266)	F(101)	F(103)
US 15 & Market Street (PA 45)	F(104)	F(365)	F(256)	F(265)
US 15 & Moore Avenue	C(26)	F(132)	C(35)	D(43)
K-Mart Driveway & US 15	B(10)	C(34)	B(10)	B(10)
US 11 & US 15 (US 11-15 Split)	C(29)	F(129)	D(37)	C(31)
US 11/15 & Baldwin Blvd.	D(36)	F(343)	B(19)	C(20)
US 11/15 & Eighth Ave.	C(26)	F(329)	C(21)	C(21)
US 11/15 & Eleventh Ave.	C(22)	F(264)	B(18)	B(18)
US 11/15 & Park Rd.	B(19)	F(177)	B(17)	B(17)
US 11/15 & Lori Lane	B(17)	F(85)	C(20)	B(15)
US 11/15 & Sixteenth St.	C(24)	F(123)	C(27)	C(25)
US 11/15 & Susquehanna Valley Mall Entrance	C(30)	D(46)	B(14)	B(18)
US 11/15 & Ninth St.	B(15)	F(91)	B(13)	B(15)

* D(54) = Level of Service (Average seconds of delay per vehicle).
** All listed signal locations occur in urban areas with the exception of the intersection between US 15 and Hafer Road, which occurs in an area classified as rural.

4. Measures of Effectiveness

In addition to the determination of future volumes and capacities, other measures of effectiveness (MOE) were obtained for the alternatives studied in detail. The CORSIM program, a microscopic traffic simulation program in the which the movements of individual vehicles are represented, was used to simulate and compile the measures of effectiveness for the alternatives studied in detail. CORSIM combines the freeway network and urban street network of the Central Susquehanna Valley

TABLE IV-M-4
INTERCHANGE LEVELS OF SERVICE
EVENING PEAK HOUR
YEAR 2030 BUILD CONDITIONS

Interchange	Interchange Ramps	Levels of Service	
		Build (DAMA/OT2A) Year 2030	Build (OT2B) Year 2030
CSVT @ PA Route 147	Northbound	B	B
	Southbound	B	B
CSVT @ US Route 15	Northbound	B	B
	Southbound	B	B
CSVT @ PA Route 61 Connector	Northbound	C	N/A
	Southbound	B	N/A
CSVT @ Route 15 Connector	Northbound	N/A	B
	Southbound	N/A	C
CSVT @ Stetler Avenue Interchange	Northbound	N/A	C
	Southbound	N/A	C
CSVT @ US Routes 11/15 (Selinsgrove)	Northbound	C	B
	Southbound	B	B
PA Route 61 Connector @ US Routes 11/15	Eastbound	B	N/A
	Westbound	B	N/A

so that the traffic on the new alternatives and the existing street networks can be simulated and analyzed simultaneously. In addition to the Highway Capacity Manual defined parameters (number of lanes, lane usage, lane widths, turning volumes, signal timing), CORSIM accounts for a number of real-life factors, such as lane change parameters, acceptance gaps at signals (permissive left turns and right turns on red) and stop signs. In CORSIM, the movements of individual vehicles are represented. The modeling of individual vehicles combined with the different types of programmed driver characteristics can influence driver behavior. The make-up of the vehicle fleet (automobiles, single unit trucks, single and double tractor trailers, buses, etc.) can also be defined.

Several different measures of effectiveness were obtained from CORSIM and are compared to each other for each alternative and the No-Build Condition. Travel time, delay time, average speed, and fuel consumption are the traffic measures of effectiveness that are used to analyze and compare the overall utility of the different alternatives.

- ***Travel time*** is the time required to traverse a segment of roadway or complete a trip. Travel time is measured in seconds for this analysis and is expressed for discrete sections of study area roadways. CORSIM records the time it takes each vehicle to traverse links in the system and provides a summary of total vehicles and travel time by link.

- ***Delay time*** is the time loss associated with congested conditions. Delay time can be attributed to stopping at traffic signal(s) or heavy traffic volumes. It is measured as a weighted average delay, in seconds, for each vehicle. The CORSIM program identifies delay time along each link as a function of the variation in desirable travel time (generally free-flow conditions) from actual recorded travel time.

- ***Vehicle Hours Traveled (VHT)*** for a particular segment of roadway relates directly to travel time and is equal to the product of the average travel time in hours (per vehicle) and the number of vehicles per hour that traverse a specific roadway segment.
- ***Average speed*** relates directly to travel time and is the travel rate at which vehicles traverse specific roadway segments. Speed is measured as an average value for each vehicle in miles per hour and is calculated from the travel time and segment distance.

