

Attachment 6
Wyanet Connection Aquatic/Stream Impact analysis
Conceptual Mitigation Technical Memorandum

Chicago to Iowa City Intercity Passenger Rail Service - Wyanet Connection Aquatic/Stream Impact Analysis and Conceptual Mitigation Plan

INTRODUCTION

As part of the FY2010 High-Speed Intercity Passenger Rail (HSIPR) Grant Application, the Federal Railroad Administration (FRA) has requested that the Illinois Department of Transportation (Illinois DOT) provide, at the “service level,” more site-specific information concerning the potential effects of the construction of a new railroad connection between the Iowa Interstate Railroad and the BNSF Railway near Wyanet, Illinois (Wyanet Connection).

The purpose of this technical memo is to characterize the affected environment for aquatic resources and anticipated environmental consequences to these resources from the construction of a new track connection at Wyanet, Bureau County, Illinois, for the Chicago to Iowa City Intercity Passenger Rail Service Project (the proposed action) (see Figure 1 for the general location of the Wyanet Connection section of the Project area). Detailed discussions of the proposed action, the purpose of and need for the proposed action, and alternatives to the proposed action are provided in the original Tier 1 Service Level Environmental Assessment (EA) published in September 2009.

Should FRA approve Illinois DOT’s HSIPR grant application, the next steps in the development process for the Wyanet Connection will be to complete preliminary engineering for the connection, complete a tier 2 project level National Environmental Policy Act (NEPA) review, undertake detailed avoidance and minimization evaluations, and apply for all appropriate permits for the connection. Following the approval of the project level NEPA document and the receipt of appropriate permits, Illinois DOT will undertake final design and construction.

AFFECTED ENVIRONMENT

This technical memo describes the existing conditions of the aquatic resources within the Wyanet Track Connection section of the Project area (see Figure 2 for an aerial view of the Wyanet Connection section of the Project area). The assessment of existing conditions for the aquatic resources in this section of the Project area includes background information on aquatic habitat quality as well as a discussion of biological quality, water quality, and geomorphic condition. The assessment of existing conditions focuses on Pond Creek, a third-order perennial tributary of West Bureau Creek (see Figure 2). Field observations were made on June 30, 2010, at one representative sample reach of Pond Creek. A photo log and key map of the site observations is included in Attachment A. The observed reach of Pond Creek is representative of the entire stream that may be affected by the Wyanet Connection.

Background Information

The Wyanet Connection section of the Project area is within the Lower Illinois River-Senachwine Lake Watershed, hydrologic unit code (HUC) 8 (07130001), within the Pond Creek-Big Bureau Creek sub-basin HUC 12 (071300010701) (see Figure 3). This section the Project area contains numerous aquatic resources including: one primary perennial stream, Pond Creek, and several smaller intermittent and ephemeral tributaries. The site also contains forested wetlands along the stream banks and one large emergent pond/wetland (see Figure 4). A discussion and maps of the delineated wetlands within the Wyanet Connection section of the Project area is provided in the Wetlands Delineation Report conducted by the Illinois Natural History Survey (INHS) (Attachment B).

Pond Creek can be characterized as a typical Midwestern headwater stream in that it has been heavily influenced by agricultural land practices. Historical aerial photography from 1941 (see Figure 5) and U.S. Geological Survey USGS topographic mapping (see Figure 6) indicate that this stream has been substantially altered through channelization. The 1923 15-minute series U.S. Geological Survey (USGS) topographic mapping (see Figure 7) provides the earliest post settlement documentation of the channelization of Pond Creek. Furthermore, presettlement land cover data provide some insight into the original stream channel and its relation to West Bureau Creek (see Figure 8). The presettlement stream channel of Pond Creek was mapped near the current channel, within an extensive prairie landscape. High-quality remnant prairie sites have been identified within the right-of-way of the IAIS railroad. Because of their rarity, species diversity, and vulnerability to habitat degradation, prairie communities are of special concern in Illinois. These sites have been surveyed by INHS and have been determined to represent Grade A- to Grade B Illinois Natural Areas Inventory (INAI) quality sites (Attachment B). Grade A and B designation is reserved for only the highest quality prairie remnants. These sites have a low abundance of exotic species, high density of forb species, high diversity of forb species diversity, and the presence of conservative prairie species (Handle and Kuntz, 2004).

Biological Quality

The biological quality of a stream is best assessed through detailed field sampling of various groups of aquatic species (fish, macroinvertebrates, mussels, crayfish, amphibians, etc.) conducted according to Illinois-approved methodologies. When detailed sampling data are unavailable, consultation with the Illinois Department of Natural Resources (IDNR) Stream Rating System provides some insight into regional biological quality. According to the Illinois Biological Stream Rating System (IDNR, 2008), Pond Creek is not listed as a Biologically Significant Stream (BSS) and it is not rated as A or B for diversity or integrity. West Bureau Creek, located approximately 2 miles downstream, is rated as Class B (high) for diversity and is rated as Class C (moderate) for integrity (see Figure 9) immediately upstream of the confluence with Pond Creek. These IDNR stream ratings indicate that West Bureau Creek is fully functional according to its biological communities.

A search of the Illinois Natural History Survey (INHS) Fish Collection Database did not identify any records from Pond Creek; however, INHS records from West Bureau Creek indicate that more than 30 species of fish have been collected from this downstream tributary (see Table 1). Based on the proximity to and downstream connection with West Bureau Creek, many of these fish species may also be present within Pond Creek. Field observations conducted on June 30, 2010, indicate that Pond Creek is functioning biologically and is a productive resource. Water clarity during the site visit was excellent, allowing observation throughout the stream channel

habitats. Numerous leopard frogs jumped from the banks of the stream, moving upstream during the site visit. Several species of fish, including minnows and sunfish, were observed within the deeper pools and runs of the stream. Many damselfly and dragonfly adults were also observed using the Pond Creek channel and adjacent emergent wetlands. In general, Pond Creek is a relatively homogenous stream environment; however, it still provides suitable habitat conditions for many different species of aquatic animals.

Table 1: Illinois Natural History Fish Collection Database

#	Genus species	Common Name	Stream
1	<i>Ameiurus natalis</i>	Yellow bullhead	West Bureau Creek
2	<i>Campostoma anomalum</i>	Central stoneroller	West Bureau Creek
3	<i>Carpiodes cyprinus</i>	Quillback carpsucker	West Bureau Creek
4	<i>Catostomus commersoni</i>	White sucker	West Bureau Creek
5	<i>Cyprinella lutrensis</i>	Red shiner	West Bureau Creek
6	<i>Cyprinella spiloptera</i>	Spotfin Shiner	West Bureau Creek
7	<i>Etheostoma flabellare</i>	Faintail darter	West Bureau Creek
8	<i>Etheostoma nigrum</i>	Johnny darter	West Bureau Creek
9	<i>Etheostoma spectabile</i>	Orangethroat darter	West Bureau Creek
10	<i>Hypentelium nigricans</i>	Northern hogsucker	West Bureau Creek
11	<i>Ictalurus punctatus</i>	Channel catfish	West Bureau Creek
12	<i>Lampetra appendix</i>	American brook lamprey	West Bureau Creek
13	<i>Lepomis cyanellus</i>	Green sunfish	West Bureau Creek
14	<i>Lepomis macrochirus</i>	Bluegill	West Bureau Creek
15	<i>Luxilus chrysocephalus</i>	Striped Shiner	West Bureau Creek
16	<i>Lythrurus umbratilis</i>	Redfin shiner	West Bureau Creek
17	<i>Micropterus dolomieu</i>	Smallmouth bass	West Bureau Creek
18	<i>Moxostoma duquesnei</i>	Black redhorse	West Bureau Creek
19	<i>Moxostoma erythrurum</i>	Golden redhorse	West Bureau Creek
20	<i>Moxostoma macrolepidotum</i>	Shorthead redhorse	West Bureau Creek
21	<i>Nocomis biguttatus</i>	Hornyhead chub	West Bureau Creek
22	<i>Notropis atherinoides</i>	Emerald shiner	West Bureau Creek
23	<i>Notropis blennius</i>	River shiner	West Bureau Creek
24	<i>Notropis dorsalis</i>	Bigmouth shiner	West Bureau Creek
25	<i>Notropis ludibundus</i>	Sand shiner	West Bureau Creek
26	<i>Noturus flavus</i>	Stonecat	West Bureau Creek
27	<i>Percina caprodes</i>	Logperch	West Bureau Creek
28	<i>Percina maculata</i>	Blackside darter	West Bureau Creek
29	<i>Phenacobius mirabilis</i>	Suckermouth minnow	West Bureau Creek
30	<i>Pimephales notatus</i>	Bluntnose minnow	West Bureau Creek
31	<i>Pimephales promelas</i>	Fathead minnow	West Bureau Creek
32	<i>Rhinichthys atratulus</i>	Blacknose dace	West Bureau Creek
33	<i>Semotilus atromaculatus</i>	Creek chub	West Bureau Creek

Source: Illinois Natural History Fish Collection Database, <http://ellipse.inhs.uiuc.edu:591/INHSCollections/fishsearch.html>, retrieved on July 1, .2010._____.

Water Quality

Water Quality standards in Illinois are determined by the Watershed Management Section (WMS) of the Illinois Environmental Protection Agency (IEPA). In addition to setting state limits on water quality, IEPA administers the state 401 certification program. A typical 401 project certification process includes: 1) a detailed antidegradation review according to state standards, 2) a public notice, 3) posting of an antidegradation fact sheet, 4) IEPA review of the comments received, 5) IEPA decision to hold a public hearing, and 6) preparation of comment responses prior to the issuance of any certification. Typical 401 project level certification may take up to two or more years for IEPA to fully process.

Water quality standards have been established for all surface waters in Illinois. Rivers and streams are rated based on the degree of support (attainment) of a designated use. Ratings are determined by an analysis of various types of information, including biological, physicochemical, physical habitat, and toxicity data. When sufficient data are available, each applicable designated use in each segment is assessed as Fully Supporting (good), Not Supporting (fair), or Not Supporting (poor). Waters in which at least one applicable use is not fully supported are considered “impaired.” The water quality of streams within Illinois can be assessed by consulting the IEPA Integrated Water Quality Report and Section 303(d) List of Impaired Waters (IEPA, 2010).

According to the 2010 Section 303(d) list, Pond Creek was not assessed (see Table 2) as part of the 2010 study. West Bureau Creek was assessed as fully supporting aquatic life (582), and not supporting primary contact for fecal coliform – (400). The source of the fecal coliform impairment is unknown (140).

