

**APPENDIX H
LAUREL RUN HYDROLOGIC AND HYDRAULIC ANALYSIS**

This appendix consists of the Preliminary Hydrologic and Hydraulic Report for the proposed bridge crossing of Laurel Run located in Decatur Township along the Modified Proposed Action's Alternate Route from Philipsburg to Munson.

TABLE OF CONTENTS

| | PAGE |
|---|-------------|
| PART A - SITE DATA | 1 |
| 1.1 STATEMENT OF PURPOSE | 1 |
| 1.2 SITE LOCATION | 1 |
| 1.3 EXISTING STRUCTURES | 2 |
| 1.4 FLOOD INFORMATION | 2 |
| 1.5 PHOTOGRAPHS | 2 |
| 1.6 SITE INSPECTION RECORDS | 3 |
| PART B - HYDROLOGIC ANALYSIS | 4 |
| 2.1 DRAINAGE AREA | 4 |
| 2.2 FLOOD RECORDS | 4 |
| 2.3 FLOOD DISCHARGES | 4 |
| PART C - HYDRAULIC ANALYSIS | 5 |
| 3.1 STATUS OF FEMA STUDIES | 5 |
| 3.2 SELECTED HYDRAULIC METHOD | 5 |
| 3.3 DESCRIPTION OF HYDRAULIC MODELS | 7 |
| 3.4 RESULTS | 10 |
| PART D - RISK ASSESSMENT | 17 |



LIST OF FIGURES

| NO. | DESCRIPTION | PAGE |
|------------|--|----------------|
| 1 | SITE LOCATION MAP | Following Text |
| 2 | COMPARISON OF FIRM TO CURRENT TOPO MAPPING | Following Text |
| 3 | DUPLICATE EFFECTIVE MODEL | Following Text |
| 4 | CORRECTED EFFECTIVE MODEL | Following Text |
| 5 | EXISTING CONDITIONS MODEL | Following Text |
| 6 | PROPOSED CONDITIONS MODEL | Following Text |
| 7 | COMPARISON OF FIRM, CORRECTED EFFECTIVENESS MODEL, AND REVISED CONDITIONS MODEL | Following Text |
| 8 | COMPARISON OF FIRM, EXISTING CONDITIONS MODEL, AND REVISED CONDITIONS MODEL | Following Text |



LIST OF TABLES

| NO. | DESCRIPTION | PAGE |
|------------|---|-------------|
| 1 | FLOW ESTIMATE FROM FLOOD INSURANCE STUDY | 4 |
| 2 | SELECTED MANNING'S n ROUGHNESS COEFFICIENTS | 6 |
| 3 | RESULTS OF DUPLICATE EFFECTIVE MODEL | 8 |
| 4 | RESULTS OF CORRECTED EFFECTIVE MODEL | 9 |
| 5 | RESULTS OF EXISTING (PRE-PROJECT) MODEL | 11 |
| 6 | RESULTS OF REVISED (POST-PROJECT) MODEL | 12 |



LIST OF APPENDICES

- APPENDIX A - PHOTOGRAPH LOG
- APPENDIX B - PORTION OF FLOOD INSURANCE RATE MAP (FIRM)
- APPENDIX C - EXCERPTS FROM FLOOD INSURANCE STUDY (FIS)
- APPENDIX D - FEMA RESPONSE LETTER REGARDING BACKUP DATA REQUEST
- APPENDIX E - HEC-RAS DUPLICATE EFFECTIVE MODEL
- APPENDIX F - HEC-RAS CORRECTED EFFECTIVE MODEL
- APPENDIX G - HEC-RAS EXISTING (PRE-PROJECT) CONDITIONS MODEL
- APPENDIX H - HEC-RAS REVISED (POST-PROJECT) CONDITIONS MODEL



PART A - SITE DATA

1.1 STATEMENT OF PURPOSE

R J Corman Railroad Company is investigating the feasibility of reopening pre-existing railroad rights-of-way that were either neglected and abandoned or converted to trails. One leg of the reopened railroad would connect to the Philipsburg Industrial Track by a connector traversing the floodplain of Laurel Run near its confluence with Moshannon Creek, just north of the intersection of US Route 322 and PA Route 53. The intent of this report is to determine the ramifications of the proposed connector and bridge over Laurel Run, with respect to flood mapping issues. The goals of this project and report are to

- 1) create a HEC-RAS model for evaluating the pre- and post-improvements hydraulics;
- 2) determine the impacts of the proposed improvements; and
- 3) assess the potential need for securing a LOMR (Letter of Map Revision) from FEMA.

1.2 SITE LOCATION

The project site is located east of US 322 and northwest of PA Route 53 in Decatur Township, Clearfield County, Pennsylvania. This study focuses on Laurel Run, a tributary of Moshannon Creek. Refer to Figure 1 for the location of the site on the Philipsburg, Pennsylvania, USGS quadrangle map.

The project site is somewhat centrally located within the floodplain of Laurel Run. An old strip mine borders the valley of Laurel Run to the northeast, while the southeastern margin of the floodplain is framed by US 322 and the existing railroad (noted as Conrail on the Flood Insurance Rate Map). A review of historical aerial photography (secured from the Penn Pilot Web site, <http://www.pennpilot.psu.edu/>) shows that the entire project area (northeastern and southwestern sides of the valley) has been subject to mining activities over the past century. Changes in channel alignment are readily evident in the aerial photographs.



1.3 EXISTING STRUCTURES

Beyond the limits of the immediate project site, the nearest upstream structure is the existing railroad crossing over Laurel Run located approximately 780 feet west northwest of the proposed crossing. The nearest downstream structure is the PA Route 53 crossing over Laurel Run, approximately 2,860 feet in the east southeast direction.

The existing structure upstream of the proposed crossing falls between FEMA sections B and C shown on the Flood Insurance Rate Map (FIRM) and on the Flood Insurance Study (FIS) profile. Measurements of the existing structure were taken during a site visit on November 13, 2009. The existing structure consists of a single span over Laurel Run. Steel I-beams carry the railroad load over the stream. The steel beams rest on cast-in-place concrete abutments, with a formed bearing seat. The clear span between the face of the abutments (measured orthogonal to the baseflow of Laurel Run) is 11.2 feet, while the distance between the abutments as measured along the track length is 14.2 feet. This equates to a skew angle of 38 degrees off of normal.

Benchmark RM4 of the Flood Insurance Study was found to be intact on the bearing seat at the southern corner of the bridge structure (at the southwestern end of the southeastern abutment). From the FIRM and FIS, it was found that RM4 is at elevation 1425.00 (NGVD1929). This provided a good reference for determining elevations of various bridge elements. At the time of the site inspection, the baseflow water surface of Laurel Run was 3.5 feet below RM4. The top surface of the rails are 2.9 feet above RM4, while the streambed at the crossing is 6.5 feet below RM4. No historical high water marks are evident on the existing bridge structure.

1.4 FLOOD INFORMATION

According to the FIS for the Township of Decatur, Clearfield County, Pennsylvania (November 16, 1990), the flood of record occurred on March 18, 1936. No other flood records were investigated as part of this study.

1.5 PHOTOGRAPHS

Refer to Appendix A for photographs of the existing structure over Laurel Run and for photos of the typical floodplain characteristics.



