

Module 14: Streams/Wetlands [Chapter 105/§77.504/§77.523]

Note: The United States Army Corp of Engineers (Corps) authorizes a Pennsylvania State Programmatic General Permit – 4 (PASPGP-4) when there will be a discharge of dredged or fill materials, or the placement of both temporary and/or permanent structures, which individually or cumulatively result in impacts to 1.0 acre or less of waters including wetlands. Projects will be sent to the Corps as a Category III activity for review. The Commonwealth has issued 401 Water Quality Certification for projects eligible under PASPGP-4.

If there will be a discharge of dredged or fill materials, or the placement of both temporary and/or permanent structures, which individually or cumulatively result in impacts to more than 1.0 acre of waters including wetlands, or such activities are otherwise ineligible for a PASPGP-4, the Corps may require an individual permit in accordance with Section 404 of the Clean Water Act and separate 401 Water Quality Certification.

Stream/Wetland encroachments may also require authorization from the US Army Corps of Engineers (Corps) under Section 404 of the Clean Water Act. If this project requires a federal permit, you may be eligible for either PASPGP-4 authorization or you must file a separate application with the Corps. If you require a permit and are not eligible under the PASPGP-4 you must request a Section 401 Water Quality Certification from the Department using module 14A "Request for Federal Clean Water Act (CWA) Section 401 Certification for Mining Activities."

Does this project require a permit from the Corps? Yes No

If no, explain why not.

No earthwork is proposed within the floodway of any stream. The stream channels will not be altered and there are no structures proposed within the streams. The floodway for the 100-year event was calculated using the HEC-RAS program for Stream Variance #1.

Stream Variance #1

14.1 Mining Activities Within 100 Feet of a Stream/Stream Relocation/Channel Change

If the mining activities are proposed within 100 feet of an intermittent or perennial stream, including haul road crossings, or the relocation or channel change of an intermittent or perennial stream provide the following information: (Note: Variance request for these and the expansion of pits must be included in the proof of publication. A separate Module 14.1 should generally be completed for each proposed encroachment.)

- a) **Name and location of the stream; and location, length, and acreage disturbed by the proposed activities (Identify the location of the proposed activities on Exhibits 9 and 18);**

Stream Variance #1 will encroach upon Unnamed Tributary #4A (UNT-4A). The location of the variance is shown on Exhibits 9, 14.1(1), and 18. The proposed variance is approximately 400 feet long on the southern side of UNT-4A. The 100-year floodway was determined using HEC-RAS software and is shown on Exhibit 14.1(1). The proposed area of Stream Variance #1 is approximately 0.5 acres. Upgrading an existing road on the southern side of UNT-4A will involve earthwork not closer than 30 feet from the stream. Collection ditch construction of CD-4 and culverts CULV-1 and CULV-2 will occur not closer than 50 feet above the stream head. During construction and reclamation, compost filter sock will be installed to prevent sedimentation to the stream.

- b) **A narrative giving a description and the purpose and justification of the proposed activities;**

Stream Variance #1 will serve to provide space to upgrade an existing road, and install collection ditch CD-4. The haul road will follow an existing access road that is already within the 100-foot stream barrier. Upgrading this existing road is within the 100-stream barrier due to space limitations between the stream to the north and the stream to the south. Collection ditch CD-4 must be installed within the 100-foot stream barrier to collect as much sediment laden runoff as possible from the haul road and convey it to SP-1. CD-4 must also be low enough in the hillside to allow CULV-1 and CULV-2 to daylight into it.

- c) **A description of the character of the stream bed and banks, and a profile of the stream for a reasonable distance above and below the proposed site showing bed slopes, normal and flood**

water surfaces and a description of the riparian vegetation including a characterization of the resident aquatic community, a description of the riparian vegetation and an assessment of the probable hydrologic consequences of the proposed activities on the water quality and quantity and the resident aquatic community. Provide the name(s), address(es) and telephone number(s) of the individual(s) responsible for the collection and analysis of this data and provide a description of the methodologies used to collect and analyze the data;

The proposed activities will not physically alter or impact the stream. No hydrologic consequences are anticipated since the stream is spring fed. The proposed variance will be to utilize an existing haul road as well as construct a collection ditch to control runoff from the site. This will protect the stream from mud and silt washing into the stream channel due to rainfall events.

