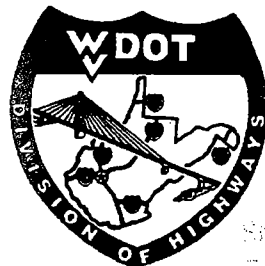


Appalachian Corridor

FINAL ENVIRONMENTAL IMPACT STATEMENT

Volume III

Mitigation Document



State Project: X142-H-38.99 C-2
Federal Project: CHHD-484 (59)

State Hwy: 20
Route No.: CHHD-484

TABLE OF CONTENTS

I. INTRODUCTION

A. INCORPORATED BY REFERENCE.....	2
B. AGENCY INVOLVEMENT PROCEDURES.....	2
C. ENVIRONMENTAL MONITOR.....	4
D. WATER QUALITY MONITORING AND INVESTIGATIONS.....	4
1. CONSTRUCTION MONITORING.....	4
2. CONSTRUCTION IMPACT INVESTIGATION.....	5
E. ENVIRONMENTAL PLANNING.....	5
F. SCENIC OVERLOOKS.....	5
G. BIKEWAYS.....	5
H. NOISE.....	6
I. CULTURAL RESOURCES.....	6

II. GENERAL MITIGATION MEASURES

A. WETLANDS.....	7
B. STREAMS.....	7
1. GENERAL HABITAT IMPROVEMENT STRATEGY.....	8
2. SELECTION OF HABITAT IMPROVEMENT AREAS.....	8
3. INDIVIDUAL STREAM HABITAT IMPROVEMENT PLANS.....	12
4. FENCING OF STREAMS WITHIN THE RIGHT-OF-WAY.....	13
5. SENSITIVE WATERS.....	13
C. EROSION AND SEDIMENTATION CONTROL.....	13
1. SEED MIXTURES (Specification 642.5.3.2).....	13
2. SCHEDULE OF SEEDING OPERATIONS (Specification 642.5.2).....	14
3. SEASON OF WORK (Specification 652.3).....	14
4. MULCH, FERTILIZER, MULCH MATERIAL AND MATTING FOR EROSION CONTROL.....	14
5. SEDIMENT BASIN REQUIREMENTS.....	14
6. CLEARING AND GRUBBING.....	14
7. WATER QUALITY.....	15
8. WATER QUALITY MAINTENANCE.....	15
9. INSPECTION.....	16
D. RECLAMATION.....	17
1. RIGHT-OF-WAY CLEARING, TOPSOIL REMOVAL AND STORAGE.....	17
2. RECLAMATION MONITORING.....	18
3. PHOTOMONITORING POINTS.....	19
4. MONITORING SCHEDULE AND REPORTING.....	19
5. REPORTING AND DATA PRESENTATION.....	20
E. EXCESS EXCAVATION.....	20
1. PLACEMENT OF EXCESS EXCAVATION AND BORROWING.....	21
2. MITIGATION MEASURES.....	22

TABLE OF CONTENTS (Cont.)

F. ACID DRAINAGE	22
1. PREDICTION OF POTENTIAL SEVERITY OF ACID DRAINAGE	23
2. MITIGATION MEASURES	24
3. ACID PRODUCING EXCESS EXCAVATION.....	25
G. TERRESTRIAL HABITAT	25
H. GROUNDWATER.....	26
1. PRIVATE WELLS	26
2. GROUNDWATER IN KARST REGIONS.....	26
 III. DESIGN SECTION MITIGATION REQUIREMENTS	
A. SECTION 16	28
1. STREAMS	28
2. EROSION AND SEDIMENTATION CONTROL	30
3. EXCESS EXCAVATION.....	30
4. ACID DRAINAGE.....	30
5. TERRESTRIAL HABITAT	30
6. GROUNDWATER	31
7. SCENIC OVERLOOKS	31
8. BIKEWAYS	31
B. SECTION 15	31
1. STREAMS	31
2. EROSION AND SEDIMENTATION CONTROL	32
3. EXCESS EXCAVATION.....	33
4. ACID DRAINAGE.....	33
5. TERRESTRIAL HABITAT	33
6. GROUNDWATER	33
7. SCENIC OVERLOOKS	33
8. BIKEWAYS	33
9. NOISE BARRIER	33
C. SECTION 14	34
1. STREAMS	34
2. EROSION AND SEDIMENTATION CONTROL	34
3. EXCESS EXCAVATION.....	34
4. ACID DRAINAGE.....	34
5. TERRESTRIAL HABITAT	34
6. GROUNDWATER	35
7. SCENIC OVERLOOKS	35
8. BIKEWAYS	35
D. SECTION 13	35
1. STREAMS	35
2. EROSION AND SEDIMENTATION CONTROL	37
3. EXCESS EXCAVATION.....	37
4. ACID DRAINAGE.....	37
5. TERRESTRIAL HABITAT	38
6. GROUNDWATER	38

TABLE OF CONTENTS (Cont.)

7. SCENIC OVERLOOKS	38
8. BIKEWAYS	38
E. SECTION 12.....	38
1. STREAMS	39
2. EROSION AND SEDIMENTATION CONTROL	39
3. EXCESS EXCAVATION.....	39
4. ACID DRAINAGE	40
5. TERRESTRIAL HABITAT	40
6. GROUNDWATER	41
7. SCENIC OVERLOOKS	41
8. BIKEWAYS	41
F. SECTION 11.....	41
1. STREAMS	41
2. EROSION AND SEDIMENTATION CONTROL	41
3. EXCESS EXCAVATION.....	42
4. ACID DRAINAGE	42
5. TERRESTRIAL HABITAT	43
6. GROUNDWATER	43
7. SCENIC OVERLOOKS	43
8. BIKEWAYS	43
G. SECTION 10.....	43
1. STREAMS	43
2. EROSION AND SEDIMENTATION CONTROL	43
3. EXCESS EXCAVATION.....	44
4. ACID DRAINAGE	44
5. TERRESTRIAL HABITAT	44
6. GROUNDWATER	45
7. SCENIC OVERLOOKS	45
8. BIKEWAYS	45
H. SECTION 9.....	45
1. STREAMS	45
2. EROSION AND SEDIMENTATION CONTROL	46
3. EXCESS EXCAVATION.....	46
4. ACID DRAINAGE	46
5. TERRESTRIAL HABITAT	47
6. GROUNDWATER	47
7. SCENIC OVERLOOKS	48
I. SECTION 8.....	48
1. STREAMS	48
2. EROSION AND SEDIMENTATION CONTROL	50
3. EXCESS EXCAVATION.....	50
4. ACID DRAINAGE	50
5. TERRESTRIAL HABITAT	51
6. GROUNDWATER	51
7. SCENIC OVERLOOKS	51
8. BIKEWAYS	51

TABLE OF CONTENTS (Cont.)

J. SECTION 7	51
1. STREAMS	51
2. EROSION AND SEDIMENTATION CONTROL	52
3. EXCESS EXCAVATION.....	52
4. ACID DRAINAGE.....	52
5. TERRESTRIAL HABITAT	53
6. GROUNDWATER	53
7. SCENIC OVERLOOKS	53
8. BIKEWAYS	53
K. SECTION 6	53
1. STREAMS	54
2. EROSION AND SEDIMENTATION CONTROL	54
3. EXCESS EXCAVATION.....	55
4. ACID DRAINAGE.....	55
5. TERRESTRIAL HABITAT	55
6. GROUNDWATER	55
7. SCENIC OVERLOOKS	55
8. BIKEWAYS	56
L. SECTION 5.....	56
1. STREAMS	56
3. EXCESS EXCAVATION.....	57
4. ACID DRAINAGE.....	58
5. TERRESTRIAL HABITAT	58
6. GROUNDWATER	58
7. SCENIC OVERLOOKS	58
8. BIKEWAYS	58
M. SECTION 4	58
1. STREAMS	58
2. EROSION AND SEDIMENTATION CONTROL	60
3. EXCESS EXCAVATION.....	60
4. ACID DRAINAGE.....	60
5. TERRESTRIAL HABITAT	61
6. GROUNDWATER	61
7. SCENIC OVERLOOKS	61
8. BIKEWAYS	61
N. SECTION 3	61
1. STREAMS	61
2. EROSION AND SEDIMENTATION CONTROL	63
3. EXCESS EXCAVATION.....	63
4. ACID DRAINAGE.....	64
5. TERRESTRIAL HABITAT	64
6. GROUNDWATER	64
7. SCENIC OVERLOOKS	65
8. BIKEWAYS	65

TABLE OF CONTENTS (Cont.)

APPENDIX A - STREAM HABITAT IMPROVEMENT DATA TABLES

LIST OF FIGURES AND TABLES

Figure 1 - Agency Involvement Project Plan..... 3
Figure 2 - Stream Habitat Improvement Decision Flow Chart..... 9
Table 1 - Summary of Stream Habitat Improvements 10
Table 2 - Predicted Reductions in Excess Excavation 21
Table 3 - Summary of Acid Drainage Test Results 24

INTRODUCTION

I. INTRODUCTION

This document is a compilation of mitigation issues and commitments developed as part of the Corridor H Alignment Selection SDEIS in response to agency and public concerns. After the publication of the Alignment Selection SDEIS, meetings were held with the natural and cultural resource agencies to further discuss mitigation. The results of these meetings have been incorporated into this document.

Mitigation commitments made in this document should not be viewed as static but as a commitment by the WVDOH to continually refine and develop appropriate and practicable mitigation measures as the project passes through its various stages of development.

Some of the mitigation measures discussed in this document are specific (e.g., wetland replacement); where as others (e.g., stream enhancement, acid drainage mitigation measures) are discussed in conceptual terms. These differences in level of detail occur because of the length of the proposed project both spatially and temporally and the engineering level of detail required at various stages of project development that preclude detailed development of certain mitigation measures. Consideration of mitigation measures in this manner is consistent with FHWA regulations (23 CFR 711.125(a)(1)).

This 110 mile long highway project will be designed and built over many years. Much of the detailed information required to make final mitigation decisions will be generated during the final design process. The details of the highway design and its predicted environmental impacts will become more definitive as the project moves into final design. The required level of mitigation will be modified over time to reflect the more detailed information generated during final design. For example, additional preliminary engineering on several design sections was undertaken to more carefully examine the issue of large amounts of excess excavation. This additional level of engineering has determined that the level of excess excavation predicted in the Alignment Selection SDEIS will be reduced, dramatically in some cases, during final design.

A. INCORPORATED BY REFERENCE

This document is incorporated by reference into the Corridor H FEIS. The goals of this document are:

- ◆ To expand upon the commitments presented in the Alignment Selection SDEIS in response to agency and public concerns.
- ◆ To provide a framework within which the mitigation commitments will be refined as the design sections progress through additional phases of engineering and into construction.
- ◆ To serve as a reference for final design engineers of the mitigation requirements in each design section.
- ◆ To provide the FHWA, WVDOH and agencies with an easy to use inventory of mitigation commitments.

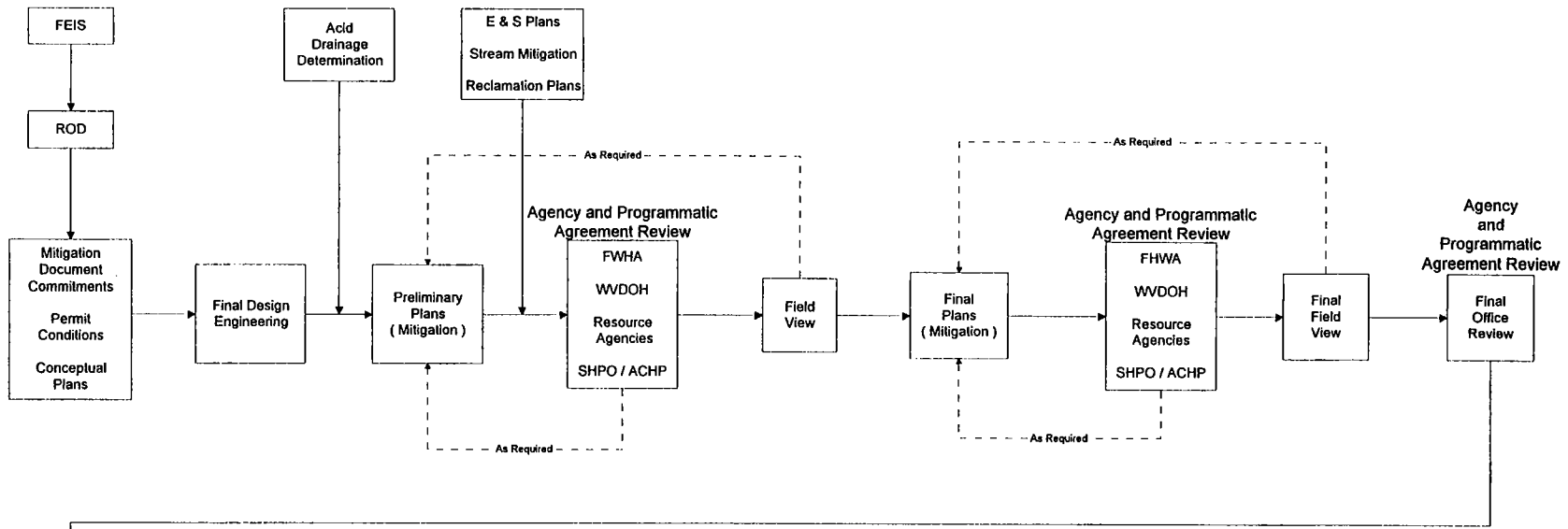
B. AGENCY INVOLVEMENT PROCEDURES

WVDOH has developed a process that will integrate the natural and cultural resource agencies into the mitigation development process as the various design sections move through the design process and into construction (Figure 1). Natural and cultural resource agencies include the following: U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Corps of Engineers, Natural Resources Conservation Service, U.S. Forest Service WV Department of Natural Resources, WV Department of Environmental Protection They are simply referred to throughout this document as “agencies”.

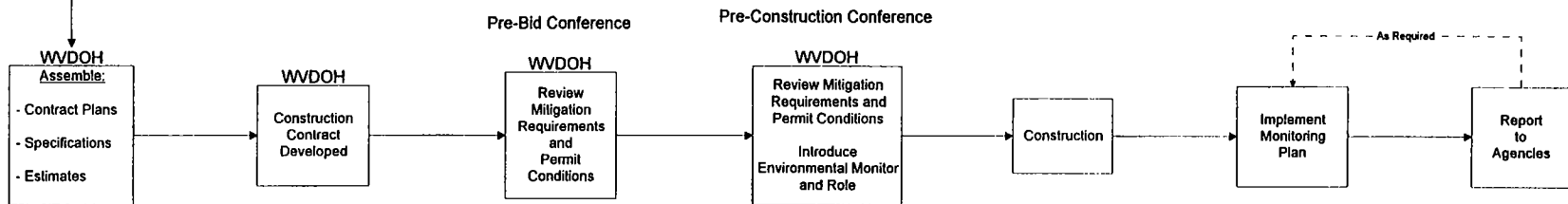
The refinement of mitigation commitments is incorporated into the design phase of the project. The implementation of the mitigation measures is incorporated into the construction phase of the project. This process will be employed for each of the design sections. During several steps in the process, agencies will be given the opportunity to review and comment on proposed mitigation plans and participate in field views associated with the development of the plans. Finally, agencies will have the opportunity to be updated on the effectiveness of mitigation plans at WVDOH Agency coordination meetings.

Figure 1 - Agency Involvement Project Plan

Mitigation Development



Mitigation Implementation



C. 2. ENVIRONMENTAL MONITOR INVESTIGATION

The WVDOH is proposing to utilize a full time environmental monitor to assure that mitigation commitments developed in the design process are carried through the construction phase of the project. The Environmental Monitor will: *date following these guidelines:*

- ◆ Report directly to the State Highway Engineer
- ◆ Participate in the mandatory pre-bid conference and pre-award meeting with contractors in order to explain the mitigation measures and permit conditions included within each individual design section.
- ◆ Assure that contractors are properly constructing, installing, and/or maintaining required mitigation measures.
- ◆ Assure that contractors are properly constructing, installing, and maintaining required erosion and sedimentation control measures.
- ◆ Conduct monitoring in order to determine compliance with State water quality standards, including monitoring of sites with the potential for production of acidic drainage.

E. ENVIRONMENTAL PLANNING

- ◆ Assure that all permit conditions are being adhered to during the construction phase.
- ◆ Advise agencies of major construction operations which may have impact on water quality and will attend all field reviews conducted with the agencies during construction.

D. WATER QUALITY MONITORING AND INVESTIGATIONS

WVDOH will develop a two part program to assess the impacts of highway construction on surface water quality. Program details will be developed in cooperation with the agencies.

1. CONSTRUCTION MONITORING

The Environmental Monitor will monitor water quality during construction to assure compliance with all permit conditions and effectiveness of erosion and sedimentation control plans.

- ◆ Monitoring will be carried out on all perennial streams located along the project during construction.
- ◆ The methods used to collect data , perform analyses, and report the resulting data will be developed in concert with the agencies.
- ◆ Monitoring results will be reported monthly to appropriate agencies and WVDOH.