1.6 SITE INSPECTION RECORDS

The author of this report, Mr. Michael E. Lower, P.E., of Skelly and Loy, Inc., visited the project site on November 13, 2009. The existing structure was examined along with the upstream and downstream segments of the watercourse. Additionally, the author performed a minimal windshield survey of the watershed in Laurel Run to gain familiarity with the terrain of the watershed.



PART B - HYDROLOGIC ANALYSIS

2.1 DRAINAGE AREA

As reported in the FIS, the drainage area of Laurel Run at the confluence with Moshannon Creek is 21.9 square miles. The USGS Pennsylvania Streamstats Web site calculates the drainage area of Laurel Run at the project site to be 19.7 square miles.

2.2 FLOOD RECORDS

The FIS for the Township of Decatur became effective on November 16, 1990. Flooding records are included within the FIS. No additional attempts at securing flood records were made as part of this study.

2.3 FLOOD DISCHARGES

This portion of Laurel Run was studied in detail as part of the FIS. The hydrology calculations for Laurel Run were computed in accordance with USGS Water Resources Investigation Report 82-21. This report uses regional regression relationships to estimate flood magnitudes, based on gage data within varying regions of the state. The 100-year peak discharge for Laurel Run, as presented in the FIS, is included in Table 1 below.

**TABLE 1
FLOOD FLOW ESTIMATE FROM FLOOD INSURANCE STUDY**

| FLOODING EVENT | ANNUAL PERCENT CHANCE OF EXCEEDANCE | PEAK DISCHARGE (CFS) |
|-----------------------|--|-----------------------------|
| 100-Year | 1% | 825 |



PART C - HYDRAULIC ANALYSIS

3.1 STATUS OF FEMA STUDIES

A FEMA FIS with an effective date of November 16, 1990, has been published for the township. As explained in the FIS, this section of Laurel Run has been studied in detail. Base flood elevations have been determined, and a profile has been published in the FIS. However, no floodways were calculated as part of the study; therefore, no floodways have been established on the flood mapping. A portion of the FIRM is included in Appendix B, and excerpts from the FIS are included in Appendix C. As a side note, the FEMA Web site lists that a 30-day comment period (presumably for an update to the FIS) expired on October 25, 2009. It is presumed that a revised FIS will be forthcoming in the near future. However, no revised or updated Flood Insurance Study or Flood Insurance Rate Map were found on the FEMA Web site. Additionally, it is assumed that the forthcoming revised FIS will be reporting elevations based upon NAVD88 datum. Therefore, the elevations reported in this report (unless noted otherwise) are based upon NAVD88.

The hydraulic analysis for this project has been performed in accordance with the guidelines included in the MT-2 Form Instructions. These guidelines suggest that the electronic model used in the FIS hydraulic analysis should be obtained from FEMA (whether it be a HEC-RAS model or printouts from the superceded HEC-2 modeling program) and recreated using an acceptable hydraulic model. The author of this report submitted the required data request forms to the FEMA Engineering Library, requesting printouts of the HEC-2 input data for the hydraulic model. The response letter from the FEMA Engineering Library (see Appendix D) indicates that the backup data cannot be located. Therefore, rather than converting the exact HEC-2 hydraulic model used in the FIS to a HEC-RAS model, this study focuses on the creation of a HEC-RAS model that closely replicates the results of the FIS model.

3.2 SELECTED HYDRAULIC METHOD

The software selected for this hydraulic analysis is the United States Army Corps of Engineer's HEC-RAS v4.0. A subcritical flow regime was selected for all models to provide the most conservative estimate of flood water elevations across the site. Steady state flow values were used to evaluate the water surface profiles.



3.2.1 Topographic Source

The cross sections of the existing site conditions are based on topographic contours from LiDaR data files downloaded from the PASDA Web site. The vertical datum of the LiDaR contour mapping is the North American Vertical Datum of 1988 (or, NAVD88), while the vertical datum of the FIS is the National Geodetic Vertical Datum of 1929 (NGVD29). AutoCAD software with a Carlson Civil module was used to convert the contour mapping into a triangular network file (or, “tin”) and to cut the sections from the resulting topographic model of the site. Refer to Figure 2 for a comparison of the topographic mapping with the FEMA FIRM as a backdrop.

3.2.2 Surface Roughness Coefficients

Manning’s n coefficients were published in the FIS. An inspection of the site verified the selection of the following Manning’s n values for this hydraulic analysis.

**TABLE 2
SELECTED MANNING’S n ROUGHNESS COEFFICIENTS**

| LEFT OVBANK | CHANNEL | RIGHT OVBANK |
|--------------------|----------------|---------------------|
| 0.08 | 0.045 | 0.08 |

The overbank value of 0.08 was selected due to the nature of the floodplain (heavy stand of timber, minimal undergrowth, with flood stage below branches). The value of 0.045 for the channel is suitable for a stream that is clean and winding with some pools and shoals, and a good number of stones. These numbers correlate well with the range of values included in the FIS (0.040 to 0.050 for the channel, and 0.060 to 0.090 for the overbank regions).

3.2.3 Expansion and Contraction Losses

Throughout the freely flowing reaches of the stream and its floodplain, an expansion coefficient of 0.1 and a contraction coefficient of 0.3 were used. However, within the contraction and expansion zones of the two bridges, the expansion and contraction coefficients were increased



to 0.3 and 0.5, respectively, in accordance with the publication Flow Transitions in Bridge Backwater Analysis (U.S. Army Corps of Engineers, September 1995).

3.3 DESCRIPTION OF HYDRAULIC MODELS

3.3.1 Duplicate Effective Model

To conform with the modeling requirements outlined in the FEMA MT-2 Instructions, the limits of the modeling were set at the nearest upstream and downstream labeled sections. These are shown as Sections B and C on the FIRM and the FIS Profile. A close inspection of the FIS profile (the only available document that summarizes the results of the original hydraulic modeling efforts) reveals only three cross sections within the limits of this study. One cross section at FEMA Section B, one cross section at the Conrail bridge, and one cross section at FEMA Section C. The locations of these sections were determined by inflections in the plotted lines for the 100-year flood and the stream bed. The alignment of the sections taken for the Duplicate Effective Model are presented in Figure 3, along with the calculated extent of flooding predicted by the model. Two sections are taken, one on each side of the railroad bridge, to conform with HEC-RAS modeling protocol. The profile elevations predicted by the Duplicate Effective Model are summarized in Table 3.

3.3.2 Corrected Effective Model

The Corrected Effective Model was created by adding Sections 1.3, 1.4., 1.6, 1.7, 2.0, and 4.0. Sections 1.3 through 1.7 were added to model the area within the vicinity of the proposed channel crossing. Sections 2.0 and 4.0 were added to conform with HEC-RAS modeling protocol within the vicinity of bridges to capture the transition into contracted flow and the end of the expansion zone. The channel distances between the cross sections are based upon the channel length as shown on the FIRM. The profile elevations predicted by the Corrected Effective Model are summarized in Table 4, along with the elevation differences between other profiles.