In the requested stream variance area, unnamed tributary #4A can be characterized as a low gradient, headwater stream. The banks are steeply cut, creating a distinct channel (See Figure 1). The average stream slope is 4%. This section of stream consists mainly of shallow riffle-run habitat, with no pools present. Substrate consists of sand, small pebbles, with a few larger stones. These substrates are covered with a moderate layer of sediment. Mosses line the banks and emergent substrate. Adjacent riparian vegetation is dominated by scrub/shrub species, with Japanese knotweed (*Reynoutria japonica*) very prevalent. Other species identified include *Rubus* spp., *Rosa multiflora*, Brassicas, *Allium* spp., *Packera aurea*, and *Solidago* spp. Canopy cover is ~50%, and is mainly *Robinia pseudoacacia*. The resident aquatic community is typical of low-order, headwater streams, and is relatively diverse. Qualitative field sampling produced 8 different macroinvertebrate species, representing 5 different orders. Chironomids and microplecopterans were present in the greatest numbers, with fewer individuals from Tipulidae, Isoptera, Coleoptera, and Trichoptera. Additionally, two salamander species were present in the kick samples. The biota and stream character were evaluated on 13 December 2021 by Amanda Deal (M.S. Applied Ecology and Conservation Biology) Earthtech, Inc., 966 Pleasant Hill Road, Somerset, PA 15501, 814-266-6402.

- d) A stream profile for the existing and proposed channel for a reasonable distance upstream, downstream and within the proposed change, showing bed slopes, pool-riffle ratios, normal and flood water surfaces, and existing obstructions;**

See Exhibit 14.1(1).

- e) A hydrologic and hydraulic analysis which shall include:**
- 1. data on size, shape and characteristics of the watershed;**
 - 2. the size and frequency of the design storm;**
 - 3. the hydraulic capacity of any structures or replacement channel;**
 - 4. the hydraulic capacity of the channel upstream and downstream of the structure or the relocation/channel change;**

See Exhibit 14.1(1).

- f) Where a bridge, culvert or other water obstruction is proposed, provide the following information: (Note: General Permit (BMR-GP-102) is available for construction of access roads.)**

- 1) Plans and details showing the location, type, size, and height of the structure;**

N/A. No water obstructions are proposed.

- 2) A narrative description of the construction methods and sequence including water handling during construction, and erosion and sedimentation controls;**

N/A. No water obstructions are proposed.

- 3) Indicate if the structure will be temporary or permanent (include plans for removal of temporary structures).**

N/A. No water obstructions are proposed.

g) For a Channel Change or Stream Relocation:

N/A. No proposed channel change or stream relocation.

A detailed plan and cross-sections of the existing and proposed channel upstream, downstream and within the proposed channel change showing the limits and configuration of the proposed activities, dimensions, channel linings, and normal and flood water surfaces;

A description of the construction methods and sequence including: water handling during construction, erosion and sedimentation controls, and measures to be taken to prevent adverse impacts to water quality and quantity, water users and the aquatic communities.

h) A characterization of the existing water quality and quantity of the stream including downstream water uses, and 25 Pa Code Chapter 93 Protected Water Use Classification.

Water quality is shown on module 8.1A data sheets, specifically point 104 for representative stream. The upland watershed area is comprised of unmanaged natural habitat and pastureland or land occasionally cut for hay. The water quantity contains a steady baseflow fed by groundwater and a quickly draining surface runoff conveyance. Downstream of the project, the stream enters the Conemaugh River. There are no public uses such as water supplies downstream. The stream is classified as Cold Water Fishes (CWF), while the Conemaugh River is classified as Warm Water Fishes (WWF) by Chapter 93 designation.