Table 2: 2010 IEPA 303(d) List - Specific Assessment Information for Pond Creek

Name	Assessment Unit ID	10-Digit HUC	IEPA Basin	Cat.	Size (miles)	Use Attainment*	Causes	Sources
Pond Creek	IL_DQDA	0713000107	11	3	10.16	X582, X583, X585, X586, X590	N/A	N/A
West Bureau Creek	IL_DQD-01	0713000104	11	5	23.57	F582, X583, N585, X586, X590	400	140

* X = not assessed; F = fully supporting; N = not supporting; 582 = primary contact; 583 = fish consumption; 585 = aquatic life; 586 = secondary contact...; 590 = aesthetic quality.

The major potential causes of impairment within Illinois streams are fecal coliform bacteria impairing swimming (582-*primary contact*) use, mercury, and polychlorinated biphenyls (PCBs) in fish tissue impairing (583-*fish consumption*) use, and low dissolved oxygen, high nutrients, excessive siltation, physical-habitat alterations, and high suspended solids which impair (585-*aquatic life*) use (IEPA, 2010).

Geomorphic Condition

As mentioned above, Pond Creek has been subject to numerous alterations. Based on historical aerial photographs and USGS topographic mapping, these alterations were likely undertaken during the drainage boom of the late 1800s or early 1900s. During this time, farmers began

transforming native prairie into highly productive farmland by installing a network of clay tiles. The tiles drained into excavated channels (ditches) that conveyed water from fields into the natural streams. Natural streams such as Pond Creek were often dredged, leveed, and straightened to speed the flow of water away from farm fields. Within the Wyonet Connection section of the Project area, Pond Creek was most likely relocated and channelized during the initial construction of the IAIS rail line in the mid 1800s. Since this time, the Pond Creek channel has been under gradual recovery and has redeveloped some natural features such as point bars, riffles, and pools. The existing geomorphic condition was assessed by observation of both the channel condition and the hydrological condition within Pond Creek. In addition, the IEPA Qualitative Stream Habitat Assessment Procedure (SHAP) was performed for the reach of Pond Creek that would be affected by the Wyonet Connection.

Channel and Hydrological Condition

Within the Wyonet Connection section of the Project area, Pond Creek is located at the base of a large trapezoidal-shaped channel, approximately 15 to 20 feet below top of bank. The stream has been heavily incised, straightened, confined, and isolated from the majority of its riparian floodplain; however, the channel does maintain a riparian wetland bench approximately 50 to 75 feet wide. The bench is approximately 1 to 2 feet above the wetted channel under normal base flow and appears to be frequently inundated as flood waters increase after rain events. The bank's slopes are approximately 1.5:1 (H:V) from the toe of the bench to the top of the bank. The slopes are very steep; however, they appeared stable and were well vegetated from the edge of the water to the top of the bank.

Herbaceous wetland vegetation was present along the margins of the channel and submergent vegetation was present within the channel. The wetted width of the Pond Creek channel measures approximately 30 to 50 feet within the Wyonet Connection section of the Project area and maintains a relatively even depth of flow of approximately 2.0 feet. Substrate throughout the channel is composed of coarse and fine sands with some silt deposition along the littoral margins. The stream is slightly constricted by two large open-bottom arched culverts in the IAIS railroad embankment and then again by similar culverts in the BNSF railroad embankment. The large open-bottom arched culverts within the existing rail embankments downstream of the proposed connection do not appear to critically impede or constrict flow; however, under low-flow conditions, they may impede the upstream movement of aquatic animals. Pond Creek becomes much more natural downstream of the BNSF rail line and eventually flows into West Bureau Creek.

Qualitative Stream Habitat Assessment Procedure (SHAP)

During the field survey conducted on June 30, 2010, observations of Pond Creek for the 15 habitat metrics were mostly within the fair to poor category, generating a total score of 74 out of 208. This score indicates that the habitat within the affected reach has not been able to fully recover from the impacts of channelization that occurred at the turn of the century. In general, the bank zone habitat and substrate habitat within the channelized reach of Pond Creek is very homogenous. This reach maintains little channel sinuosity and lacks typical riffle-pool sequencing in natural unaltered streams. The majority of the stream habitat within Pond Creek is similar in flow, depth, substrate, and velocity and can be characterized as a run or glide habitat. The riparian vegetation surrounding stream is a mix of both herbaceous and woody species. In some areas, bush honeysuckle has completely eliminated all other species within the

riparian corridor. The slopes are well vegetated, stable, and provide a good mix of canopy cover. See Attachment C for the completed SHAP form.

ENVIRONMENTAL CONSEQUENCES

The environmental consequences of the proposed action would result in the relocation of approximately 2,050 feet of Pond Creek. The following analysis of these impacts includes a discussion of the direct effects of the proposed action as well as the potential indirect effects.

Direct Effects

Construction of the Wyanet Connection would fill and relocate approximately 2,050 linear feet of Pond Creek as part of the construction of a new rail embankment. This direct effect would alter the current stream channel and would result in the temporary loss of this channelized stream habitat for numerous aquatic and terrestrial organisms, including fish, amphibians, invertebrates, and mammals. As the embankment is constructed, a new more natural channel would be reconstructed north of the new embankment to enhance the existing habitat for these species.

During construction, Pond Creek would be affected physically, chemically, and biologically. The biological functions of Pond Creek would be affected by the loss of habitat during construction. The biological functions within Pond Creek include habitat, refugia, food production, reproduction, and dispersal. The chemical integrity of Pond Creek can be defined as the natural composition and properties of various substances within the aquatic system. Impacts on the chemical functions within Pond Creek would include alteration of nutrient cycling, particulate retention, organic carbon export, removal and sequestration of elements and compounds, and diminished water quality. The physical functions can be characterized as the hydrological attributes of a particular stream. Impacts on the physical functions of Pond Creek would include alteration of the natural flow regime, flood attenuation ability, storm water reduction, groundwater exchange, and maintenance of natural thermal regimes.

Indirect Effects

Indirect effects would include impacts both upstream and downstream of the channel relocation. Indirect effects upstream of the Wyanet Connection section of the Project area would include impacts on aquatic organism movement and disruption of the current hydrological regime. Downstream impacts on biota and habitat may also result from construction of the new connection. During construction, changes in the hydrological flow may have indirect effects on downstream habitat. Furthermore, after construction, the new channel would require time to adjust. During the channel adjustment period, downstream habitat areas may indirectly change through scour and/or accretion; however, these impacts are likely to be short term and localized to areas immediately downstream of this section of the Project area.

POTENTIAL MITIGATION MEASURES

As stated above, construction of the Wyanet Connection would impact approximately 2,050 linear feet of Pond Creek and its associated riparian wetlands. To offset the loss of aquatic habitat, mitigation for these resources would be required. The following paragraphs and figures referenced describe a conceptual mitigation plan.

In March of 2010, the U.S. Army Corps of Engineers (USACE) produced a regulatory guidance document that provides detailed guidance for stream mitigation in Illinois (USACE, 2010). This guidance document was designed to facilitate Clean Water Act Section 404 permit applications and provides a standard way to assess adverse impacts and to determine the amount of mitigation required.

Mitigation for the impacts on Pond Creek could be accomplished through a combination of restoration alternatives, including:

1. On-site replacement and enhancement of the current functions Pond Creek through development of a more natural channel
2. Off-site enhancement of downstream habitat within the Pond Creek watershed
3. On-site wetland development within a newly developed riparian corridor
4. Purchase of stream/wetland mitigation credits from an approved mitigation bank

Preliminary analysis of on-site mitigation alternatives indicated that on-site mitigation options were limited by many natural and anthropogenic constraints. Given the complex nature of the Pond Creek system and the on-site constraints, the relocation of Pond Creek must be performed along the north side of the new rail connection (see Figure 10). The on-site channel mitigation would increase the total channel length by 1.5 times the existing length by introducing meandering to the new channel. The new channel would measure approximately, 3,000 linear feet and would replace the current hydrological functions performed by Pond Creek while also enhancing the quality of the habitat by incorporating multiple in-stream treatments such as cross veins, j-hooks, porous weirs, newberry riffles, or root wads. These structures would be strategically located within the new channel to optimize their effect on scour and deposition. Attachment D depicts various typical sections for the various in-stream treatment options. Installation of channel treatments would enhance the heterogeneity of the substrate, aid the development of riffle-pool sequencing, and restore a more natural width-to-depth ratio of the channelized reach of Pond Creek.

Additionally, the new stream channel would be constructed with a riparian bench to accommodate overbank flooding and natural wetland development. The wetland bench would be constructed with slopes conducive to the establishment of wetland vegetation. In addition to the planting of the wetland bench, the site would be managed to eliminate the establishment of exotic species through routine maintenance of the restored stream corridor. Detailed, site-specific mitigation plans will be developed during the tier 2 project level NEPA process.

Off-site enhancement of stream resources within the Pond Creek watershed will also be included in the mitigation plan. Due to on-site constraints, additional mitigation downstream of the proposed connection will be proposed to further mitigate for the loss of aquatic habitat associated with the Wyanet Connection. As Pond Creek flows downstream and southeast through the BNSF embankment, the stream channel becomes much more natural and meandrous (see Figure 11),

making this section of stream an ideal location for further enhancement, restoration, and protection. The off-site channel enhancement location is close to the Hennepin Canal State Park, making potential deeding to IDNR a potential alternative.

Approximately 2,050 linear feet of stream would be enhanced through a combination of exotic species removal, wetland planting, bank stabilization, and/or installation of the appropriate instream treatments such as cross veins, j-hooks, porous weirs, newberry riffles, or root wads. Exact locations for the downstream mitigation measures have not been selected at this point; detailed surveys to identify specific mitigation sites will be conducted during the tier 2 project level NEPA process.

FUTURE PHASES OF THE PROJECT

Illinois DOT and Iowa DOT are currently applying for a grant from FRA through the HSIPR. If FRA approves the grant application, Service Development Plan, and Tier 1 EA, the next step in the development process will be to conduct a detailed tier 2 project level NEPA review of the various Project elements. During the tier 2 process, numerous environmental surveys will be conducted at a more defined scale. The tier 2 project level NEPA review will also include an evaluation of the full range of alternatives, impact assessment and proposed mitigation development, including permit applications. It is also important to note that the detailed engineering and alternative analysis will be concurrent with the tier 2 project level NEPA review. Illinois DOT will coordinate the future tier 2 project level NEPA reviews with all of the appropriate federal and state agencies, including IDNR, and will work with these agencies to identify the best alternatives to avoid and minimize impacts on aquatic resource features.