- ***Fuel consumption*** is the total amount of gallons of fuel (gasoline and diesel) that vehicles utilize in traversing segments of roadway or in completing a trip. CORSIM calculates fuel consumption based upon the nine vehicle types (four auto, four truck, and one bus) it utilizes in the simulations. Each vehicle type has a set of acceleration and deceleration curves that describe the vehicle's performance on the street system and these acceleration and deceleration rates also consume different amounts of fuel. CORSIM records, second by second, the acceleration and deceleration of vehicles and the resulting fuel consumption.

Five different scenarios were analyzed using CORSIM: Year 2001 Existing; Year 2030 No-Build; Year 2030 DAMA/Section 2 Alternatives; Year 2030 OT2A/Section 2 Alternatives; and Year 2030 OT2B/Section 2 Alternatives. All scenarios were analyzed and simulated for a one-hour period (60 minutes) using only the PM peak hour volumes. The evening peak hour volumes were used because they represent worst-case conditions for each alternative.

The following tables show the resulting measures of effectiveness for the simulations for each of the alternatives. Tables IV-M-5, IV-M-6, IV-M-7, and IV-M-8 detail the measures of effectiveness for the main thoroughfares through the study area, US Routes 11/15, US Route 11, US Route 15, and PA Route 147. The results shown in the tables are two-way averages (except for fuel consumption, which is a two-way total) of the northbound and southbound traffic.

The effects of the great increase in traffic on the existing roadways (US Routes 11/15, US Route 11, US Route 15, and PA Route 147) are evident in the results of the future 2030 No-Build scenario shown in the following tables. In the year 2030 No-Build scenario on US Routes 11/15, total delay and vehicle hours traveled will increase by approximately 115 percent when compared to the

TABLE IV-M-5
CORSIM MEASURES OF EFFECTIVENESS FOR US ROUTES 11/15

US Routes 11/15					
	Existing (2001)	No-Build (2030)	DAMA/Section 2 (2030)	OT2A/Section 2 (2030)	OT2B/Section 2(2030)
Total Delay (sec/veh)*	121	248	134	538	169
Total Travel Time (sec/veh)*	496	622	516	909	540
Total Vehicle Hours Traveled (VHT)*	205	458	175	295	164
Average Speed (mph)*	31	25	30	17	29
Fuel Consumption (gallons)	685	1,410	651	816	580

* Average Values for northbound and southbound traffic.

TABLE IV-M-6
CORSIM MEASURES OF EFFECTIVENESS FOR US ROUTE 11

US Route 11					
	Existing (2001)	No-Build (2030)	DAMA/Section 2 (2030)	OT2A/Section 2 (2030)	OT2B/Section 2 (2030)
Total Delay (sec/veh)*	89	1,027	92	77	90
Total Travel Time (sec/veh)*	292	1,221	308	293	274
Total Vehicle Hours Traveled (VHT)*	51	209	86	74	76
Average Speed (mph)*	35	19	35	37	37
Fuel Consumption (gallons)	169	601	266	238	265

* Average Values for northbound and southbound traffic.

same measures of effectiveness under existing conditions. On PA Route 147, the total delay increases by more than 4 times from the year 2001 Existing scenario to the year 2030 No-Build scenario, and the total vehicle hours traveled is 170 percent greater. The fuel consumption results also exhibit the congested conditions that will exist in the future along US Routes 11/15 if no expressway is built. With the addition of the new facility in the future, the through traffic will be separated from the local traffic, thereby freeing up the local roadway system for the local traffic.

The following results are evident in Tables IV-M-5 through IV-M-8.

TABLE IV-M-7
CORSIM MEASURES OF EFFECTIVENESS FOR US ROUTE 15

US Route 15					
	Existing (2001)	**No-Build (2030)**	**DAMA/Section 2 (2030)**	**OT2A/Section 2 (2030)**	**OT2B/Section 2 (2030)**
Total Delay (sec/veh)*	36	54	36	35	35
Total Travel Time (sec/veh)*	323	342	332	332	340
Total Vehicle Hours Traveled (VHT)*	75	176	53	48	45
Average Speed (mph)*	42	39	40	41	40
Fuel Consumption (gallons)	255	628	212	185	188

* Average Values for northbound and southbound traffic.