Stream Variance #2

14.1 Mining Activities Within 100 Feet of a Stream/Stream Relocation/Channel Change

If the mining activities are proposed within 100 feet of an intermittent or perennial stream, including haul road crossings, or the relocation or channel change of an intermittent or perennial stream provide the following information: (Note: Variance request for these and the expansion of pits must be included in the proof of publication. A separate Module 14.1 should generally be completed for each proposed encroachment.)

a) Name and location of the stream; and location, length, and acreage disturbed by the proposed activities (Identify the location of the proposed activities on Exhibits 9 and 18);

Stream Variance #2 will encroach upon Unnamed Tributary #6 (UNT-6). The location of the variance is shown on Exhibits 9, 14.1(2), and 18. The proposed variance is approximately 600 feet long along the north side of UNT-6. The proposed area of Stream Variance #2 is approximately 0.8 acres. Upgrading an existing road on the northern side of UNT-6 will involve earthwork not closer than 20 feet from the stream. Collection ditch construction of CD-3 and CD-4 will occur not closer than 50 feet from the stream. Installation of culvert CULV-1 will occur not closer than 50 feet from the stream.

b) A narrative giving a description and the purpose and justification of the proposed activities;

Stream Variance #2 will serve to provide space to upgrade an existing road, install collection ditches CD-3 and CD-4, and install culvert CULV-1. The haul road will follow an existing access road that is already within the 100-foot stream barrier. Upgrading this existing road is within the 100-stream barrier due to space limitations between the stream to the north and the stream and wetlands to the south. Collection ditch CD-3 and CD-4 and culvert CULV-1 must be installed within the 100-foot stream barrier to collect as much sediment laden runoff as possible from the haul road and convey it to SP-1.

c) A description of the character of the stream bed and banks, and a profile of the stream for a reasonable distance above and below the proposed site showing bed slopes, normal and flood water surfaces and a description of the riparian vegetation including a characterization of the resident aquatic community, a description of the riparian vegetation and an assessment of the probable hydrologic consequences of the proposed activities on the water quality and quantity and the resident aquatic community. Provide the name(s), address(es) and telephone number(s)

of the individual(s) responsible for the collection and analysis of this data and provide a description of the methodologies used to collect and analyze the data;

UNT-6 is an intermittent stream and does not contain water year-round. The stream bed in this area is relatively steep and very narrow. The average stream slope is 5%. The banks are at a slope of about 25-30% and are approximately 2 feet high. The riparian vegetation is timber consisting of maple, oak, cherry, and poplar trees, shrubs, and grasses. The proposed activities will not negatively impact the stream. The variance area will not alter the stream channel inside of the banks. No hydrologic consequences will occur since the stream is spring fed. The proposed variance will be used to construct a haul road, collection ditches, and a culvert. The biota and stream character were evaluated on 13 December 2021 by Amanda Deal (M.S. Applied Ecology and Conservation Biology) Earthtech, Inc., 966 Pleasant Hill Road, Somerset, PA 15501, 814-266-6402.

- d) A stream profile for the existing and proposed channel for a reasonable distance upstream, downstream and within the proposed change, showing bed slopes, pool-riffle ratios, normal and flood water surfaces, and existing obstructions;**

See Exhibit 14.1(2).

- e) A hydrologic and hydraulic analysis which shall include:**

- 1. data on size, shape and characteristics of the watershed;**
- 2. the size and frequency of the design storm;**
- 3. the hydraulic capacity of any structures or replacement channel;**
- 4. the hydraulic capacity of the channel upstream and downstream of the structure or the relocation/channel change;**

See Exhibit 14.1(2).

- f) Where a bridge, culvert or other water obstruction is proposed, provide the following information:**
(Note: General Permit (BMR-GP-102) is available for construction of access roads.)

- 1) Plans and details showing the location, type, size, and height of the structure;**

N/A. No water obstructions are proposed.

- 2) A narrative description of the construction methods and sequence including water handling during construction, and erosion and sedimentation controls;**

N/A. No water obstructions are proposed.

- 3) Indicate if the structure will be temporary or permanent (include plans for removal of temporary structures).**

N/A. No water obstructions are proposed.

- g) For a Channel Change or Stream Relocation:**

N/A. No proposed channel change or stream relocation.

