

Item 5: Water Quality Certification Application

PIC-CR22-6.95 BRIDGE REPLACEMENT (PID 83541)

Antidegradation Analysis

**Antidegradation Analysis:
PIC-CR22-6.95 BRIDGE REPLACEMENT (PID 83541)**

Section 1: Antidegradation Analysis:

1.1 Project Description:

1.1.1 Project History

The existing PIC-CR22-6.58 Bridge, also known as the Scioto Darby Road Bridge, built in 1910 is a two-span bridge with a pin-connected-pratt through truss on concrete gravity abutments and piers. It has a corrugated steel plate deck with asphalt concrete driving course. According to the Ohio Department of Transportation (ODOT) Bridge Inspection Report from an inspection conducted on November 30, 2011, the overall condition of the bridge is considered to be in critical condition. Specifically, the floor and railing of the deck are in poor or serious condition; the verticals, lower chord, pins/hangers/hinges, floor beam connections, diagonals and bearing devices of the superstructure are in poor, serious or critical condition; and the substructure abutments, piers, back walls, abutment seats and pier seats are in poor or serious condition. The overall National Bridge Inspection (NBIS) rating for the CR-22-6.95 bridge is 1, which means that the bridge has been determined to be structurally deficient, (Item 9: Bridge Inventory Report and Bridge Inspection Report). Generally, when the NBIS rating is 2 or less, the bridge is unlikely to have potential for rehabilitation. Additionally, due the current and future traffic demands the existing one-lane bridge has been deemed functionally obsolete.

The County Engineer's Office aware of the deteriorated state of the existing bridge maintained constant inspections of the bridge since 2012. The County Engineer's Office decided, based on the unsafe condition of the existing bridge, to close it in May of 2013 to through traffic.

1.1.2 Preferred Alternative (PA):

The PA for the PIC-CR22-6.95 bridge replacement project involves the road and bridge improvement in the location of the CR 22 (Scioto Darby Road) bridge over Big Darby Creek. The old bridge would be deconstructed, CR-22 would be realigned and a new bridge would be constructed within the new alignment approximately 150 feet downstream of the existing structure.

The proposed structure would be a three-span bridge with composite prestressed concrete I-beams, concrete deck, reinforced concrete abutments on piles and T-type piers on drilled shafts. The project, including road realignment, would be approximately 2,863 feet long, begin at Station 10+11.92 and end at Station 38+75.00. The new bridge over the Big Darby Creek would be approximately 362.0 feet long and 32 feet wide, begin at Station 25+23.76 and end at Station 29+42.33. The piers of the new bridge are planned to be located outside of the Ordinary High Water Mark (OHWM) of the stream. The floodway opening (distance between the abutments) would be enlarged, compared to the existing bridge to 362 feet (See Item 6: Project Plans).

The new bridge would be located approximately 150 feet downstream (center line to center line) of the existing bridge. The new bridge location was selected in order to minimize the overall environmental impacts to Big Darby Creek, in full cooperation with the resource agencies, (See Item 4: Agency Coordination). The proposed profile and alignment are a direct result of this cooperation and coordination between Pickaway County and the resource agencies. The proposed bridge is located at a narrow section of the creek, which has the advantage of affording a smaller span length, thereby eliminating the need to construct a pier in the waterway. Coupled with the removal of the existing pier spanning the Big Darby Creek would serve to restore the waterway back to a free flowing condition. The average existing right of way width along County Route 22 is 40 feet to the south of the bridge and 75 feet to the north of

Antidegradation Analysis:
PIC-CR22-6.95 BRIDGE REPLACEMENT (PID 83541)

the bridge. Due to the new alignment of the roadway and the removal of the existing roadway, the purchase of right of way from adjacent property owners would be necessary on both sides of the existing road.

The alignment and profile are based on providing the least disturbance necessary to connect the existing roadway to the proposed bridge location. The proposed horizontal alignment is designed to minimize the length of work along County Route 22 and avoid existing sub-standard geometric features; therefore the alignment was designed to meet criteria for a 40 mph design speed instead of 55 mph. A minimum degree of curve of 11°30'00" was used. The existing horizontal alignment includes multiple deficient curves on either end of the project, including a 32°44'26" curve before the project and a 16°00'00" curve after the project. The existing roadway curves only meet design criteria for 15 mph and 36 mph, respectively. Therefore the proposed horizontal alignment of County Route 22 surpasses the design speed of the surrounding roadway. The proposed vertical profile is designed to meet the minimum hydraulic capacity required for the structure, while also meeting the design criteria for a 45 mph design speed. The existing profile along County Route 22 has a deficient grade before the project as well as a deficient vertical curve over the bridge that has an approximate design speed of 45 mph. Therefore the proposed profile would improve the stopping sight distance (SSD) of the roadway, within the project limits and surpass the existing vertical profile design speed outside the project limits. When completed roadway geometric in the project area would meet all standards of Pickaway County and ODOT.