BEECH CREEK BRANCH LINE
PHILIPSBURG INDUSTRIAL TRACK CONNECTOR
 Preliminary Hydrologic and Hydraulic Report
 SKELLY and LOY, Inc. Project No.: R08-0101.000-8-1
 Decatur Township, Clearfield County, PA

TABLE 3 - RESULTS OF DUPLICATE EFFECTIVE MODEL

| SUMMARY OF FIS PROFILE | | | | DUPLICATE EFFECTIVE MODEL | | | |
|------------------------|------------------|-------------------------------|-------------------------------|---------------------------|----------------|-------------------------|------------------------|
| Regulatory Section | Channel Distance | 100-Year FIS Profile [NGVD29] | 100-Year FIS Profile [NAVD88] | River Station | Segment Length | 100-Year CWSEL [NAVD88] | Δ [FIS Profile] |
| C | 5,900 | 1,429.8 | 1,429.3 | 5.0 | 1,203 | 1,429.01 | -0.3 |
| (Conrail) | 4,870 | 1,428.5 | 1,428.0 | 3.1 | 1 | 1,427.00 | |
| (Conrail) | 4,870 | 1,427.3 | 1,426.8 | 3.05 U | 13 | 1,427.00 | -1.0 |
| | | | | 3.05 D | 4 | 1,426.96 | +0.2 |
| B | 2,120 | 1,424.5 | 1,424.0 | 3.0 | 2,730 | 1,426.93 | |
| | | | | 1.0 | | 1,423.60 | -0.4 |



**BEECH CREEK BRANCH LINE
PHILPSBURG INDUSTRIAL TRACK CONNECTOR**
Preliminary Hydrologic and Hydraulic Report
SKELLY and LOY, Inc. Project No.: R08-0101.000-8-1
Decatur Township, Clearfield County, PA

TABLE 4 - RESULTS OF CORRECTED EFFECTIVE MODEL

| SUMMARY OF FIS PROFILE | | | | CORRECTED EFFECTIVE MODEL | | | | |
|------------------------|------------------|----------------------|----------------------|---------------------------|----------------|----------------|-------|---------------|
| Regulatory Section | Channel Distance | 100-Year FIS Profile | 100-Year FIS Profile | River Station | Segment Length | 100-Year CWSEL | Δ | |
| | | NGVD29 | NAVD88 | | | NAVD88 | | [FIS Profile] |
| C | 5,900 | 1,429.8 | 1,429.3 | 5.0 | 1,171 | 1,429.03 | +0.02 | -0.3 |
| | | | | 4.0 | 32 | 1,427.81 | | |
| | | | | 3.1 | 1 | 1,427.77 | +0.77 | |
| (Conrail) | 4,870 | 1,428.5 | 1,428.0 | 3.05 U | 13 | 1,427.78 | +0.78 | -0.2 |
| (Conrail) | 4,870 | 1,427.3 | 1,426.8 | 3.05 D | 4 | 1,427.76 | +0.80 | +1.0 |
| | | | | 3.0 | 91 | 1,427.75 | +0.82 | |
| | | | | 2.0 | 719 | 1,427.67 | | |
| | | | | 1.7 | 33 | 1,426.42 | | |
| | | | | 1.6 | 35 | 1,426.33 | | |
| | | | | 1.4 | 81 | 1,426.25 | | |
| | | | | 1.3 | 1,771 | 1,425.99 | | |
| B | 2,120 | 1,424.5 | 1,424.0 | 1.0 | 1,423.60 | | +0.00 | -0.4 |



3.3.3 Existing (Pre-Project) Conditions Model

The present-day alignment of Laurel Run was used to compute channel lengths in the Existing Conditions Model, as opposed to the alignment shown on the FIRM. Additionally, measurements taken of the existing channel width and shape were used to create an approximate existing channel configuration within sections 1.4 and 1.6 to allow for the depiction of the proposed bridge crossing in the Revised Conditions Model. The profile elevations predicted by the Existing Conditions Model are summarized in Table 5, along with the elevation differences between other profiles.

3.3.4 Revised (Post-Project) Conditions Model

The Revised Conditions Model incorporates the addition of a bridge crossing over Laurel Run, between Sections 1.4 and 1.6. The superstructure of the proposed crossing is estimated to be 2.0 feet thick, from top surface to bottom chord, with the top surface set at elevation 1425.00. The clear span of the structure is estimated to be 50 feet based on measurements taken in the field. The profile elevations predicted by the Revised Conditions Model are summarized in Table 6, along with the elevation differences between other profiles.

3.4 RESULTS

As stated in the preceding section, flood elevations from each of the four models and the FIS profile are compared in Tables 3 through 6. Printouts from the HEC-RAS models are included in Appendices E through H.



**BEECH CREEK BRANCH LINE
PHILIPSBURG INDUSTRIAL TRACK CONNECTOR**
Preliminary Hydrologic and Hydraulic Report
SKELLY and LOY, Inc. Project No.: R08-0101.000-8-1
Decatur Township, Clearfield County, PA

TABLE 5 - RESULTS OF EXISTING (PRE-PROJECT) MODEL

| SUMMARY OF FIS PROFILE | | | | EXISTING (PRE-PROJECT) MODEL | | | | | |
|------------------------|------------------|-----------------------------|-----------------------------|------------------------------|----------------|-----------------------|----------------------|----------------------|------------------------|
| Regulatory Section | Channel Distance | 100-Year FIS Profile NGVD29 | 100-Year FIS Profile NAVD88 | River Station | Segment Length | 100-Year CWSEL NAVD88 | Δ [Corrected] | Δ [Duplicate] | Δ [FIS Profile] |
| C | 5,900 | 1,429.8 | 1,429.3 | 5.0 | 1,171 | 1,429.00 | -0.03 | -0.01 | -0.3 |
| | | | | 4.0 | 32 | 1,427.68 | -0.13 | | |
| (Conrail) | 4,870 | 1,428.5 | 1,428.0 | 3.1 | 1 | 1,427.64 | -0.13 | +0.64 | |
| | 4,870 | 1,427.3 | 1,426.8 | 3.05 U | 13 | 1,427.64 | -0.14 | +0.64 | -0.4 |
| B | | | | 3.05 D | 4 | 1,427.62 | -0.14 | +0.66 | +0.8 |
| | | | | 3.0 | 91 | 1,427.60 | -0.15 | +0.67 | |
| | | | | 2.0 | 688 | 1,427.51 | -0.16 | | |
| | | | | 1.7 | 30 | 1,426.23 | -0.19 | | |
| | | | | 1.6 | 27 | 1,426.18 | -0.15 | | |
| | | | | 1.4 | 60 | 1,426.14 | -0.11 | | |
| | | | | 1.3 | 1,789 | 1,425.93 | -0.06 | | |
| | 2,120 | 1,424.5 | 1,424.0 | 1.0 | | 1,423.60 | +0.00 | +0.00 | -0.4 |



**BEECH CREEK BRANCH LINE
PHILIPSBURG INDUSTRIAL TRACK CONNECTOR**
Preliminary Hydrologic and Hydraulic Report
SKELLY and LOY, Inc. Project No.: R08-0101.000-8-1
Decatur Township, Clearfield County, PA