REFERENCES

- Illinois Department of Natural Resources. 2008. Integrating Multiple Taxa in a Biological Stream Rating System. Illinois State Wildlife Grant Program Report. Springfield, Illinois. 34 p. <http://dnr.state.il.us/orc/biostrmratings/>
- Illinois Environmental Protection Agency. 303(d) List Specific Assessment Information for Streams. On-line. <http://www.epa.state.il.us/water/tmdl/303-appendix/2010/appendix-b2-streams-draft-3-26-10.pdf>
- Illinois Natural History Survey. On-line Fish Collection Database. Updated May 10, 2010. On-line. <http://ellipse.inhs.uiuc.edu:591/INHSCollections/fishsearch.html>
- U.S. Army Corps of Engineers. Illinois Stream Mitigation Guidance, Stream Mitigation Method for Processing Section 404 Clean Water Act Permit Applications in the State of Illinois. Version 1.0, March 2010.
- Handel, W.C. and J. Koontz. 2004. Inventory of Roadside Prairies. Illinois Department of Transportation Illinois Natural History Survey Center for Biodiversity. Technical Report.

FIGURES

1. Location Map for the Wyanet Connection section of the Project area
2. 2005 Aerial Photograph for the Wyanet Connection section of the Project area
3. Watershed Map for the Wyanet Connection section of the Project area
4. Wetlands and Waterways Map for the Wyanet Connection section of the Project area
5. 1941 Historical Aerial Photograph for the Wyanet Connection s section of the Project area
6. USGS Topographic Map for the Wyanet Connection section of the Project area
7. 1923 Historic USGS Topographic Map for the Wyanet Connection section of the Project area
8. Presettlement Land Cover Map for the Wyanet Connection section of the Project area
9. IDNR Stream Rating Map for the Wyanet Connection section of the Project area
10. On-site Mitigation Alternative Map for the Wyanet Connection section of the Project area
11. Off-site Mitigation Alternative Map for the Wyanet Connection section of the Project area

Figure 1: Location Map for the Wyanet Connection section of the Project area

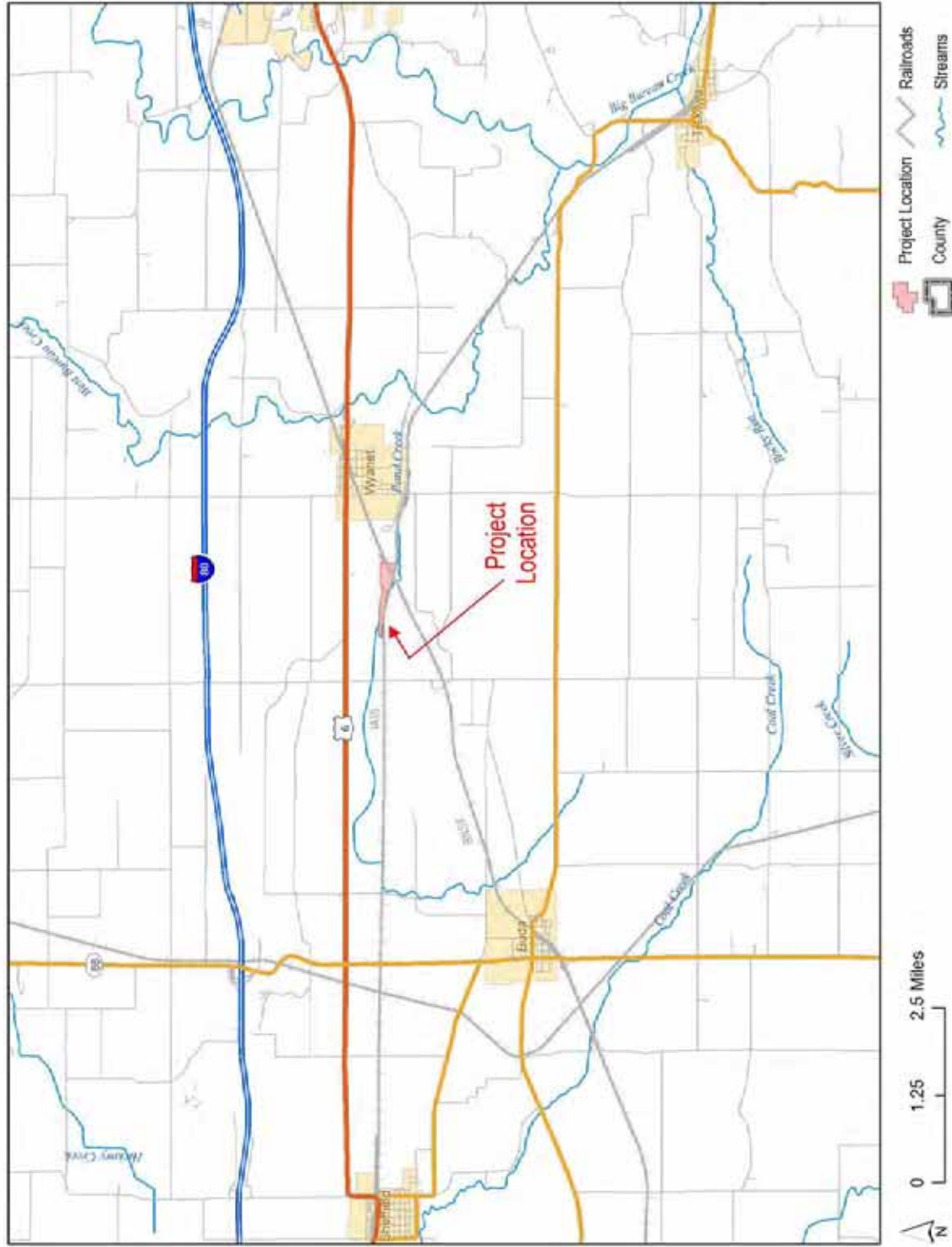


Figure 2: 2005 Aerial Photograph for the Wyandot Connection section of the Project area