1.1.3 Minimal Degradation Alternative (MDA):

The MDA would reduce the footprint of the CR-22-6.95 plan by rehabilitating the old bridge, not building the new bridge and not realigning the road. Impacts to waters would occur to the Big Darby Creek, as a result of the rehabilitation construction, including the existing pier located below the ordinary high water mark, and the need for temporary pads below the Ordinary High Water Mark (OHWM). Impacts to Streams 3-7 would be limited to replacement of the existing culverts.

The MDA is a scaled-down version of the project that would have fewer overall environmental impacts; however greater permanent impacts to the Big Darby would occur. Due to the frequent coordination and consultation with the resource agencies (See Item 4: Agency Coordination) the MDA was omitted early on from serious consideration. The MDA therefore has not been developed to the same level of engineering detail as the PA.

While this alternative would allow traffic to continue to cross the Big Darby Creek via CR-22, it is not a feasible alternative based upon the deficient condition of the CR-22-6.95 Bridge. According to an Ohio Department of Transportation (ODOT) bridge inspection conducted in 2011 the overall rating of the bridge is considered critical (See Item 9: Buckeye Assets, 2011). The beam seats at both the abutments and pier are in critical condition and are deteriorated to the point that they are losing suitable bearing for the bridge. Also the lower chord was listed to be in critical condition. Rehabilitation of the lower chord on this pin connected truss would require completely taking the truss apart and replacing the lower chord members. In summary, total reconstruction would need to be undertaken in order to rehabilitate the existing CR-22-06.95 Bridge to acceptable condition.

1.1.4 Non-Degradation Alternative (NDA):

Due to the location and configuration of the Big Darby, tributaries to Big Darby, Wetlands A-E and the existing bridge piers with the Big Darby and CR-22 roadway, this proposed project cannot be completed without impacts to wetlands or streams. Therefore, the Non-Degradation Alternative is presented as a "No-Build" alternative. If no new bridge is constructed to replace the existing CR-22-6.95 Bridge, this

Antidegradation Analysis: PIC-CR22-6.95 BRIDGE REPLACEMENT (PID 83541)

bridge would have to remain closed. While no new impacts to the environmental resources would occur within the project area, the “No-Build” alternative does not meet the project purpose or need.

1.2 Avoidance

1.2.1 Preferred Alternative (PA):

Stream Resources

Details of each stream are presented within this section. A total of 659 linear feet of streams would be impacted as a result of the project

Stream 1: Stream 1 is the Big Darby Creek, situated beneath the existing CR-22-6.95 bridge (ITEM 6: Plans and Item 3: Ecological Survey Report). Big Darby Creek has an approximate drainage area of 512 square miles upstream of the study area and pool depths greater than 40 centimeters; therefore the QHEI was used to evaluate habitat of this stream. The proposed study area spans a section of the Big Darby Creek from approximately River Mile (RM) 18.7 to RM 18.8. A QHEI was performed by the Ohio EPA in 2001 at RM 18.7 (Item 8: OEPA Biological & Water Quality Study, 2001/2002), with a resulting score of 85. This score, combined with an Index of Biotic Integrity (IBI) score of 52 (Ohio EPA, 2001) and an Invertebrate Community Index (ICI) score of 42 (Ohio EPA, 2001), places this stream within the Exceptional Warmwater Habitat (EWH) Aquatic Life Use Designation. Big Darby Creek is listed as a State and National Scenic River in the proposed project area (See Item 3: Ecological Survey Report). This segment of the Big Darby Creek has an Anti-degradation Designation of Outstanding State Waters.

The Darby Creek system is commonly recognized as one of the most biologically diverse systems in the Midwest, supporting many different species of plants and animals. Within this segment of the stream, three (3) state listed fish, none of which are federally listed, and 12 state listed mussels are presumed present. Of the state listed mussels, four (4) of these mussels species are also federally listed (see Impacts to Federally and State Listed Species subsection below and the Item 3: Ecological Survey Report for details of listed species). Of the fish identified during a 2001 survey by the Ohio EPA at RM 18.7 (Item 8: OEPA Biological & Water Quality Study, 2001/2002), the following are considered popular sport fish: smallmouth buffalo (*Ictiobus bubalus*), white sucker (*Catostomus commersoni*), common carp (*Cyprinus carpio*), white crappie (*Pomoxis annularis*), rock bass (*Ambloplites rupestris*), smallmouth bass (*Micropterus dolomieu*), spotted bass (*Micropterus punctulatus*), largemouth bass (*Micropterus salmoides*), green sunfish (*Lepomis cyanellus*), bluegill sunfish (*Lepomis macrochirus*), longear sunfish (*Lepomis megalotis*), sauger (*Stizostedion canadense*) and freshwater drum (*Aplodinotus grunniens*) (Ohio EPA, 2001).