TABLE 6 - RESULTS OF REVISED (POST-PROJECT) MODEL

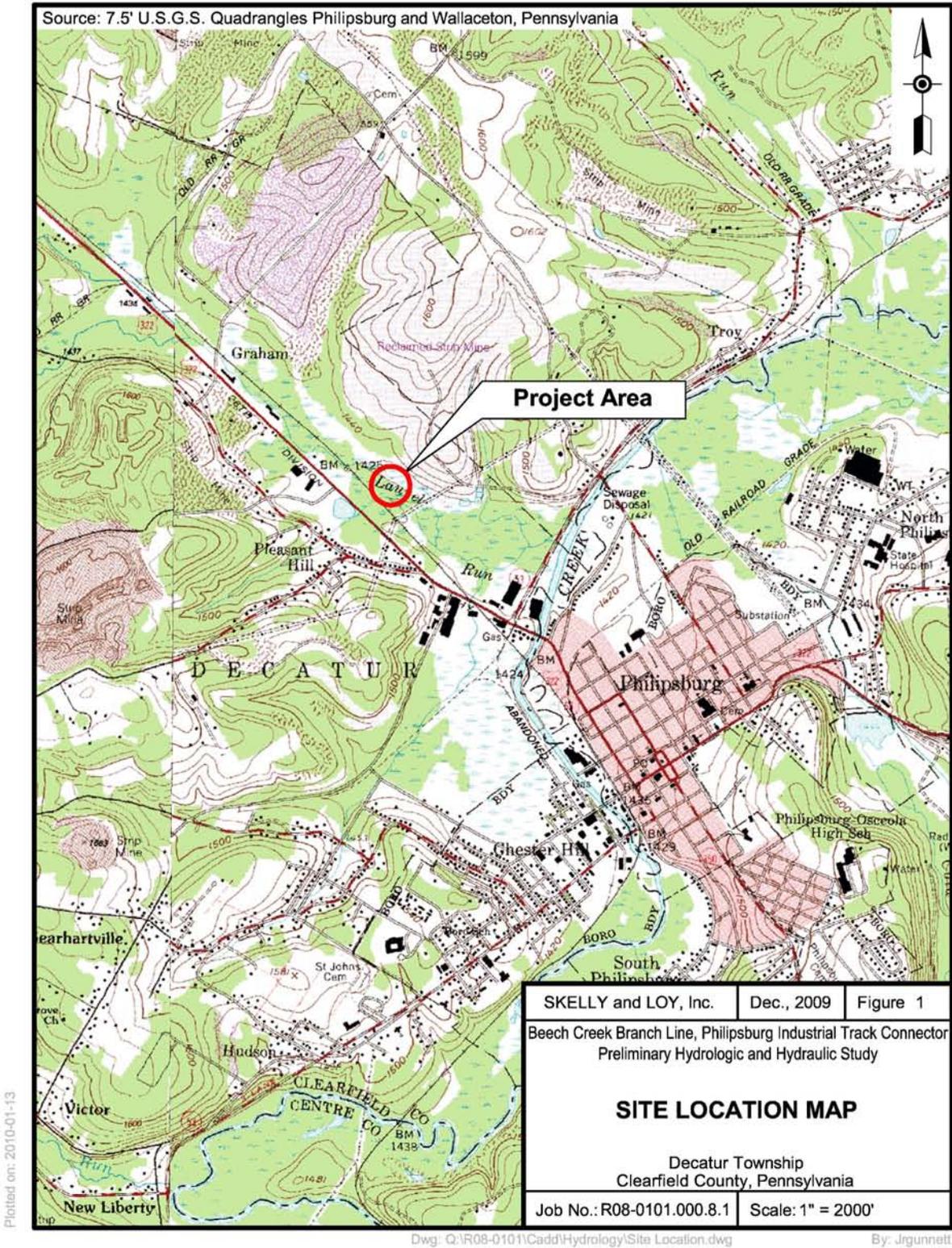
| SUMMARY OF FIS PROFILE | | | | REVISED (POST-PROJECT) MODEL | | | | | | |
|------------------------|------------------|----------------------|----------------------|------------------------------|----------------|----------------|--------------|--------------|--------------|---------------|
| Regulatory Section | Channel Distance | 100-Year FIS Profile | 100-Year FIS Profile | River Station | Segment Length | 100-Year CWSEL | Δ | Δ | Δ | Δ |
| | | NGVD29 | NAVD88 | | | NAVD88 | [Existing] | [Corrected] | [Duplicate] | [FIS Profile] |
| C | 5,900 | 1,429.8 | 1,429.3 | 5.0 | 1,171 | 1,429.01 | +0.01 | -0.02 | +0.00 | -0.3 |
| | | | | 4.0 | 32 | 1,427.72 | +0.04 | -0.09 | | |
| | | | | 3.1 | 1 | 1,427.67 | +0.03 | -0.10 | +0.67 | |
| (Conrail) | 4,870 | 1,428.5 | 1,428.0 | 3.05 U | 13 | 1,427.68 | +0.04 | -0.10 | +0.68 | -0.3 |
| (Conrail) | 4,870 | 1,427.3 | 1,426.8 | 3.05 D | 4 | 1,427.66 | +0.04 | -0.10 | +0.70 | +0.9 |
| | | | | 3.0 | 91 | 1,427.64 | +0.04 | -0.11 | +0.71 | |
| | | | | 2.0 | 688 | 1,427.55 | +0.04 | -0.12 | | |
| | | | | 1.7 | 30 | 1,426.45 | +0.22 | +0.03 | | |
| | | | | 1.6 | 1 | 1,426.41 | +0.23 | +0.08 | | |
| | | | | 1.5 U | 24 | 1,426.39 | | | | |
| | | | | 1.5 D | 2 | 1,426.13 | | | | |
| | | | | 1.4 | 60 | 1,426.15 | +0.01 | -0.10 | | |
| | | | | 1.3 | 1,789 | 1,425.93 | +0.00 | -0.06 | | |
| B | 2,120 | 1,424.5 | 1,424.0 | 1.0 | | 1,423.60 | +0.00 | +0.00 | +0.00 | -0.4 |