TABLE IV-M-8
CORSIM MEASURES OF EFFECTIVENESS FOR PA ROUTE 147

PA Route 147					
	Existing (2001)	**No-Build (2030)**	**DAMA/Section 2 (2030)**	**OT2A/Section 2 (2030)**	**OT2B/Section 2 (2030)**
Total Delay (sec/veh)*	82	394	83	86	95
Total Travel Time (sec/veh)*	363	669	365	368	368
Total Vehicle Hours Traveled (VHT)*	68	183	60	59	67
Average Speed (mph)*	35	24	35	35	35
Fuel Consumption (gallons)	188	462	172	171	194

* Average Values for northbound and southbound traffic.

- Regarding US Routes 11/15 (Table IV-M-5) - Total Delay is 46% lower for DAMA/Section 2 than for the No-Build Alternative and 32% lower for the OT2B/Section 2 than for the No-Build Alternative. The OT2A/Section 2 Alternative is higher than the No-Build Alternative due to the interchange design south of Ninth Street. There are similar patterns in Total Travel Time, Vehicle Hours Traveled and in Fuel Consumption. Average Vehicle Speed is higher than the No-Build for the DAMA/Section 2 and OT2B/Section 2 Alternatives.

- Regarding US Route 11, a comparison of all measures of effectiveness indicates improvements for each alternative of between 55% and 95%. However, all alternatives are relatively equal, with differences no greater than 10%. OT2A has slightly better measures of effectiveness than DAMA or OT2B.

- US Route 15 measures of effectiveness show similar results between the alternatives, but the Build Alternatives provide improvements ranging between 35% and 75% over the No-Build Alternative.

- On PA Route 147, all measures of effectiveness show improvement over the No-Build Alternative with all three Build Alternatives having nearly identical performance.

Table IV-M-9 shows the measure of effectiveness for each of the new facilities that would be constructed under the DAMA/Section 2, OT2A/Section 2 or OT2B/Section 2 combination alternative.

The resulting measures of effectiveness are similar on the new facility for all three alternatives. Both of the Old Trail Alternatives in combination with the Section 2 Alternatives have nearly similar results for the new CSVT roadway. The DAMA/Section 2 combination will have a slightly higher travel time, vehicle hours traveled, and fuel consumption totals because the actual new expressway is longer in length with the DAMA than it would be with either of the Old Trail Alternatives, and the new CSVT roadway carries more traffic under the DAMA/Section 2 combination alternative than it does under the OT2B/Section 2 combination alternative.

Table IV-M-10 summarizes the results of Tables IV-M-5 through IV-M-9 for all study area roadways.

Overall, the future traffic conditions on the existing roadway system for all three of the build alternative combinations will be greatly improved over the more congested conditions of the No-Build Alternative. The measures of effectiveness show little discernable difference between any of the three build alternatives. With the construction of a new facility, the future transportation system will work better overall and will adequately serve the Central Susquehanna Valley.

5. Mitigation

As part of the environmental impact studies, certain transportation deficiencies were identified within the study area that are being addressed as follows.

- The following intersections would continue to operate at a LOS F in the year 2030 despite the reduction in traffic volumes associated with the Build Alternatives.

  1. US 15 and PA 45 (Market Street) - Lewisburg Borough
  2. US 15 Route and PA Route 192 - Lewisburg Borough
  3. US Route 11 (Water Street) and PA Route 147 (King Street) - Northumberland Borough
  4. US Route 11 (Water Street) and PA Route 147 (Duke Street) - Northumberland Borough (for OT2B only)

TABLE IV-M-9
CORSIM MEASURES OF EFFECTIVENESS FOR CSVT ROADWAY

New Alignment					
	Existing (2001)	**No-Build (2030)**	**DAMA/Section 2 (2030)**	**OT2A/Section 2 (2030)**	**OT2B/Section 2 (2030)**
Total Travel Time (sec/veh)*	N/A	N/A	774	749	760
Total Vehicle Hours Traveled (VHT)*	N/A	N/A	931	674	809
Average Speed (mph)*	N/A	N/A	60	61	60
Fuel Consumption (gallons)	N/A	N/A	2,712	2,404	2,663

* Average Values for northbound and southbound traffic.

TABLE IV-M-10
TOTAL CORSIM MEASURES OF EFFECTIVENESS

Total for all Roadways (US 11/15, US 11, US 15, PA 147, and New Alignment)					
	Existing (2001)	**No-Build (2030)**	**DAMA/Section 2 (2030)**	**OT2A/Section 2 (2030)**	**OT2B/Section 2 (2030)**
Total Delay (sec/veh)*	327	1,722	345	736	389
Total Travel Time (sec/veh)*	1,473	2,853	1,521	1,901	1,522
Total Vehicle Hours Traveled (VHT)*	399	1,027	1,305	1,149	1,162
Average Speed (mph)*	34	28	48	44	49
Fuel Consumption (gallons)	1,298	3,101	4,012	3,814	3,890

* Average Values for northbound and southbound traffic.