Permanent impacts have been avoided and no permanent impacts would occur to the Big Darby as a result of the construction activities. However, to remove the existing bridge piers temporary impacts would occur as a result of the construction of a temporary pad immediately downstream of the bridge. A maximum total of 0.079 acres extending 50 linear feet (measured up and down stream) of temporary fill would be needed to construct the temporary pad, which would provide access to existing bridge pier. Once demolition of the existing bridge has been completed, all temporary fill would be removed from the stream to ensure pre-construction conditions.

Any impacts to aquatic fauna within the Big Darby should be minimal and temporary and should not lower the aquatic life use designation. Any downstream sedimentation would be temporary and an attempt to lessen sedimentation through best management practices would be made. A mussel survey has been conducted and is attached in Item 8: Mussel Survey. All mussels in need of relocation would be relocated

Antidegradation Analysis:
PIC-CR22-6.95 BRIDGE REPLACEMENT (PID 83541)

upstream prior to construction by a Professional Malcologist. Recovery of this stream would be expected to occur following completion of construction.

Stream 2: Stream 2 was determined to be non-jurisdictional by the USACE during the field meeting of March 7, 2013. (See Item 3: PJD Letter).

Streams 3 through 7: A formal survey of macroinvertebrates was not performed on Streams 3 through 7. However, three caddisfly larvae (stone case builders, not keyed to genus) were found within Stream 4. Therefore, it can be assumed that these aquatic macroinvertebrates are likely in one or more other ephemeral streams within the study area and some individuals would likely be impacted.

Impacts to Streams 3 through 7 have been minimized or avoided to the extent practicable given the realignment of Scioto Darby Road to meet up with the proposed bridge over the Big Darby Creek.

Stream 3: Stream 3 is a tributary to Stream 1 (Big Darby Creek). It is located south of the CR-22-6.95 bridge, in the southeastern portion of the study area (See Item 3: Ecological Survey Report). The stream is captured by Stream 6 (a captured stream functioning as a roadside ditch). This stream has an approximate drainage area of less than one (1) square mile and pool depths less than 40 centimeters; therefore the HHEI was used to evaluate habitat of this stream. Stream 3 had a score of 20 utilizing the latest version of the HHEI (See Item 2: Stream Impact Table and Item 3: Ecological Survey Report). An HHEI score of less than 30 for a stream channel is indicative of a Class 1 PWH stream. A formal survey of macroinvertebrates was not performed. A total of 70 linear feet would be impacted as a result of the PA.

Stream 4: Stream 4 is a tributary to Stream 1 (Big Darby Creek). It is located south of the CR-22-6.95 bridge, in the southeastern portion of the study area (See Item 3: Ecological Survey Report). The stream is captured by Stream 6 (a captured stream functioning as a roadside ditch). This stream has an approximate drainage area of less than one (1) square mile and pool depths less than 40 centimeters; therefore the HHEI was used to evaluate habitat of this stream. Stream 4 had a score of 28 utilizing the latest version of the HHEI (See Item 2: Stream Impact Table and Item 3: Ecological Survey Report). An HHEI score of less than 30 for a stream channel is indicative of a Class 1 PWH stream. A formal survey of macroinvertebrates was not performed on Stream 4. However, three caddisfly larvae (stone case builders, not keyed to genus) were found within Stream 4. 133 linear feet of Stream 4 would be impacted in the construction of the PA.

Stream 5: Stream 5 is a tributary to Stream 4. It is located south of the CR-22-6.95 bridge, in the southeastern portion of the study area (See Item 3: Ecological Survey Report). The stream flows into Stream 4. This stream has an approximate drainage area of less than one (1) square mile and pool depths less than 40 centimeters; therefore the HHEI was used to evaluate habitat of this stream. Stream 4 had a score of 27 utilizing the latest version of the HHEI (See Item 2: Stream Impact Table and Item 3: Ecological Survey Report). An HHEI score of less than 30 for a stream channel is indicative of a Class 1 PWH stream. A formal survey of macroinvertebrates was not performed. No impacts would occur to Stream 5 under the PA.