A detailed plan and cross-sections of the existing and proposed channel upstream, downstream and within the proposed channel change showing the limits and configuration of the proposed activities, dimensions, channel linings, and normal and flood water surfaces;

A description of the construction methods and sequence including: water handling during construction, erosion and sedimentation controls, and measures to be taken to prevent adverse impacts to water quality and quantity, water users and the aquatic communities.

- h) A characterization of the existing water quality and quantity of the stream including downstream water uses, and 25 Pa Code Chapter 93 Protected Water Use Classification.**

Water quality is shown on module 8.1A data sheets, specifically point 112 for representative stream. The upland watershed area is comprised of forestland and unmanaged natural habitat. The water quantity contains an intermittent baseflow fed by a quickly draining surface runoff conveyance. Downstream of the project, the stream enters the Conemaugh River. There are no public uses such as water supplies downstream. The stream is classified as Cold Water Fishes (CWF), while the Conemaugh River is classified as Warm Water Fishes (WWF) by Chapter 93 designation.

14.2 Wetland Related Information

- a) **Provide the name(s), address(es), telephone number(s) and qualifications of the person(s) who made the determination if wetlands exist within the proposed permit area.**

Personnel from Earthtech, Inc have walked the proposed permit areas and surface disturbance areas. All potential wetlands found are shown on Exhibits 6.2, 9, and 18. Earthtech, Inc. frequently deals with wetland delineations, identifications and agency permitting regarding wetlands. The Corps of Engineers Wetlands Delineation Manual is used as reference when observing site conditions.

Earthtech, Inc. – Uniontown Office
 P.O. Box 4A
 Lemont Furnace, PA 15456
 724-439-1313

- b) **Show the location of wetlands on Exhibits 6.2, 9 and 18.**

See Exhibits 6.2, 9, and 18.

- c) **What is the total wetland acreage (which will be affected) for the proposed permit area?**

0 acres.

- d) **Provide responses to the following for each wetland which will be affected by the proposed mining activities:**

Exceptional Value Wetland Characteristics

- 1) **Does the wetland serve as habitat for flora and fauna listed as “threatened” or “endangered” under the Endangered Species Act of 1973, Wild Resource Conservation Act, Fish and Boat Code, or Game and Wildlife Code?** yes no
- 2) **Is the wetland hydrologically connected to or located within 1/2 mile of the wetlands identified in d)1) and does it maintain the habitat of the “threatened” or “endangered” species within the wetlands identified in d)1) above)?** yes no

NOTE: If this wetland is located more than 1000 feet from the permit area, show its location (and the location of the wetland that is hydrologically connected to or located within 1/2 mile of) on the Exhibit 6.1 Map.

- 3) **Is the wetland located in or along the floodplain of a wild trout stream (as designated by the Pennsylvania Fish and Boat Commission), or the floodplain of a tributary to a wild trout stream?** yes no
- 4) **Is the wetland located in or along the floodplain of a stream listed as exceptional value (under 25 Pa Code Chapter 93) or the floodplain of a tributary to an exceptional value stream?** yes no
- 5) **Is the wetland within the corridor of a waterway which has been designated as a wild or scenic river in accordance with the Wild and**

- Scenic Rivers Act of 1968 or the PA Scenic Rivers Act? yes no
- 6) Is the wetland part of, or located along, an existing public or private drinking water supply and does it maintain the quality or quantity of the drinking water supply? yes no
- 7) Is the wetland located in areas designated by the Department as "natural" or "wild" areas within state forest or park lands? yes no
- 8) Is the wetland located in areas designated as Federal wilderness areas under the Wilderness Act or the Federal Eastern Wilderness Act of 1975? yes no
- 9) Is the wetland located in areas designated as National natural landmarks by the Secretary of the Interior under the Historic Sites Act of 1935? yes no

NOTE: If a "yes" response is indicated for any question in d)1) through d)9), the wetlands would be "exceptional value" (as defined in 25 Pa Code Section 105.17) and a demonstration must be made that the requirements of subsection (a) of 25 Pa Code Section 105.18(a) have been met.