Proposed improvements at each intersection location would vary and would depend on the level of local support shown for transportation improvements at each location. Improvements at these intersections would need to advance through PENNDOT's 12-Year Program.

- The SEDA Council of Governments, known as SEDA-COG, which PENNDOT works with as a transportation planning partner, has undertaken several steps recently to address congestion in three corridors, two of which have portions that are included in the Central Susquehanna Valley Transportation Project Study Area - US Route 11 in Northumberland and PA Route 45 in Lewisburg. These corridor studies are currently ongoing and are designed to address current capacity and safety deficiencies and future deficiencies. These studies will develop a series of recommendations designed to address the capacity deficiencies remaining after the CSVT project is opened to traffic. Improvements identified would need to advance through PENNDOT's 12-Year Program.

N. SCENIC RIVERS

1. Impacts

> More detailed information on the scenic rivers in the project area and anticipated project impacts is located in the Scenic Rivers Technical Support Data. An index of the Technical Support Data is located in Section IX, Appendix A.

The Pennsylvania Scenic Rivers Act (Act 283) of 1972, as amended, authorized the establishment of the Pennsylvania Scenic Rivers System, and specified procedures for designating certain river segments having outstanding aesthetic and recreational values. During the initial phase of the Program (1975), an inventory of drainage basins was compiled to identify potential components for the Pennsylvania Scenic Rivers System and to recommend priorities for river studies. Rivers were evaluated and rated according to natural resource values, character and extent of man-made development, resource endangerment and recreational use or potential. More than 200 nominations were evaluated, and included in the Pennsylvania Scenic Rivers Program: Scenic Rivers Inventory. Designation of these rivers as components in the Pennsylvania Scenic Rivers System requires legislative action from the Governor and the General Assembly.

No streams, rivers, or watercourses within the CSVT project study area have been officially designated as Pennsylvania Scenic Rivers. Within the project area, however, the West Branch and Main Stem of the Susquehanna River have been nominated as Priority 1 "A" scenic river candidates. This priority nomination indicates that they are watercourses of statewide significance with need for protection and additional study. All Section 2 alignment alternatives will require the construction of a new bridge crossing with multiple piers over the West Branch Susquehanna River. As such, coordination regarding the location and design of the proposed bridge crossing has been completed with the entity with jurisdiction over the Pennsylvania Scenic Rivers Program (i.e., the DCNR, Bureau of Recreation and Conservation).

2. Mitigation

Mitigation for the construction of a new bridge crossing over the West Branch Susquehanna River relevant to its designation as a Priority 1 "A" scenic river candidate shall consist of those recommendations listed in the DCNR's scenic river review comment response letter (see Appendix D). A summary of these recommendations is provided below.

- The construction staging areas should be screened by vegetative buffer and set back as far as possible from the river's edge.
- The materials in the bridge should reflect the natural character of the surrounding area as much as possible.
- An approved erosion and sedimentation control plan must be utilized.
- Native or local stone should be used in areas where riprap is needed.
- Once construction is underway, river users shall be notified of construction activities upstream and downstream from the construction site by using appropriate signage. Signs of sufficient size should be appropriately located to notify all river users they are entering a construction area.
- Since the West Branch of the Susquehanna River is a canoeable stream, an identification sign should be incorporated on the parapet on the upstream side of the bridge identifying it as the State Route 15 Bridge. The specifications of the sign should be developed so that canoeists can read the sign from the river. Final sign specifications need to be developed through consultation with PENNDOT.
- If a causeway is to be used as a temporary crossing during construction of the bridge, the Contractor must adhere to the requirements of DEP permit BDWW-GP-8 - Temporary Road Crossings.
- During construction and cleanup, all debris entering the river shall be removed.

Additionally, the DCNR comment response letter indicated that several governmental agencies, municipalities, and non-profit organizations, including PENNDOT, are exploring the possibility of studying the area for the potential development of a greenway along the Susquehanna River. As such, they suggest that access to the river for the potential development of recreational facilities (such as a trail or greenway) should be maintained. Given that the proposed bridge crossing is planned to span the FEMA 100-year floodplain with an elevated structure, access to the river will be maintained for the future development of recreational facilities.