2. CONSTRUCTION IMPACT INVESTIGATION

WVDOH will establish a long-term investigation focused on providing community level information concerning highway construction impacts on stream ecosystems. The details of the monitoring program will be developed at a later date following these guidelines:

- ◆ Monitoring will be carried out on approximately ten streams located along the project.
- ◆ The goals of this program will be developed in concert with the agencies.
- ◆ The methods used to collect field data or samples, perform laboratory analyses, and report the resulting data will be developed in concert with the agencies.
- ◆ Investigations will be carried out by agency or academic investigators with experience in aquatic ecosystem ecology.
- ◆ Research results will be reported annually to WVDOH and the agencies.

E. ENVIRONMENTAL PLANNING

WVDOH will develop a program, in concert with the agencies to inform local and regional planners about sensitive resources in their respective regions that could be potentially harmed by development. This program will include:

- ◆ Transfer of the environmental data collected as part of the Corridor H SDEIS to the counties.
- ◆ Identify the concerns of the agencies within each county to local planning officials.
- ◆ Inform the county of the various environmental permits required for development.

F. SCENIC OVERLOOKS

Possible locations for scenic overlooks are contained in the FEIS, Section III, Visual Impact mitigation. Locations of possible scenic overlooks are indicated in Section III of this document. Design of scenic overlooks at or near those locations indicated in Section III should be considered when practicable.

G. BIKEWAYS

Possible location for bikeways are included in Section III. Bikeways should be considered between stations listed for each section. A discussion of bikeway types to be considered is found in the FEIS, Section II.

H. NOISE

Based on site specific, detailed analyses, there will be only one sound barrier (noise wall) considered for mitigation as part of this project. The location of this sound barrier is presented in Section III.

I. CULTURAL RESOURCES

Methods and techniques to be employed for avoidance and mitigation to cultural resources are contained in the Section 106 Programmatic Agreement. That agreement is contained in the FEIS and will be consulted before proceeding with engineering design and construction activities. This document will be amended as sensitive cultural resources are identified and mitigation measures are developed for them.

II. GENERAL MITIGATION MEASURES

The following discussion of mitigation measures incorporates new information and commitments made since the publication of the Alignment Selection SDEIS.

A. WETLANDS

Wetland mitigation is discussed in detail in the Alignment Selection SDEIS (Section III, pp. III-378-III-400). Preliminary contract plans have been completed for the Potomac River Basin. The new design is presented in Exhibit III-12 of the Alignment Selection SDEIS but remains the same mitigation effort as presented in the Alignment Selection SDEIS (Section III-13 of the Corridor H FEIS). This site was field viewed and approved by the USCOE, FWS and WVDNR on February 13, 1995. Preliminary contract plans have also been completed for this site and property acquisition is being concluded.

Because of property acquisition difficulties an alternate site was chosen in the Monongahela River Basin. Like the previous site identified in the Alignment Selection SDEIS (Section III, p. 397) the new site is situated on the Landing Creek floodplain. The design of the new site results in the same mitigation ratios and storage as presented in the Alignment Selection SDEIS (Section III-13 of the Corridor H FEIS). This site was field viewed and approved by the USCOE, FWS and WVDNR on February 13, 1995. Preliminary contract plans have also been completed for this site and property acquisition is being concluded.

B. STREAMS

The overall goals of the stream habitat improvement effort are to provide the following for each local project watershed within which perennial streams are enclosed or relocated:

- **Improve aquatic wildlife habitat** - Stabilization of banks improves substrate conditions and reduces sedimentation of pools; riparian vegetation provides shading and source of leaf litter.
- **Improve water quality** - Fencing reduces agricultural impacts; bank stabilization reduces suspended sediment; riparian vegetation reduces nutrients in surface water and groundwater.
- **Improve terrestrial wildlife habitat** - Riparian areas provides habitat for amphibians, reptiles, small mammals and bird species.

II. GENERAL MITIGATION MEASURES

The conceptual guidelines and strategy to improve aquatic habitat was based on data. The following discussion of mitigation measures incorporates new information and commitments made since the publication of the Alignment Selection SDEIS. Each linear foot of enclosure or relocation. This is the most straight forward approach to quantifying the amount of stream habitat improvement required and easily understood by all parties involved.

A. WETLANDS

Wetland mitigation is discussed in detail in the Alignment Selection SDEIS (Section III, pp. III-378-III-400). Preliminary contract plans have been completed for the Potomac River Basin wetland replacement site located near Walnut Run in Section 7. Discovery of archaeological resources at the site required some deviation from the design presented in the Alignment Selection SDEIS but results in the same mitigation ratios and acreage of wetlands. The new design is presented in Exhibit III-12 of the *Corridor H FEIS*. Preliminary contract plans have also been completed for this site and property acquisition is being concluded.

Because of property acquisition difficulties an alternate site was chosen in the Monongahela River Basin. Like the previous site identified in the Alignment Selection SDEIS (Section III, p.397) the new site is situated on the Leading Creek floodplain. The design of the new site results in the same mitigation ratios and acreage as presented in the Alignment Selection SDEIS (Exhibit III-13 of the *Corridor H FEIS*). This site was field viewed and approved by the USCOE, FWS and WVDNR on February 13, 1995. Preliminary contract plans have also been completed for this site and property acquisition is being concluded.

B. STREAMS

The overall goals of the stream habitat improvement effort are to provide the following for each local project watershed within which perennial streams are enclosed or relocated:

- ♦ **Improve aquatic wildlife habitat** - Stabilization of banks improves substrate conditions and reduces sedimentation of pools; riparian vegetation provides shading and source of leaf litter.
- ♦ **Improve water quality** - Fencing reduces agricultural impacts; bank stabilization reduces suspended sediment; riparian vegetation reduces nutrients in surface water and groundwater.
- ♦ **Improve terrestrial wildlife habitat** - Riparian areas provides habitat for amphibians, reptiles, small mammals and bird species.

1. GENERAL HABITAT IMPROVEMENT STRATEGY

The conceptual guidelines and strategy to improve aquatic habitat was based on data collected for and reported in the Alignment Selection SDEIS (Section III, pp. III-403 through III-471). Habitat improvements will be planned based on a linear foot of habitat improvement for each linear foot of enclosure or relocation. This is the most straight forward approach to quantifying the amount of stream habitat improvement required and easily understood by all parties involved.

2. SELECTION OF HABITAT IMPROVEMENT AREAS

A total of 21 Habitat Improvement Areas have been identified representing over 10,500 meters (35,000 linear feet) of stream improvement. Each stream was field viewed during the development of the habitat improvement strategy. The flowchart in Figure 2 represents the process through which the location of Habitat Improvement Areas was identified for each perennial stream enclosed or relocated. The most important criteria in selecting the location of Habitat Improvement Areas was the availability of sufficient stream length in need of habitat improvement. Table 1 provides a summary of the type and length of habitat improvements, techniques to be used within each Habitat Improvement Area, as well as the proposed habitat improvement strategy.

Detailed discussions of each Habitat Improvement Area are provided in Section III. Appendix A provides more detailed environmental data and rationale for the type and location of habitat improvements for each perennial stream enclosed or relocated.

The goal for each Habitat Improvement Area will be to improve existing degraded stream habitat. To accomplish this goal, restoration will focus on improving stream habitat from poor/fair condition to good or excellent. The goal is not to replicate the habitat of the affected streams because many of the affected streams have poor or fair habitat conditions. In addition, since many of the Habitat Improvement Areas are located in a receiving stream which is larger than the impacted streams, restoring the same type of stream will not be possible due to the differences in physical environment (hydrology, substrate, gradients, etc.).

Figure 2 Stream Habitat Improvement Decision Flow Chart

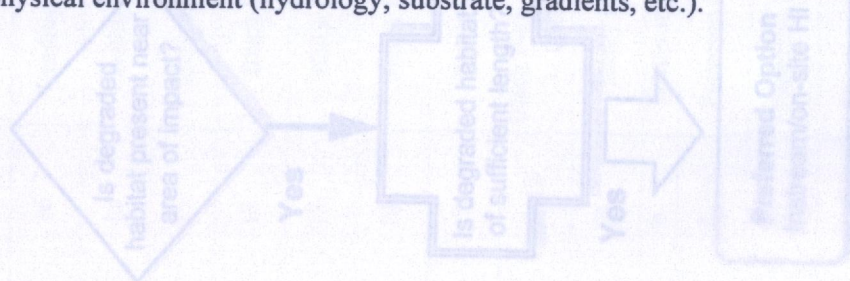
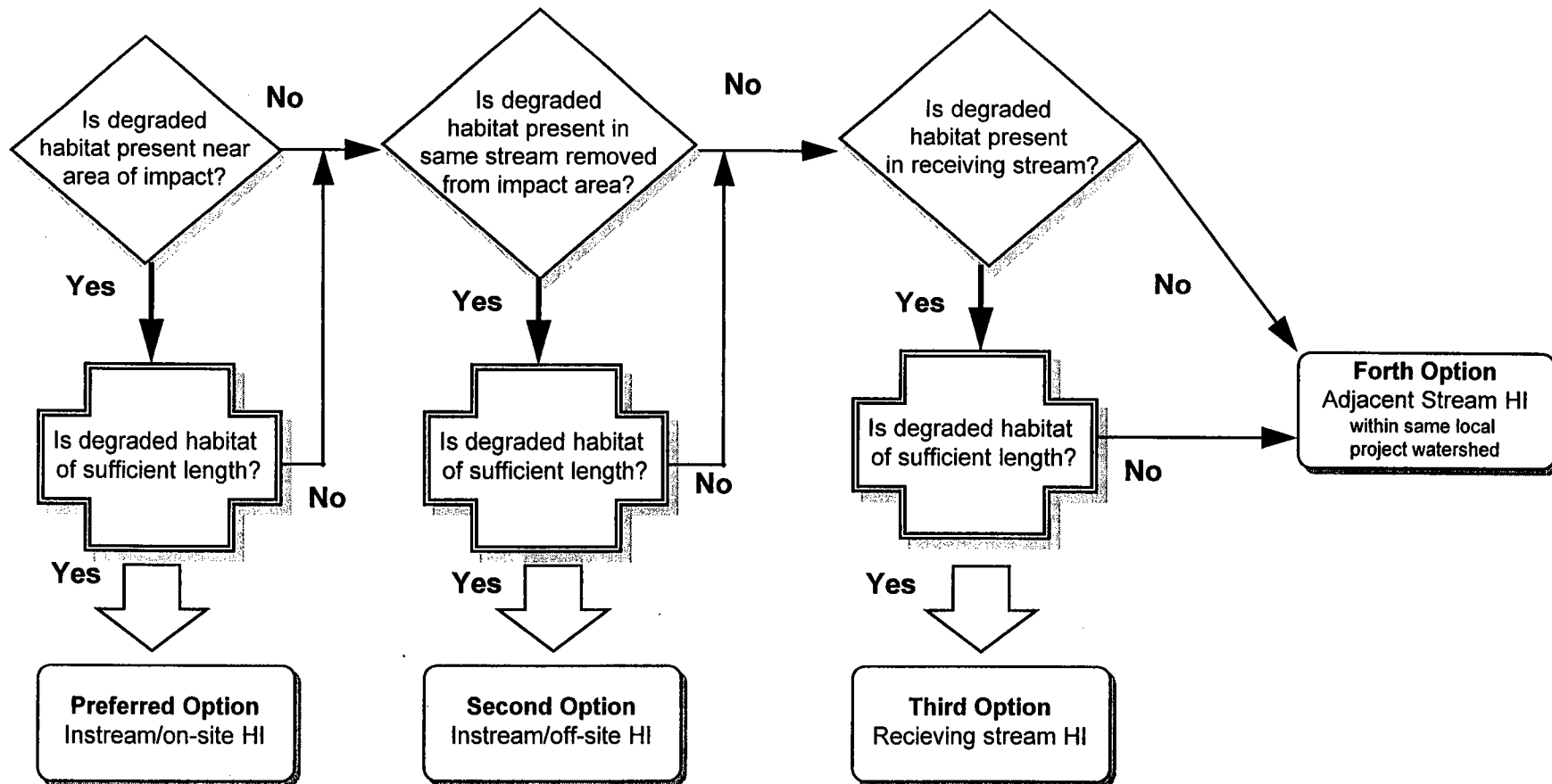


Figure 2
Stream Habitat Improvement Decision Flow Chart

Criteria for selection of Habitat Improvement areas



Definition of local project watershed as explained in Alignment Selection SDEIS, Glossary of Terms

Table 1
SUMMARY OF STREAM HABITAT IMPROVEMENTS

Section	Local Project Watershed	HI Area Name	Type of HI	Length (feet)	Proposed HI Techniques
16	Leading Creek	Claylick Run	Instream/onsite & Receiving Stream	1,550	Stream bank stabilization with woody vegetation; establish riparian buffer; instream flow deflectors
16	Leading Creek	Trib. to Leading Creek	Instream/offsite	800	Fencing; alternative water source and stream bank stabilization with woody vegetation
16	Leading Creek	Leading Creek	Receiving Stream	790	Control residential water quality pollution sources
15	Shavers Fork	Pleasant Run	Receiving Stream	1,320	Stabilize stream banks with woody vegetation; instream structures for pools
13	Black Fork	Trib. to Black Fork	Instream/onsite	650	Stabilize stream banks; reduce residential impacts
13	Black Fork	Roaring Run	Receiving Stream	3,450	Stabilize stream banks; reduce residential impacts
13	Black Fork	Slip Hill Mill Run	Instream/offsite	410	Stream channel reconstruction, slope and logging road stabilization
13	Black Fork	Long Run	To Be Determined	600	Specific HI techniques to be determined in concert with agencies
11 & 12	Black Fork -Beaver Creek	Tribs. to Beaver Creek	To Be Determined	3,995	Specific HI techniques to be determined in concert with agencies
10	Stony River	Section 10 HI area	To Be Determined	3,690	Specific HI techniques to be determined in concert with agencies
9	Patterson Creek	Trib. to Elklick Run	Receiving Stream	300	Stabilize stream banks;
8	Patterson Creek	Trib. to MF of Patterson Creek	Instream/offsite & Receiving Stream	1,160	Fencing; alternative water sources
8	Patterson Creek	Thorn Run HI Area	Receiving Stream	690	Stabilize stream banks with woody vegetation; reconstruct culvert crossings
8	Patterson Creek	Patterson Creek	Instream/onsite & Receiving Stream	4,750	Fencing; alternative water sources; stabilize stream banks with woody vegetation
7	Anderson Run	Trib. to Walnut Bottom	Instream/onsite	650	Fencing; stabilize stream banks with woody vegetation

Table 1
SUMMARY OF STREAM HABITAT IMPROVEMENTS

Section	Local Project Watershed	HI Area Name	Type of HI	Length (feet)	Proposed HI Techniques
6	South Branch	Fort Run	Instream/offsite	1,100	Fencing; alternative water supply; stabilize stream banks with woody vegetation; establishing a forested buffer
5	Skaggs Run	Skaggs Run	Instream/offsite & Receiving Stream	3,490	Fencing; stabilization of banks; instream structures for pools
5	Baker Run	Long Lick	Receiving Stream	577	Fencing; alternative water sources; stabilize banks
4	Central Cacapon	Lost River	Receiving Stream	2,835	Fencing; alternative water sources; stabilize banks; establish forested riparian buffer
3	Waites Run	Waites Run	Receiving Stream	700	Bank stabilization; flow deflectors; revegetation of riprap; clearing of debris jams
3	Slate Rock Run	Slate Rock Run	Receiving Stream	2,235	Fencing; alternative water sources; stabilized cattle crossing; channel reconstruction; bank stabilization with woody vegetation

Total Length of Stream Habitat Improvement 34,642

Since each proposed Habitat Improvement Area has different existing habitat conditions and different potentials for restoration, the improvements must be tailored to each individual site. Potential techniques are proposed for each Habitat Improvement Area based on an initial field review, but more detailed stream assessments during the design phase will allow for more specific plan development. The techniques which are proposed for the Habitat Improvement Areas include a combination of the following:

- ◆ Stabilizing eroding stream banks.
- ◆ Revegetating stream banks with woody species to improve bank stability, increasing shading, and providing wildlife habitat.
- ◆ Planting a wide riparian buffer along streams adjacent to cropland in order to reduce nutrient loadings.
- ◆ Fencing streams located in pastures and providing alternative water sources for livestock.
- ◆ Providing instream structures to create additional habitat.
- ◆ Improving stream hydrology by modifying culvert alignments along certain existing roadways.

The proposed techniques improve aquatic habitat as well as provide terrestrial wildlife habitat within the riparian zone, attenuate flood flows, provide corridors between wetlands and streams, and provide water quality improvements via uptake and transformation of nutrients by woody riparian vegetation.

3. INDIVIDUAL STREAM HABITAT IMPROVEMENT PLANS

After a proposed Habitat Improvement (HI) Area has been reviewed in the field and approved by the agencies, negotiations will be started toward obtaining the required easements. An individual HI Plan will be developed following easement negotiations. In order to properly identify the optimal techniques for each site, a comprehensive stream assessment will be conducted. This effort will include assessment of stream benthic communities, fish communities, and habitat based on EPA Rapid Bioassessment Methods and geomorphologic classification. These data will guide the selection of proper techniques and provide documentation of environmental conditions prior to restoration.

4. FENCING OF STREAMS WITHIN THE RIGHT-OF-WAY

Where the right-of-way limits extend along a 1st or 2nd order stream, opportunities will be explored for extending the right-of-way to the opposite stream bank and fencing that portion of the stream along the expanded right-of-way. These opportunities will be identified during development of preliminary contract plans and will be discussed with the agencies.