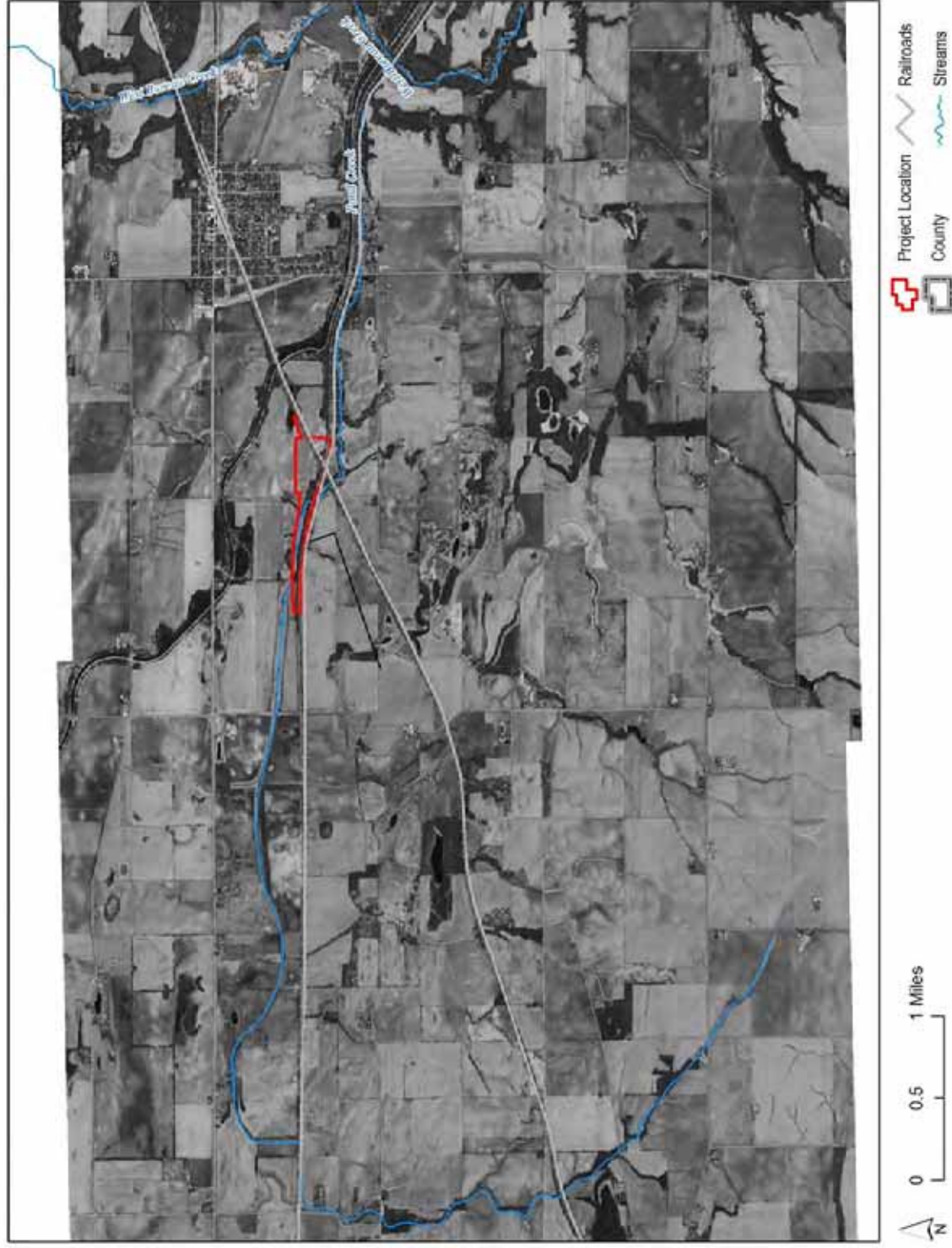


Figure 3: Watershed Map for the Wyanet Connection section of the Project area

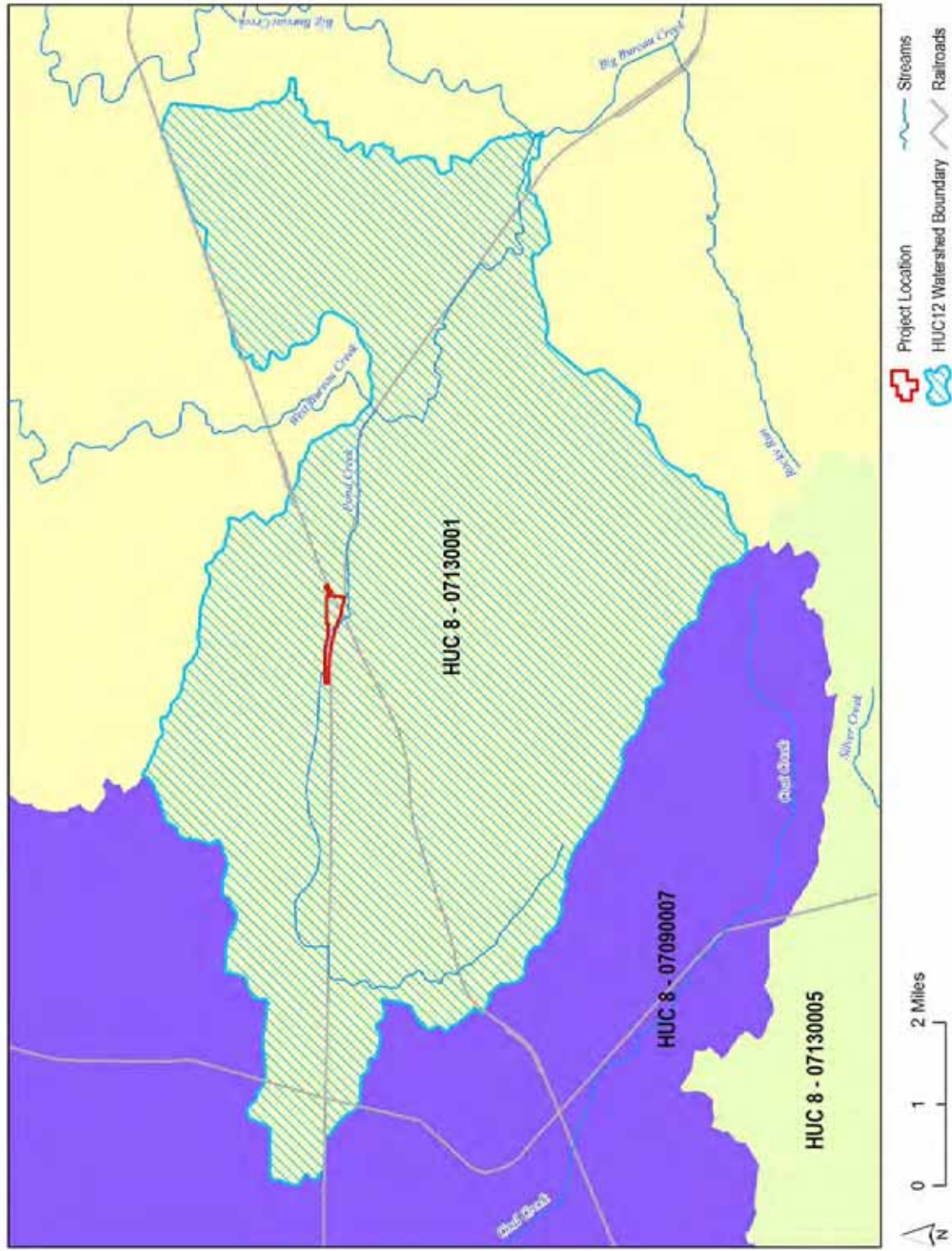


Figure 4: Wetlands and Waterways Map for the Wyanet Connection section of the Project area

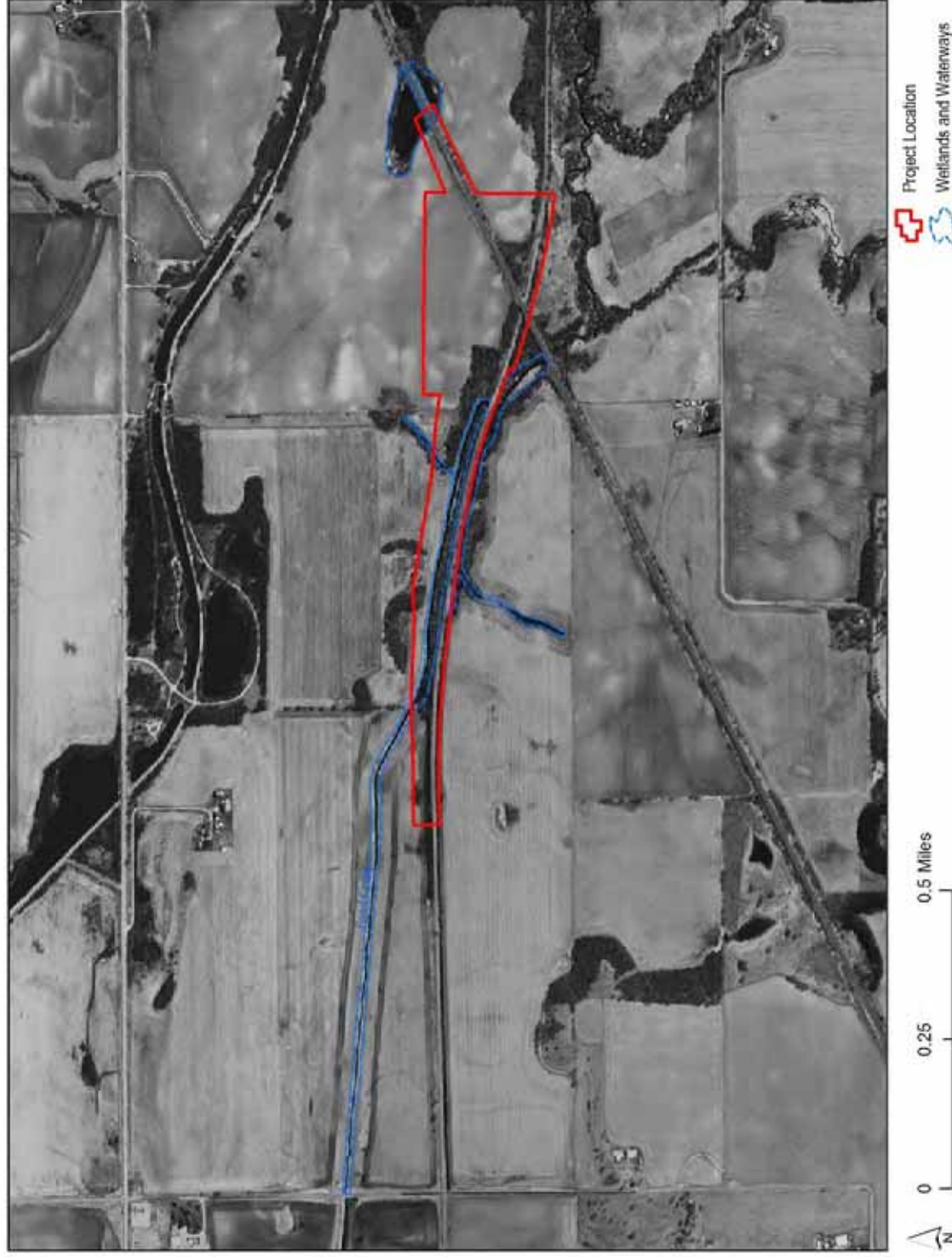


Figure 5: 1941 Historical Aerial Photograph for the Wyanet Connection section of the Project area

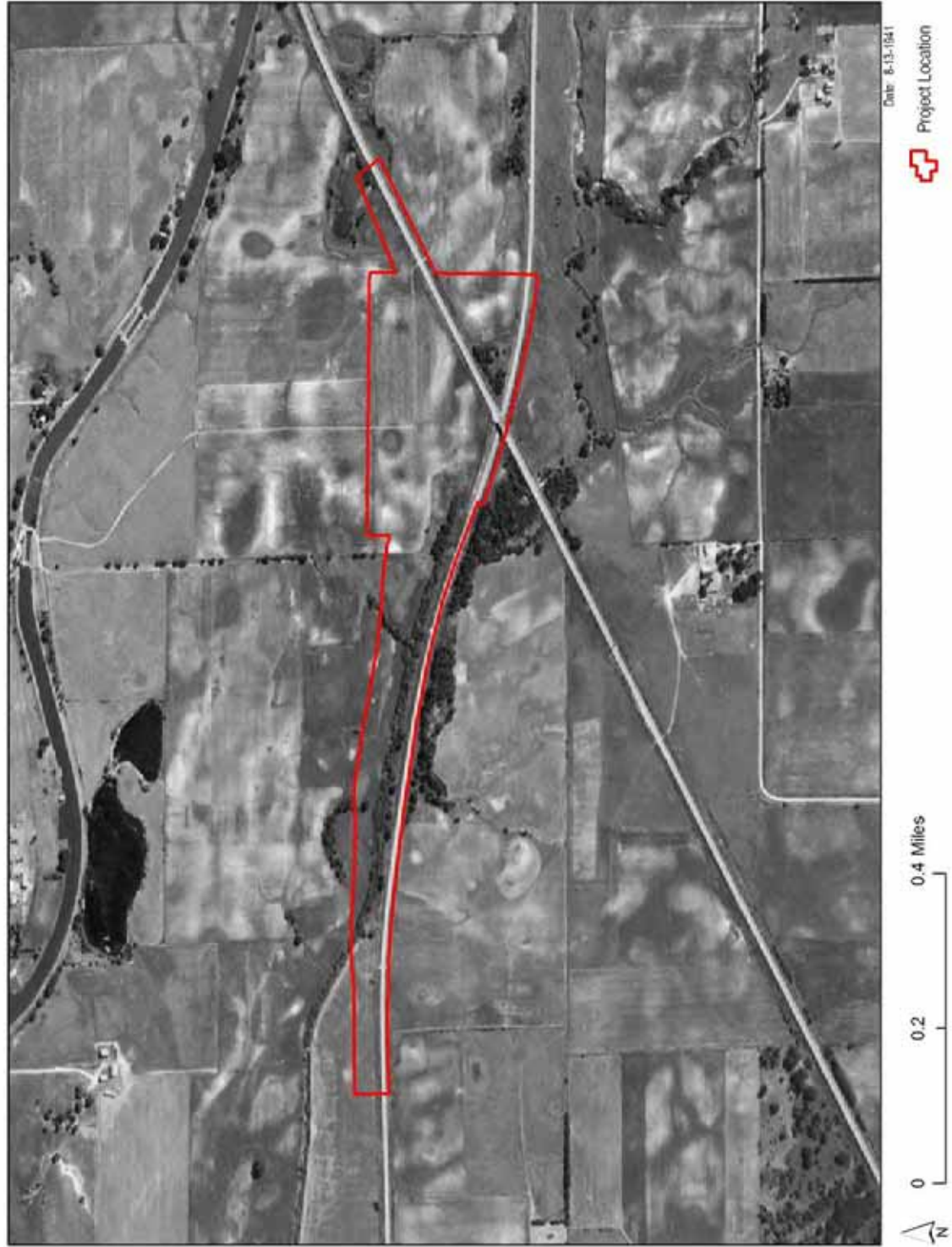


Figure 6: USGS Topographic Map for the Wyanet Connection section of the Project area