Wetland Functions

- 10) Does the wetland serve natural biological functions, including food chain production; general habitat; and nesting, spawning, or resting sites for aquatic or land species? yes no
- 11) Does the wetland provide areas for study of the environment, or as sanctuaries or refuges? yes no
- 12) Does the wetland aid in, or maintain natural drainage characteristics, natural water filtration processes, current (flow) patterns or other environmental characteristics? yes no
- 13) Does the wetland serve as storage areas for flood and storm waters, or does it shield other areas from erosion or storm damage? yes no
- 14) Does the wetland provide a groundwater recharge area that maintains minimum baseflows? yes no
- 15) Does the wetland serve as a prime natural recharge area where surface water and groundwater are directly connected? yes no
- 16) Does the wetland aid in the prevention of pollution? yes no
- 17) Is the wetland used for, or does it provide the opportunity to be used for recreation? yes no
- e) If a "yes" response is indicated for the question in d)1) or d)2), identify how the determination was made and indicate any contacts with state or federal agency personnel.

14.3 Wetland Impact Analysis/Assessment

N/A. No Wetland Impacts proposed for this project.

- a) Describe the alternatives to the proposed mining activities that have been considered to avoid or minimize impacts on wetlands. An alternative analysis should include alternatives to the proposed mining activities, including alternative locations, routings or designs to avoid adverse impacts on the wetlands (e.g. relocating spoil/topsoil storage areas, rerouting haul roads).

- b) Discuss whether any of the alternatives are practical to achieve the basic purposes of the project taking into account availability, cost, technology and logistics of the other possible project sites which would not affect the wetlands.

- c) For any wetlands within the proposed permit area, provide the following:
 - 1) Identify and delineate the wetland and the areal extent of the impact (wetlands must be identified and delineated in accordance with 25 Pa Code Section 105.451 Identification and delineation of wetlands – statement of policy).

 - 2) Submit a cross-sectional view showing the wetland and the proposed mining area.

 - 3) Explain how the proposed mining activities will directly affect the wetlands.
 - aa) If the proposed mining activities will affect less than 1.0 acre of wetland and the wetland is not an exceptional value wetland (in accordance with 25 Pa Code Section 105.17), provide a description of the wetland functions which will be impacted by the proposed mining activities. Note: If a “yes” response is indicated for any question in Module 14.2 d)1) through d)9), the wetlands would be exceptional value (as defined in Section 105.17).

 - bb) If the proposed mining activities will affect 1.0 or more acres of wetlands or may affect an exceptional value wetland, provide a detailed assessment of the wetland functions identified in Module 14.2 d)10) through d)17).

- d) If any wetlands within the proposed permit or adjacent area will be indirectly affected (e.g. altering the wetland hydrology), provide the following:
 - 1) Identify and delineate the wetland and provide an estimate of the total wetland acreage affected (wetlands must be identified and delineated in accordance with 25 Pa Code Section 105.451 Identification and Delineation of Wetlands – statement of policy).

 - 2) A description of how the proposed mining activities will indirectly affect the wetlands.

- e) Will the cumulative impact of the proposed and anticipated mining activities result in a major impairment of the wetland resource in the general area? yes no

Provide an explanation of the determination and identify any contacts with state or federal agencies involved in making the determination.

14.4 Wetland Mitigation/Replacement

N/A. No Wetland Impacts proposed for this project.

Note: If a total of one-half (.5) acres or less of wetlands will be affected, participation in Pennsylvania’s Wetlands Replacement Project may be authorized by the Department in lieu of onsite replacement of the wetlands.

- a) If wetland mitigation measures or wetland replacement are proposed, address the following:

- 1) Identify the wetlands where mitigation measures will be employed.
- 2) Identify the wetlands that will be replaced and the location of the replacement wetland site. Provide the number of acres for each wetland to be replaced and the acreage of the replacement wetland.
- 3) Provide a plan for mitigation/replacement following the guidelines in the Department's technical guidance titled "Design Criteria - Wetlands Replacement Monitoring" document 363-0300-001. This guidance is available from the Division of Waterways, Wetlands and Erosion Control, Post Office Box 8854, Harrisburg, Pennsylvania 17105-8554 or through the Department's website.