O. CONSTRUCTION IMPACTS AND MITIGATION

This section of the Final EIS will identify likely impacts which will result from the activities associated with the physical construction of the new highway. For the most part, except as noted below, implementation of any of the Final EIS Alternatives will result in similar construction impacts. The No-Build Alternative will have no construction impacts.

Specific to the CSVT Project, potential construction impacts can be discussed in two major categories.

1. Impacts from construction activities
2. Operational impacts from construction sequencing

The construction of an approximately 20-kilometer (12.5-mile) four-lane limited access highway on new alignment is a major construction project and has the potential for substantial construction impacts. Typical construction impacts for a project with the scope of the CSVT Project would include the following.

- Traffic Impacts (including impacts on emergency service providers)
- Air Quality Impacts
- Noise Impacts
- Water Quality Impacts
- Property Access Impacts
- Impacts Related to Earthwork Balance
- Invasive Plant Species Management

The following sections discuss each of these impacts and methods to mitigate the likely impacts.

1. Traffic Impacts

Due to its location primarily to the west of the existing roadway network, the DAMA Alternative in Section 1 would have considerably less impact to existing traffic patterns during construction than the Old Trail Alternatives. Traffic patterns during construction of the DAMA would only be impacted during the construction of the interchanges, on US Routes 11/15 just south of the Susquehanna Valley

Mall during construction of the Selinsgrove Interchange, and on US Routes 11/15 and PA Route 61 in Shamokin Dam near the Veterans Memorial Bridge during the construction of the 61 Connector interchange. These impacts to existing travel patterns will be minimal, localized, and of relatively short duration. However, it is acknowledged that the construction of the new interchange associated with DAMA may impact emergency service vehicles by slightly increasing response times.

On the converse, the construction of the Old Trail Alternatives has the potential for more substantial impacts to traffic patterns. The Old Trail 2A Alternative would have interchanges located in similar areas as the DAMA. Thus, the localized impact to traffic patterns associated with the DAMA would also be applicable to the OT2A. In addition, the OT2A Alternative requires the construction of a bridge over US Routes 11/15 in the vicinity of Stetler Avenue, as the alignment moves from its initial location east of existing US Routes 11/15 near the river to the west of US Routes 11/15. The construction of this bridge over existing 11/15 has the potential to substantially impact traffic patterns on US Routes 11/15, causing delays on 11/15 while the bridge abutments are set and bridge members are put in place. In addition, construction of a new bridge over the Old Trail will impact motorists during the construction of OT2A. Road closures and detours are expected.

The OT2B Alternative would also have substantial impacts on existing traffic patterns during its construction. OT2B also has an interchange in the Selinsgrove area on US Routes 11/15, and interruption of traffic would be anticipated at this location. However, as noted for the DAMA and OT2A, this impact would be minimal and would be localized and of relatively short duration. However, the OT2B Alternative also includes the construction of a fully directional interchange with US Routes 11/15 in the vicinity of Stetler Avenue. The construction of this interchange would substantially impact traffic patterns. As with OT2A, existing US Routes 11/15 would be bridged. The construction of the bridge will cause delays since travel under the bridge on US 11/15 would be prohibited while the bridge members are put in place. In addition, improvements to existing US Routes 11/15 are necessary with the construction of this new interchange. As a result, motorists on existing 11/15 may need to be detoured for a short time, further snarling traffic. Impacts to motorists using Old Trail Road will be similar to those for OT2A. Road closures and detours are expected.

The impacts to traffic during the construction of the Section 2 Alternatives are somewhat similar. All Section 2 Alternatives (RC1-E, RC1-W, RC5, and RC6) require an interchange with US Route 15 just south of Winfield. Interruption of traffic at this location would be anticipated during construction. However, this impact would be minimal, localized, and of relatively short duration. The construction of RC1-E, RC1-W, and RC6 also necessitate construction of an interchange with PA Route 147. The construction of this interchange will impact traffic patterns on existing PA Route 147. As with the construction of the other interchanges, traffic interruptions and delays at this interchange location are expected. However, they are anticipated to be minimal and of relatively short duration. RC5 also interchanges with PA Route 147, but in a different location. The interchange for RC5 is located at Ridge

Road. Minor interruption to traffic patterns on both PA Route 147 and Ridge Road during the construction of this interchange are anticipated.

A Maintenance and Protection of Traffic (MPT) Plan will be developed during Final Design to minimize the disruption of traffic as much as possible for the alternative selected for construction. Coordination will be undertaken with emergency service providers and agencies in the implementation of the MPT Plans during construction.