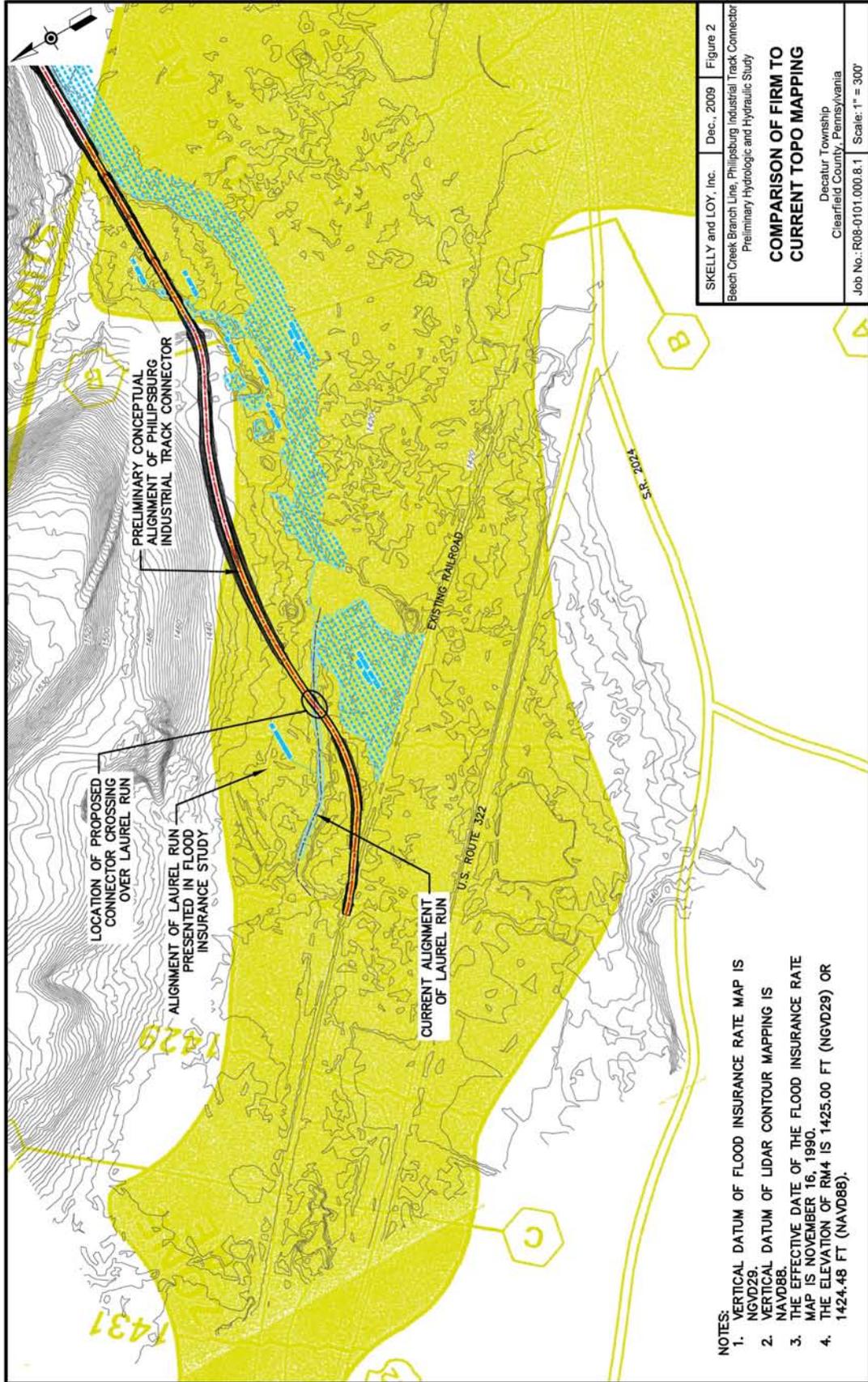


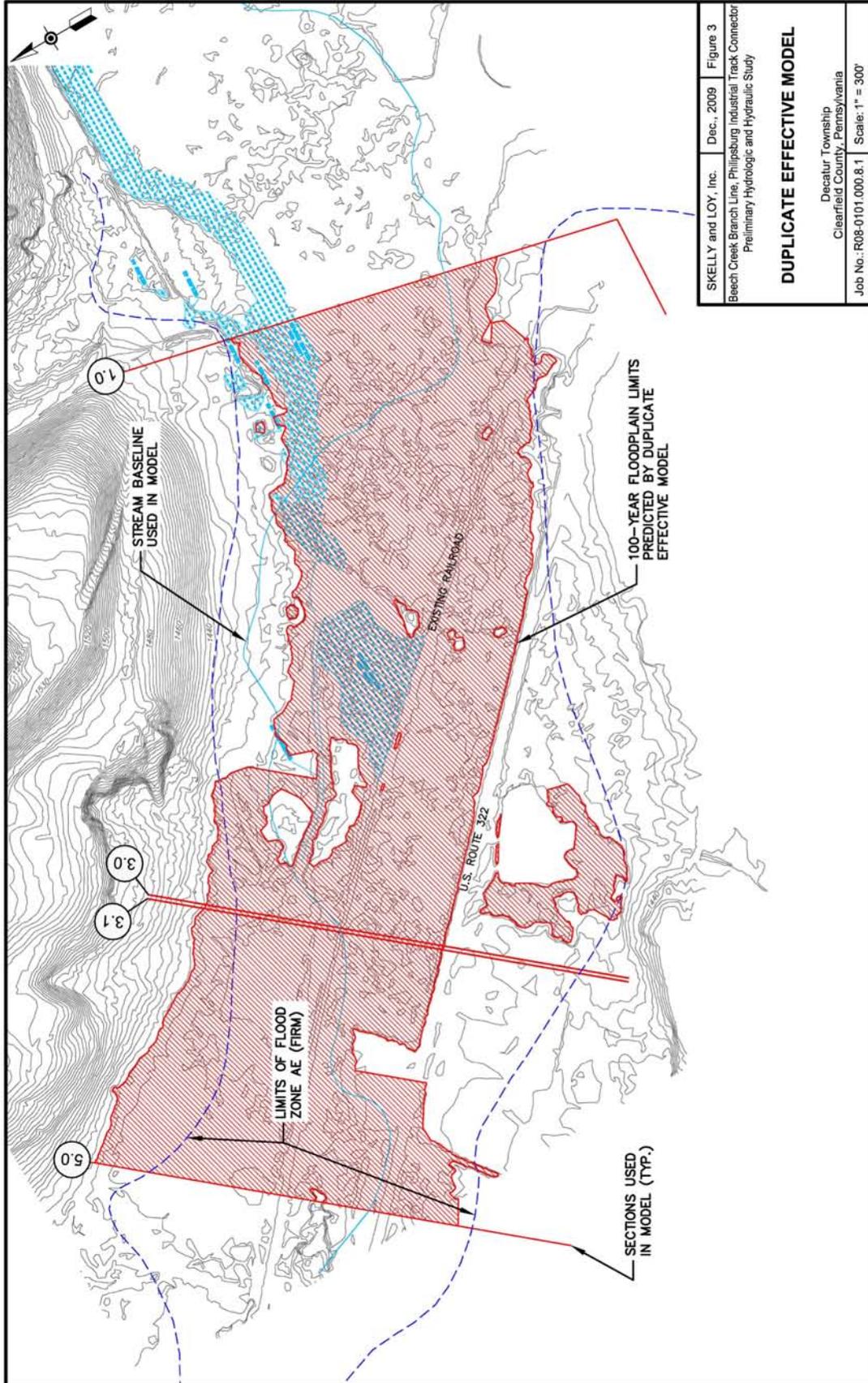
PART D - RISK ASSESSMENT

The potential additional flooding impacts due to the proposed crossing were also evaluated. These impacts are summarized on Figures 7 and 8. In Figure 7, the anticipated inundation level of the Revised Conditions Model is compared with the inundation level of the Corrected Effective Model. As the most significant increase amounts to only 0.08 feet, the additional area of flooding impact is both negligible and confined within the original delineation of the 100-year floodplain on the Flood Insurance Rate Map. In Figure 8, the inundation level of the Revised Conditions Model is compared with that of the Existing Conditions Model. The most significant increase between the Revised and Existing models is 0.23 foot. Again, this additional area of flooding impact is both negligible and confined within the original delineation of the 100-year floodplain on the FIRM. Therefore, it can be surmised that the construction of the railroad crossing over Laurel Run will not create any additional flood hazard zones beyond the limit of Zone AE that is delineated on the FIRM.