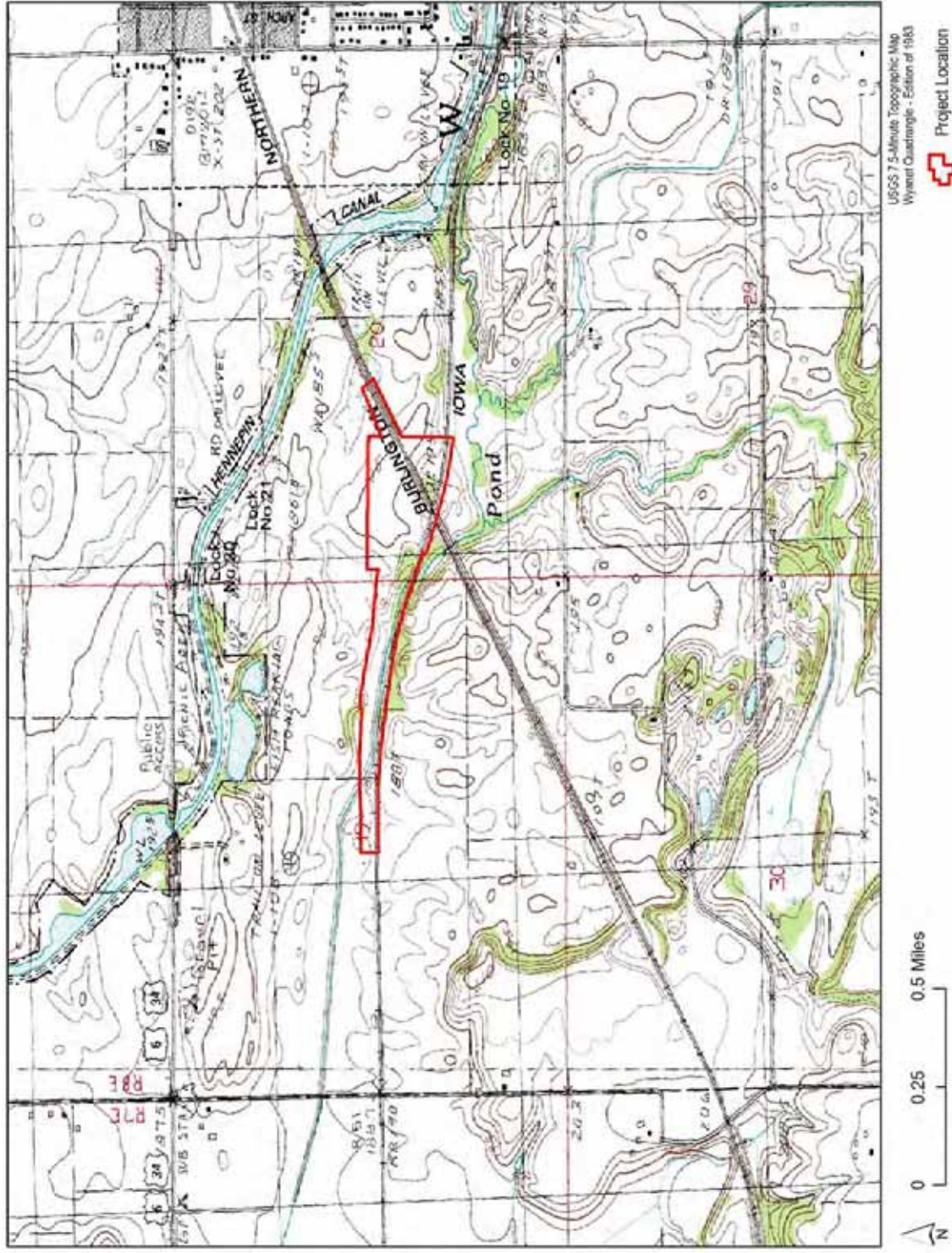


Figure 7: 1923 Historic USGS Topographic Map for the Wyanet Connection section of the Project area

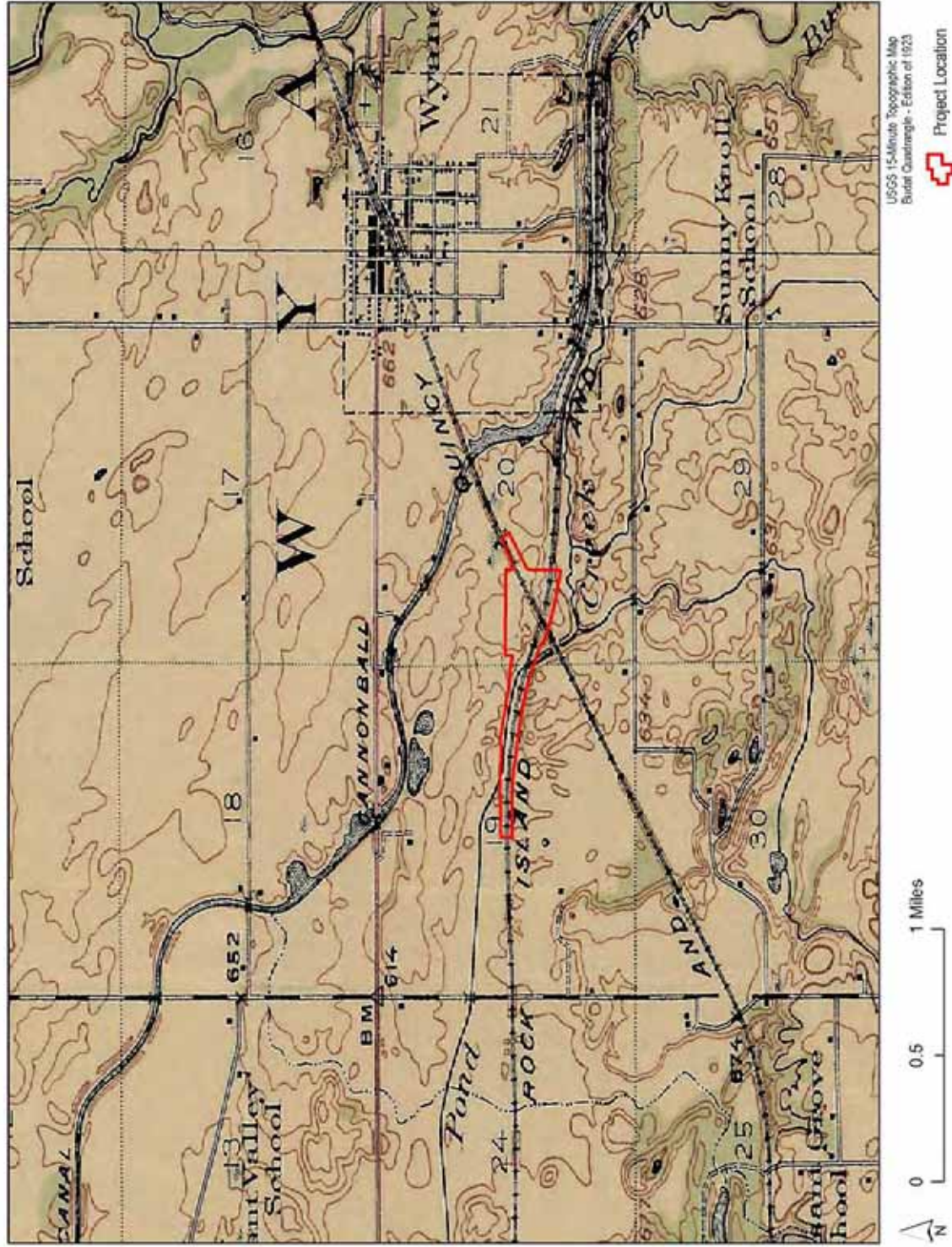


Figure 8: Presettlement Land Cover Map for the Wyanet Connection section of the Project area

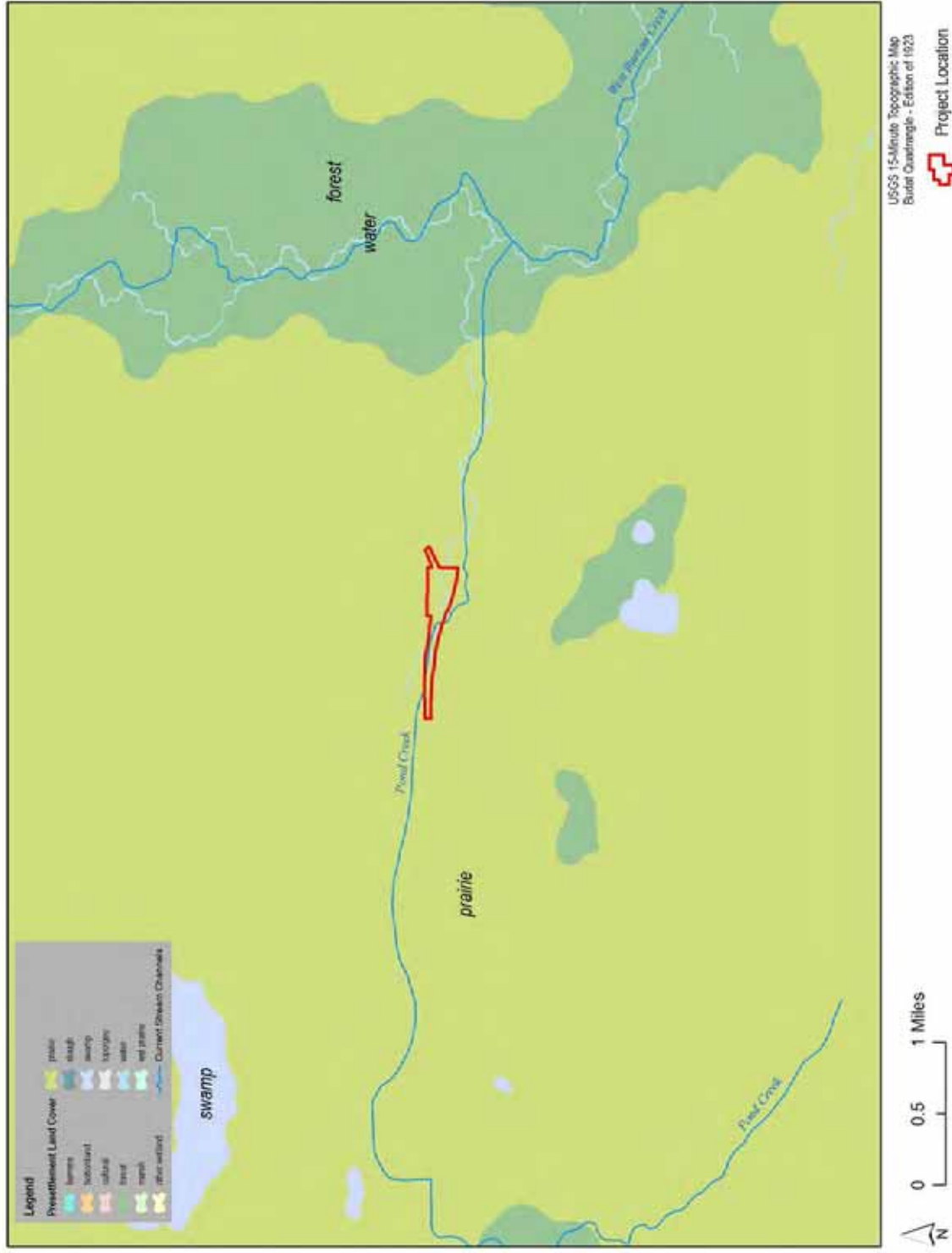


Figure 9: IDNR Stream Rating Map for the Wyanet Connection section of the Project area