5. SENSITIVE WATERS

Through coordination with the agencies, streams deemed to be particularly sensitive to sedimentation will be identified. The design effort within the watershed of these streams will incorporate additional erosion and sedimentation control measures. These measures will include:

- ♦ More extensive use of sediment traps, erosion control matting, and silt fencing.
- ♦ Design, construction and maintenance of permanent stormwater management facilities to control both water quantity and quality.
- ♦ Grass lined ditches.

C. EROSION AND SEDIMENTATION CONTROL

The March 1, 1995 edition of the *WVDOH, Division of Highways' Erosion and Sedimentation Control Manual* is incorporated by reference into this document. Additionally, if newer editions or revisions of this manual are produced and adopted by WVDOH prior to the beginning of contract plan development for any final design section, the newer documentation will be incorporated into this mitigation document. WVDOH will incorporate additional measures into the design and construction of this project including:

1. SEED MIXTURES (Specification 642.5.3.2)

The seed mixture (B) called for medians, shoulders, waterways and mowable areas is predominately Kentucky 31 fescue and red fescue. Seed mixture D which is used on cut and fill slopes is composed of Kentucky 31 fescue, red fescue, and crownvetch. Contract plans will include alternative seed mixtures which will make a greater use of native or naturalized species with equal or greater soil stabilization characteristics.

2. SCHEDULE OF SEEDING OPERATIONS (Specification 642.5.2)

Fill slopes, embankments, borrow sites and excess excavation disposal sites will be, when practicable, seeded and mulched at the completion of each 1.5 meter lift or every two weeks, whichever occurs more frequently. Cut slopes and borrow pits shall be seeded and mulched at the completion of each 3 meter depth of excavation or every two weeks which ever is more frequent.

3. SEASON OF WORK (Specification 652.3)

Soil stabilization will be required between October 16 and February 28; and between June 16 and July 31, outside of the normal periods of grass seeding and mulching. The use of hydraulically applied mulches and tackifiers and other methods to stabilize soils out of the growing season will be included in contract plans where appropriate.

4. MULCH, FERTILIZER, MULCH MATERIAL AND MATTING FOR EROSION CONTROL (Specifications 652.6, 715.27 and 715.24)

The use of mulches and matting which provide greater erosion control will be incorporated into the contract plans. The types of materials to be considered include:

- ◆ Combination coir fiber and straw matting and blankets.
- ◆ Coir fiber matting and blankets.
- ◆ Hydraulically applied bonded fiber matrixes (wood fiber or man-made).
- ◆ Turf reinforcement matrixes.
- ◆ Pre-seeded matting and blankets.

5. SEDIMENT BASIN REQUIREMENTS

Sediment basins will be developed in contract plans when 1.2 ha (3.12 acres) or more of land disturbance activities drain to a particular location.

6. CLEARING AND GRUBBING

Clearing and grubbing operations will be scheduled and performed so that grading operations and permanent erosion control features could follow immediately thereafter if the project conditions permit; otherwise, temporary erosion control measures will be required between successive construction stages.

The Engineer will limit the area of clearing and grubbing, excavation, borrow and embankment operations in progress commensurate with the Contractor's capability and progress in keeping the finish grading, mulching, seeding and other such permanent erosion and pollution control measures current in accordance with the accepted schedule.

The Contractor will control all operations in such a manner that drainage from the project area will not cause the water quality, especially for turbidity and suspended solids of streams, rivers, and wetland, to exceed State water quality standards.

7. WATER QUALITY

The Contractors project supervisor will be responsible for water quality throughout the duration of construction. The Environmental Monitor will work closely with the Project Supervisor. The Project Supervisor will be responsible for the following:

- ◆ Developing and implementing an effective erosion control plan.
- ◆ Directing the construction, operation, and dismantling of temporary erosion control features.
- ◆ Implementing remedial action required to repair failing erosion and sedimentation control features.
- ◆ Implementing storm and winter shutdown procedures.

The Contractor will be required to prepare a Spill Prevention, Control, and Countermeasures (SPCC) plan that itemized specific measures that will be implemented to prevent and clean up chemical and petroleum product spills that may occur during all phases of project construction. Fuel storage and fueling procedures will be specifically identified. Fuel storage, refueling activities, equipment maintenance activities, and equipment washing will be kept at least 500 feet away from any perennial or intermittent watercourse or wetland.

8. WATER QUALITY MAINTENANCE

Work will be conducted in a manner to minimize increases in turbidity and suspended solids and to prevent other foreign substances from entering into streams, lakes, ponds, reservoirs, and wetlands. Prior to suspension of grading operations each day, the Contractor will shape the earthwork in a manner that will permit storm runoff with a minimum of erosion. The erosion control features installed by the Contractor will be operated and maintained by the Contractor in an acceptable functional condition. When depths of material in these features

reach half of capacity, the devices will be cleaned and restored to their original condition. Removed accumulated sediment will be disposed of in such locations that the sediment will not again erode into the construction areas or into natural waterways or wetlands.

9. INSPECTION

The Contractor's Project Supervisor and the WVDOH Environmental Monitor will inspect the construction site a minimum of once per week during periods of heavy precipitation and/or active construction and once per month during the winter shutdown period. They will assess the success of all erosion and sedimentation control measures and revegetation efforts, and recommend remediation measures if necessary. The following specific items will be monitored during inspection:

- ◆ Evidence of sheet and rill erosion, gullies, slumping, and subsidence.
- ◆ Proper installation and maintenance of erosion control measures.
- ◆ Effectiveness of the erosion control measures installed.
- ◆ Proper installation and maintenance of sediment retention structures.
- ◆ Effectiveness of the sediment retention structures installed.
- ◆ Effectiveness of the vegetation stabilization.

As part of the inspections, photographs will be used to document the progress of the construction work and associated erosion and sedimentation control measures. Photographs will be taken prior to, during and following the construction of each design segment. The photographs will be taken from permanently located markers. The photographs will be taken on 35 mm color print film using a 50 mm lens with camera held approximately 1.5 meters from the ground. The location of the photo sites will be determined by the Environmental Monitor. The photographs will be used to document revegetation at the following type of sites:

- ◆ Fill slopes near sensitive waters or other critical resources.
- ◆ Particularly long or steep cut and fill slopes.
- ◆ Excess excavation disposal areas.
- ◆ Borrow areas.

D. RECLAMATION

1. RIGHT-OF-WAY CLEARING, TOPSOIL REMOVAL AND STORAGE

Construction would involve clearing a minimal amount of woody vegetation. Vegetation within the right-of-way will be preserved, where possible, to screen, shade, and break up the linear character of the highway. Within cover types without woody vegetation and wetland cover types all vegetation must be bladed from the right-of-way with the topsoil. Topsoil will be utilized in certain areas (see below) to insure success of reclamation efforts.

Topsoil, where present, will be handled separately from subsoil materials. Topsoil will be stripped to provide for sufficient quantities to be spread to a depth of at least 4 to 8 inches over disturbed areas to be reclaimed. The topsoil will be bladed to the margins of the right-of-way and stockpiled for redistribution over the disturbed right-of-way and cut and fill slopes upon completion of highway construction activities and material staging areas, excess excavation and borrow sites. Topsoil will be stored separately from other earth materials to preclude contamination or mixing, and will be marked with signs and identified on construction design plans. Runoff will be diverted around topsoil stockpiles to minimize erosion of topsoil materials. Stockpiled topsoil protection measures will generally not be required because cut and fill slopes will be topsoiled and revegetated soon after construction (See Erosion and Sedimentation Section above). However, if topsoil is stockpiled for more than one year, stockpiles should be seeded with the seed mixture discussed above (p. 16) and covered with mulch to provide protection from wind and water erosion and to discourage invasion of weeds. Topsoil not anticipated to be stockpiled for over one year, but not re-placed immediately, will be temporarily protected with mulch.

a. Performance Standards

The following performance standard will be used to determine the attainment of successful reclamation:

ALL YEARS (TEMPORARY AND FINAL RECLAMATION)

- ♦ protective cover-all disturbed areas to be left bare, unprotected, or unreclaimed for more than one month will have at least a 80 percent cover of protective material in the form of mulch, matting, or vegetative growth. This does not apply to work areas.

SECOND YEAR (FINAL RECLAMATION)

- ◆ seedling density-the density and abundance of desirable species is at least 3 to 4 seedlings per linear foot of drill row (if drilled) or transect (if hydroseeded).
- ◆ percent cover-total vegetal cover will be at least 80 percent of pre-disturbance vegetal cover as measured for establishing baseline conditions.

BY THE FIFTH YEAR (FINAL RECLAMATION)

- ◆ percent cover-total vegetal cover will be at least 80 percent of pre-disturbance vegetal cover as measured for establishing baseline conditions.
- ◆ dominant species-90 percent of the revegetation consists of species included in the seed mixture(s) and/or occurring in the surrounding natural vegetation as measured for establishing the baseline conditions.
- ◆ erosion condition/soil surface factor-erosion condition of the reclaimed areas is equal to or in better condition than that measured for establishing baseline conditions.

2. RECLAMATION MONITORING

Pre-disturbance cover and species composition will be evaluated prior to construction activities to provide data useful in determining when performance standards have been achieved. Evaluation methodology will follow that methodology prescribed below for reclamation success monitoring.

Reclamation success will be monitored both in the short-term (temporary reclamation) and in the long-term (temporary and final reclamation). Monitoring of temporary reclamation measures will include visual observations of soil stability, condition and effectiveness of mulching and runoff and erosion control measures, and a quantitative evaluation of revegetation success where appropriate. Reclamation monitoring will include visual observations of soil stability, condition of the effectiveness of mulching and runoff and erosion control measures; and a quantitative evaluation of revegetation success.

Revegetation success will be determined through monitoring and evaluation of percent ground cover to include a measure of vegetal cover (by species), litter/mulch, rock/gravel, and bare ground. The success of the vegetation stabilization of all disturbed areas will be evaluated based on a quantitative method. Vegetation will be sampled using one quarter square meter quadrats. At each site, data will be collected from 25 or more randomly placed quadrats per hectare. In each quadrat, the percent cover of each plant species will be recorded. For each site, the average total percent coverage for all quadrats measured for that site must be 50 percent in order to meet the minimum acceptable standard for temporary vegetation and must be 80 percent in order to meet the minimum acceptable standard for permanent vegetation. If vegetation stabilization does not meet the minimum standard, remedial action is required to increase vegetation coverage. Obvious evidence of erosion will require remedial action regardless of the level of success in vegetation stabilization.

The disturbed areas will be monitored until attainment of 80 percent of pre-disturbance vegetative cover is attained within five years of seeding; 90 percent of the vegetative cover is desirable species; and the erosion condition of the reclaimed area is equal to or in better condition than pre-disturbance conditions as prescribed under the Performance Standard section of these recommendations.

3. PHOTOMONITORING POINTS

Permanent photomonitoring points will be established at appropriate vantage locations along the highway and at staging/borrow areas. Each photomonitoring point will be permanently marked and identified on a topographic map of the area. The location of each point will be described in detail to assist in relocation from year to year. Photos will be taken at each photomonitoring point prior to initiation of construction. Photographs, framing the same scene as previously taken, will be taken each year until the performance standards have been successfully met. These photographs (slides and prints) will be included in a yearly report and will provide visual support to the written findings.

4. MONITORING SCHEDULE AND REPORTING

The WVDOH Environmental Monitor will schedule and visit the site a minimum of once per year during the middle of the growing season to inspect and review the reclamation conditions of the project area. They will assess the success and prognosis of all runoff and erosion control measures and revegetation efforts, and recommend remediation measures if necessary. Photographs will be taken each year to document the progress of the reclamation

program at the established photomonitoring points along the disturbed areas. The following specific items will be monitored during inspection:

- ◆ revegetation success;
- ◆ noxious weed invasion;
- ◆ degree of herbivory on seed and seedlings;
- ◆ evidence of wildlife grazing; and
- ◆ overgrazing/trampling of riparian and wetland areas.

5. REPORTING AND DATA PRESENTATION

An annual report describing the quantitative and qualitative findings of the semi-annual inspection, photographs taken at each photomonitoring point, prognosis of the reclamation effort, and discussion and results of any remedial measures applied during the year will be prepared and submitted for review to the regulatory resource agencies. Should monitoring of site conditions identify areas of concern, the WVDOH will incorporate into the annual report what measures will be taken to mitigate the problems(s). If pesticides or herbicides are necessary, the WVDOH will prepare and submit a "Pesticide Use Proposal" in addition to a noxious weed control proposal, consistent with existing management objectives and standards.

E. EXCESS EXCAVATION

Initial estimates of excess excavation, commonly called waste, were based on engineering at a scale which limits the precision of the estimates, generally resulting in an over estimation. During final design, efforts will be made to reduce excess earthwork as much as practicable. To determine the potential reduction in excess excavation during the final design phase several "typical" design sections were examined in more detail (Table 2). In 4 out of the 5 sections receiving further evaluation, excess excavation estimates were reduced from 50 to 97 percent. One section experienced an increase in excess excavation. Overall, the total reduction of excess excavation possible for the entire project will range from 30%-50% of the totals reported in the Alignment Selection SDEIS.

**TABLE 2
PREDICTED REDUCTIONS IN EXCESS EXCAVATION**

SECTION	TERRAIN	ORIGINAL ESTIMATE (cubic meters)	REVISED ESTIMATE (cubic meters)	PERCENT CHANGE
3	Mountainous	665,511	330,444	- 50 %
4	Mountainous	6,297,123	244,617	- 96 %
5	Mountainous	3,987,948	132,947	- 97 %
6	Rolling	1,048,459	350,000	- 67 %
16	Rolling	2,708,448	3,882,265	+43 %

1. PLACEMENT OF EXCESS EXCAVATION AND BORROWING

The environmental data collected as part of the Alignment Selection SDEIS will be utilized to identify areas where placement of excess excavation will not be allowed. Areas unsuitable for disposal of excess excavation and borrowing include:

- ◆ Wetlands.
- ◆ Known habitat of Rare, Threatened or Endangered Species.
- ◆ Known archaeological sites.
- ◆ Perennial Streams.
- ◆ Floodplains.

Areas unsuitable for disposal of excess excavation and borrowing will be identified by the WVDOH. Contractors will be prohibited from placement of excess excavation in these areas. These sites will be identified for contractors by inclusion of mapping in contract bid packages indicating the location of the above resources.

Where possible, alternatives to disposal of the excess excavation and borrowing will be evaluated. Beneficial uses of the excess material may include flood protection walls, landfill cover, and strip mine reclamation.

Additionally, the WVDOH will investigate all areas proposed by contractors for borrowing and excess excavation disposal. Investigations will include identification of perennial streams, known historic and archaeological resources (for borrowing only), wetlands and floodplains. If such features are discovered at the proposed site, the site's use will be disallowed. WVDOH will not be responsible for obtaining any required environmental clearances or permits.

2. MITIGATION MEASURES

Contractors will be instructed by WVDOH that excess excavation sites and borrow sites will be contoured and vegetatively restored to reflect the surrounding landscape contours and to reflect the vegetative community that existed prior to placement of excess excavation. Planting plans for the disposal areas will be developed by the contractor and will be submitted to WVDOH for review and to appropriate agencies during the agency coordination activities outlined in Figure 1. Planting plans will include a list of species to be planted, planting density and planting sequence. Included with these plans will be a description of the vegetative communities currently surrounding the disposal site. Plantings will reflect those native vegetative communities.

F. ACID DRAINAGE

The potential to encounter acid producing materials, either natural formations or remnants of past mining operations, is a potential source of water quality impacts. In light of the regional effort underway to control existing acid mine drainage and its impacts on several watersheds within the project area, WVDOH will require additional mitigation measures during both the design and construction phase of this project in order to minimize acid drainage as a result of construction of Corridor H.

In order to provide a more detailed assessment of the location of acid drainage producing materials along the proposed alignment, additional analyses were conducted as part of the FEIS. Geologic formations with potential for acid production were mapped along the preferred alignment. Cut limits were identified from preliminary engineering undertaken for the SDEIS. Using the known chemical characteristics of these formations, areas of high probability for acid drainage production were identified by the GIS developed for this project. This information is presented for each design section in Section III of this document. In summary, there are potentially acid producing formations located in Sections 2, 3, 4, 7, 8, 9, 10, 11, 12, and 13.

A routine component of the final engineering phase is to conduct geotechnical borings to determine the geological characteristics along the alignment. In areas of high acid drainage probability, these borings will be analyzed to more accurately determine the geological formations' potential for acid formation.

1. PREDICTION OF POTENTIAL SEVERITY OF ACID DRAINAGE

In order to predict the possible levels of acidity and chemical characteristics of drainage that may result from construction of Corridor H, additional investigations of acid drainage were conducted. A field survey of acid drainage areas along Corridor H from Buckhannon WV to Elkins, WV was carried out on March 23, 1995. This investigation identified acid producing areas and obtained field measurements of the level of acidity (pH) and conductivity of the drainage. Based on these limited field observations the acid drainage had pH levels ranging from approximately 2.5 to 6.0. Conductivity tests indicated that few minerals (e.g., iron, sulfates) were associated with this drainage.