Stream 6: Stream 6 is located south of the CR-22-6.95 bridge, in the southeastern portion of the study area (See Item 3: Ecological Survey Report). Stream 6 is a captured stream functioning as a roadside ditch that captures Streams 2, 3 and 4 and drains to the Big Darby Creek. Because it has a defined bed and bank and captures streams, it was categorized as a stream. This stream has an approximate drainage area of less than one (1) square mile and pool depths less than 40 centimeters; therefore the HHEI was used to evaluate habitat of this stream. Stream 6 had a score of 42 utilizing the latest version of the HHEI (See Item 2: Stream Impact Table and Item 3: Ecological Survey Report). An HHEI score of

Antidegradation Analysis:
PIC-CR22-6.95 BRIDGE REPLACEMENT (PID 83541)

greater than or equal to 30 for a modified channel is indicative of a Modified Class 2 PHWH stream. While Class 2 streams are generally considered intermittent or perennial, Stream 6 is likely ephemeral and scored higher based on constructed size. A formal survey of macroinvertebrates was not performed. Stream 6 would be relocated in the PA; a total of 406 linear feet would be impacted.

Stream7: Stream 7 is located north of the CR-22-6.95 bridge, in the northwestern portion of the study area (See Item 3: Ecological Survey Report). Stream 7 flows directly into the Big Darby Creek. This stream has an approximate drainage area of less than one (1) square mile and pool depths less than 40 centimeters; therefore the HHEI was used to evaluate habitat of this stream. Stream 7 had a score of 41 utilizing the latest version of the HHEI (See Item 2: Stream Impact Table and Item 3: Ecological Survey Report). An HHEI score of greater than or equal to 30 for a modified channel is indicative of a Modified Class 2 PHWH stream. Stream 7 was determined to be a Relatively Permanent Water. A formal survey of macroinvertebrates was not performed. No impacts would occur to Stream 7 as a result of the PA.

Wetland Resources

See Item 2: Wetland Impacts Table and Item 3: Ecological Survey Report for the further details of each wetland presented within this section. The Corps of Engineers approved wetland delineation may be found in Item 4: Preliminary Jurisdictional Determination letter. A total of 0.17 acres of wetlands (Wetland A) would be impacted as a result of the project. Impacts to Wetland A would involve filling associated with the straightening and relocation of CR-22 (Scioto-Darby Road) east of its current location, and would necessitate impacting this wetland permanently. Wetland A would be filled with clean earthen fill obtained from on-site. Wetland A is provisionally classified as Category 1 and is characterized by limited habitat quality. Because the study area is the same as the construction limits for the Preferred Alternative, ecological resources found within the study area are the same as those that would be impacted.

Wetland A is a PFO/PSS/PEM wetland complex located partially within the scrub-shrub/forested floodplain of Big Darby Creek and partially within a mowed utility right of way in the northwestern portion of the study area (See Item 3: Ecological Survey Report). Wetland A is dominated in the tree stratum by eastern cottonwood (*Populus deltoides*-FAC) and American elm (*Ulmus Americana*-FACW), in the shrub stratum by common buttonbush (*Cephalanthus occidentalis*-OBL), and in the herbaceous stratum by Gray's sedge (*Carex grayi*-FACW), Virginia wildrye (*Elymus virginicus*-FACW), reed canarygrass (*Phalaris arundinacea*-FACW), Kentucky bluegrass (*Poa pratensis*-FAC), and Canada bluegrass (*Poa compressa*-FACU). This wetland has a probable hydrologic regime of regularly inundated/saturated (>25% - 75% of the growing season) (Environmental Laboratories, 1987, Corps of Engineers, 2010). The *Soil Survey of Pickaway County* maps the soil within this area as Genesee silt loam (Gn), which is listed as non-hydric for Pickaway County (Soil Conservation Service, 1980a and 1994). An adjacency determination in the field (March 7, 2013) revealed that this wetland is considered adjacent. According to the latest version of the ORAM, this wetland scored a 43 due to disturbances, including recent and frequent mowing, road bed filling and grading, which makes this a Modified Category 2 wetland. In total extent, this wetland is 0.17 acres within the study area. No wetland was identified on the NWI map in this portion of the study area (See Item 3: Ecological Survey Report). Due to the realignment of CR 22, to minimize impacts to the National Scenic Big Darby Creek, a total of 0.17 acres of Wetland A would be impacted by the PA.

