Hydro Green Energy®

Braddock Locks & Dam Hydropower Project

(FERC Project No. 13739)

December 5, 2012 FERC Scoping Meetings

Objectives

- Overview of HGE and the Braddock Project
- Overview of licensing process and studies to date
- Solicit feedback on Braddock Project and studies
- Identify any new issues, if any, before FERC moves into its NEPA process and works towards issuing a new operating license in 2013

About Hydro Green Energy (HGE)

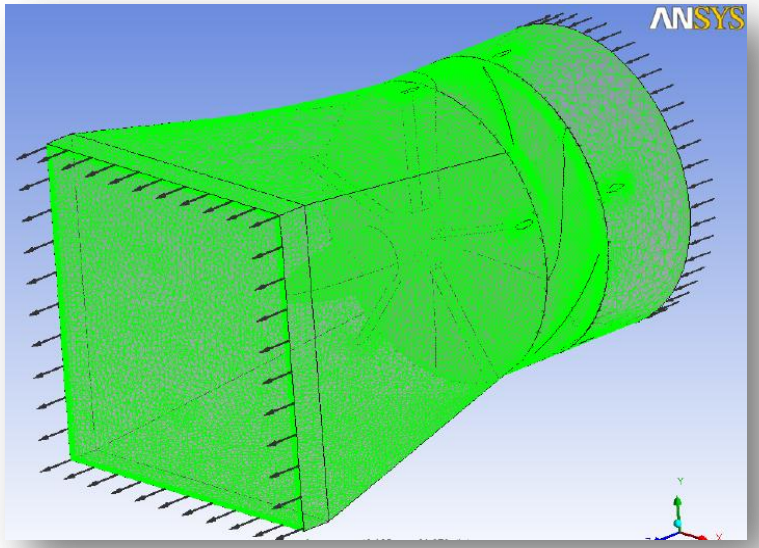
- Renewable energy development company with proprietary hydropower technology
- Based in Westmont, IL
- Focus on building new, low-impact hydropower capacity at non-powered dams
- Pursuing numerous projects in15 states (400 MW in total) and Latin America
- Braddock Project is expected to be the first low-head hydropower project for HGE in USA
- Hydro Friends Fund XLII (HFF) – official license Applicant – is a wholly-owned project development subsidiary of HGE

HGE Hydropower System

- Patented modular steel frame design
- Roots in offshore systems, other proven industrial systems
- Modular technology proven at HGE's Hastings Project – first FERC-licensed, grid connected hydrokinetic power project in U.S. history
- Eliminates need for traditional concrete powerhouse, disruptive installation work and long development timeframes
- Integrated into cellular portion of USACE dam away from navigational locks
- Draft tubes deployed within existing weir, no penstock
- Minor riverbed excavation at dam for project foundation

HGE Turbine

- Horizontal axis bulb turbine
- Nearly identical design to 1st generation HGE turbine
- 7.7 feet in diameter
- ~108 RPM
- Four blades
- ~1,100 cfs/unit



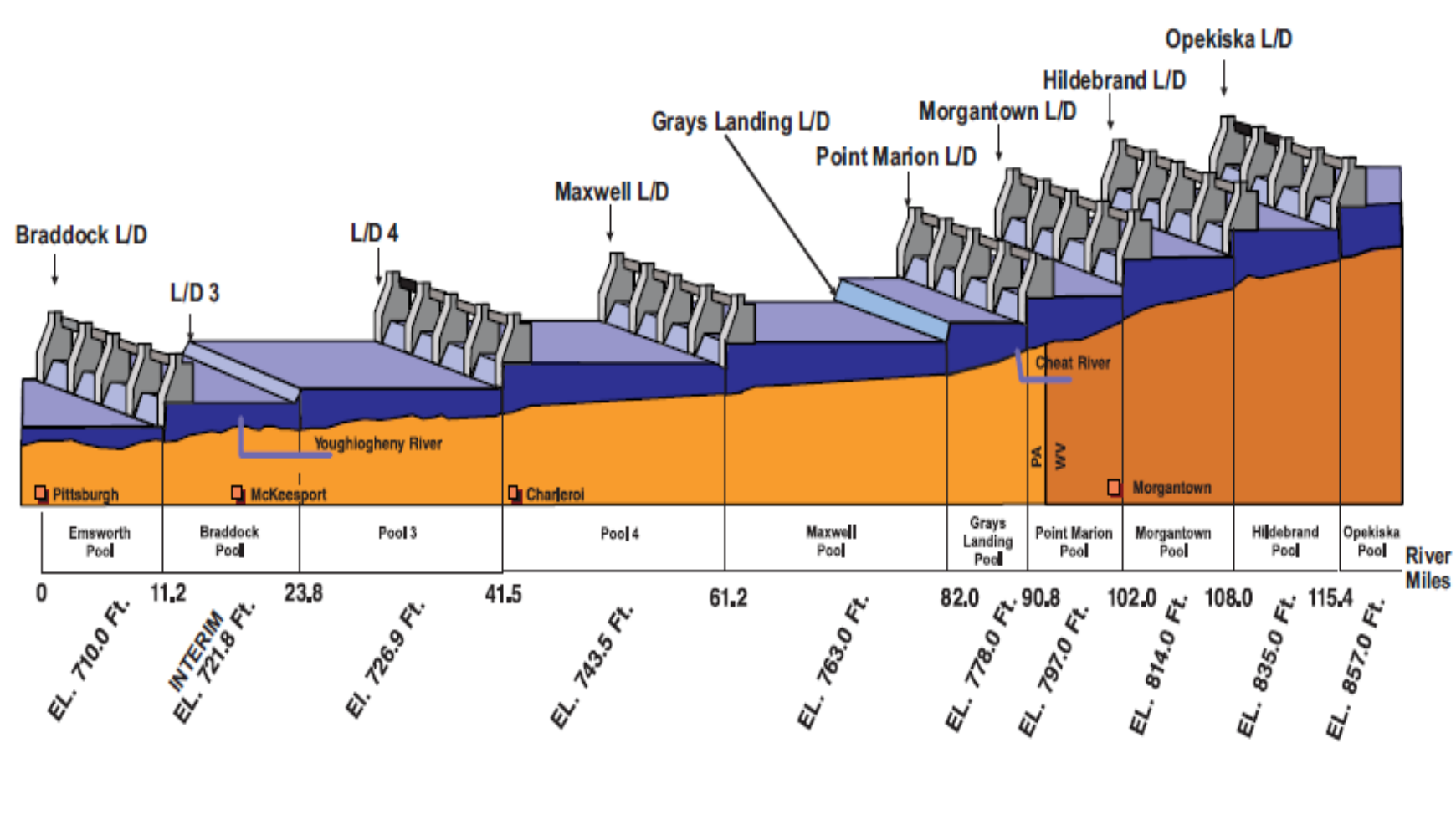
- Fish survival for fish that enter system is expected to be in the mid-90s
- No expected impact of any biological significance on water temperature, D.O. or turbidity (primarily due to low-head nature of site and turbine design)