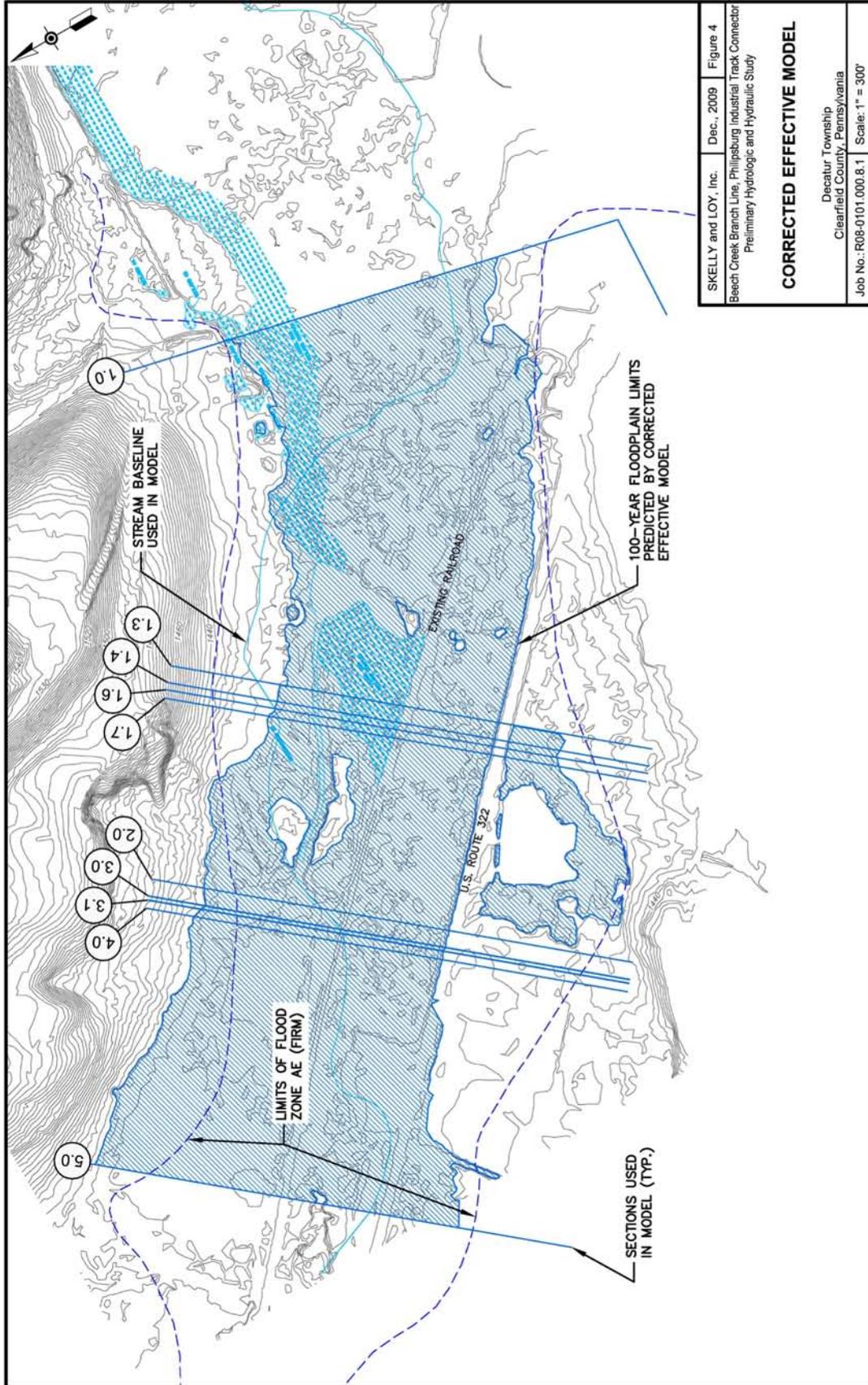






| | | |
|---|------------|------------------|
| SKELLY and LOY, Inc. | Dec., 2009 | Figure 3 |
| Beech Creek Branch Line, Philipsburg Industrial Track Connector Preliminary Hydrologic and Hydraulic Study | | |
| DUPLICATE EFFECTIVE MODEL | | |
| Decatur Township Clearfield County, Pennsylvania | | |
| Job No.: R08-0101.000.8.1 | | Scale: 1" = 300' |

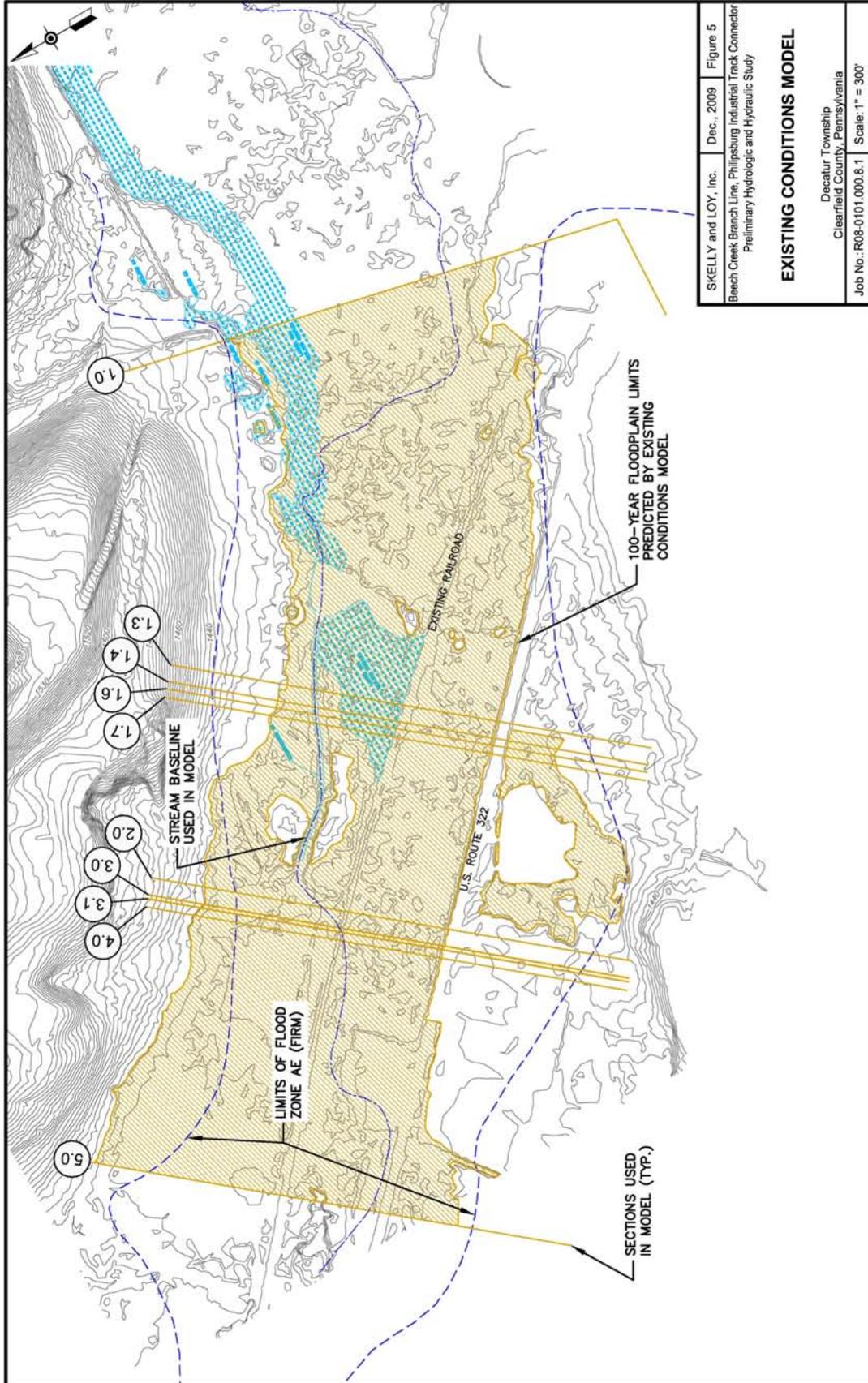
Printed on: 2010-01-13



| | | |
|---|------------|----------|
| SKELLY and LOY, Inc. | Dec., 2009 | Figure 4 |
| Beech Creek Branch Line, Philipsburg Industrial Track Connector Preliminary Hydrologic and Hydraulic Study | | |
| CORRECTED EFFECTIVE MODEL | | |
| Decatur Township Clearfield County, Pennsylvania | | |
| Job No.: R08-0101.000.8.1 Scale: 1" = 300' | | |