Wetland B is a REM wetland located within the Big Darby Creek in the central portion of the study area (See Item 3: Ecological Survey Report). Wetland B is dominated in the herbaceous stratum by silver maple (*Acer saccharinum*-FACW), clammy hedgehyssop (*Gratiola neglecta*-OBL) and sandbar willow (*Salix interior*-FACW) (See Item 3: Ecological Survey Report). This wetland has a probable hydrologic

Antidegradation Analysis:
PIC-CR22-6.95 BRIDGE REPLACEMENT (PID 83541)

regime of regularly inundated/saturated (>25% - 75% of the growing season) (Environmental Laboratories, 1987, Corps of Engineers, 2010). The *Soil Survey of Pickaway County* maps the soil within this area as Genesee silt loam (Gn), which is listed as non-hydric for Pickaway County (Soil Conservation Service, 1980a and 1994). An adjacency determination in the field revealed (March 7, 2013) that this wetland is considered abutting. According to the latest version of the ORAM, this wetland scored a 51, which makes this a Modified Category 2 wetland. In total extent, this wetland is 0.01 acres within the study area. No wetland was identified on the NWI map in this portion of the study area. Impacts to this wetland have been avoided due to the realignment of CR 22.

Wetland C is a REM wetland located within the Big Darby Creek in the central portion of the study area (See Item 3: Ecological Survey Report). Wetland C is dominated in the herbaceous stratum by American water-willow (*Justicia americana*-OBL). This wetland has a probable hydrologic regime of regularly inundated/saturated (>25% - 75% of the growing season) (Environmental Laboratories, 1987). The *Soil Survey of Pickaway County* maps the soil within this area as Genesee silt loam (Gn), which is listed as non-hydric for Pickaway County (Soil Conservation Service, 1980a and 1994). An adjacency determination (March 7, 2013) in the field revealed that this wetland is considered abutting. According to the latest version of the ORAM, this wetland scored a 54 due to disturbances, including recent and frequent mowing, road bed filling and grading, which makes this a Modified Category 2 wetland. In total extent, this wetland is 0.01 acres within the study area. No wetland was identified on the NWI map in this portion of the study area. Impacts to this wetland have been avoided due to the realignment of CR 22.

Wetland D is a PEM wetland located within the Big Darby Creek in the central portion of the study area (See Item 3: Ecological Survey Report). Wetland D is dominated in the herbaceous stratum by silver maple (*Acer saccharinum*-FACW). This wetland has a probable hydrologic regime of regularly inundated/saturated (>25% - 75% of the growing season) (Environmental Laboratories, 1987). The *Soil Survey of Pickaway County* maps the soil within this area as Genesee silt loam (Gn), which is listed as non-hydric for Pickaway County (Soil Conservation Service, 1980a and 1994). An adjacency determination in the field (March 7, 2013) revealed that this wetland is considered abutting. According to the latest version of the ORAM, this wetland scored a 56 due to disturbances, including recent and frequent mowing, road bed filling and grading, which makes this a Modified Category 2 wetland. In total extent, this wetland is 0.03 acres within the study area. No wetland was identified on the NWI map in this portion of the study area. Impacts to this wetland have been avoided due to the realignment of CR 22.

Wetland E is a REM wetland located within the Big Darby Creek in the central portion of the study area (See Item 3: Ecological Survey Report). Wetland E is dominated in the herbaceous stratum by American water-willow (*Justicia americana*-OBL), silver maple (*Acer saccharinum*-FACW) and rough cocklebur (*Xanthium strumarium*-FAC). This wetland has a probable hydrologic regime of regularly inundated/saturated (>25% - 75% of the growing season) (Environmental Laboratories, 1987, 1987, Corps of Engineers, 2010). The *Soil Survey of Pickaway County* maps the soil within this area as Genesee silt loam (Gn), which is listed as non-hydric for Pickaway County (Soil Conservation Service, 1980a and 1994). An adjacency determination in the field (March 7, 2013) revealed that this wetland is considered abutting. According to the latest version of the ORAM, this wetland scored a 51 due to disturbances, including recent and frequent mowing, road bed filling and grading, which makes this a Modified Category 2 wetland. In total extent, this wetland is 0.08 acres within the study area. No wetland was identified on the NWI map in this portion of the study area. Impacts to this wetland have been avoided due to the realignment of the temporary demolition fill needed to remove the existing bridge pier.

**Antidegradation Analysis:
PIC-CR22-6.95 BRIDGE REPLACEMENT (PID 83541)**

Evaluation of Potential Mussel Beds

The Pickaway CR 22 Bridge Project mussel survey (See Item 8: Mussel Survey) area was found to contain very modest mussel resources, most of which were located outside of anticipated construction / demolition impact areas. Only one weathered dead valve of the federally listed snuffbox (*Epioblasma triquetra*) was detected but 5 State of Ohio Species of special concern were found within the study area (3 at 150ft upstream and 2 at 200ft downstream from the CR22 Bridge) in small numbers. Prior to construction the project area would be resurveyed for mussels and any mussels found within the project area would be relocated by the Professional Malacologist.