Additional laboratory analyses of acid drainage was conducted by with the West Virginia University Department of Soil Sciences. Water samples from suspected acid producing materials (6 natural formations and one mine spoil pile) were collected on April 10, 1995. Flow rates, pH, acidity, and iron concentrations were measured. Acidity as it relates to acid drainage incorporates hydrogen ion concentration (pH) as well as mineral acidity which arises from the presence of dissolved iron, aluminum, and manganese in the water.

The drainage from the natural formations had limited acidity and iron concentrations (Table 3). This type of drainage is what will be expected from the formations along the proposed alignment for the remainder of Corridor H. Based on the small volumes of discharge and the relatively low levels of acidity, West Virginia University reclamation specialists have predicted the acid drainage coming from these areas could be neutralized by limestone lining of drainage ditches.

TABLE 3
SUMMARY OF ACID DRAINAGE TEST RESULTS
from Corridor H-Buckannon to Elkins

SITE	Flow (gpm)	pH	Acidity (mg/l)	Fe (mg/l)
0.6 mi. east of Sand Run	10	4.4	140	10
West of Gormley Rd	30	3.6	221	26
East of Nebo Rd Mine Spoil Pile	5	2.4	958	211
100 ft. east of Middle Fork River Bridge	30	6.0	80	10
East of Talbott Rd.	10	7.6	0	0
0.6 mi. West of Middle Fork River	30	4.0	210	6
0.6 mi. East of Tygart Valley River	60	4.0	332	50

2. MITIGATION MEASURES

During the final design phase for each section, the more detailed information obtained from the geotechnical borings will be used to predict the location and the severity of acid drainage. Appropriate mitigation strategies will be developed. These mitigation measures will be included as part of the contract plans for each section.

In those sections where acid producing materials are identified, each contractor will develop an Acid Producing Materials Handling Plan. The Plan will be reviewed and approved by WVDOH prior to construction within areas containing acid producing materials. The Plan will address measures to avoid and minimize the production of acidic drainage during construction.

Specific construction techniques will be employed in those areas determined to have a high potential for acid production. These techniques will include:

- ♦ The incorporation of crushed limestone into the roadway subbase in an amount necessary to buffer the acid producing capacity. The amount and type of limestone to be used will be determined following acid-base accounting investigations.

- ◆ Maintain a construction schedule that will allow for the compaction and covering of any acid producing material within 48 hours of exposure.
- ◆ In acid producing areas that may be exposed by deep cuts, benching and revegetation of benches will be employed where practicable.
- ◆ Should acid drainage occur following construction, necessary and practicable mitigation measures will be developed.

3. ACID PRODUCING EXCESS EXCAVATION

All excess excavation which is from acid producing materials will be disposed of in accordance with the approved Acid Producing Materials Handling Plan. The location of the disposal will be approved by WVDOH. The disposal site will be monitored by the Environmental Monitor for the production of acidic drainage.

G. TERRESTRIAL HABITAT

Measures to mitigate the impacts to terrestrial resources will include the following (some of these are discussed more thoroughly in the Sedimentation and Erosion Control, Excess Excavation, Reclamation and Acid Drainage sections above):

- ◆ Where practicable, the establishment of clearing limits independent of the right-of-way edge so as to preserve existing wildlife habitat within the right-of-way.
- ◆ Maintenance, where practicable, of original vegetation under bridge structures
- ◆ Where practicable, contour and revegetate waste disposal areas to approximate those contours and vegetation present prior to waste disposal activities
- ◆ Promptly revegetate all disturbed areas with appropriate seed mixture to minimize introduction and establishment of noxious weeds
- ◆ Coordination with appropriate agencies to determine the feasibility, practicability and extent of reclamation activities of abandoned mine lands in the Section 10, 11, 12 vicinities.

Following a meeting with FWS and WVDNR held at the FWS Elkins, WV field office on Thursday May 25, 1995 the following upland habitat mitigation strategy was developed and concurred with:

- ◆ Upland habitat mitigation acreage will be based on the revised habitat unit (HU) data generated for and included in the FEIS.
- ◆ HU data will be revised by excluding the ruffed grouse from the HEP analysis.

- ◆ Credits toward HU loss will be based on net HUs lost due to direct highway impacts as reported in the FEIS.
- ◆ A HU "credit ledger" will be maintained by the Environmental Monitor.
- ◆ HU credits will be recovered from the net HU loss reported in the FEIS by:
 - ◆ reduction of clearing and grubbing limits.
 - ◆ purchase and preservation of unique habitat.

The identification and HEP analysis of the unique habitat to be purchased for preservation will be carried out by a team of wildlife biologists assembled from WVDOH, FWS and WVDNR. Purchase price of property shall be approximately \$1.8 million.

H. GROUNDWATER

1. PRIVATE WELLS

The WVDOH will notify all utility companies, all pipeline owners or other parties affected and endeavor to have all necessary adjustments of the public or private utility fixtures, sewers, pipelines and other appurtenances within or adjacent to the limits of construction, made as soon as practicable.

The Contractor shall secure and provide, until all work under the terms of the project are satisfactorily completed and accepted, the proper contractor liability insurance.

2. GROUNDWATER IN KARST REGIONS

Karst topography occurs along many areas of the alignment. Approximate locations of these regions were mapped during the SDEIS studies and are presented in Section III below. These areas were divided into zones of sensitivity relative to public and private water supply contamination.

During the design phase, the following mitigation measures will, when practicable, be included in the final contract plans:

- ◆ Impervious ditches will be designed to transport stormwater runoff to areas outside of the zone or to a stormwater detention pond.

During the construction phase, the following mitigation measures will be required:

- ◆ No storage of fuels or re-fueling of equipment within these areas.
- ◆ No maintenance of vehicles or equipment will be allowed within these areas.
- ◆ Construction vehicles and equipment will be stored outside of these zones.
- ◆ Advanced levels of erosion and sedimentation controls throughout these zones as discussed above.
- ◆ If sinkholes form or solution cavities are uncovered during construction, these areas will be protected from stormwater run off, erosion, and sedimentation.
- ◆ Blasting programs will be designed to use the smallest effective charge and so that cuts will be made in the smallest incremental heights practicable.

DESIGN SECTION

III. DESIGN SECTION MITIGATION REQUIREMENTS

Final design engineers will utilize the following information to assure that the commitments made by WVDOH will be carried forward into the construction of the project.

A. SECTION 16

The preliminary and final design of this Section will include the following mitigation commitments.

1. STREAMS

A total of 3,142 linear feet of stream HI is required within this section. Preliminary assessments identified three HI areas which are discussed below. Upon completion of preliminary designs plans the total linear feet of stream HI required will be revised. During field reviews of the alignment the proposed HI areas will be reviewed.

a. Claylick Run HI Area

This HI area will extend along Claylick Run from the proposed relocation of County Route 11 downstream to the confluence with Leading Creek. There is approximately 2,500 feet of highly sinuous stream channel which will benefit from HI. The western shore of the stream is well forested, while the eastern bank has a mixture of grassland, forest and narrow wooded riparian buffer. A few narrow drainage ways / wetlands are located within the floodplain of the creek. These wetlands are very small and will not constrain stream HI. The banks are 3 to 5 feet in height with steep slopes of alluvial soils. The streambed is composed chiefly of silts and clays. Lots of floating trash (plastic jugs, bottles and bags) were present along the floodplain and within the stream channel, typically snagged on woody material.

HI within this area will provide instream compensation for impacts to Claylick Run and receiving stream compensation for a tributary to Claylick Run. The area downstream of the proposed interchange was selected because upstream of the proposed interchange Claylick Run is surrounded by residential areas and wetlands which make it a less attractive candidate for HI.

A total of 1,550 feet of stream HI is proposed for this HI Area. Potential HI techniques:

- ◆ Cleaning out trash in the stream and riparian forest along stream.
- ◆ Establishing a 23 meter (75 foot) forested buffer in areas of grass.
- ◆ Planting highly erodible stream banks with woody vegetation.
- ◆ Installing instream flow deflectors (or other similar structures) to reduce bank erosion.

b. Leading Creek Tributary HI Area

This HI area is located along a small stream between U.S. 219 and Leading Creek. There is approximately 1,000 feet of stream which will benefit from HI. The stream flows under U.S. 219, then through an active cattle pasture. The stream is fenced on the north side but is not fenced on the south side. There is considerable soil and bank erosion due to cattle access. There are several riffle areas along the stream. The upstream 500 feet does not contain shrubs or trees. The herbaceous vegetation along the upper portion of the stream was identified as a wetland, but wetland vegetation is very sparse, typically limited to soft rush growing on the slumping soils from the stream bank. Restoration of the stream will improve the existing condition of the wetland. The lower half of the HI area contains some shrubs and trees along the banks.

The HI in this area will provide instream compensation for habitat loss along MT1604. A total of 800 feet of stream HI is proposed for this HI Area. Potential HI techniques will include:

- ◆ Fencing of the south side of the stream.
- ◆ Developing an alternate water source for the cattle or a stabilized stream access.
- ◆ Revegetating stream banks with woody vegetation.

c. Leading Creek HI Area

This HI area is located immediately downstream of the proposed highway crossing. Leading Creek flows through a wide floodplain with a high sinuous channel. The creek has high banks with a cobble substrate and a narrow wooded riparian buffer. The HI in this area will provide receiving stream compensation for habitat loss along Horse Run (MT1602)

and two tributaries to Leading Creek (MT3603, MT1604). A total of 790 feet of stream HI is proposed for this HI Area. Due to the proximity of residential land use impacts, Horse Run was not a good candidate for HI. Potential HI techniques include:

- ◆ Stabilizing banks with woody vegetation.
- ◆ Installing instream structures to provide fish habitat.

2. EROSION AND SEDIMENTATION CONTROL

Erosion and Sedimentation control features, measures and structures will follow the *WVDOT, Division of Highways, Erosion and Sedimentation Control Manual, March 1, 1995 edition*. Additional erosion and sedimentation control measures that should be incorporated into erosion and sedimentation control plans for this section are detailed above (SECTION II, Erosion and Sedimentation Control).

3. EXCESS EXCAVATION

In the Alignment Selection SDEIS the amount of excess excavation estimated for this Section was 2,708,448 cubic meters. Additional design efforts indicated that excess excavation will increase to 3,882,265 cubic meters. During preliminary and final design for this Section, design efforts will be made to reduce the amount of excess excavation to the extent practicable.

In addition, those areas where disposal of excess excavation will not be allowed will be identified on the preliminary and final design plans. The environmental data collected as part of the Alignment Selection SDEIS was utilized to identify wetlands, known habitat of rare, threatened or endangered species, known archaeological sites, perennial streams, and floodplains.

4. ACID DRAINAGE

Based on the geological formations that occur in this Section acid drainage will not occur during or following construction.

5. TERRESTRIAL HABITAT

Clearing and grubbing limits to minimize upland habitat destruction will be identified on the contract plans and will be pointed out during field reviews.

6. GROUNDWATER

The following portions of this Section have been determined to be susceptible to groundwater pollution:

- ♦ Sta 281-312 Elkins

Impervious ditches will be designed to transport stormwater runoff to areas outside of the zone or to a permanent stormwater treatment facility. The final contract plans will include specification requiring the mitigation measures cited in Section II (page 29).

7. SCENIC OVERLOOKS

No scenic overlooks are proposed for this Section.

8. BIKEWAYS

A bikeway will be designed for the portion of the section between station 490 and 660.

B. SECTION 15

The preliminary and final design of this Section will include the following mitigation commitments.

1. STREAMS

A total of 1,320 linear feet of stream HI is required within this section. Preliminary assessments identified one HI area which is discussed below. Upon completion of preliminary designs plans the total linear feet of stream HI required will be revised to reflect the preliminary plans. During field reviews of the alignment the proposed HI areas will be reviewed by the agencies.

a. Pleasant Run HI Area

This HI Area is located along Pleasant Run at the confluence with Slabcamp Run. Both Pleasant Run and Slabcamp Run have long stretches of riffles and runs over flat, cobble substrate. The only pool observed was at the County Route 47/1 crossing (bridge). The surrounding land is mostly open grassland near residencies, but which does not appeared to be grazed. There are no shrubs or trees along the banks of either stream within the HI area. In

several areas where the stream has meandered close to the county roads, local cobble has been used to stabilize slopes. Large numbers and diversity of benthic invertebrates as well as small fish were observed in the riffle areas. Instream habitat appears very good, but could benefit from more pools and from increased shading and stability provided by woody vegetation along the stream banks.

Pleasant Run HI Area will compensate for impacts to a tributary to Pleasant Run (MC1506) as well as a tributary to Shavers Fork (MC 1402). MC1506 is located upstream of the HI area in a steep ravine with heavily wooded slopes. The potential of HI along Pleasant Run at this location is low due to the existing high quality of the stream and watershed. The confluence of Slabcamp Run and Pleasant Run was the closest area with significant potential for HI. HI for MC1402 was included with this HI Area due to the lack of areas requiring HI along Shavers Fork.

A total of 1,320 feet of stream HI is proposed for this HI Area. The potential HI techniques include:

- ◆ Stabilizing banks of Slabcamp Run where in close proximity to County 47/1.
- ◆ Stabilizing banks of Pleasant Run where in close proximity to County Route 47.
- ◆ Planting remaining stream banks with woody vegetation to improve stability and provide shading.
- ◆ Providing instream structure to create a few pools for refuge for fish during periods of low flow.

2. EROSION AND SEDIMENTATION CONTROL

Erosion and Sedimentation control features, measures and structures will follow the *WVDOT, Division of Highways, Erosion and Sedimentation Control Manual, March 1, 1995 edition*. Additional erosion and sedimentation control measures that should be incorporated into erosion and sedimentation control plans for this section are detailed above (SECTION II, Erosion and Sedimentation Control).

3. EXCESS EXCAVATION

In the Alignment Selection SDEIS, the amount of excess excavation estimated for this Section was 2,824,827 cubic meters. During preliminary and final design for this Section, design efforts will be made to reduce the amount of excess excavation to the extent practicable.

In addition, those areas where disposal of excess excavation will not be allowed will be identified on the preliminary and final design plans. The environmental data collected as part of the Alignment Selection SDEIS was utilized to identify wetlands, known habitat of rare, threatened or endangered species, known archaeological sites, perennial streams, and floodplains.

4. ACID DRAINAGE

Based on the geological formations that occur in this Section acid drainage will not occur during or following construction.

5. TERRESTRIAL HABITAT

Clearing and grubbing limits to minimize upland habitat destruction will be identified on the contract plans and will be pointed out during field reviews.

6. GROUNDWATER

There are no zones sensitive to groundwater contamination within this section. The final contract plans will include specification requiring the mitigation measures cited in Section II (page 29).

7. SCENIC OVERLOOKS

No scenic overlooks are proposed for this Section.

8. BIKEWAYS

A bikeway will be designed for the portion of the section between stations 3300 and 3345.

9. NOISE BARRIER

A noise barrier will be considered and further evaluated during the design of the portion of this section between stations 3207 and 3264+50.

C. SECTION 14

The preliminary and final design of this Section will include the following mitigation commitments.

1. STREAMS

The Habitat Improvement required for a single stream encroachment within Section 14 will be incorporated into the Pleasant Run Habitat Improvement Area in Section 15.

2. EROSION AND SEDIMENTATION CONTROL

Erosion and Sedimentation control features, measures and structures will follow the *WVDOT, Division of Highways, Erosion and Sedimentation Control Manual, March 1, 1995 edition*. Additional erosion and sedimentation control measures that should be incorporated into erosion and sedimentation control plans for this section are detailed above (SECTION II, Erosion and Sedimentation Control).

3. EXCESS EXCAVATION

In the Alignment Selection SDEIS the amount of excess excavation estimated for this Section was 3,010,444 cubic meters. During preliminary and final design for this Section, design efforts will be made to reduce the amount of excess excavation to the extent practicable.

In addition, those areas where disposal of excess excavation will not be allowed will be identified on the preliminary and final design plans. The environmental data collected as part of the Alignment Selection SDEIS was utilized to identify wetlands, known habitat of rare, threatened or endangered species, known archaeological sites, perennial streams, and floodplains.

4. ACID DRAINAGE

Based on the geological formations that occur in this Section acid drainage will not occur during or following construction.

5. TERRESTRIAL HABITAT

Clearing and grubbing limits to minimize upland habitat destruction will be identified on the contract plans and will be pointed out during field reviews.

6. GROUNDWATER

There are no zones sensitive to groundwater contamination within this section. The final contract plans will include specification requiring the mitigation measures cited in Section II (page 29).

7. SCENIC OVERLOOKS

No scenic overlooks are proposed for this Section.

8. BIKEWAYS

A bikeway will be designed for the portion of the section between stations 3346 and 3578.

D. SECTION 13

The preliminary and final design of this Section will include the following mitigation commitments.

1. STREAMS

A total of 4,060 linear feet of stream HI is required within this section. Preliminary assessments identified four HI areas which are discussed below. Upon completion of preliminary designs plans the total linear feet of stream HI required will be revised to reflect the preliminary plans. During field reviews of the alignment the proposed HI areas will be reviewed by the agencies. Open bottom culverts will be designed for the stream crossings at station 3900 and 3757.

a. Trib. to Black Fork HI Area

This HI area is located along an unnamed tributary to the Black Fork (MC1318) which parallels County Route 219/4. Throughout most of the valley, the stream flows through rural residential areas. Substrate is covered with fine sediment. Residential land use is impacting the stream water quality and habitat.