Show the location of replacement wetland sites on the Operations Map (Exhibit 9) and the Land Use and Reclamation Map (Exhibit 18).

Note: At a minimum, wetland replacement must be at a 1:1 ratio (replacement acres: affected acres). The Department may require the ratio to exceed 1:1 based on the functions and values of the wetlands to be affected. Wetland replacement sites will generally not be approved unless the site is located within the same general area as the existing wetland to be replaced.

14.5 United States Army Corp of Engineers Permits

- a) If the United States Army Corp of Engineers (Corps) requires a Pennsylvania State Programmatic General Permit – 4 (PASPGP-4) for your proposed activity:
Completed and attach the "PASPGP-4 Cumulative Impacts Project Screening Form (3150-PM-BWEW0050)" and supporting documents listed below.
 - 1) the PASPGP-4 Cumulative Impact Project Screening Form (3150-PM-BWEW0050);
 - 2) Exhibits (pdf format):
 - a) U.S.G.S. Map 6.1 (site location map),
 - b) Environmental Resources Map 6.2,
 - c) Operations Map 9,
 - d) Land Use and Reclamation Map 18, and
 - e) a CD or DVD with any plans that are larger than 8 ½ by 11 inches.
 - 3) Module 1: Large Noncoal (Industrial Minerals) Mine Permit Application
 - 4) Module 14 and any detail drawings for stream / wetland encroachment activities (including Form 14A, Request for Federal Clean Water Act (CWA) Section 401 Certification For Mining / Coal Refuse Disposal Activities).
 - 5) the Endangered Species Act / Pennsylvania Natural Diversity Inventory receipt,
 - 6) the Pennsylvania Historical and Museum Commission correspondence (Section 106 coordination)

FORM 14A - Request for Federal Clean Water Act (CWA) Section 401 Certification For Mining / Coal Refuse Disposal Activities

General requirements: A mining or coal refuse disposal activity that involves encroachment into a stream or wetland requires a DEP mining activity permit and a US Army Corps of Engineers (Corps) permit issued pursuant Section 404 of the Federal Clean Water Act (FWPCA). An applicant proposing this type of activity must file a state mining activity permit application with the DEP district mining office and a separate federal permit application with the Corps district office.

Need for a Section 401 certification: As a matter of coordination, the Corps district office will not issue the federal Section 404 permit until DEP issues an Individual Water Quality Certification pursuant to Section 401 of the FWPCA, certifying that the activity will comply with the provisions of sections 301-303, 306 and 307 of the FWPCA and will not violate applicable federal and state water quality standards. The DEP district mining office issues this certification based on the information presented in the state permit application, public comments received with respect to the state permit application, and consultation with the Corps district office in regard to the federal permit application.

To ensure timely processing of both state and federal permit applications, the applicant is encouraged to:

- Contact the Corps district office to determine if a Section 404 permit is required for the proposed activity, and what type of permit is needed (an individual permit or nationwide permit).
- Complete and submit this form with the state mining activity permit application to the DEP district mining office.

Applicant _____	Application No. _____
Address _____	Operation Name _____
_____	Municipality _____
Telephone _____	County _____

Section 1: Corps Determination:

This project requires 401 certification for:

- An individual 404 permit
- Modification to an existing 404 permit
- Authorization to operate under Nationwide Permit No. _____

Section 2: Activity Description:

Please describe the activities that are the subject of this request:

If the scope of activities (including any mitigation to be performed as compensation for the unavoidable impacts of fill placement) proposed under the federal permit application is the same as the scope of activities proposed under the state permit application, check here and provide the application number assigned by the Corps _____ and the date on which the application was filed _____.

If the scope of activities described under the federal permit application differs from the scope of activities described under the state permit application, attach a copy of the federal permit application.

Note that any substantial revisions required as part of the federal application review process must be provided to the DEP district mining office.