1.2.2 Minimal Degradation Alternative (MDA):

The MDA was developed and explored to avoid and/or minimize impacts to aquatic resources in the project area. The MDA would reconstruct the existing bridge in the current location, thus minimizing the overall project footprint. County Road 22 (CR22) would be rehabilitated in place and impacts to waters would be limited the Big Darby Creek and the replacement of the existing culverts under CR22. The existing bridge pier, located below the Ordinary High Water Mark (OHWM) of the Big Darby Creek, would be demolished and replaced causing both temporary and permanent impacts. Impacts to Wetland A would be eliminated. The MDA was rejected in the agency field meeting of March 7, 2013; where it was agreed that returning the Big Darby Creek to a free flowing river (i.e., Preferred Alternative) was the more ecologically beneficial alternative.

1.2.3 Non-degradation Alternative (NDA):

Due to the location of the existing CR22 Bridge, impacts to the Big Darby Creek cannot be avoided. Regardless of the build alternative the removal and/or replacement of the existing bridge pier selected would incur impacts to the Big Darby Creek. Therefore, the NDA is presented as the 'No Build' Alternative. While the 'No Build' would avoid all impacts to aquatic resources it does not meet the project purpose and need.

1.3 Minimization

1.3.1 Preferred Alternative (PA):

To minimize impacts to the Big Darby Creek the PDA proposes to relocate CR22 and the existing bridge 150 feet down stream to an area where the river narrows, compared to the existing bridge location, and construct a one span bridge over the Big Darby Creek. This alternative eliminates the need to build a bridge pier within the waterway and returns the Big Darby to a free flowing condition in the project area. The PA does however require that approximately 0.31 miles of CR22 be relocated to connect the relocated bridge to the existing roadway.

The alignment and profile are based on providing the least disturbance necessary to connect the existing roadway to the proposed bridge location. The proposed horizontal alignment is designed to minimize the length of work along County Route 22 and avoid existing sub-standard geometric features; therefore the alignment was designed to meet criteria for a 40 mph design speed instead of 55 mph. A minimum degree of curve of 11°30'00" was used. The existing horizontal alignment includes multiple deficient curves on either end of the project, including a 32°44'26" before the project and a 16°00'00" after the project. These curves only meet design criteria for 15 mph and 36 mph, respectively. Therefore the proposed horizontal alignment of County Route 22 surpasses the design speed of the surrounding roadway. The proposed vertical profile is designed to meet the minimum hydraulic capacity required for

**Antidegradation Analysis:
PIC-CR22-6.95 BRIDGE REPLACEMENT (PID 83541)**

the structure, while also meeting the design criteria for a 45 mph design speed. The existing profile along County Route 22 has a deficient grade before the project as well as a deficient vertical curve over the bridge that has an approximate design speed of 45 mph. Therefore the proposed profile would improve the stopping sight distance (SSD) of the roadway, within the project limits and surpass the existing vertical profile design speed outside the project limits. When completed roadway geometric in the project area would meet all standards of Pickaway County and ODOT.

1.3.2 Minimal Degradation Alternative (MDA):

To minimize impacts to Streams 3-7 and Wetland A the MDA proposes to reconstruct the existing bridge and roadway in their current locations. The MDA would reduce the overall footprint of the CR-22-6.95 plan by rehabilitating the old bridge and maintaining the existing roadway alignment. Impacts to waters would be limited to replacing the existing culverts in the project area and the Big Darby Creek, as a result of the rehabilitation construction and the need for temporary pads below the Ordinary High Water Mark (OHWM). No impacts would occur to Wetland A.

1.2.3 Non-degradation Alternative (NDA):

Due to the location of the existing CR22 bridge, impacts to the Big Darby Creek cannot be minimized. Regardless of the build alternative the removal and/or replacement of the existing bridge pier selected would incur impacts to the Big Darby Creek. Therefore, the NDA is presented as the 'No Build' Alternative. While the 'No Build' would avoid all impacts to aquatic resources it does not meet the project purpose and need.

1.4 Magnitude of the Lowering of Water Quality

1.4.1 Preferred Alternative (PA):

The Preferred Alternative would necessitate the temporary and permanent impact of streams and wetlands within the study area as specified in Section 1.2. However, any lowering of water quality would be temporary.