The HI in this area will provide instream compensation for habitat loss along MC1318 downstream of the HI area. A total of 650 feet of stream HI is proposed for this HI Area. Potential HI techniques include:

- ◆ Stabilizing stream banks.
- ◆ Vegetating eroded areas along stream.

b. Roaring Run HI Area

This HI area is located along Roaring Run which parallels US Route 219. The land use along Roaring Run is composed of either well forested areas or rural residential areas. The forested areas have stable stream banks, with good pool structures although there is some sand and silt in the substrate. In the residential areas, there is greater erosion, a lack of vegetation, and poorer substrate.

The HI in this area will provide out-of-stream compensation for habitat loss along several small tributaries to Roaring Run (MC1315, MC1316, MC1317). A total of 3,450 feet of stream HI is proposed for this HI Area Potential HI techniques include:

- ◆ Vegetating stream banks.
- ◆ Stabilizing stream banks.

c. Trib. to Slip Hill Mill Run HI Area

This HI area is located immediately downstream of U.S. 219 at the headwaters of Slip Hill Mill Run. Due to the steep terrain and erodible soils, sedimentation further downstream has been identified by agencies as a concern. The existing culverts under U.S. 219 do not discharge to the original natural stream channel. Base flows have cut several new channels into the steep slopes, including one which runs down an old forest road. Storm flows appear to flood out of the new channels and flow overland downhill.

The HI in this area will provide instream compensation for habitat loss along one small tributary to Slip Hill Mill Run (MC3304). A total of 410 feet of stream HI is proposed for this HI area. The HI techniques will, where practicable, includes:

- ◆ Redirecting flows through culverts into original stream channels.
- ◆ Filling in and vegetating erosion channels.
- ◆ Clearing original stream channels of blockages.
- ◆ Stabilizing old logging road near stream crossings.

d. Long Run HI Area

The specific type, location and techniques for Habitat Improvements for stream within this Section will require further study and coordination with agencies. Due to the complex mixture of past and present land uses within this Section a more comprehensive approach to HI is required in order to have a measurable benefit to the stream ecosystems in this region. Additional evaluations will be coordinated with EPA's regional study of the Beaver Creek watershed, recent and future reclamation project, and acid neutralization projects

2. EROSION AND SEDIMENTATION CONTROL

Erosion and Sedimentation control features, measures and structures will follow the *WVDOT, Division of Highways, Erosion and Sedimentation Control Manual, March 1, 1995 edition*. Additional erosion and sedimentation control measures that should be incorporated into erosion and sedimentation control plans for this section are detailed above (SECTION II, Erosion and Sedimentation Control).

3. EXCESS EXCAVATION

In the Alignment Selection SDEIS the amount of excess excavation estimated for this Section was 9,615,723 cubic meters. During preliminary and final design for this Section, design efforts will be made to reduce the amount of excess excavation to the extent practicable.

In addition, those areas where disposal of excess excavation will not be allowed will be identified on the preliminary and final design plans. The environmental data collected as part of the Alignment Selection SDEIS was utilized to identify wetlands, known habitat of rare, threatened or endangered species, known archaeological sites, perennial streams, and floodplains.

4. ACID DRAINAGE

Because of certain geological formations that occur in this section, there is a possibility that acid drainage may occur during or following construction. The portions of this Section which have the highest potential for acid drainage are:

- ♦ Sta 4006 - 4053 Conemaugh Formation
- ♦ Sta 4096 - 4126 Conemaugh Formation

Quantitative assessments of acid drainage potential will be conducted concurrent with geotechnical drilling and will include acid-base accounting or other standard chemical procedures to characterize the acid forming potential of the formations associated with highway cuts. Once the location of acid producing materials has been identified, appropriate mitigation techniques will be developed and incorporated into the design plans.

5. TERRESTRIAL HABITAT

Clearing and grubbing limits to minimize upland habitat destruction will be identified on the contract plans and will be pointed out during field reviews.

6. GROUNDWATER

The following portions of this Section have been determined to be susceptible to groundwater pollution.

- ♦ Sta 3760-3773 Backbone Mountain

Impervious ditches will be designed to transport stormwater runoff to areas outside of the zone or to a permanent stormwater treatment facility. The final contract plans will include specification requiring the mitigation measures cited in Section II (page 29).

7. SCENIC OVERLOOKS

Contract Plans will included, if practicable, a Cheat River Valley Scenic Overlook and pedestrian footbridge to access Allegheny Trail over the Preferred Alternative (between stations 3855 and 3870).

8. BIKEWAYS

A bikeway will be designed for the portion of the section between stations 3904 and 4123.

E. SECTION 12

The preliminary and final design of this Section will include the following mitigation commitments.

1. STREAMS

The specific type, location and techniques for Habitat Improvements for stream within this Section will require further study and coordination with agencies. Due to the complex mixture of past and present land uses within this Section a more comprehensive approach to HI is required in order to have a measurable benefit to the stream ecosystems in this region. Additional evaluations will be coordinated with EPA's regional study of the Beaver Creek watershed, recent and future reclamation project, and acid neutralization projects.

2. EROSION AND SEDIMENTATION CONTROL

Erosion and Sedimentation control features, measures and structures will follow the *WVDOT, Division of Highways, Erosion and Sedimentation Control Manual, March 1, 1995 edition*. Additional erosion and sedimentation control measures that should be incorporated into erosion and sedimentation control plans for this section are detailed above (SECTION II, Erosion and Sedimentation Control).

3. EXCESS EXCAVATION

In the Alignment Selection SDEIS there was no excess excavation estimated for this Section. During preliminary and final design for this Section, design efforts will be made to minimize the amount of excess excavation to the extent practicable.

In addition, those areas where disposal of excess excavation will not be allowed will be identified on the preliminary and final design plans. The environmental data collected as part of the Alignment Selection SDEIS was utilized to identify wetlands, known habitat of rare, threatened or endangered species, known archaeological sites, perennial streams, and floodplains.

4. ACID DRAINAGE

Because of certain geological formations that occur in this section, there is a possibility that acid drainage may occur during or following construction. The portions of this Section which have the highest potential for acid drainage are:

- ♦ Sta 4163-4174 Conemaugh Formation
- ♦ Sta 4204-4229 Conemaugh Formation
- ♦ Sta 4238-4243 Conemaugh Formation
- ♦ Sta 4261-4268 Conemaugh Formation
- ♦ Sta 4273-4277 Conemaugh Formation
- ♦ Sta 4282-4291 Conemaugh Formation
- ♦ Sta 4309-4317 Conemaugh Formation
- ♦ Sta 4360-4366 Conemaugh Formation
- ♦ Sta 4363-4365 Conemaugh Formation
- ♦ Sta 4377-4382 Conemaugh Formation
- ♦ Sta 4396-4417 Conemaugh Formation
- ♦ Sta 4417-4426 Allegheny Formation
- ♦ Sta 4433-4448 Quarternary Formation
- ♦ Sta 4448-4450 Conemaugh Formation
- ♦ Sta 4453-4462 Conemaugh Formation
- ♦ Sta 4454-4495 Conemaugh Formation
- ♦ Sta 4500-4520 Conemaugh Formation
- ♦ Sta 4523-4528 Conemaugh Formation

Quantitative assessments of acid drainage potential will be conducted concurrent with geotechnical drilling and will include acid-base accounting or other standard chemical procedures to characterize the acid forming potential of the formations associated with highway cuts. Once the location of acid producing materials has been identified, appropriate mitigation techniques will be developed and incorporated into the design plans.

5. TERRESTRIAL HABITAT

Clearing and grubbing limits to minimize upland habitat destruction will be identified on the contract plans and will be pointed out during field reviews.

6. GROUNDWATER

There are no zones sensitive to groundwater contamination within this section. The final contract plans will include specification requiring the mitigation measures cited in Section II (page 29).

7. SCENIC OVERLOOKS

No scenic overlooks are proposed for this Section.

8. BIKEWAYS

A bikeway will be designed for the portion of the section between stations 4124 and 4527.

F. SECTION 11

The preliminary and final design of this Section will include the following mitigation commitments.

1. STREAMS

An open bottom culvert will be designed for the stream crossing at station 4668. The specific type, location and techniques for Habitat Improvements for stream within this Section will require further study and coordination with agencies. Due to the complex mixture of past and present land uses within this Section a more comprehensive approach to HI is required in order to have a measurable benefit to the stream ecosystems in this region. Additional evaluations will be coordinated with EPA's regional study of the Beaver Creek watershed, recent and future reclamation project, and acid neutralization projects

2. EROSION AND SEDIMENTATION CONTROL

Erosion and Sedimentation control features, measures and structures will follow the *WVDOT, Division of Highways, Erosion and Sedimentation Control Manual, March 1, 1995 edition*. Additional erosion and sedimentation control measures that should be incorporated into erosion and sedimentation control plans for this section are detailed above (SECTION II, Erosion and Sedimentation Control).

3. EXCESS EXCAVATION

In the Alignment Selection SDEIS the amount of excess excavation estimated for this Section was 657,826 cubic meters. During preliminary and final design for this Section, design efforts will be made to reduce the amount of excess excavation to the extent practicable.

In addition, those areas where disposal of excess excavation will not be allowed will be identified on the preliminary and final design plans. The environmental data collected as part of the Alignment Selection SDEIS was utilized to identify wetlands, known habitat of rare, threatened or endangered species, known archaeological sites, perennial streams, and floodplains.

4. ACID DRAINAGE

Because of certain geological formations that occur in this section, there is a possibility that acid drainage may occur during or following construction. The portions of this Section which have the highest potential for acid drainage are:

- ◆ Sta 4528-4539 Allegheny Formation
- ◆ Sta 4550-4570 Allegheny Formation
- ◆ Sta 4577-4637 Allegheny Formation
- ◆ Sta 4671-4689 Allegheny Formation
- ◆ Sta 4705-4739 Allegheny Formation
- ◆ Sta 4775-4777 Conemaugh Formation
- ◆ Sta 4777-4788 Conemaugh Formation
- ◆ Sta 4796-4815 Conemaugh Formation
- ◆ Sta 4845-4849 Conemaugh Formation

Quantitative assessments of acid drainage potential will be conducted concurrent with geotechnical drilling and will include acid-base accounting or other standard chemical procedures to characterize the acid forming potential of the formations associated with highway cuts. Once the location of acid producing materials has been identified, appropriate mitigation techniques will be developed and incorporated into the design plans.

5. TERRESTRIAL HABITAT

Clearing and grubbing limits to minimize upland habitat destruction will be identified on the contract plans and will be pointed out during field reviews.

6. GROUNDWATER

There are no zones sensitive to groundwater contamination within this section. The final contract plans will include specification requiring the mitigation measures cited in Section II (page 29).

7. SCENIC OVERLOOKS

No scenic overlooks are proposed for this Section.

8. BIKEWAYS

A bikeway will be designed for the portion of the section between stations 4528 and 4893.

G. SECTION 10

The preliminary and final design of this Section will include the following mitigation commitments.

1. STREAMS

The specific type, location and techniques for Habitat Improvements for stream within this Section will require further study and coordination with agencies. Due to the complex mixture of past and present land uses within this Section a more comprehensive approach to HI is required in order to have a measurable benefit to the stream ecosystems in this region. Additional evaluations will be coordinated with EPA's regional study of the Beaver Creek watershed, recent and future reclamation project, and acid neutralization projects.

2. EROSION AND SEDIMENTATION CONTROL

Erosion and Sedimentation control features, measures and structures will follow the *WVDOT, Division of Highways, Erosion and Sedimentation Control Manual, March 1, 1995 edition*. Additional erosion and sedimentation control measures that should be incorporated into erosion and sedimentation control plans for this section are detailed above (SECTION II, Erosion and Sedimentation Control).

3. EXCESS EXCAVATION

In the Alignment Selection SDEIS the amount of excess excavation estimated for this Section was 3,216,325 cubic meters. During preliminary and final design for this Section, design efforts will be made to reduce the amount of excess excavation to the extent practicable.

In addition, those areas where disposal of excess excavation will not be allowed will be identified on the preliminary and final design plans. The environmental data collected as part of the Alignment Selection SDEIS was utilized to identify wetlands, known habitat of rare, threatened or endangered species, known archaeological sites, perennial streams, and floodplains.

4. ACID DRAINAGE

Because of certain geological formations that occur in this section, there is a possibility that acid drainage may occur during or following construction. The portions of this Section which have the highest potential for acid drainage are:

- ♦ Sta 4896-4898 Conemaugh Formation
- ♦ Sta 4914-5000 Conemaugh Formation
- ♦ Sta 5037-5051 Allegheny Formation
- ♦ Sta 5062-5075 Allegheny Formation

Quantitative assessments of acid drainage potential will be conducted concurrent with geotechnical drilling and will include acid-base accounting or other standard chemical procedures to characterize the acid forming potential of the formations associated with highway cuts. Once the location of acid producing materials has been identified, appropriate mitigation techniques will be developed and incorporated into the design plans.

5. TERRESTRIAL HABITAT

Clearing and grubbing limits to minimize upland habitat destruction will be identified on the contract plans and will be pointed out during field reviews.

6. GROUNDWATER

The following portions of this Section have been determined to be susceptible to groundwater pollution.

- ♦ Sta 5169-5184 Allegheny Front

Impervious ditches will be designed to transport stormwater runoff to areas outside of the zone or to a permanent stormwater treatment facility. The final contract plans will include specification requiring the mitigation measures cited in Section II (page 29).

7. SCENIC OVERLOOKS

An Allegheny Front Scenic Overlook will be included in the contract plans, if practicable, between stations 5125 and 5130.

8. BIKEWAYS

A bikeway will be designed for the portion of the section between stations 4893-5036.

H. SECTION 9

The preliminary and final design of this Section will include the following mitigation commitments.

1. STREAMS

A total of 300 linear feet of stream HI is required within this section. Preliminary assessments identified one HI area which is discussed below. Upon completion of preliminary designs plans the total linear feet of stream HI required will be revised to reflect the preliminary plans. During field reviews of the alignment the proposed HI areas will be reviewed by the agencies

a. Trib. to Elklick Run HI Area

This HI area is located along County Route 1. The stream flows through old pastures with little sign of active grazing. Scattered locust and red cedar are located through the pasture and along the stream. The terrain is steep and there are a number of eroding banks.

The remaining portion of impacted stream (PNB903) has little HI potential due to excellent existing habitat. HI for this impact will be carried out in the receiving stream immediately downstream (PNB904). A total of 300 feet of stream HI is proposed for this HI Area. The potential HI techniques include:

- ♦ Stabilizing the most severely eroding banks.
- ♦ As part of the relocation of the impacted stream, develop a new stabilized confluence with the receiving stream.

2. EROSION AND SEDIMENTATION CONTROL

Erosion and Sedimentation control features, measures and structures will follow the *WV DOT, Division of Highways, Erosion and Sedimentation Control Manual, March 1, 1995 edition*. Additional erosion and sedimentation control measures that should be incorporated into erosion and sedimentation control plans for this section are detailed above (SECTION II, Erosion and Sedimentation Control).

3. EXCESS EXCAVATION

In the Alignment Selection SDEIS the amount of excess excavation estimated for this Section was 4,782,506 cubic meters. During preliminary and final design for this Section, design efforts will be made to reduce the amount of excess excavation to the extent practicable.

In addition, those areas where disposal of excess excavation will not be allowed will be identified on the preliminary and final design plans. The environmental data collected as part of the Alignment Selection SDEIS was utilized to identify wetlands, known habitat of rare, threatened or endangered species, known archaeological sites, perennial streams, and floodplains.

4. ACID DRAINAGE

Because of certain geological formations that occur in this section, there is a possibility that acid drainage may occur during or following construction. The portions of this Section which have the highest potential for acid drainage are:

- ♦ Sta 5268-5275 Marcellus Formation

Quantitative assessments of acid drainage potential will be conducted concurrent with geotechnical drilling and will include acid-base accounting or other standard chemical procedures to characterize the acid forming potential of the formations associated with highway cuts. Once the location of acid producing materials has been identified, appropriate mitigation techniques will be developed and incorporated into the design plans.

5. TERRESTRIAL HABITAT

Clearing and grubbing limits to minimize upland habitat destruction will be identified on the contract plans and will be pointed out during field reviews.

6. GROUNDWATER

The following portions of this Section have been determined to be susceptible to groundwater pollution.

- ◆ Sta 5275-5301 Greenland Gap/North Fork of Patterson Creek recharge areas
- ◆ Sta 5302-5400 Upslope of sinkholes within recharge area
- ◆ Sta 5401-5455 Greenland Gap/North Fork of Patterson Creek recharge areas
- ◆ Sta 5575 Knobly Road Spring

A long portion of Section 9 crosses several geological formations which recharge springs located along the North Fork of Patterson Creek, near Greenland Gap. In addition, there are several sinkholes and sinking streams down slope of the alignment which also provide recharge to these springs. Special design efforts will be required to protect these areas from the introduction of contaminants into the groundwater. Impervious ditches will be designed to transport stormwater runoff to surface waters. Stormwater will not be discharged into sinkholes or sinking streams.

Knobly Road Spring is located down slope of station 5575, along the Middle Fork of Patterson Creek. The recharge area for Knobly Road Spring has not been defined. As part of the design effort for this section, the extent of the recharge area and the depth to the top of the saturated zone will be determined in order to more accurately predict potential impacts and design avoidance and minimization measures.

The final contract plans will include specification requiring the mitigation measures cited in Section II (page 29).