Section 3: Signature(s)

I (am the applicant) (am an officer of the applicant) (have the authority to file a Section 404 application for this project) and certify that the plans, reports and documents submitted as part of the application are true and correct to the best of my knowledge and belief, I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. **(Note: Cross out inapplicable portions in parenthesis).**

Signature of Applicant or Responsible Official

Name (typed)

Title

UNT-4A Time of Concentration (SCS)
2020

Mon Nov 9 12:47:17

Project: SMT EAST
Location: UNT-4A
Present

By: CGY
Checked:

Date: 11/09/20
Date: 11/09/20

Curve Number : 75
Length of Flow : 1945.14 ft
Average Land Slope : 7.60 %

Time of Concentration : 0.380 hrs, 22.8 mins

UNT-4A Graphical Peak Discharge
2020

Mon Nov 9 12:51:33

Project: SMT EAST

By: CGY

Date: 11/09/20

Location: UNT-4A

Checked:

Date:

Present

1. Data:

Drainage area:.....A = 11.8000Acres

Runoff Curve Number:.....CN = 75

Time of Concentration:.....Tc = 22.80 min

Storm Type:..... = II

Pond and swamp areas spread
throughout watershed..... = 0.00 percent of A
0.0000 Acres

2. Frequency.....yr = 100

3. Rainfall,P(24-hour).....in = 5.350

4. Initial abstraction, Ia..... = 0.6667

5. Compute Ia/P..... = 0.1246

6. Unit peak discharge, qu.....csm/in = 602.495

7. Runoff,Q.....in = 2.736

8. Pond & swap adjustment factor,...Fp = 1.00

9. Peak Discharge,qp.....cfs = 30.393

HEC-RAS Plan: Plan 01 River: UNT4A Reach: 1 Profile: PF 1

Reach	River Sta	Profile	Q Total (cfs)	Mini Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	300	PF 1	30.40	1030.39	1031.55	1031.55	1031.90	0.028462	4.77	6.37	9.20	1.01
1	300	PF 1	30.40	1023.61	1024.33	1024.33	1024.51	0.034177	3.44	8.84	24.86	1.02
1	200	PF 1	30.40	1017.88	1018.51	1018.51	1018.74	0.031121	3.82	7.96	17.83	1.01
1	100	PF 1	30.40	1015.56	1016.66	1016.47	1016.79	0.010695	2.62	11.62	20.56	0.61
1	0	PF 1	30.40	1014.25	1014.83	1014.83	1014.98	0.036362	3.10	9.80	33.76	1.02

Plan: Plan 01 UNT4A 1 RS: 0 Profile: PF 1

E.G. Elev (ft)	1014.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.040	
W.S. Elev (ft)	1014.83	Reach Len. (ft)			
Crit W.S. (ft)	1014.83	Flow Area (sq ft)		9.80	
E.G. Slope (ft/ft)	0.036362	Area (sq ft)		9.80	
Q Total (cfs)	30.40	Flow (cfs)		30.40	
Top Width (ft)	33.76	Top Width (ft)		33.76	
Vel Total (ft/s)	3.10	Avg. Vel. (ft/s)		3.10	
Max Chl Dpth (ft)	0.58	Hydr. Depth (ft)		0.29	
Conv. Total (cfs)	159.4	Conv. (cfs)		159.4	
Length Wtd (ft)		Wetted Per. (ft)		33.78	
Min Chl El (ft)	1014.25	Shear (lb/sq ft)		0.66	
Alpha	1.00	Stream Power (lb/ft s)		2.04	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Plan: Plan 01 UNT4A 1 RS: 100 Profile: PF 1