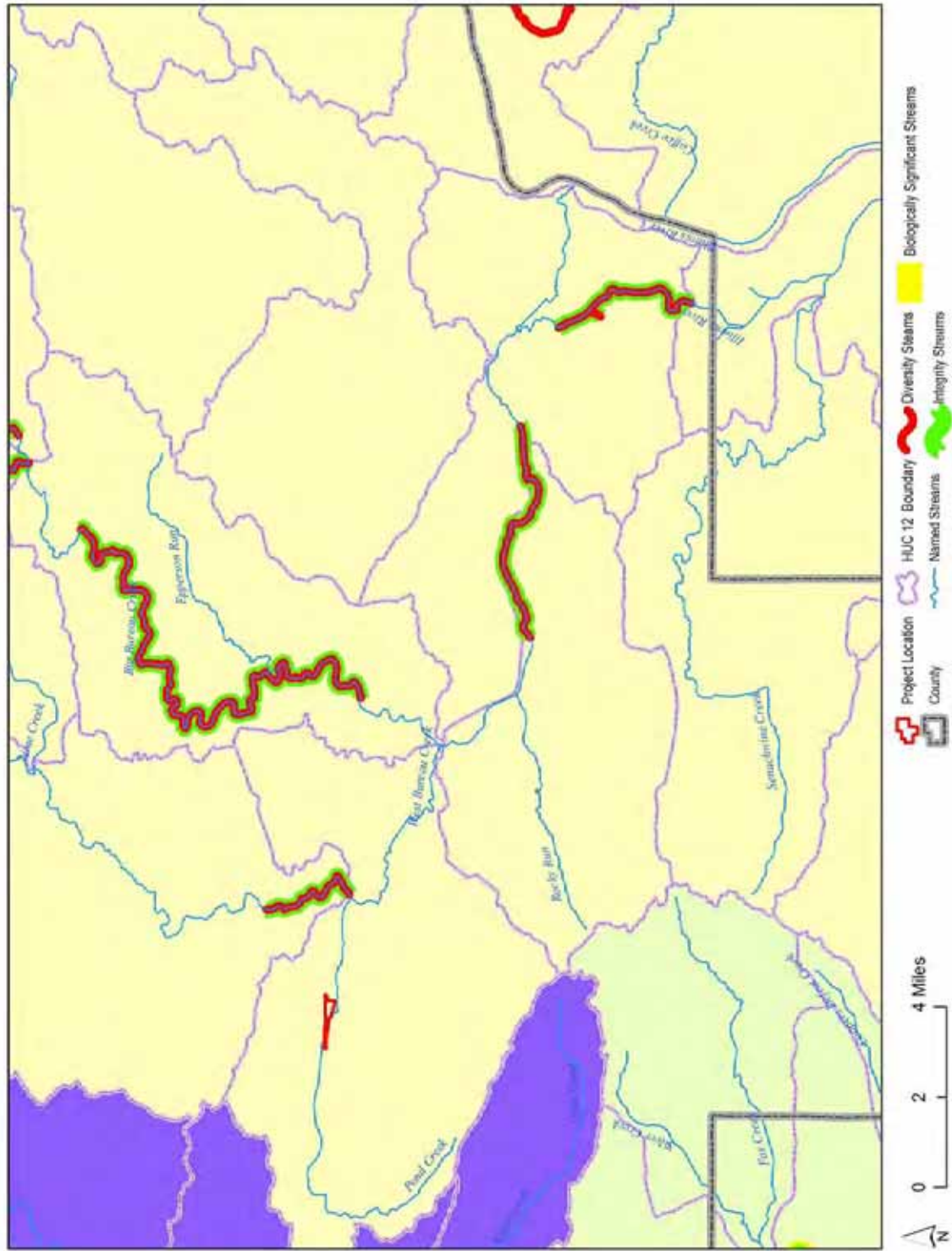


Figure 10: On-site Mitigation Alternative Map for the Wyanet Connection section of the Project area

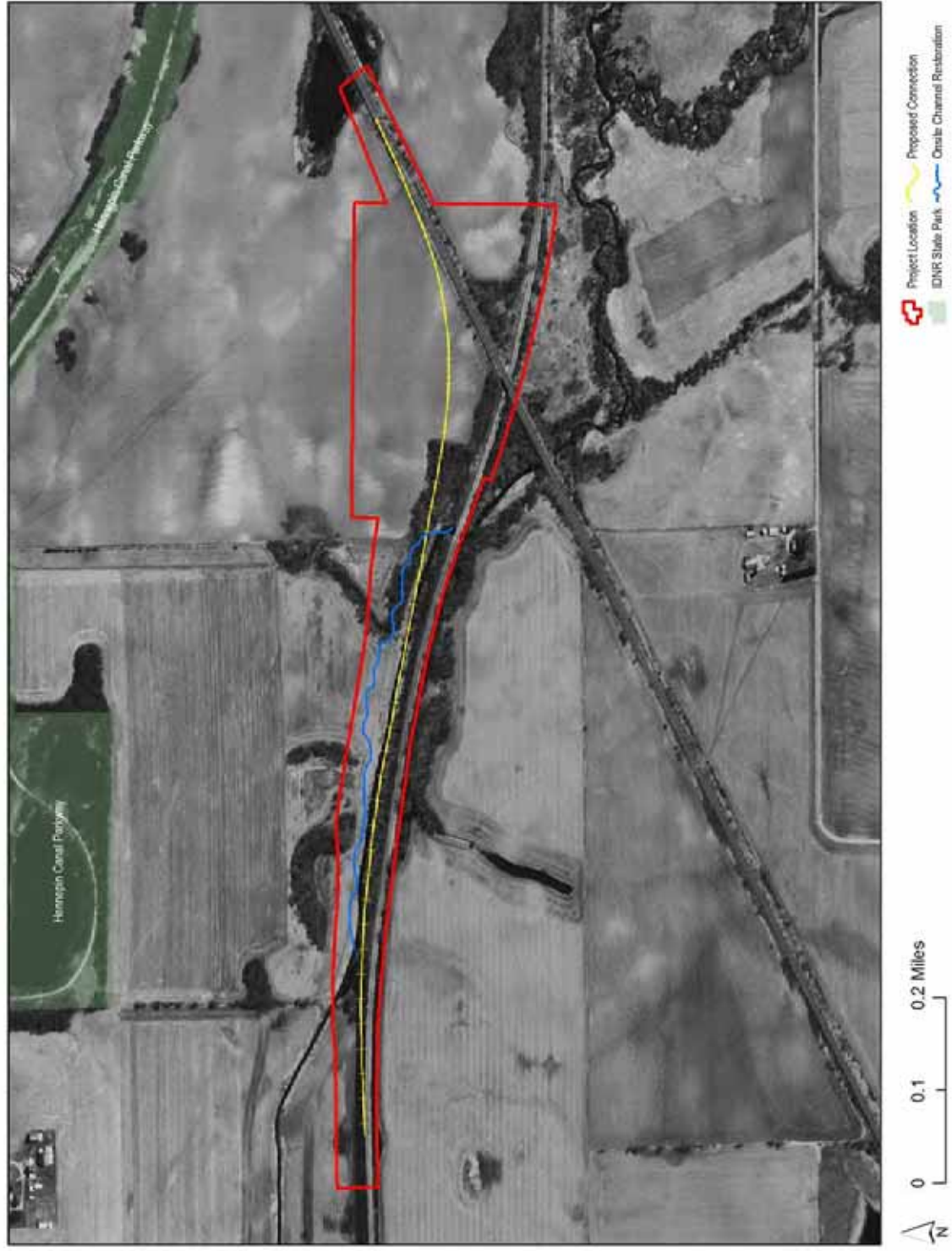
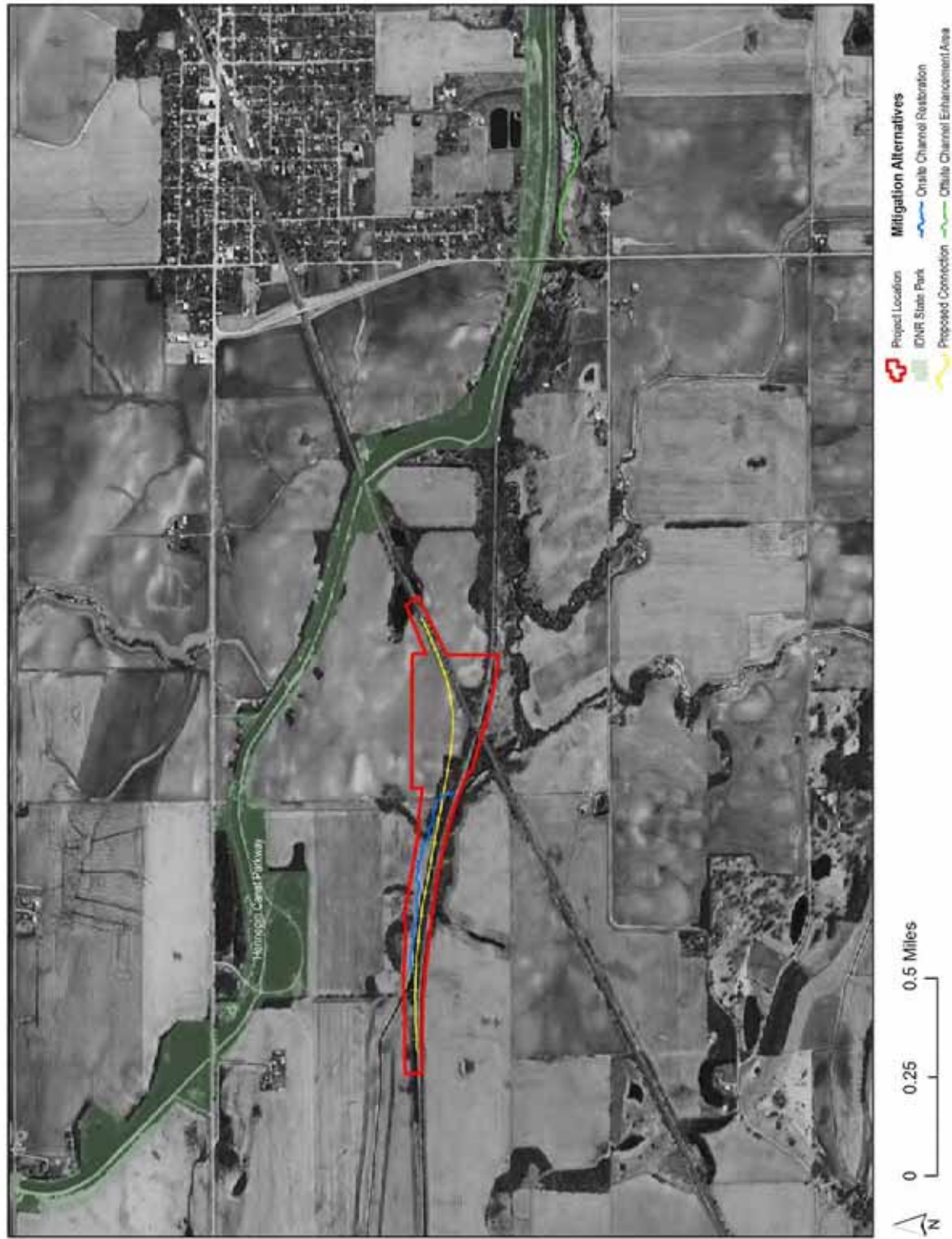