7. SCENIC OVERLOOKS

No scenic overlooks are proposed for this Section.

8. Bikeways

No bikeways are proposed for this Section.

I. SECTION 8

The preliminary and final design of this Section will include the following mitigation commitments.

1. STREAMS

A total of 6,600 linear feet of stream HI is required within this section. Preliminary assessments identified three HI areas which are discussed below. Upon completion of preliminary designs plans the total linear feet of stream HI required will be revised to reflect the preliminary plans. During field reviews of the alignment the proposed HI areas will be reviewed by the agencies

a. Trib. to Middle Fork of Patterson Creek HI Area

This HI area is located south of the Middle Fork of Patterson Creek and east of County Route 3. The stream is surrounded by pasture, some which is heavily grazed. There are few shrubs or trees along the stream. The wetlands along the stream are severely impacted by grazing. HI potential along this stream is high for both the stream channel as well as the associated wetlands.

The HI in this area will provide instream compensation for habitat loss along the Trib. to the MF of Patterson Creek (PNB804) as well as receiving stream compensation for two other tributaries (PNB901, PNB806). A total of 1,160 feet of stream HI is proposed for this HI Area. Potential HI techniques include:

- ◆ Fencing of stream to exclude cattle.
- ◆ Providing alternative water source for cattle.

- ◆ Providing stabilized stream crossing, if required.
- ◆ Stabilizing stream bank, including replanting with woody vegetation.

b. Thorn Run HI Area

This HI area is located along Thorn Run, upstream of a flood control impoundment, parallel to County Route 5/4. In this area, Thorn Run has a mixture of eroding banks and poorly placed culverts. There are a number of wetlands along the stream.

The HI in this area will provide out-of-stream compensation for habitat loss along two small tributaries to Thorn Run (PNB903, PNB902). A total of 690 feet of stream HI is proposed for this HI Area. The potential HI techniques include:

- ◆ Stabilizing the most severely eroding banks.
- ◆ Reconstructing culvert crossing to eliminate constrictions to flow and formation of pooled areas.

c. Patterson Creek HI Area

This HI area is located along Patterson Creek south of the proposed interchange at Forman. The stream is surrounded by pasture, some of which is heavily grazed. Banks are 2 to 4 feet in height and range from well grassed and stable to eroding and slumping. There are a few scattered sycamores and willows along the banks, but long stretches of the stream are completely devoid of woody vegetation. Substrate is covered with sand from the alluvial soils in the valley, but there are areas of riffles still evident. HI potential along this stream is high.

Potential HI area were examined along several tributaries to Patterson Creek, but due to the small size of streams and poor substrate, HI was combined for several streams into one larger HI area along the main channel. The HI in this area will provide instream compensation for habitat loss along Patterson Creek (PNB807) as well as receiving -stream compensation for several tributaries (PNB800, PNB801, PNB808, PNB809). A total of 4,750 feet of stream HI is proposed for this HI Area. Potential HI techniques include:

- ◆ Fencing of stream to exclude cattle.
- ◆ Providing alternative water source for cattle.
- ◆ Providing stabilized stream crossing, if required.
- ◆ Stabilizing of stream bank, including replanting with woody vegetation.

2. EROSION AND SEDIMENTATION CONTROL

Erosion and Sedimentation control features, measures and structures will follow the *WVDOT, Division of Highways, Erosion and Sedimentation Control Manual, March 1, 1995 edition*. Additional erosion and sedimentation control measures that should be incorporated into erosion and sedimentation control plans for this section are detailed above (SECTION II, Erosion and Sedimentation Control).

3. EXCESS EXCAVATION

In the Alignment Selection SDEIS the amount of excess excavation estimated for this Section was 475,279 cubic meters. During preliminary and final design for this Section, design efforts will be made to reduce the amount of excess excavation to the extent practicable.

In addition, those areas where disposal of excess excavation will not be allowed will be identified on the preliminary and final design plans. The environmental data collected as part of the Alignment Selection SDEIS was utilized to identify wetlands, known habitat of rare, threatened or endangered species, known archaeological sites, perennial streams, and floodplains.

4. ACID DRAINAGE

Because of certain geological formations that occur in this section, there is a possibility that acid drainage may occur during or following construction. The portions of this Section which have the highest potential for acid drainage are:

- ◆ Sta 5606-5609 Harrell Formation
- ◆ Sta 5754-5757 Harrell Formation

Quantitative assessments of acid drainage potential will be conducted concurrent with geotechnical drilling and will include acid-base accounting or other standard chemical procedures to characterize the acid forming potential of the formations associated with highway cuts. Once the location of acid producing materials has been identified, appropriate mitigation techniques will be developed and incorporated into the design plans.

5. TERRESTRIAL HABITAT

Clearing and grubbing limits to minimize upland habitat destruction will be identified on the contract plans and will be pointed out during field reviews.

6. GROUNDWATER

The following portions of this Section have been determined to be susceptible to groundwater pollution.

- ♦ Sta 5852-5911 Patterson Creek

Impervious ditches will be designed to transport stormwater runoff to areas outside of the zone or to a permanent stormwater treatment facility. The final contract plans will include specification requiring the mitigation measures cited in Section II (page 29).

7. SCENIC OVERLOOKS

No scenic overlooks are proposed for this Section.

8. BIKEWAYS

A bikeway will be designed for the portion of the section between stations 5603 to 5790.

J. SECTION 7

The preliminary and final design of this Section will include the following mitigation commitments.

1. STREAMS

A total of 650 linear feet of stream HI is required within this section. Preliminary assessments identified one HI area which is discussed below. Upon completion of preliminary designs plans the total linear feet of stream HI required will be revised to reflect the preliminary plans. During field reviews of the alignment the proposed HI areas will be reviewed by the agencies

a. Trib. to Walnut Bottom Run HI Area

This HI area is located immediately downstream from the proposed highway crossing over a tributary to Walnut Bottom Run (PSB709). The stream is surrounded by an active pasture. A wetland is located along the western edge of the stream.

The HI in this area will provide instream compensation for habitat loss along this stream. A total of 650 feet of stream HI is proposed for this HI Area. Potential HI techniques include:

- ◆ Fencing of stream to exclude cattle (downstream).
- ◆ Providing alternative water source for cattle.
- ◆ Providing stabilized stream crossing, if required
- ◆ Stabilizing stream bank, including replanting with woody vegetation.

2. EROSION AND SEDIMENTATION CONTROL

Erosion and Sedimentation control features, measures and structures will follow the *WVDOT, Division of Highways, Erosion and Sedimentation Control Manual, March 1, 1995 edition*. Additional erosion and sedimentation control measures that should be incorporated into erosion and sedimentation control plans for this section are detailed above (SECTION II, Erosion and Sedimentation Control).

3. EXCESS EXCAVATION

In addition, those areas where disposal of excess excavation will not be allowed will be identified on the preliminary and final design plans. The environmental data collected as part of the Alignment Selection SDEIS was utilized to identify wetlands, known habitat of rare, threatened or endangered species, known archaeological sites, perennial streams, and floodplains.

4. ACID DRAINAGE

Because of certain geological formations that occur in this section, there is a possibility that acid drainage may occur during or following construction. The portions of this Section which have the highest potential for acid drainage are:

- ◆ Sta 6226-6233 Marcellus Formation

Quantitative assessments of acid drainage potential will be conducted concurrent with geotechnical drilling and will include acid-base accounting or other standard chemical procedures to characterize the acid forming potential of the formations associated with highway cuts. Once the location of acid producing materials has been identified, appropriate mitigation techniques will be developed and incorporated into the design plans.

In the Alignment Selection SDEIS there was no excess excavation estimated for this Section. During preliminary and final design for this Section, efforts will be made to minimize the amount of excess excavation to the extent practicable.

5. TERRESTRIAL HABITAT

Clearing and grubbing limits to minimize upland habitat destruction will be identified on the contract plans and will be pointed out during field reviews.

6. GROUNDWATER

The following portions of this Section have been determined to be susceptible to groundwater pollution.

- ♦ Sta 5911-6055 Patterson Creek

Impervious ditches will be designed to transport stormwater runoff to areas outside of the zone or to a permanent stormwater treatment facility. The final contract plans will include specification requiring the mitigation measures cited in Section II (page 29).

7. SCENIC OVERLOOKS

No scenic overlooks are proposed for this Section.

8. BIKEWAYS

A bikeway will be designed for the portion of the section between stations 6158-6268.

K. SECTION 6

The preliminary and final design of this Section will include the following mitigation commitments.

1. STREAMS

A total of 1,100 linear feet of stream HI is required within this section. Preliminary assessments identified one HI area which is discussed below. Upon completion of preliminary designs plans the total linear feet of stream HI required will be revised to reflect the preliminary plans. During field reviews of the alignment the proposed HI areas will be reviewed by the agencies

a. Fort Run HI Area

This HI area is located along Fort Run either side of County Route 4/1. Downstream of this crossing, the stream is within an active pasture with lots of slumping, eroding and overly steep banks. However, the stream is 10 to 20 feet wide, has cobble substrate with three sets of riffles within a few hundred feet. HI potential is very high in this section of the stream. Upstream of the road crossing the stream is surrounded by corn fields with a narrow band of mature red maples and willows as well as brush along the banks.

HI was evaluated just downstream of the headwaters of Fort Run where the proposed impact will occur. The potential for HI was poor at this location. The watershed is forested and the stream banks area stable however the stream flow is low and the substrate is poor (flat cobble embedded with shaley gravel and sand).

The HI in this area will provide receiving stream compensation for habitat loss within the headwaters of Fort Run. A total of 1,100 feet of stream HI is proposed for this HI Area. Potential HI techniques include:

- ◆ Fencing of stream to exclude cattle (downstream).
- ◆ Providing alternative water source for cattle.
- ◆ Providing stabilized stream crossing, if required.
- ◆ Stabilizing stream bank, including replanting with woody vegetation.
- ◆ Planting of a riparian buffer (75') on both sides of the stream (upstream) to reduce NPS runoff from cropland.

2. EROSION AND SEDIMENTATION CONTROL

Erosion and Sedimentation control features, measures and structures will follow the *WVDOT, Division of Highways, Erosion and Sedimentation Control Manual, March 1, 1995 edition*. Additional erosion and sedimentation control measures that should be incorporated into

erosion and sedimentation control plans for this section are detailed above (SECTION II, Erosion and Sedimentation Control).

3. EXCESS EXCAVATION

In the Alignment Selection SDEIS the amount of excess excavation estimated for this Section was 1,048,459 cubic meters. This amount was reduced during additional design efforts to 350,000 cubic meters. During preliminary and final design for this Section, design efforts will be made to reduce the amount of excess excavation to the extent practicable.

In addition, those areas where disposal of excess excavation will not be allowed will be identified on the preliminary and final design plans. The environmental data collected as part of the Alignment Selection SDEIS was utilized to identify wetlands, known habitat of rare, threatened or endangered species, known archaeological sites, perennial streams, and floodplains.

4. ACID DRAINAGE

Based on the geological formations that occur in this Section acid drainage will not occur during or following construction.

5. TERRESTRIAL HABITAT

Clearing and grubbing limits to minimize upland habitat destruction will be identified on the contract plans and will be pointed out during field reviews.

6. GROUNDWATER

There are no zones sensitive to groundwater contamination within this section. The final contract plans will include specification requiring the mitigation measures cited in Section II (page 29).

7. SCENIC OVERLOOKS

A Clifford Hollow Bridge Scenic Overlook will be included in the contract plans, if practicable, between stations 6505 and 6525.

8. BIKEWAYS

A bikeway will be designed for the portion of the section between stations 6269 and 6283.

L. SECTION 5

The preliminary and final design of this Section will include the following mitigation commitments.

1. STREAMS

A total of 4,067 linear feet of stream HI is required within this section. Preliminary assessments identified two HI areas which are discussed below. Upon completion of preliminary designs plans the total linear feet of stream HI required will be revised to reflect the preliminary plans. During field reviews of the alignment the proposed HI areas will be reviewed by the agencies. Open bottom culverts will be designed for the stream crossing at station 6791 and 6864.

a. Skaggs Run HI Area

The HI area is located along Skaggs Run downstream of the proposed crossing. The HI area will extend north along County Route 23/3. The watershed surrounding the HI area is forested while the HI area is old pasture with scattered trees and shrubs along the banks. The grassy banks have eroded and are steep on the outside bends. There area a number of groundwater seeps within the old pasture.

The HI in this area will provide instream compensation for habitat loss along Skaggs Run (PC513) as well as out-of-stream compensation for several tributaries (PC516, PC514, PC512, PC511, PC509). A total of 3,490 feet of stream HI is proposed for this HI Area. Potential HI techniques include:

- ◆ Fencing of stream to exclude cattle (may not be required if cattle no longer present).
- ◆ Stabilizing of stream bank, including replanting with woody vegetation.
- ◆ Installing instream structures to create pool habitat.

b. Long Lick HI Area

This HI area is located at the headwaters of Long Lick Run, along WV55. The headwater streams in this valley may make good candidates for agricultural Best Management Practices. A number of headwater streams flow through cattle yards and chicken houses which appear to be contributing NPS pollution to the stream. A cattle yard is located just upstream of sampling station PC506, and the stream has low habitat and low benthic abundance and diversity. A chicken house and pasture is located near stream station PC2501. This stream exhibits a combination of low habitat assessment and some pollution tolerant benthos, while at the same time pollution sensitive benthos and fish. Restoration through BMPs may stabilize and reverse the degradation of these headwater streams, which in turn will benefit the tributary to Long Lick.

The HI in this area will provide out-of-stream compensation for several tributaries to Long Lick (PC501, PC505, PC507). The tributary of Long Lick Run was reviewed for possible HI but does not appear to be a good candidate because the majority of the stream already has a forested buffer, there were minimal signs of erosion along stream, and the wetlands in the stream valley appear to experience minimal impacts from grazing. A total of 577 feet of stream HI is proposed for this HI Area. Potential HI techniques include:

- ◆ Fencing to exclude cattle.
- ◆ Developing alternative water sources.
- ◆ Revegetating of areas experiencing erosion.
- ◆ Stabilizing stream bank (both bioengineering and traditional methods).

3. EXCESS EXCAVATION

In the Alignment Selection SDEIS the amount of excess excavation estimated for this Section was 3,987,948 cubic meters. This amount was reduced during additional design efforts to 132,947 cubic meters. During preliminary and final design for this Section, design efforts will be made to reduce the amount of excess excavation to the extent practicable.

In addition, those areas where disposal of excess excavation will not be allowed will be identified on the preliminary and final design plans. The environmental data collected as part of the Alignment Selection SDEIS was utilized to identify wetlands, known habitat of rare, threatened or endangered species, known archaeological sites, perennial streams, and floodplains.

4. ACID DRAINAGE

Based on the geological formations that occur in this Section acid drainage will not occur during or following construction.

5. TERRESTRIAL HABITAT

Clearing and grubbing limits to minimize upland habitat destruction will be identified on the contract plans and will be pointed out during field reviews.

6. GROUNDWATER

There are no zones sensitive to groundwater contamination within this section. The final contract plans will include specification requiring the mitigation measures cited in Section II (page 29).

7. SCENIC OVERLOOKS

No scenic overlooks are proposed for this Section.

8. BIKEWAYS

A bikeway will be designed for the portion of the section between stations 6629 and 6694 and stations 6849 and 7049.

M. SECTION 4

The preliminary and final design of this Section will include the following mitigation commitments.

1. STREAMS

A total of 2,853 linear feet of stream HI is required within this section. Preliminary assessments identified one HI area which is discussed below. Upon completion of preliminary designs plans the total linear feet of stream HI required will be revised to reflect the preliminary plans. During field reviews of the alignment the proposed HI areas will be reviewed by the agencies

a. Lost River HI Area

This HI area is proposed for impacts to four small streams within this local watershed. This HI area is located upstream of Hanging Rock. This section of the Lost River is experiencing severe bank erosion and lacks riparian vegetation. The entire floodplain along this section of the river is a pasture with a few individual trees scattered along its length. There are no shrubs and a few scattered sycamore trees along the river banks. Immediately downstream, the river flows through the water gap at Hanging Rock, which has minimal floodplain and steep, forested slopes.

This section is located approximately 2,500 feet upstream of the proposed crossing of the Lost River, near Hanging Rock. A portion of the Lost River which is stocked with trout and supports recreational fishing is located immediately downstream from the potential restoration area. Fish habitat within the river appears to be good, but continued erosion will impact both the water quality and wildlife value of this section as well as further downstream.

A number of emergent wetlands are located within the floodplain of the Lost River within this section. These wetlands (#404 and #405) are located at the base of a steep slope within the floodplain of the Lost River. These wetlands appear to be supported by groundwater and flooding. The wetlands are a combination of emergent and open water areas, with a perennial stream flowing through a portion of one of the wetlands. Both plant and animal diversity are high. Fish, amphibians, reptiles, birds and waterfowl were observed in these wetlands. A restoration effort to re-establish a riparian buffer along the Lost River could also tie into the existing wetlands providing additional wildlife habitat.

The HI in this area will be out-of-stream compensation for several tributaries to Lost River (PC314, PC403, PC404, PC405, PC406). Instream HI was evaluate for all of the individual streams but determined not to be feasible since they were either very small or already had good to excellent habitat. A total of 2,835 feet of stream HI is proposed for this HI Area. Potential HI techniques include:

- ◆ Fencing to exclude cattle, if required.
- ◆ Stabilizing of the river bank.
- ◆ Establishing a forested riparian buffer along both sides of the river.
- ◆ Extending riparian buffer to provide a corridor between the Lost River and the existing wetland systems.