2. Air Quality Impacts

Potential air quality impacts associated with roadway construction are generally the result of one of three distinct construction activities.

1. Direct exhaust emissions from the construction equipment.
2. Dust generated by vehicle movements within the construction area.
3. Wood smoke associated with open burning of grubbed woody material.

Impacts to air quality associated with direct exhaust emissions can be minimized through the use of air pollution control devices on the exhausts of construction vehicles. The contractor will be directed to locate vehicle staging and holding areas away from residential areas to the extent possible.

Dust associated with roadway construction is a common construction problem that has effectively been dealt with by PENNDOT and all reputable roadway construction contractors. The contractor will be under strict contract guidelines regarding the control of dust. The direct application of water is the most common form of dust suppression used in roadway construction projects. However, winter construction activities sometimes required the use of chemical dust suppression agents. The PENNDOT Construction Managers will constantly monitor dust levels and take corrective action, where necessary.

Excessive wood smoke associated with the open burning of woody grubbed material (trees, stumps, roots, etc.) can occasionally result in air quality impacts. However, PENNDOT, District 3-0, does not permit the burning of wood material on roadway construction projects. Additionally, the recent high price of timber and the advent of "super chippers" has reduced the frequency of burning grub material on highway projects in general. Often the woody material from the roadway area is "salvaged" as some type of salable wood product and removed from the site rather than simply burned. PENNDOT will encourage the contractor to make wise use of the wood resources within the roadway area.

Contractors will be required to comply with the New Source Review Section of the PA DEP's Air Quality Program. This coordination will take place prior to construction, if necessary. Any required plan approvals will be obtained prior to construction.

3. Noise Impacts

A variety of noise generation sources are common in roadway construction projects. These include the following.

- Routine operation of heavy construction equipment
- The use of power hammering equipment to set piles, break rock and concrete pavement
- The sawing of existing pavement
- The operation of drilling equipment (pre-split and shot charge holes, etc.)
- Blasting of rock

Substantial noise impacts associated with construction activities are anticipated (in residential areas) for any of the DEIS alternatives. In Section 1, construction noise impacts for the Old Trail Alternatives are expected to be greater than those for DAMA due to the greater number of residential structures adjacent to the Old Trail Alternatives. In Section 2, construction noise impacts are relatively similar for all four River Crossing Alternatives.

Construction noise impacts can be mitigated to some degree by limiting construction activities to daylight hours. However, this contract limitation can lengthen the overall construction schedule. PENNDOT is committed to working with the contractor to minimize construction noise impacts to the extent possible.

4. Water Quality Impacts

Construction of the CSVT Project could result in temporary impacts to water quality. Likely, impacts to surface waters associated with the construction activities are discussed in Section IV.F.3.

Likely impacts to groundwater resources (and water supplies) associated with construction activities are discussed in Section IV.G.

Additionally, as a result of a recommendation in the Draft EIS, a Groundwater Quality and Impact Monitoring Plan has been prepared. This plan is intended to provide the means to ensure the health and safety with respect to groundwater quality particularly in the areas of the Ash Basins. This plan establishes the locations of groundwater monitoring, the types of groundwater sampling and analysis to be performed at these locations, and an abatement plan to be implemented if it is determined during the sampling that groundwater degradation will occur. An alternate water supply contingency plan is also outlined. This plan can be found in the Public/Private Water Supplies Technical Support Data. A summary of the plan is provided in Section IV.G.

The results of the Groundwater Quality and Impact Monitoring Plan will be used to minimize the risk of contamination and to refine the proposed mitigation measures.

5. Property Access and Usage Impacts

The construction of any of the DEIS alternatives for the CSVT Project would result in the bisection of some properties. This bisection by the highway would essentially cut off access from one part of the property to the other. These issues of access will be addressed during the right-of-way acquisition process. Following the completion of construction, property owner access will be reestablished to the isolated portions of bisected properties. PENNDOT policy is that access will be provided or the owner will be compensated for loss of access. However, temporarily (during construction) access may be cut off to these isolated portions of the property.

This temporary interruption in access to isolated portions of properties may or may not be a problem depending upon the landowner usage of the property. Isolated portions of properties used for agricultural or recreational purposes are most likely to realize temporary access impacts during construction.

PENNDOT is committed to maintaining temporary access to isolated portions of property to the extent possible and feasible. PENNDOT Right-of-Way Acquisition personnel will verify with landowners all land uses for these portions of property so as to facilitate PENNDOT's ability to provide temporary access during construction.