Figure 11: Off-site Mitigation Alternative Map for the Wyanet Connection section of the Project area



ATTACHMENTS

- A – Site Observation Photo Log**
- B - INHS Wetland Delineation Report / INHS Prairie Report**
- C – IEPA SHAP Data Sheet**
- D – Typical Section of Instream Mitigation Features**

Attachment A – Site Observation Photo Log



1. Looking East at riparian area surrounding Pond Creek from 1200 East Bridge



2. Looking East at the trapezoidal channel of Pond Creek from 1200 East Bridge



3. Looking West at a remnant prairie site identified by the INHS during their recent survey of the connection site



4. Looking northwest from rail embankment where Pond Creek Flows through the IAIS railroad



5. Looking west at the double arched culverts open bottom culverts within the IAIS rail embankment



6. Looking south toward the IAIS railroad from within the Pond Creek floodplain



7. Leopard Frog observed along the banks of Pond Creek



8. Honeysuckle invades the riparian slope adjacent to the rail embankment.



9. Looking downstream at a typical section of Pond Creek, notice the stable, well vegetated banks



10. Looking west (upstream) at Pond Creek, notice submerged vegetation along the left bank of the stream.



11. Looking at a typical slope along the north bank of Pond Creek, slopes of approximately 1.5:1



12. Curly leaf pond weed has successfully colonized a narrow zone along the bank where flows are not to strong



13. Typical fine grained sand substrate within the majority of the stream channel



14. Typical silt substrate at the edge of the channel



15. Typical coarse grained sand substrate within the some portions of the stream channel



16. Typical emergent wetland fringe at the edge of the channel



17. Looking from within Pond Creek at a typical bank height of 15-20 to the top of bank.

Attachment B

INHS Wetland Delineation Report

(This report is included as *Attachment 8* to the
Tier 1 Service Level Environmental Assessment Supplemental Information)

Supplemental INHS Prairie Report

(This report is included as *Attachment 11* to the
Tier 1 Service Level Environmental Assessment Supplemental Information)

Attachment C – IEPA SHAP Data Sheet

APPENDIX E-9: IEPA QUALITATIVE STREAM HABITAT ASSESSMENT PROCEDURE (SHAP)

Stream: Pond Creek

Station Code: IL_DQDA

Reach Length: ~ 2,000 ft Date: 6.30.2010

Assessed by: JLB ; DRK

Reach Description: Wyanet Connection Site Location

Consensus

		EXCELLENT	GOOD	FAIR	POOR
1	Bottom Substrate	Greater than 50% gravel, cobble or boulders	30-50% consolidated gravel, cobble or boulders	10-30% gravel (largely unconsolidated) cobble, boulders	Less than 10% gravel, cobble or boulders; predom. Sand or silt
Score:	<u>3</u>	16-20	11-15	6-10	1-5 ✓
2	Deposition	Less than 5% affected; minor accumulation of coarse particles at channel bars, point bars snags or submerged vegetation	5-30% affected; moderate accumulation of sand/gravel at channel point bars, snags or submerged vegetation	5-30% affected; major deposition of sand at channel point bars, snags or submerged vegetation; pools shallow from heavy deposition	Mud, silt, or sand in braided or nonbraided channels; pools almost absent due to deposition
Score:	<u>4</u>	10-12	7-9	4-6 ✓	1-3
3	Substrate Stability	Abundance of boulders or cobble; periphyton/aquatic vegetation often abundant	Presence of some boulders or cobble with some periphyton	Few boulders and cobble; small shifting particles common; periphyton rare; or predom. Claypan or bedrock	Stable substrate types absent; small gravel, sand and silt abundant; periphyton usually absent or present only during low flow
Score:	<u>2</u>	13-16	9-12	5-8	1-4 ✓
4	Instream Cover (for pan fish juveniles or adults)	Abundant submerged logs, undercut banks or other stable habitat (>12% of stream)	Adequate habitat (6-12% of stream)	Habitat availability less than desirable (2-6% of stream)	Lack of habitat obvious (<2 of stream)
Score:	<u>4</u>	10-12	7-9	4-6 ✓	1-3
5	Pool Substrate Characterization	Mixture of coarse substrate materials with gravel and firm sand prevalent; root mats and submerged vegetation common	Mixture of soft sand, mud or clay; mud may be dominant; some root mats and submerged vegetation present	All mud/clay or sandy bottom; little or no root mat, no submerged vegetation; older channelization	Hardpan clay or bedrock; no root mats or vegetation OR maintained channel with shifting sand substrates; OR pools absent
Score:	<u>10</u>	16-20	11-15	6-10 ✓	1-5
6	Pool Quality	(see flow chart)			✓
Score:	<u>4</u>				
7	Pool Variability	Approx equal mix of deep/shallow/large/small pools present	Majority of pools large and deep; very few shallow	Shallow pools much more prevalent than deep pools	Majority of pools small and shallow or pools absent
Score:	<u>3</u>	13-16	9-12	5-8	1-4 ✓
8	Canopy Cover (Shading)	Mixture of conditions some areas fully exposed to sun while others receive various degrees of filtered light	Covered by sparse canopy; entire water surface receiving filtered light	Water surface completely shaded OR nearly full sun reaching water surface (10-20%)	Lack of canopy, full sunlight reaching water surface (0-10%)
Score:	<u>10</u>	10-12	7-9	4-6	1-3

APPENDIX E-9: IEPA QUALITATIVE STREAM HABITAT ASSESSMENT PROCEDURE (SHAP)

		EXCELLENT	GOOD	FAIR	POOR
9	Bank Vegetative Protection/ stability (waters edge to top of bank)	Over 90% of the streambank surfaces covered by vegetation or bare rock	70-90% of the stream bank surface covered by vegetation or bare rock	50-70% of the stream bank surface covered by vegetation or bare rock OR older channelization	<50% of the stream bank surface covered by vegetation or bare rock OR new or regularly maintained channelization
Score:	12	13-16	9-12 ✓	5-8	1-4
10	Top of bank land use (top of bank to 30 yards inland)	Well vegetated or =>90% in undisturbed land use	Generally undisturbed (79-90%)	Moderately disturbed (40-70%)	Little of immediate watershed undisturbed (<40%)
Score:	3	7-8	5-6	3-4 ✓	1-2
11	Flow-related refugia	Readily available refugia at all flow regimes	Abundant stable cover for fish present between water's edge and top of bank; moderate pool depth at low flows	Sparse cover for fish present between the waters edge and top of bank OR pools nearly absent at low flow	Lack of refugia at most stream stages
Score:	4	10-12	7-9	4-6 ✓	1-3
12	Channel Alteration	Little or no enlargement of islands or point bars or no channelization	Some natural channel modification or recovered old channelization	Older channelization in various degrees of recovery	Extensive recent or regularly maintained channelization
Score:	3	7-8	5-6	3-4 ✓	1-2
13 **	Channel Sinuosity	Instream channel length 3 to 4 times straight distance	Instream channel length 2 to 3 times straight line distance	Instream channel length 1 to 2 times straight line distance	Channel straight, channelized waterway
Score:	4	10-12	7-9	4-6 ✓	1-3
14 **	Width /Depth ratio	Stream very deep and narrow; width/depth <=7	Stream moderately deep and narrow; Width/depth 8-15	Stream moderately shallow with some deep areas; width/depth 15-25	Stream relatively wide and shallow; width/depth >25
Score:	5	13-16	9-12	5-8 ✓	1-4
15	Hydrologic diversity	Variety of habitats: deep riffles and pools; diverse velocities readily apparent	Adequate depth in pools and riffles; bends provide habitat; good velocity diversity	Occasional riffle or bend; bottom contours provide some habitat; fair velocity diversity	Essentially a straight stream with poor habitat; uniform velocity
Score:	3	10-12	7-9	4-6	1-3 ✓

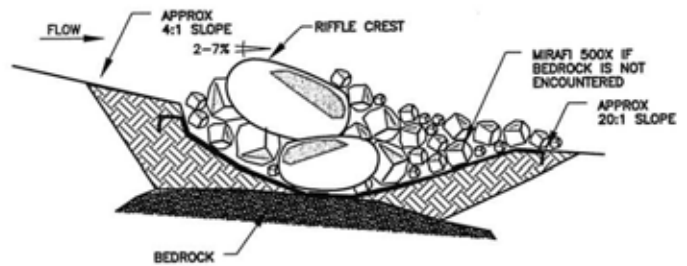
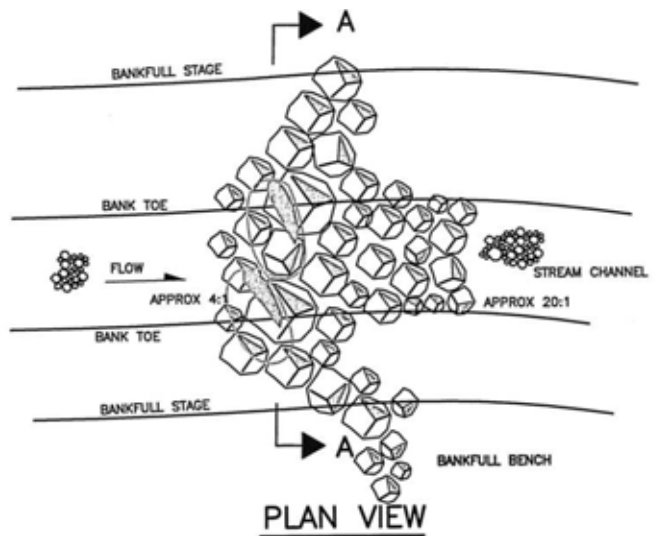
Total Score: 74

Representativeness of sampled reach to entire stream reach: Excellent, Good, Fair, Poor (circle one)

Comments: Bad Creek is channelized and trapment short. Little habitat diversity, essentially entire stream is a wet environment.