2. EROSION AND SEDIMENTATION CONTROL

Erosion and Sedimentation control features, measures and structures will follow the *WV DOT, Division of Highways, Erosion and Sedimentation Control Manual, March 1, 1995 edition*. Additional erosion and sedimentation control measures that should be incorporated into erosion and sedimentation control plans for this section are detailed above (SECTION II, Erosion and Sedimentation Control).

3. EXCESS EXCAVATION

In the Alignment Selection SDEIS the amount of excess excavation estimated for this Section was 6,297,123 cubic meters. This amount was reduced during additional design efforts to 244,617 cubic meters. During preliminary and final design for this Section, design efforts will be made to reduce the amount of excess excavation to the extent practicable.

In addition, those areas where disposal of excess excavation will not be allowed will be identified on the preliminary and final design plans. The environmental data collected as part of the Alignment Selection SDEIS was utilized to identify wetlands, known habitat of rare, threatened or endangered species, known archaeological sites, perennial streams, and floodplains.

4. ACID DRAINAGE

Because of certain geological formations that occur in this section, there is a possibility that acid drainage may occur during or following construction. The portions of this Section which have the highest potential for acid drainage are:

- ◆ Sta 7331-7345 Marcellus Formation
- ◆ Sta 7447-7450 Marcellus Formation

Quantitative assessments of acid drainage potential will be conducted concurrent with geotechnical drilling and will include acid-base accounting or other standard chemical procedures to characterize the acid forming potential of the formations associated with highway cuts. Once the location of acid producing materials has been identified, appropriate mitigation techniques will be developed and incorporated into the design plans.

5. TERRESTRIAL HABITAT

Clearing and grubbing limits to minimize upland habitat destruction will be identified on the contract plans and will be pointed out during field reviews.

6. GROUNDWATER

The following portions of this Section have been determined to be susceptible to groundwater pollution.

- ◆ Sta 7077-7120 Hanging Rock Area
- ◆ Sta 7281-7813 Hanging Rock Area

Impervious ditches will be designed to transport stormwater runoff to areas outside of the zone or to a permanent stormwater treatment facility. The final contract plans will include specification requiring the mitigation measures cited in Section II (page 29).

7. SCENIC OVERLOOKS

Two scenic overlooks will be included in the contract plans, if practicable. The Hanging Rock Scenic Overlook will be located near station 7160. A West Virginia Welcome Center - Lost River Valley Scenic Overlook will be located near station 7425.

8. BIKEWAYS

A bikeway will be designed for the portion of the section between stations 7049 and 7340.

N. SECTION 3

The preliminary and final design of this Section will include the following mitigation commitments.

1. STREAMS

A total of 2,935 linear feet of stream HI is required within this section. Preliminary assessments identified two HI areas which are discussed below. Upon completion of preliminary designs plans the total linear feet of stream HI required will be revised to reflect the preliminary plans. During field reviews of the alignment the proposed HI areas will be reviewed by the agencies. An open bottom culvert will be designed for the stream crossing at station 7681.

a. Waites Run HI Area

This HI area extends from the J. Allen Hawkins Community Park, upstream along Waites Run for approximately 1,600 feet, just upstream of the proposed crossing. Since Waites Run itself will be bridge, no HI will be required for this crossing, but two tributaries to Waites Run will be enclosed. Waites Run has excellent substrate and benthic populations as well as good riparian vegetation along its length. However there are several stretches of stream bank which are experiencing increasing undercutting and erosion. A 200 foot section of bank adjacent one of the picnic shelters within the park has been stabilized with riprap.

The HI in this area will provide out-of-stream compensation for several tributaries to Waites Run (PC311, PC307). A total of 700 feet of HI is proposed for this HI Area. Potential HI techniques:

- ◆ Clearing several trees and log jams which may result in blocking stream channel during high flows and exacerbating erosion.
- ◆ Installing instream flow deflectors (or other similar structures) to reduce bank erosion.
- ◆ Planting riprap stabilized bank with vegetation in order to provide shading.

b. Slate Rock Run HI Area

This HI area is near the mouth of Slate Rock Run where there is 1,600 feet of severely degraded stream between Route 55 and the Cacapon River. Within this area Slate Rock Run flows through a cattle yard next to a barn. There is no vegetation along the stream channel, the cattle have direct access to the stream, and erosion is active. Upstream of Route 55, there is an additional 1,200 feet of moderately degraded stream. The surrounding land is pasture with some shrubs and trees along the banks of the stream.

Due to the high quality stream habitat with low HI potential along the Slate Rock Run and its tributaries within the GWNF HI is proposed for a degraded section of stream near its

confluence with the Lost River . A total of 2,235 feet of stream HI is proposed for this HI Area. Potential HI techniques include:

- ◆ Fencing of stream to exclude cattle.
- ◆ Providing alternative water source for cattle.
- ◆ Providing stabilized stream crossing, if required.
- ◆ Stabilizing of stream bank, including revegetation.

Potential HI techniques for the upstream section include:

- ◆ Fencing of stream to exclude cattle.
- ◆ Installing of additional woody vegetation along the stream banks.
- ◆ Planting of a riparian buffer (75') on both sides of the stream.

2. EROSION AND SEDIMENTATION CONTROL

Erosion and Sedimentation control features, measures and structures will follow the *WVDOT, Division of Highways, Erosion and Sedimentation Control Manual, March 1, 1995 edition*. Additional erosion and sedimentation control measures that should be incorporated into erosion and sedimentation control plans for this section are detailed above (SECTION II, Erosion and Sedimentation Control).

3. EXCESS EXCAVATION

In the Alignment Selection SDEIS the amount of excess excavation estimated for this Section was 665,511 cubic meters. During preliminary and final design for this Section, design efforts will be made to reduce the amount of excess excavation to the extent practicable.

In addition, those areas where disposal of excess excavation will not be allowed will be identified on the preliminary and final design plans. The environmental data collected as part of the Alignment Selection SDEIS was utilized to identify wetlands, known habitat of rare, threatened or endangered species, known archaeological sites, perennial streams, and floodplains.

4. ACID DRAINAGE

Because of certain geological formations that occur in this section, there is a possibility that acid drainage may occur during or following construction. The portions of this Section which have the highest potential for acid drainage are:

- ♦ Sta 7458-7488 Marcellus Formation
- ♦ Sta 7527-7540 Marcellus Formation
- ♦ Sta 7643-7650 Harrell Formation
- ♦ Sta 7704-7711 Marcellus Formation

Quantitative assessments of acid drainage potential will be conducted concurrent with geotechnical drilling and will include acid-base accounting or other standard chemical procedures to characterize the acid forming potential of the formations associated with highway cuts. Once the location of acid producing materials has been identified, appropriate mitigation techniques will be developed and incorporated into the design plans.

5. TERRESTRIAL HABITAT

Clearing and grubbing limits to minimize upland habitat destruction will be identified on the contract plans and will be pointed out during field reviews.

6. GROUNDWATER

The following portions of this Section have been determined to be susceptible to groundwater pollution.

- ♦ Sta 7540-7576 - Wardensville Spring Well Head Protection Area (WHPA)
- ♦ Sta 7721-7752 - Great North Mountain Area (geological formations associated with Capon Warm Springs)

The WHPA is the area which provides recharge to the Wardensville Spring, the sole source of drinking water for the town of Wardensville. Design efforts in this portion of Section 3 will require additional consideration of measures to avoid and minimize the potential for groundwater contamination due to stormwater runoff and accidental spills.

During the design process, groundwater monitoring wells will be installed along the alignment in order to obtain information on the elevation of the saturated zone of the aquifer. Final design will take into account the information collected from the monitoring wells to determine if adjustments in the vertical grade of the highway is required.

Design of permanent stormwater management facilities to collect and treat all roadway runoff from the portion of the highway within the WHPA. These facilities will be designed to reduce stormwater quantity and to improve stormwater quality. These facilities will discharge to Trout Run or Waites Run.

In addition to the collection and treatment of stormwater run off, the drainage facilities within the WHPA should also be designed in a manner which allows them to collect and contain any accidentally spilled hazardous materials.

Along the portion of the alignment which crosses the geological formations associated with the Capon Warm Spring Complex, stormwater management facilities will be designed to collect all roadway runoff and discharge it to surface waters outside of the geologic formations.

The final contract plans will include specification requiring the mitigation measures cited in Section II (page 29).

7. SCENIC OVERLOOKS

No scenic overlooks are proposed for this Section.

8. BIKEWAYS

A bikeway will be designed for the portion of the section between stations 7509 and 7579.

APPENDIX A

Table A-1 Stream Habitat Improvement Type

SECTION 5 - Skaggs Run Local Watershed

Structure	Stream Name	Stream ID	Station	SDEIS Impacts		Type and Location of Habitat Improvement	Rationale
				meters	feet		
Pipe	Trib. to Skaggs Run	PC509	6767	189	620	Receiving Stream - Skaggs Run HI Area	Poor instream HI candidate - small drainage area would not provide stable stream flows
Pipe	Trib. to Skaggs Run	PC512	6713	131	430	Receiving Stream - Skaggs Run HI Area	Instream HI potential limited by existing excellent habitat
Pipe	Trib. to Skaggs Run	PC514	6673	116	380	Receiving Stream - Skaggs Run HI Area	Poor instream HI candidate - small drainage area would not provide stable stream flows
Pipe	Trib. to Skaggs Run	PC516	6655	76	250	Receiving Stream - Skaggs Run HI Area	Poor instream HI candidate - small drainage area would not provide stable stream flows
Open Box Culvert	Trib. to Skaggs Run	PC511	6791	186	610	None Required	Open Box Culvert
Multiple Box Culvert	Skaggs Run	PC513	6690	91	300	Instream /offsite- Skaggs Run HI Area	Large area with high HI potential
Relocation	Trib. to Skaggs Run	PC510	6735	183	600	Receiving Stream - Skaggs Run HI Area	Entire stream relocated
Relocation	Trib. to Skaggs Run	PC515	6673	91	300	Receiving Stream - Skaggs Run HI Area	Poor instream HI candidate
				1,064	3,490		

SECTION 5 - Baker Run Local Watershed

Structure	Stream Name	Stream ID	Station	SDEIS Impacts		Type and Location of Habitat Improvement	Rationale
				meters	feet		
Pipe	Trib. to Baker Run	PC501	7010	94	310	Receiving Stream - Long Lick HI Area	Stream Crossed by two other roads; insufficient remaining channel remaining for instream HI
Pipe	Trib. to Long Lick Run	PC505	6913	107	350	Receiving Stream - Long Lick HI Area	Insufficient stream channel remaining for instream HI
Open Box Culvert	Trib. to Long Lick Run	PC507**		107	350	None Required	Open Bottom Culvert
				308	1,010		

Table A-1 Stream Habitat Improvement Type

SECTION 16 - Leading Creek Local Watershed

Structure	Stream Name	Stream ID	Station	SDEIS Impacts		Type and Location of Habitat Improvement	Rationale
				meters	feet		
Pipe	Trib. to Leading Creek	MT1604	512	122	400	Instream / offsite HI - Trib. to Leading Creek HI Area	Degraded stream with high HI potential
Pipe	Trib. to Claylick Run	MT1606	438	229	750	Receiving Stream - Claylick Run HI Area	Insufficient perennial stream channel remaining to accomodate instream HI
Pipe	Trib. to Leading Creek	MT3603	656	15	50	Receiving Stream - Leading Creek HI Area	Too small amount for seperate HI area
Multiple Box Culvert	Horse Run	MT1602	639	104	340	Receiving Stream - Leading Creek HI Area	Stream degraded by residential land use
Box Culvert	Trib. to Leading Creek	MT1607	389	122	400	Receiving Stream - Leading Creek HI Area	Stream degraded by residential land use
Relocation	Claylick Run	MC1605	448	244	800	Instream / onsite HI - Claylick Run HI Area	Degraded stream with high HI potential
Relocation	Trib. to Claylick Run	MC1604	512	122	400	Instream / offsite HI - Trib. to Leading Creek HI Area	Degraded stream with high HI potential
				957	3,140		

SECTION 14 & 15 - Shavers Fork Local Watershed

Structure	Stream Name	Stream ID	Station	SDEIS Impacts		Type and Location of Habitat Improvement	Rationale
				meters	feet		
Pipe	Trib. to Pleasant Run	MC1506	3173	280	920	Receiving Stream - Pleasant Run HI Area	Insufficient perennial stream channel remaining to accomodate instream HI
Relocation	Trib. to Shavers Fork	MC1402	3383	122	400	Adjacent Stream - Pleasant Run HI Area	Remaining stream poor instream HI candidate since it will be surrounded by highway and relocated CR 41
				402	1,320		

Table A-1 Stream Habitat Improvement Type

SECTION 10 & 11 - Stony River Local Watershed

Structure	Stream Name	Stream ID	Station	SDEIS Impacts		Type and Location of Habitat Improvement	Rationale
				meters	feet		
Pipe	Four Mile Run	MC1100	4823	137	450	To Be Determined	Requires more detailed study
Pipe	Trib. to Stony River	PNB1005	4893	91	300	To Be Determined	Requires more detailed study
Box Culvert	Little Creek	PNB1000	5057	76	250	To Be Determined	Requires more detailed study
Box Culvert	Abrams Creek	PNB1001	5029	137	450	To Be Determined	Requires more detailed study
Relocation	Trib. to Four Mile Run	MC1101	4820	122	400	To Be Determined	Requires more detailed study
Relocation	Trib. to Abrams Creek	PNB1004	4993	195	640	To Be Determined	Requires more detailed study
Relocation	Trib. to Abrams Creek	PNB1002	5008	122	400	To Be Determined	Requires more detailed study
Relocation	Trib. to Abrams Creek	PNB1003	5008	122	400	To Be Determined	Requires more detailed study
Relocation	Trib. to Little Creek	PNB1009	5057	122	400	To Be Determined	Requires more detailed study
				1,125	3,690		

Table A-1 Stream Habitat Improvement Type

SECTION 8 & 9 - Patterson Creek Local Watershed

Structure	Stream Name	Stream ID	Station	SDEIS Impacts		Type and Location of Habitat Improvement	Rationale
				meters	feet		
Pipe	Trib. to Patterson Creek	PNB800	5899	137	450	Receiving Stream - Patterson Creek HI Area	Poor instream HI candidate - small drainage area would not provide stable stream flows
Pipe	Trib. to Thorn Run	PNB803	5656	82	270	Receiving Stream - Thorn Run HI Area	Poor instream HI candidate - small drainage area would not provide stable stream flows
Pipe	Trib. to MF of Patterson Creek	PNB806	5586	101	330	Receiving Stream - Trib. to MF of Patterson Creek HI Area	Poor instream HI candidate - small drainage area would not provide stable stream flows
Pipe	Trib. to Patterson Creek	PNB801	5847	198	650	Receiving Stream - Patterson Creek HI Area	Insufficient stream channel to accommodate total instream HI
Pipe	Trib. to Thorn Run	PNB802	5714	128	420	Receiving Stream - Thorn Run HI Area	Better opportunities for HI in receiving stream
Box Culvert	Trib. to MF of Patterson Creek	PNB804	5615	137	450	Instream / offsite - Trib. to MF of Patterson Creek HI Area	Degraded stream with high HI potential
Multiple Box Culvert	Patterson Creek	PNB807	5802	152	500	Instream / offsite - Patterson Creek HI Area	Degraded stream with high HI potential
Relocation	Trib. to Elklick Run	PBN903	5297	91	300	Receiving Stream - Trib. to Elklick Run HI Area	Insufficient channel for instream HI
Relocation	Trib. to MF of Patterson Creek	PNB901	5515	116	380	Receiving Stream - Trib. to MF of Patterson Creek HI Area	Instream HI potential limited by topography
Relocation	Trib. to Patterson Creek	PNB809	5820	610	2000	Receiving Stream - Patterson Creek HI Area	Poor instream HI candidate - Remaining stream surrounded by wetlands
Relocation	Trib. to Patterson Creek	PNB808	5843	30	100	Receiving Stream - Patterson Creek HI Area	Small amount of HI - Better to combine with other HI areas
Relocation	Trib. to Patterson Creek	PNB801	5855	320	1050	Receiving Stream - Patterson Creek HI Area	Insufficient stream channel to accommodate total instream HI
				2,103	6,900		

Table A-1 Stream Habitat Improvement Type

SECTION 7 - Anderson Creek Local Watershed

Structure	Stream Name	Stream ID	Station	SDEIS Impacts		Type and Location of Habitat Improvement	Rationale
				meters	feet		
Multiple Box Culvert	Trib. to Walnut Bottom Run	PSB709	6102	198	650	Instream / onsite HI - Trib. to Walnut Bottom Run HI Area	Degraded stream with high HI potential

SECTION 6 - South Branch of Potomac River and Clifford Hollow Creek Local Watersheds

Structure	Stream Name	Stream ID	Station	SDEIS Impacts		Type and Location of Habitat Improvement	Rationale
				meters	feet		
Relocation	Trib. to Fort Run	PSB604	6385	335	1100	Receiving Stream - Fort Run HI Area	Degraded stream with high HI potential