Date: 02/05/09 10:12:44 AM Project: R08-0101.000.8.1

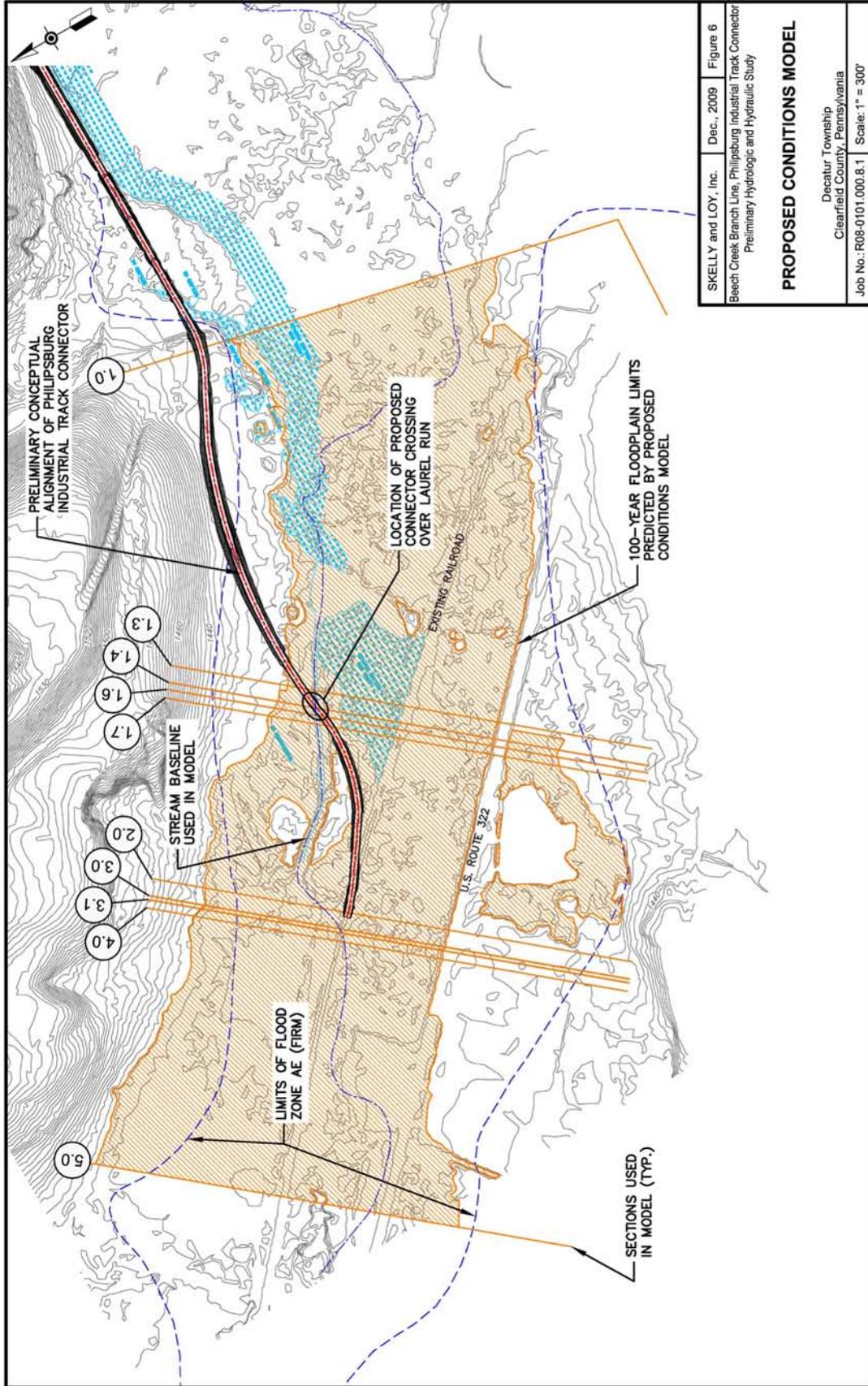
Printed on: 2010-01-13



| | | |
|---|------------------|----------|
| SKELLY and LOY, Inc. | Dec., 2009 | Figure 5 |
| Beech Creek Branch Line, Philipsburg Industrial Track Connector Preliminary Hydrologic and Hydraulic Study | | |
| EXISTING CONDITIONS MODEL | | |
| Decatur Township Clearfield County, Pennsylvania | | |
| Job No.: R08-0101.000.8.1 | Scale: 1" = 300' | |