** Office: Indicates that assessment based on measured habitat information is recommended.

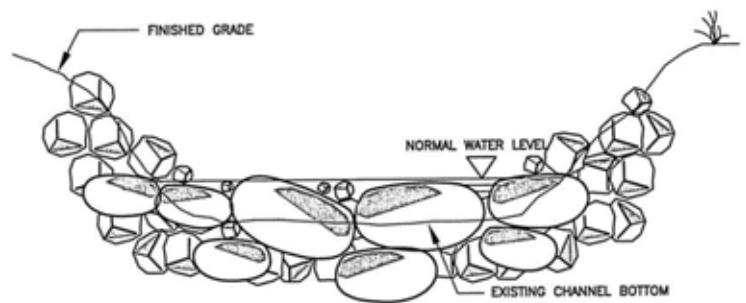
Attachment D – Typical Section of Instream Mitigation Features



PROFILE

CONSTRUCTION NOTES:

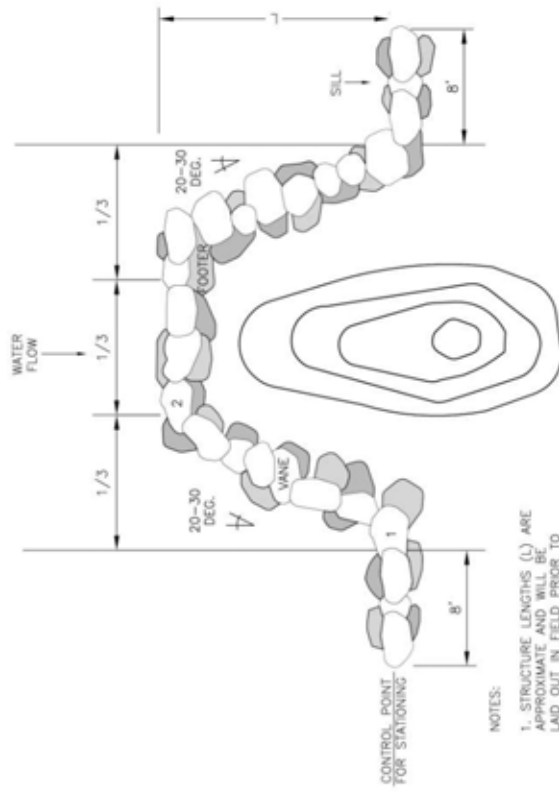
1. PLAN: BUILD RIFFLE TO EXTEND ACROSS BASE OF STREAM WITH LARGEST DIAMETER BOULDERS AT CREST LINE AND REDUCE SIZES PROGRESSIVELY DOWNSTREAM. CREST BOULDERS SIZED 1.5 TO 2 TIMES MAXIMUM SIZE TRANSPORTABLE WITH TOP-OF-BANK EVENT. RIFFLE CREST HAS SIMILAR SIZED FOOTERS TO COHESIVE SAPROLITE OR BEDROCK.
2. PROFILE: CONSTRUCT DOWNSTREAM FACE OF RIFFLE AT APPROXIMATELY 20:1 AND UPSTREAM FACE AT APPROXIMATELY 4:1 SLOPE. SLOPE SHOULD BE ADJUSTED TO MEET DESIGN RIFFLE:POOL RATIO, AND RIFFLE SLOPES.
3. CROSS SECTION: V-SHAPED CREST CUT DOWN TOWARDS CENTER OF CHANNEL.
4. SURFACE: SPACE LARGE SURFACE ROCKS 20 TO 30 CM APART ON THE DOWNSTREAM FACE OF THE RIFFLE TO FORM LOW FISH PASSAGE CHANNELS.
5. BANKS: EXTEND RIFFLE SIDE SLOPE UP BANK TO LEVELS EQUAL TO HEIGHT OF COIR FIBER LOGS, AND THEN EXTEND CREST BACK WITH ROCK PLACED WITHIN BANDS AT 20 TO 30° ANGLE FROM BANK, AND WITH RISE ANGLE OF 2-7° (AS SEEN IN THE CROSS VANE STRUCTURE).



SECTION A-A

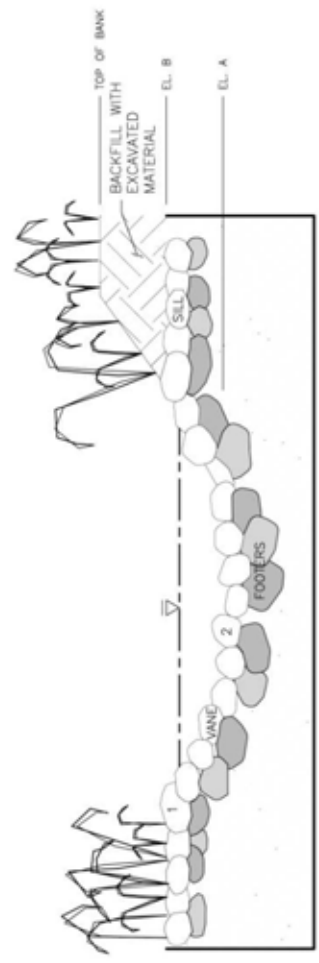
CONSTRUCTED BEDROCK RIFFLE

NO SCALE

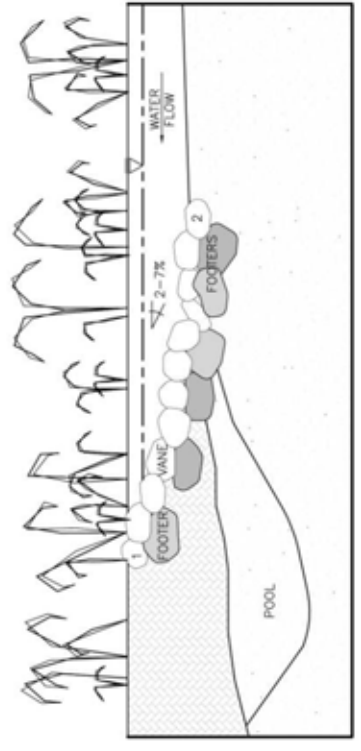


NOTES:
 1. STRUCTURE LENGTHS (L) ARE APPROXIMATE AND WILL BE LAID OUT IN FIELD PRIOR TO CONSTRUCTION

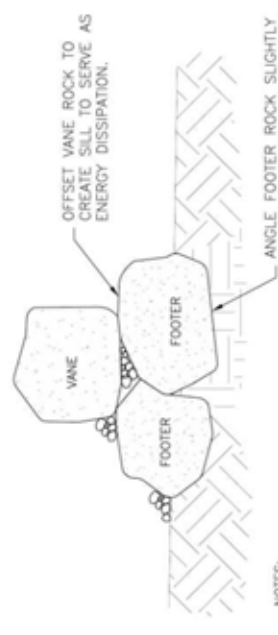
PLAN VIEW
 NTS



CROSS SECTION VIEW
 NTS



PROFILE VIEW
 NTS

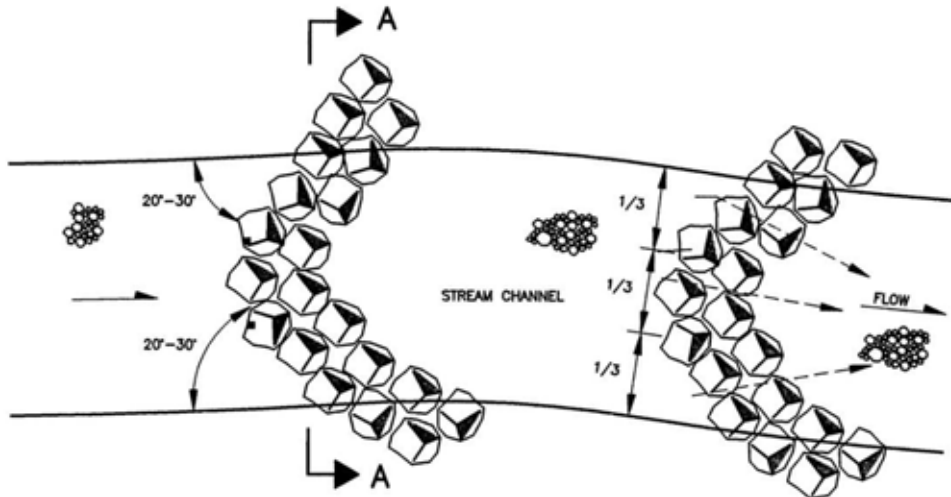


NOTES:
 1. GRAVEL BEDDING ALLOWING GOOD ROCK TO ROCK CONTACT.
 2. GOOD CONTACT BETWEEN VANE ROCKS AND FOOTER ROCK MUST BE MET TO ENSURE STABILITY.

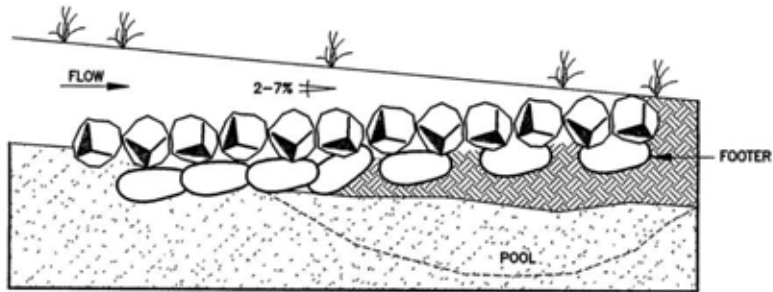
ROCK DETAIL
 NTS

OFFSET VANE ROCK TO CREATE SILL TO SERVE AS ENERGY DISSIPATION.

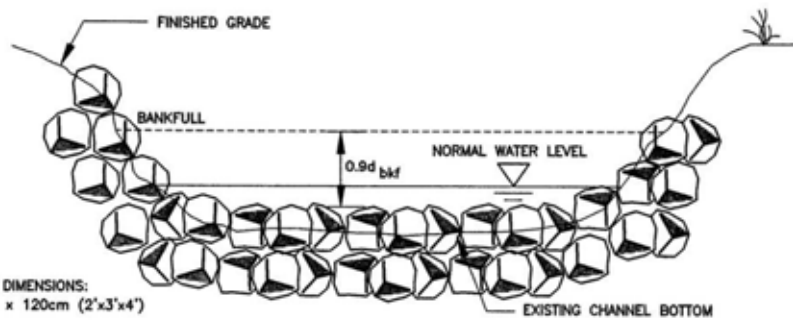
ANGLE FOOTER ROCK SLIGHTLY UPSTREAM TO ENSURE STABILITY OF VANE ROCKS.



PLAN VIEW
NOT TO SCALE



PROFILE
NOT TO SCALE



MIN. BOULDER DIMENSIONS:
60cm x 90cm x 120cm (2'x3'x4')
BOULDER SPACING:
TO BE DETERMINED IN FIELD

SECTION A-A
ROCK CROSS VANES
NO SCALE