The study area is known to harbor threatened and endangered species (See Item 4: Agency Coordination and Item 3: Ecological Survey Report). Some temporary disturbance to mussel, fish and macroinvertebrate species within the Big Darby Creek may occur as a result of construction activities within the Big Darby Creek.

1.4.2 Minimal Degradation Alternative (MDA):

Impacts to waters within the project area would be limited to the Big Darby Creek and the areas of Streams 3-7 in existing culverts. As with the Preferred Alternative, any lowering of water quality would be temporary. Temporary disturbances to mussel, fish and macroinvertebrate species within the Big Darby Creek may occur as a result of construction activities within the Big Darby Creek.

1.4.4 Non-Degradation Alternative (NDA):

The NDA would not create a direct lowering of the water quality.

**Antidegradation Analysis:
PIC-CR22-6.95 BRIDGE REPLACEMENT (PID 83541)**

1.5 Technical Feasibility and Cost Effectiveness

1.5.1 Preferred Alternative (PA):

The PA has been advanced to the engineering and drainage design stage (See Item 6: Plans). All structures, stream crossings, roadway alignment, and construction footprint have been developed to be technically feasible and available to construct. This alternative is deemed reliable with no known or foreseen maintenance or operational difficulties.

The PA would cost approximately \$4,400,000 to construct. The new bridge would possess pre-stressed I-beams, which should be sealed every 10 years to provide the longest life from the structure. Present day costs for repairs total approximately \$410,000 and include: bridge deck repairs in 25 years (\$20,000), abutments crack repairs in 40 years (\$380,000) and pier crack repairs in 40 years (\$10,000).

1.5.2 Minimal Degradation Alternative (MDA):

This alternative would reconstruct the existing CR-22-6.95 Bridge in the existing location. The reconstructed bridge structure, the culverted stream crossings, roadway rehabilitation, and construction footprint have been developed to be technically feasible and available to construct. This alternative is deemed reliable with no known or foreseen maintenance or operational difficulties.

Due to the fact that the MDA has not been developed to same engineering detail as the PA determining exact costs are difficult. It can however be assumed that the reconstruction of the existing bridge would be of similar cost to the construction of the PA bridge, however, costs for the roadway realignment would be eliminated when compared to the PA.

1.5.3 Non-Degradation Alternative (NDA):

The NDA or ‘No Build’ Alternative although technically feasible does not meet the project stated Purpose and Need and provides a functional crossing of the Big Darby Creek by CR22. There are no construction costs associated with the MDA, however, the cost to the community due to the closure of CR22 are immeasurable. Future costs for the removal of the existing bridge are estimated in excess of \$300,000.

1.6 Economic Considerations

1.6.1 Preferred Alternative (PA), Minimal Degradation Alternative (MDA) and the Non-Degradation Alternative (NDA):

While economic development is not the primary objective of the PIC-CR22 project, construction of the project would have a positive economic benefit to Pickaway County by providing much needed construction and other jobs in the region. There should be no job or economic losses as a result of the project.

In addition to the direct economic benefit that would be realized by the construction workers who are employed as a result of the project; indirect economic benefit would occur as these construction workers spend portions of their salaries to purchase goods and services in the project vicinity as well as their home communities.

The PA, MDA and the NDA are not expected to change or influence growth patterns in the area. Construction of the PIC-CR22 project would improve the current impacts to community cohesion by re-

**Antidegradation Analysis:
PIC-CR22-6.95 BRIDGE REPLACEMENT (PID 83541)**

opening CR22. The roadway has been closed since May 2013. The proposed project would not cause any substantial impacts to the local tax base or property values.

1.7 Cumulative Impact

1.7.1 Preferred Alternative (PA) and Minimal Degradation Alternative (MDA):

Temporary impacts to the Big Darby Creek for the PA and the MDA are very similar due to the temporary fills associated with the removal and/or replacement of the existing bridge pier. As described in Section 1.2, neither the PA nor the MDA would provide for cumulative impacts outside the project area.

1.7.2 Non-Degradation Alternative (NDA):

No cumulative impacts would occur as a result of the NDA.

1.8 Indirect Impacts

1.8.1 Preferred Alternative (PA) and Minimal Degradation Alternative (MDA):

Temporary indirect impacts to Big Darby Creek would include limited available habitat during construction and reduce the ability of some aquatic organisms to move up and down stream. Riparian vegetation would be removed in the area of the new bridge in the PA and to access the existing pier in both the PA and MDA.

1.8.3 Non-Degradation Alternative (NDA):

No indirect impacts to waterways would occur as a result of the NDA.