Sheet: 021020-011 (021020-011) 12/15/09

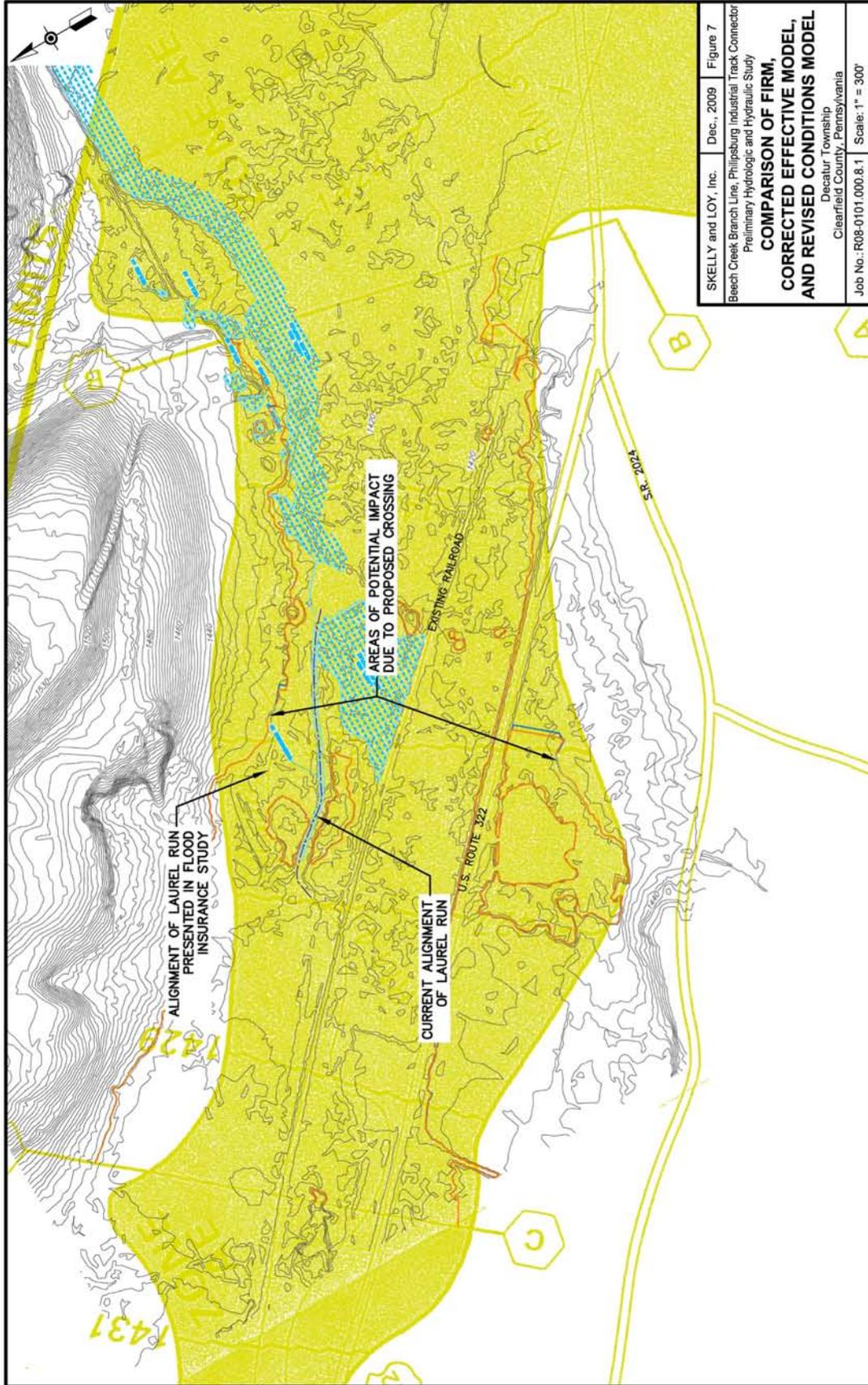
Printed on: 2010-01-13



| | | |
|--|------------|----------|
| SKELLY and LOY, Inc. | Dec., 2009 | Figure 6 |
| Beech Creek Branch Line, Phillipsburg Industrial Track Connector Preliminary Hydrologic and Hydraulic Study | | |
| PROPOSED CONDITIONS MODEL | | |
| Decatur Township Clearfield County, Pennsylvania | | |
| Job No.: R08-0101.000.8.1 Scale: 1" = 300' | | |

Date: 12/22/09 10:12 AM; Path: \\skelly\projects\R08-0101\Drawings\Figures\Figure 6.dwg

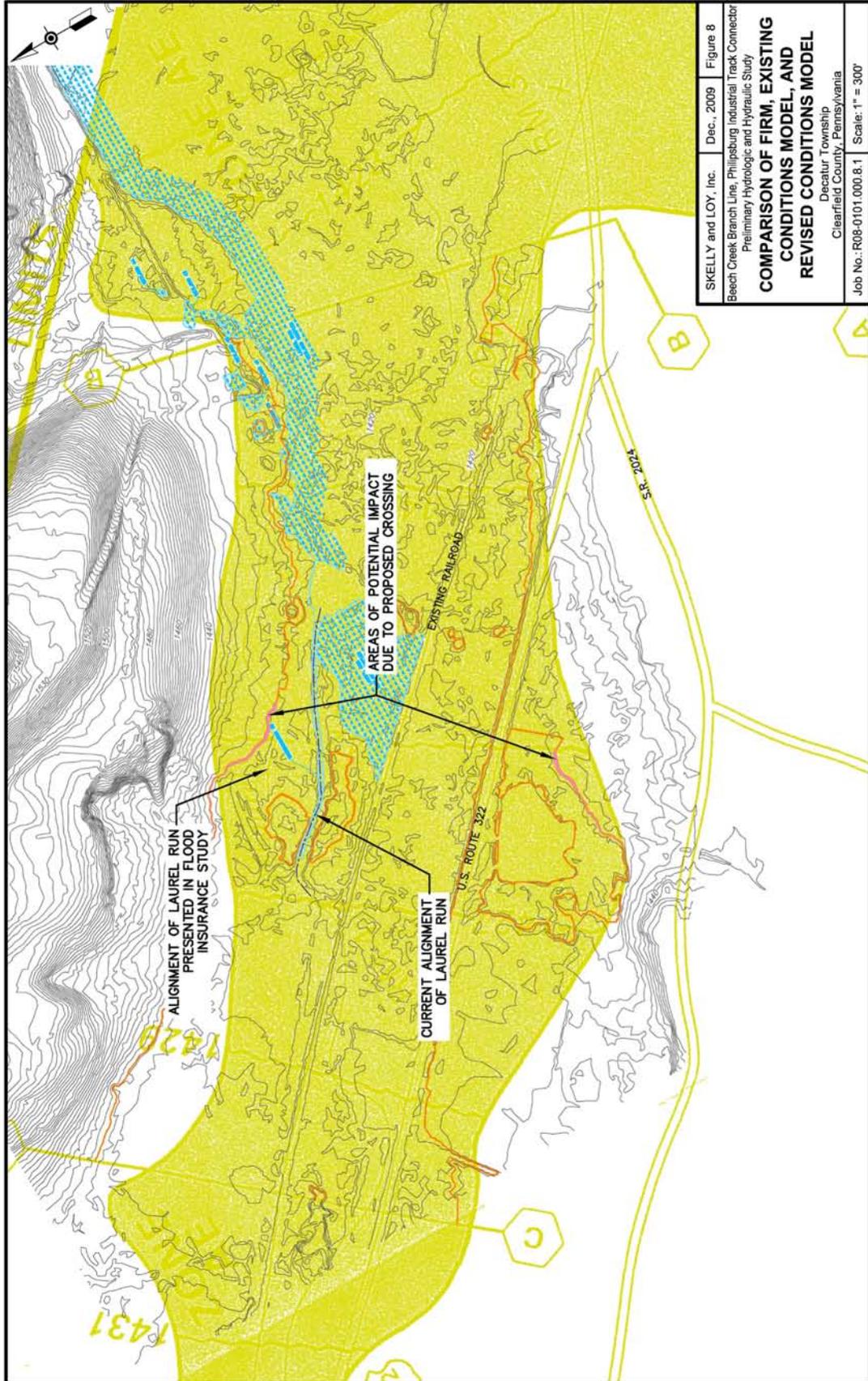
Printed on: 2010-01-13



| | | |
|---|------------------|----------|
| SKELLY and LOY, Inc. | Dec., 2009 | Figure 7 |
| Beech Creek Branch Line, Philipsburg Industrial Track Connector Preliminary Hydrologic and Hydraulic Study | | |
| COMPARISON OF FIRM, CORRECTED EFFECTIVE MODEL, AND REVISED CONDITIONS MODEL | | |
| Decatur Township Clearfield County, Pennsylvania | | |
| Job No.: R08-0101.000.8.1 | Scale: 1" = 300' | |

Sheet: 02-1020-09-101 | 12/20/09 | 10:13 AM

Printed on: 2010-01-13



| | | |
|--|------------------|----------|
| SKELLY and LOY, Inc. | Dec., 2009 | Figure 8 |
| Beech Creek Branch Line, Phillipsburg Industrial Track Connector Preliminary Hydrologic and Hydraulic Study | | |
| COMPARISON OF FIRM, EXISTING REVISED CONDITIONS MODEL | | |
| Decatur Township Clearfield County, Pennsylvania | | |
| Job No.: R08-0101.000.8.1 | Scale: 1" = 300' | |

Date: 02/05/09 10:17:00 AM Project: R08-0101.000.8.1

Printed on: 2010-01-13