6. Impacts Related to Earthwork Balance

Based on the preliminary engineering analysis completed to-date, the CSVT project earthwork will either result in a "borrow" condition, meaning that material needed for fill will have to be obtained from other sources, or a "waste" condition, meaning that surplus excavation will need to be placed elsewhere (see Table VI-1).

In comparing the Section 1 Alternatives, earthwork figures range from a 8,000 cubic yard borrow condition on the OT2B to a 2.36 million cubic yard waste on DAMA. The OT2B is the alternative in Section 1 closest to achieving a "balance" in the earthwork.

In comparing the Section 2 Alternatives, they vary from a 175,000 cubic yard borrow for RC1-W to a 2.1 million cubic yard waste condition for RC5. RC1-W is the alternative in Section 2 closest to achieving an earthwork balance.

The large amount of earth which must be excavated (also referred to as "cut") associated with the DAMA, RC1-E, RC5, and RC6 will result in excess material on both sides of the West and Main Branch Susquehanna River. In order to better understand the extent of the impacts associated with disposing material, note that the disposal of 2 million cubic yards of waste material would require 30 hectares (75 acres) of land area if the material were placed approximately 20 feet thick. Design measures have been discussed, which include plans to construct the portion of the highway in Section 1, which will cross the PPL Ash Basins on material which is placed on top of the existing ash basins (also referred to as "fill"). It is possible that more than one million cubic yards of the material excavated from the west bank of the river in Sections 1 and 2 could be used in the area of the ash basins. Disposal of material excavated from the east bank would need to be arranged within the vicinity of the project area.

It is important to note that the surplus waste figures presented in the Draft and Final EIS's are based on preliminary engineering level of detail. During final design, a detailed and comprehensive Geotechnical Survey will be conducted to ascertain site-specific information on geology and soils, as well as groundwater conditions. This information will be used to adjust the design of the selected alternative as approrpriate such as providing for steeper rock cuts (thereby reducing excess material) or widening fill slopes, where possible. Additionally, the design team will investigate places where it may be possible to raise the profile of the selected alternative, also reducing excess excavation. The FHWA and PENNDOT are committed to working toward achieving a better balance between excavated and fill material. However, it is unlikely that any alternative could be brought into total balance. As such, there will be a need to dispose of the excess material somewhere in the project vicinity.

As noted in the Draft and Final EIS's, the ash basin areas may be used for the disposal of approximately one million cubic yards of material. Additionally, PENNDOT has contacted each municipality within the CSVT study area to determine if other potential disposal sites exist. This coordination is currently in progress.

The FHWA and PENNDOT have also committed to the use of an Environmental Monitor (EM) throughout final design and construction. One of the responsibilities of the EM will be to track the placement of surplus material. However, beyond the ash basins and any locations identified by the local municipalities, the FHWA will not dictate the locations of the waste disposal sites prior to construction. The FHWA's policy is to make the locations of the waste disposal site(s) the responsibility of the contractor. During construction, if excess material is disposed of outside the right-of-way, the contractor is required to obtain the necessary approvals, including all environmental clearances. PENNDOT's Specifications, Publication 408, provides contract requirements to assure that these approvals are secured prior to disposing of the waste. Additionally, PENNDOT will add a special provision to their specification to assure that the contractor will have qualified professionals to investigate and determine that no environmental concerns exist in the proposed disposal area. If environmental concerns exist, then the contractor's qualified professional will secure the necessary permits and approvals. PENNDOT plans to use their EM to track the placement of excess material and to assure that all necessary approvals and permits are secured. PENNDOT, the contractor(s) and the EM will coordinate closely throughout construction to ensure that control measures are maintained and all necessary environmental clearances and permits are secured.

Additionally, during Final Design the possibility of using excess excavated material for the construction of earthen berms to mitigate noise impacts will be investigated.

7. Introduction of Invasive Plant Species

Large scale earth disturbance projects often result in the spread and introduction of undesirable invasive plant species. In accordance with Executive Order 13112 (February 3, 1999), Federal agencies must take actions to avoid and minimize the impacts caused by invasive species. The FHWA has directed PENNDOT to address this issue on all new roadway construction projects. PENNDOT is committed to implementing the following procedures during construction to minimize the spread of invasive plant species.