Table A-1 Stream Habitat Improvement Type

SECTION 3 & 4 - Cacapon River Local Watershed

Structure	Stream Name	Stream ID	Station	SDEIS Impacts		Type and Location of Habitat Improvement	Rationale
				meters	feet		
Pipe	Trib. to Lost River	PC314	7512	67	220	Receiving Stream - Lost River HI Area	Instream HI potential is limited by topography - located in gully
Pipe	Trib. to Lost River	PC403	7280	137	450	Receiving Stream - Lost River HI Area	Poor instream HI candidate - small drainage area would not provide stable stream flows
Pipe	Trib. to Lost River	PC404	7256	146	480	Receiving Stream - Lost River HI Area	Poor instream HI candidate - small drainage area would not provide stable stream flows
Pipe	Trib. to Lost River	PC405	7247	130	425	Receiving Stream - Lost River HI Area	Poor instream HI candidate - small drainage area would not provide stable stream flows
Box Culvert	Trib. to Lost River	PC406	7207	247	810	Receiving Stream - Lost River HI Area	Only limited areas in need of HI within impacted stream
Relocation	Trib. to Lost River	PC406	7207	137	450	Receiving Stream - Lost River HI Area	Only limited areas in need of HI within impacted stream
				864	2,835		

Table A-1 Stream Habitat Improvement Type

SECTION 3 - Waites Run Local Watershed

Structure	Stream Name	Stream ID	Station	SDEIS Impacts		Type and Location of Habitat Improvement	Rationale
				meters	feet		
Pipe	Trib. to Waites Run	PC307	7590	76	250	Receiving Stream - Waites Run HI Area	Active erosion not present in impacted stream, but is evident in receiving stream - Waites Run
Box Culvert	Trib. to Waites Run	PC311	7607	137	450	Receiving Stream - Waites Run HI Area	Instream HI potential limited by existing excellent habitat
				213	700		

SECTION 3 - Slate Rock Run Local Watershed

Structure	Stream Name	Stream ID	Station	SDEIS Impacts		Type and Location of Habitat Improvement	Rationale
				meters	feet		
Pipe	Trib. to Sine Run	PC300	7781	114	375	Adjacent Stream - Slate Rock Run HI Area	Remaining stream impacted by WV55, roads and powerline ROWs
Pipe	Trib. to Sine Run	PC301	7769	79	260	Adjacent Stream - Slate Rock Run HI Area	Remaining stream impacted by WV55, roads and powerline ROWs
Pipe	Trib. to Slate Rock Run	PC303	7723	122	400	Receiving Stream - Slate Rock Run HI Area	Instream HI potential limited by existing excellent habitat
Pipe	Trib. to Slate Rock Run	PC304	7702	168	550	Receiving Stream - Slate Rock Run HI Area	Instream HI potential limited by existing excellent habitat
Box Culvert	Trib. to Slate Rock Run	PC302	7740	198	650	Receiving Stream - Slate Rock Run HI Area	Instream HI potential limited by existing excellent habitat
Open Box Culvert	Slate Rock Run	PC305	7681	131	430	None Required	Open Box Culvert
				681	2,235		

Note: Total SDEIS Impact does not include open box culverts

Table A-1 Stream Habitat Improvement Type

SECTION 11 & 12 - Beaver and Pendelton Creek (Black Fork Local Watershed)

Structure	Stream Name	Stream ID	Station	SDEIS Impacts		Type and Location of Habitat Improvement	Rationale
				meters	feet		
Pipe w/cut	Trib. to Beaver Creek	MC1106	4610	40	130	To Be Determined	Requires more detailed study
Pipe w/cut	Trib. to Beaver Creek	MC1107	4589	46	150	To Be Determined	Requires more detailed study
Pipe w/cut	Trib. to Beaver Creek	MC1108	4583	61	200	To Be Determined	Requires more detailed study
Pipe	Trib. to Beaver Creek	MC1110	4644	58	190	To Be Determined	Requires more detailed study
Pipe w/cut	Trib. to Beaver Creek	MC1111	4555	137	450	To Be Determined	Requires more detailed study
Pipe	Trib. to Beaver Creek	MC1200	4496	23	75	To Be Determined	Requires more detailed study
Pipe	Trib. to Beaver Creek	MC1203	4462	23	75	To Be Determined	Requires more detailed study
Pipe	Trib. to Beaver Creek	MC1204	4462	23	75	To Be Determined	Requires more detailed study
Pipe	Trib. to Beaver Creek	MC1205	4451	23	75	To Be Determined	Requires more detailed study
Pipe	Trib. to Beaver Creek	MC1209	4232	23	75	To Be Determined	Requires more detailed study
Pipe	Trib. to Beaver Creek	MC1210	4213	23	75	To Be Determined	Requires more detailed study
Pipe	Trib. to Pendelton Creek	MC1213	4137	183	600	To Be Determined	Requires more detailed study
Pipe	Trib. to Beaver Creek	MC1215	4359	61	200	To Be Determined	Requires more detailed study
Pipe	Trib. to Beaver Creek	MC1216	4345	30	100	To Be Determined	Requires more detailed study
Multiple Box Culvert	Trib. to Beaver Creek	MC1104	4695	94	310	To Be Determined	Requires more detailed study
Open Box Culvert	Trib. to Beaver Creek	MC1105	4668	55	180	To Be Determined	Requires more detailed study
Box Culvert	Trib. to Beaver Creek	MC1112	4540	49	160	To Be Determined	Requires more detailed study
Box Culvert	Trib. to Beaver Creek	MC1206	4429	23	75	To Be Determined	Requires more detailed study
Multiple Box Culvert	Pendelton Creek	MC1212	4150	61	200	To Be Determined	Requires more detailed study
Relocation	Trib. to Pendelton Creek	MC1211	4182	152	500	To Be Determined	Requires more detailed study
Relocation	Trib. to Beaver Creek	MC1201	4478	30	100	To Be Determined	Requires more detailed study
				1,218	3,995		

Table A-1 Stream Habitat Improvement Type

SECTION 13 - Black Fork Local Watershed

Structure	Stream Name	Stream ID	Station	SDEIS Impacts		Type and Location of Habitat Improvement	Rationale
				meters	feet		
Pipe	Trib. to Roaring Run	MC1316	3731	271	890	Receiving Stream - Roaring Run HI Area	Insufficient channel remaining for instream HI
Pipe	Trib. to Roaring Run	MC1317	3716	323	1060	Receiving Stream - Roaring Run HI Area	Insufficient channel remaining for instream HI
Pipe w/cut	Trib. to Slip Hill Mill Run	MC3304	3803	125	410	Instream / offsite - Trib. to Slip Hill Mill Run HI Area	Stream exhibiting erosion problems downstream of WV 219
Open Box Culvert	Trib. to Big Run	MC1312	3900	61	200	None Required	Open Box Culvert
Open Box Culvert	Trib. to Roaring Run	MC1314	3757	122	400	None Required	Open Box Culvert
Box Culvert	Long Run	MC1308	3988	183	600	To Be Determined	Requires more detailed study
Box Culvert	Middle Run	MC1309	4055	49	160	To Be Determined	Requires more detailed study
Box Culvert	Trib. to Black Fork	MC1318	3638	198	650	Instream / onsite - Trib. to Black Fork HI Area	Degraded stream with HI potential
Relocation	Trib. to Roaring Run	MC1315	3735	457	1,500	Receiving Stream - Roaring Run HI Area	Insufficient channel remaining for instream HI
				1,789	5,870		

Table A-2 Stream Habitat Data Summary

SECTION 5 - Skaggs Run Local Watershed

Structure	Stream Name	Stream ID	Station	Stream Order	Drainage Area	Habitat Score	# Ind.	No. of Families	FBI	BI	Comments
Pipe	Trib. to Skaggs Run	PC509	6767	1	66	53	28	7	4.18	0.53	Small drainage area within pasture; low HA and abundance
Pipe	Trib. to Skaggs Run	PC512	6713	1	106	83	29	7	3.38	0.53	Forested watershed
Pipe	Trib. to Skaggs Run	PC514	6673	1	11	64	30	8	5.87	0.33	Very small drainage area; fairly poor water quality
Pipe	Trib. to Skaggs Run	PC516	6655	1	24	59	25	6	4.64	0.40	Small drainage area; low HA
Open Box Culvert	Trib. to Skaggs Run	PC511	6791	1	302	105	30	10	4.43	0.53	Very high HA;
Multiple Box Culvert	Skaggs Run	PC513	6690	2	918	86	97	10	3.35	0.60	High abundance; excellent water quality; second order stream with large drainage area
Relocation	Trib. to Skaggs Run	PC510	6735	1		76	3	3	3.00	0.33	Low abundance & diversity; small drainage area; excellent water quality
Relocation	Trib. to Skaggs Run	PC515	6673	1		75	25	16	2.84	0.93	Very high diversity; excellent water quality
					Average	75	33	8	3.96	0.52	

SECTION 5 - Baker Run Local Watershed

Structure	Stream Name	Stream ID	Station	Stream Order	Drainage Area	Habitat Score	# Ind.	No. of Families	FBI	BI	Comments
Pipe	Trib. to Baker Run	PC501	7010	1	86	67	21	9	4.40	0.71	Stream has been bulldozed; small DA
Pipe	Trib. to Long Lick	PC505	6913	1	57	56	12	6	1.80	0.53	Small DA; Pond upstream; low abundance
Open Box Culvert	Trib. to Long Lick	PC507**				72	45	13	4.30	0.80	Stream Assumed to be similar to PC507
					Average	65	26	9	3.50	0.68	

Table A-2 Stream Habitat Data Summary

SECTION 16 - Leading Creek Local Watershed

Structure	Stream Name	Stream ID	Station	Stream Order	Drainage Area	Habitat Score	# Ind.	No. of Families	FBI	BI	Comments
Pipe	Trib. to Leading Creek	MT1604	512	1	54	81	8	5	5.40	0.53	Small drainage area; short total stream length
Pipe	Trib. to Claylick Run	MT1606	438	1	102	59	2	2	3.00	0.13	Very low abundance and diversity; small drainage area
Pipe	Trib. to Leading Creek	MT3603	656	1	258	76	106	10	7.80	0.20	Impact due to realignment of side road
Multiple Box Culvert	Horse Run	MT1602	639	2	775	44	0	0	N/A	N/A	No benthos; sand/silt/organic substrate; residential land use impacts
Box Culvert	Trib. to Leading Creek	MT1607	389	2	675	58	1	1	4.00	0.13	Low abundance and diversity; high clay/silt load; high agriculture impacts
Relocation	Claylick Run	MC1605	448	2		59	10	8	5.70	0.33	large drainage area; w/ floodplain of Leading Creek; silt/clay substrate;
Relocation	Trib. to Claylick Run	MC1604	512	1	54	81	8	5	5.40	0.53	Small drainage area; short total stream length
Average						65	19	4	5.22	0.31	

SECTION 14 & 15 - Shavers Fork Local Watershed

Structure	Stream Name	Stream ID	Station	Stream Order	Drainage Area	Habitat Score	# Ind.	No. of Families	FBI	BI	Comments
Pipe	Trib. to Pleasant Run	MC1506	3173	1	80	85	25	9	4.00	0.67	Small drainage area; within MNF; steep forested ravine
Relocation	Trib. to Shavers Fork	MC1402	3383	1		37	103	4	7.99	0.07	Within floodplain of Shavers Fork; pond upstream; pasture along west bank
Average						61	64	7	6.00	0.37	

Table A-2 Stream Habitat Data Summary

SECTION 10 & 11 - Stony River Local Watershed

Structure	Stream Name	Stream ID	Station	Stream Order	Drainage Area	Habitat Score	# Ind.	No. of Families	FBI	BI	Comments
Pipe	Four Mile Run	MC1100	4823	1	111	62	11	6	3.10	0.53	Low abundance; fine ash in sediment
Pipe	Trib. to Stony River	PNB1005	4893	1	60	97	32	11	2.70	0.87	high HA; high diversity; recieved drainage from large wetland; trib. to Stony River
Box Culvert	Little Creek	PNB1000	5057	2	650	51	0	0	N/A	N/A	Acid Mine Drainage evident; pH=3; no benthos
Box Culvert	Abrams Creek	PNB1001	5029	2	808	50	0	0	N/A	N/A	Acid Mine Drainage evident; pH=4; no benthos
Relocation	Trib. to Four Mile Run	MC1101	4820	1		76	6	1	8.00	0.13	Small Drainage area; low abundance & diversity; poor water quality; fine ash in sediment
Relocation	Trib. to Abrams Creek	PNB1004	4993	1		80	98	9	2.20	0.87	High abundance; good bethos but pH=4.5
Relocation	Trib. to Abrams Creek	PNB1002	5008	1		53	95	9	7.34	0.20	Small drainage area; poor water quality; high abundance but mostly diptera
Relocation	Trib. to Abrams Creek	PNB1003	5008	1		68	98	12	2.45	0.87	Small drainage area; high abundance & diversity; good benthos; pH=5.5
Relocation	Trib. to Little Creek	PNB1009	5057	1		78	0	0	N/A	N/A	Acid mine drainage evident; small DA; no benthos
					Average	68	38	5	4.30	0.58	

Table A-2 Stream Habitat Data Summary

SECTION 8 & 9 - Patterson Creek Local Watershed

Structure	Stream Name	Stream ID	Station	Stream Order	Drainage Area	Habitat Score	# Ind.	No. of Families	FBI	BI	Comments
Pipe	Trib. to Patterson Creek	PNB800	5899	1	25	34	10	2	7.90	0.00	Small drainage area; w/i pasture; low HA; very poor water quality; poor substrate
Pipe	Trib. to Thorn Run	PNB803	5656	1	25	86	1	1	3.00	0.13	Small drainage area; low benthos; w/i pasture
Pipe	Trib. to MF of Patterson Creek	PNB806	5586	1	42	62	7	4	6.60	0.40	Small drainage area; silt substrate; in old pasture; low benthos
Pipe	Trib. to Patterson Creek	PNB801	5847	2	263	87	89	4	7.70	0.13	large drainage ; pasture surrounds stream; very poor water quality
Pipe	Trib. to Thorn Run	PNB802	5714	2	257	74	5	2	5.20	0.07	low abundance and diversity; w/i pasture; algae
Box Culvert	Trib. to MF of Patterson Creek	PNB804	5615	2	864	71	43	6	6.60	0.27	Large drainage area; poor water quality; surrounded by pasture and wetlands
Multiple Box Culvert	Patterson Creek	PNB807	5802	3	4624	48	97	11	6.50	0.47	large drainage area; low HA; w/i pasture with eroding banks and silt in channel
Relocation	Trib. to Ellick Run	PBN903	5297	1		96	107	7	3.82	0.60	High HA; high abundance; good substrate
Relocation	Trib. to MF of Patterson Creek	PNB901	5515	1		46	33	7	2.61	0.67	Good water quality; good substrate
Relocation	Trib. to Patterson Creek	PNB809	5820	1		64	26	12	4.92	0.87	Stream w/i wetland, poorly defined channel
Relocation	Trib. to Patterson Creek	PNB808	5825	1		51	2	2	6.50	0.20	Small DA; livestock pond in stream; pasture, sand substrate; low benthos and HA
Relocation	Trib. to Patterson Creek	PNB801	5255	2	263	87	89	4	7.66	0.13	large DA; pasture surrounds stream; poor water quality
					Average	67	44	5	5.83	0.28	

Table A-2 Stream Habitat Data Summary

SECTION 7 - Anderson Creek Local Watershed

Structure	Stream Name	Stream ID	Station	Stream Order	Drainage Area	Habitat Score	# Ind.	No. of Families	FBI	BI	Comments
Multiple Box Culvert	Trib. to Walnut Bottom Run	PSB709	6102	2	2877	66	61	8	2.50	0.67	Cattle in the stream; surrounded by pasture; some riparian vegetation remaining; excellent water quality

SECTION 6 - South Branch of Potomac River and Clifford Hollow Creek Local Watersheds

Structure	Stream Name	Stream ID	Station	Stream Order	Drainage Area	Habitat Score	# Ind.	No. of Families	FBI	BI	Comments
Relocation	Trib. to Fort Run	PSB604	6385	1		68	5	3	5.40	0.27	small drainage area; very low abundance & diversity; fair water quality

Table A-2 Stream Habitat Data Summary

SECTION 3 & 4 - Cacapon River Local Watershed

Structure	Stream Name	Stream ID	Station	Stream Order	Drainage Area	Habitat Score	# Ind.	No. of Families	FBI	BI	Comments
Pipe	Trib. to Lost River	PC314	7512	1	92	57	103	11	3.50	0.80	High abundance & diversity
Pipe	Trib. to Lost River	PC403	7280	1	72	76	2	1	8.00	0.00	Low abundance and diversity; very poor water quality
Pipe	Trib. to Lost River	PC404	7256	1	44	81	10	4	6.20	0.33	Small drainage; low abundance and diversity
Pipe	Trib. to Lost River	PC405	7247	1		55	42	9	4.30	0.87	Small drainage area; low HA
Box Culvert	Trib. to Lost River	PC406	7207	2	859	93	6	3	3.00	0.27	Large drainage area; good HA; good substrate
Relocation	Trib. to Lost River	PC406	7207	2	859	93	6	3	3.00	0.27	Large drainage area; good HA; good substrate
				Average		76	28	5	4.67	0.42	