1.9 Construction Storm Water Management Plans

1.9.1 Preferred Alternative (PA):

As shown in Table 1, the costs for the design and implementation of water pollution controls, including a storm water pollution prevention plan for the Preferred Alternative are expected to be approximately **\$384,758.15**.

Best management practices (BMPs) for erosion control would be followed during project construction. Compliance with ODOT specifications and applicable National Pollutant Discharge Elimination System (NPDES) permit requirements is expected to provide adequate sediment and erosion control protection to relevant water resources. A well-designed water pollution and erosion control plan, which would be incorporated into the final construction plans, would minimize short-term construction impacts on the quality of the water exiting the site. Temporary sediment and erosion control practices such as utilization of sediment basins, silt fence or ditch checks would be followed while constructing the proposed project. Vegetated biofilters (i.e. widened ditches) would be permanent BMP features constructed within the project area.

**Antidegradation Analysis:
PIC-CR22-6.95 BRIDGE REPLACEMENT (PID 83541)**

Table 1:

ITEM	DESCRIPTION	QTY.	UNIT	UNIT PRICE	ITEM COST
601	TIED CONCRETE BLOCK MAT, TYPE 2	172	SY	\$ 43.91	\$ 7,552.50
601	ROCK CHANNEL PROTECTION, TYPE A WITH FABRIC FILTER	756	CY	\$ 67.76	\$ 51,226.56
601	ROCK CHANNEL PROTECTION, TYPE C WITH FABRIC FILTER	244	CY	\$ 53.55	\$ 13,065.85
659	Topsoil	6,304	CY	\$ 10.28	\$ 64,805.12
659	TOPSOIL, AS PER PLAN	39.00	CY	\$10.28	\$ 400.92
659	SEEDING AND MULCHING	56,795.00	SY	\$0.310	\$ 17,606.45
659	REPAIR SEEDING AND MULCHING	2,840.00	SY	\$0.44	\$1,249.60
659	INTER-SEEDING	2,840.00	SY	\$0.13	\$ 369.20
659	COMMERCIAL FERTILIZER	7.66	TON	\$500.00	\$3,830.00
659	LIME	11.730	AC	\$75.00	\$879.75
659	WATER	307.00	MGAL	\$1.36	\$417.52
659	Mowing	0.130	MSF	\$1,500.00	\$195.00
670	SLOPE EROSION PROTECTION MAT, TYPE B	5,911	SY	\$1.10	\$6,502.10
670	DITCH EROSION PROTECTION MAT, TYPE B	173.00	SY	\$1.26	\$218.74
670	VEGETATED SWALE EROSION PROTECTION MAT, TYPE B	696	SY	\$1.19	\$828.24
832	STORM WATER POLLUTION PREVENTION PLAN, AS PER PLAN	1.00	LS	\$15,000.00	\$15,000.00
832	EROSION CONTROL	198,000	EACH	\$1.00	\$198,000.00
836	SEEDING AND EROSION CONTROL WITH TURF REINFORCING MAT, TYPE 1	583.00	SY	\$4.53	\$2,640.99
				Total=	\$ 384,758.15

Antidegradation Analysis:
PIC-CR22-6.95 BRIDGE REPLACEMENT (PID 83541)

1.9.2 Minimal Degradation Alternative (MDA):

Since the MDA has not been developed to the same engineering detail as the PA estimating the costs for the design and implementation of the water pollution controls, including the storm water pollution prevention plan, would be extremely speculative. Temporary best management practices for water pollution and erosion control would be followed as with the Preferred Alternative.

Water pollution controls costs for the MDA can be assumed to be considerably less due to the reduced earth disturbed area when compared to the PA.

1.9.3 Non-Degradation Alternative (NDA):

There would be no storm water pollution and prevention control costs associated with the Non-Degradation Alternative.

1.10 Construction Storm Water Management Plans

1.10.1 Preferred Alternative (PA) and Minimal Degradation Alternative (MDA):

To manage the post construction storm water runoff the Pickaway County Engineer's Office and the project designers have chosen to utilize Ohio DOT's standards as outlined in the Location and Design Manual, Volume 2. Vegetated biofilters and vegetated filter strips would be used throughout the project area as detailed in the project plans (see Item 6: Plans). The vegetated biofilters would be constructed to include the 'Enhanced Bankfull Width' as specified in the Location and Design Manual.

1.10.2 Non-Degradation Alternative (NDA):

There would be no construction storm water pollution costs associated with the Non-Degradation Alternative.

Item 5: Water Quality Certification Application

PIC-CR22-6.95 BRIDGE REPLACEMENT (PID 83541)

Antidegradation Analysis