1. Identify pockets of existing invasive plant species which may exist in the work area prior to construction.

2. Avoid, to the extent possible, the salvage of topsoil from areas containing invasive plant species.

3. Develop and implement seeding and other landscaping specifications which minimize the likelihood of introducing invasive plant species during construction and roadside development.

4. Implement construction procedures which result in the prompt revegetation of all disturbed soil surfaces.

5. Avoid use of invasive plant species in reseeding and other landscaping work.

6. If noxious or invasive plant species become established in the right-of-way (post-construction), PENNDOT will attempt to control these species until more beneficial species become established.

P. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

This section of the CSVT Final EIS evaluates, in summary fashion, whether or not the public good derived from the project justifies the likely environmental impacts. In other words, this is the section of the Final EIS which evaluates if the No-Build Alternative makes more sense than the various Build Alternatives. In light of the scope of the project, all the build alternatives have similar impacts to resources in the project area when compared to the No-Build Alternative. Some of the impacts associated with construction are short-term, localized effects, which have been considered in the Construction Impacts section (IV-O). The proposed transportation improvements are based on State and local planning which consider the need for present and future traffic requirements within the context of present and future land use development. Improvements are consistent with the maintenance and enhancement of long-term productivity for the local area and State. The long-term benefits resulting from the construction of a new high-level facility should more than offset any adverse construction impacts which would result from the project.

It is concluded that the public benefits of the build alternatives clearly outweigh the potential environmental impacts. This conclusion was carefully considered and is based on the following general findings of the CSVT Project study.

1. There is a clear transportation need for the project which is based primarily on traffic safety.

2. This study has evaluated a wide range of alternatives in an attempt to find an acceptable transportation solution which minimizes environmental impacts.

3. There is a clear public mandate which underscores the need for the project and an acceptance of the associated impacts.

4. The overall environmental impacts of the Final EIS alternatives are not unreasonable given the overall scope of the project.

5. The review agencies involved in the project development process have not expressed major concerns related to regulated resources.

Q. ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION

The CSVT Project would result in the irreversible and irretrievable commitment of certain resources. This commitment of resources would be similar for all Final EIS alternatives. The primary irreversible and irretrievable resources committed to this project would include the following items.

1. Natural, social, and cultural resources currently located within the area required for highway construction.

2. Public financial resources required to fund ROW acquisition, highway construction, and mitigation activities.

3. Natural resources necessary to manufacture the construction material needed to construct the highway.

4. Energy resources necessary for highway construction and the manufacturing of construction materials.

The public detriment associated with the commitment of these irreversible and irretrievable resources is clearly offset by the public benefits resulting from the transportation improvements which would be realized by the CSVT Project. Benefits which are anticipated to outweigh the commitment of these resources consist of improved traffic flow, increased safety, crash reduction, reduction in travel times, and increased availability of services.

R. ADVERSE ENVIRONMENTAL IMPACTS THAT CANNOT BE MITIGATED

The construction of the CSVT Project would result in certain unmitigatable environmental impacts. Construction of any of the build alternatives would result in the following environmental impacts which could not be completely mitigated.

- Loss of existing and future tax base
- Visual impacts to the project study area
- Noise impacts to residences
- Loss of wildlife habitat and community connectivity
- Loss of timber producing forest land
- Loss of active farmland

The No-Build Alternative would also result in certain unmitigatable environmental impacts.

- Loss of life and injury due to additional crashes and congestion remaining on the existing roadway system.
- Additional air pollution associated with vehicular idling at traffic signals.
- Increased fuel consumption.
- Economic losses due to excess fuel consumption, crash costs, and loss of ability to sustain growth due to congested transportation system.
- Time losses due to continuing delays resulting from congestion.

Detailed discussions of the environmental impacts which cannot be mitigated can be found in the following sections.

- Tax Base Impacts - Section IV.A
- Visual Impacts - Section IV.E
- Noise Impacts - Section IV.B
- Wildlife Habitat Impacts - Section IV.F.1
- Forest Land Impacts - Section IV.F
- Farmland Impacts - Section IV.D

S. REQUIRED PERMITS

The construction and operation of any of the Final EIS Alternatives for the CSVT Project would require the following permits, certifications, and/or authorizations.

- US Army Corps of Engineers Section 404 Permit
- Pennsylvania Department of Environmental Protection Chapter 105 Permit
- Pennsylvania Department of Environmental Protection 401 Water Quality Certification
- PA Individual NPDES Permit for Construction
- PA Agricultural Land Condemnation Approval Board (ALCAB) Approval
- Pennsylvania Department of Environmental Protection Residual Waste Permit or Permit Modifications