E.G. Elev (ft)	1016.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.040	
W.S. Elev (ft)	1016.68	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	1016.47	Flow Area (sq ft)		11.62	
E.G. Slope (ft/ft)	0.010695	Area (sq ft)		11.62	
Q Total (cfs)	30.40	Flow (cfs)		30.40	
Top Width (ft)	20.56	Top Width (ft)		20.56	
Vel Total (ft/s)	2.62	Avg. Vel. (ft/s)		2.62	
Max Chl Dpth (ft)	1.12	Hydr. Depth (ft)		0.57	
Conv. Total (cfs)	294.0	Conv. (cfs)		294.0	
Length Wtd. (ft)	100.00	Wetted Per. (ft)		20.70	
Min Ch El (ft)	1015.56	Shear (lb/sq ft)		0.38	
Alpha	1.00	Stream Power (lb/ft s)		0.98	
Frctn Loss (ft)	1.80	Cum Volume (acre-ft)		0.02	
C & E Loss (ft)	0.00	Cum SA (acres)		0.08	

Plan: Plan 01 UNT4A 1 RS: 200 Profile: PF 1

E.G. Elev (ft)	1018.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.		0.040	
W.S. Elev (ft)	1018.51	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	1018.51	Flow Area (sq ft)		7.96	
E.G. Slope (ft/ft)	0.031121	Area (sq ft)		7.96	
Q Total (cfs)	30.40	Flow (cfs)		30.40	
Top Width (ft)	17.83	Top Width (ft)		17.83	
Vel Total (ft/s)	3.82	Avg. Vel. (ft/s)		3.82	
Max Chl Dpth (ft)	0.63	Hydr. Depth (ft)		0.45	
Conv. Total (cfs)	172.3	Conv. (cfs)		172.3	
Length Wtd. (ft)	100.00	Wetted Per. (ft)		17.91	
Min Ch El (ft)	1017.88	Shear (lb/sq ft)		0.86	
Alpha	1.00	Stream Power (lb/ft s)		3.30	
Frctn Loss (ft)	1.70	Cum Volume (acre-ft)		0.05	
C & E Loss (ft)	0.04	Cum SA (acres)		0.11	

Plan: Plan 01 UNT4A 1 RS: 300 Profile: PF 1

E.G. Elev (ft)	1024.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.		0.040	
W.S. Elev (ft)	1024.33	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)	1024.33	Flow Area (sq ft)		8.84	
E.G. Slope (ft/ft)	0.034177	Area (sq ft)		8.84	
Q Total (cfs)	30.40	Flow (cfs)		30.40	
Top Width (ft)	24.86	Top Width (ft)		24.86	
Vel Total (ft/s)	3.44	Avg. Vel. (ft/s)		3.44	
Max Chl Dpth (ft)	0.72	Hydr. Depth (ft)		0.36	
Conv. Total (cfs)	164.4	Conv. (cfs)		164.4	
Length Wtd. (ft)	100.00	Wetted Per. (ft)		24.95	
Min Ch El (ft)	1023.61	Shear (lb/sq ft)		0.76	
Alpha	1.00	Stream Power (lb/ft s)		2.60	
Frctn Loss (ft)	3.26	Cum Volume (acre-ft)		0.07	
C & E Loss (ft)	0.00	Cum SA (acres)		0.16	

Plan: Plan 01 UNT4A 1 RS: 390 Profile: PF 1

E.G. Elev (ft)	1031.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.35	Wt. η -Val.		0.040	
W.S. Elev (ft)	1031.55	Reach Len. (ft)	90.00	90.00	90.00
Crit W.S. (ft)	1031.55	Flow Area (sq ft)		6.37	
E.G. Slope (ft/ft)	0.028482	Area (sq ft)		6.37	
Q Total (cfs)	30.40	Flow (cfs)		30.40	
Top Width (ft)	9.20	Top Width (ft)		9.20	
Vel Total (ft/s)	4.77	Avg. Vel. (ft/s)		4.77	
Max Chl Dpth (ft)	1.15	Hydr. Depth (ft)		0.69	
Conv. Total (cfs)	180.1	Conv. (cfs)		180.1	
Length Wtd. (ft)	90.00	Wetted Per. (ft)		9.59	
Min Ch El (ft)	1030.39	Shear (lb/sq ft)		1.18	
Alpha	1.00	Stream Power (lb/ft s)		5.64	
Frctn Loss (ft)	2.80	Cum Volume (acre-ft)		0.08	
C & E Loss (ft)	0.05	Cum SA (acres)		0.19	