First Project – Proof of Modular Concept

- USACE Lock & Dam No. 2 (MN)
- Installed modular, vertically stackable 100 kW system in 2008/2009
- Generated power at an existing dam
- Worked closely with USACE, FERC
- Received FERC license in 8 months after filing application – 4 months of pre-filing activities

First Project – Proof of Modular Concept

Project Location



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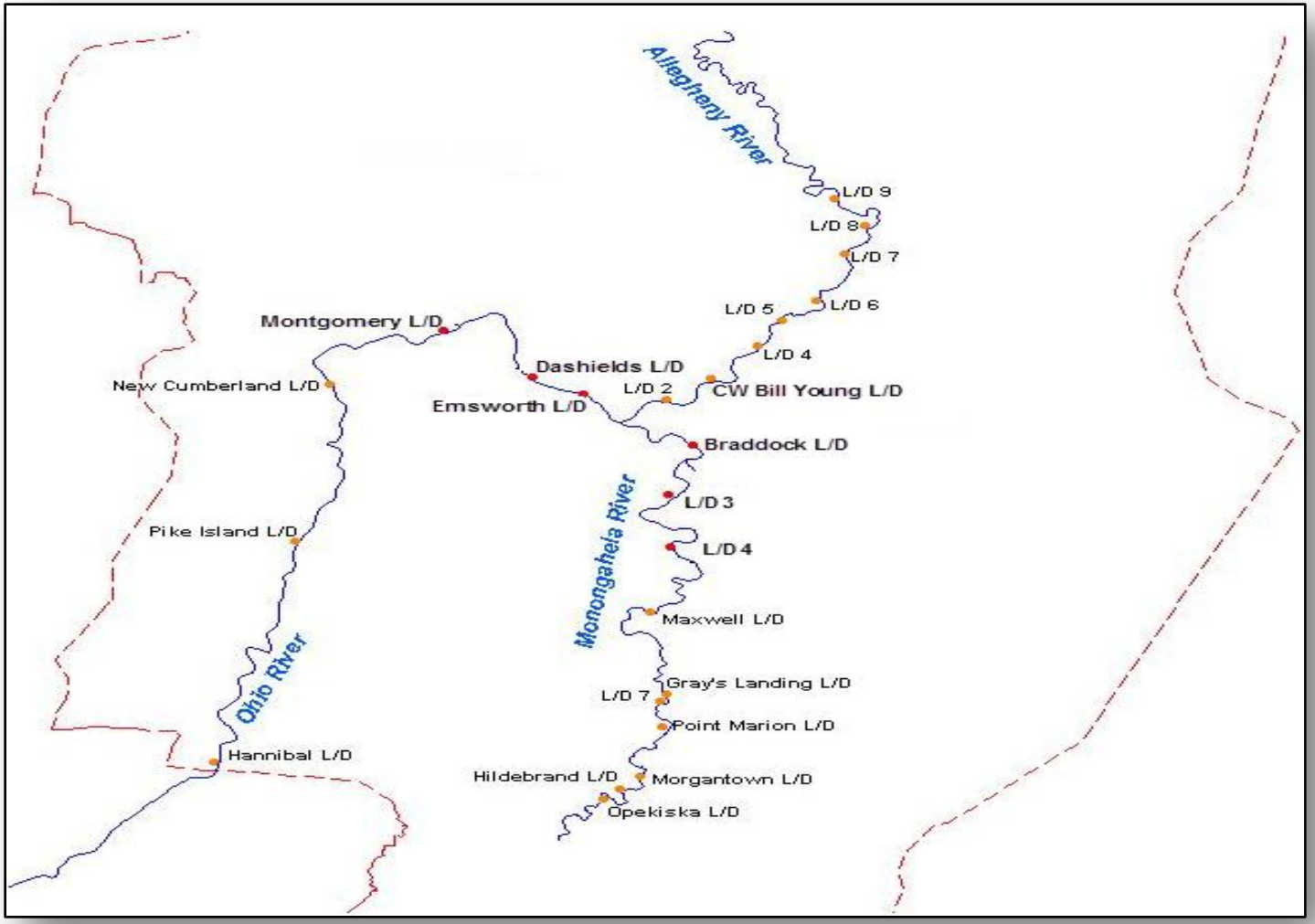

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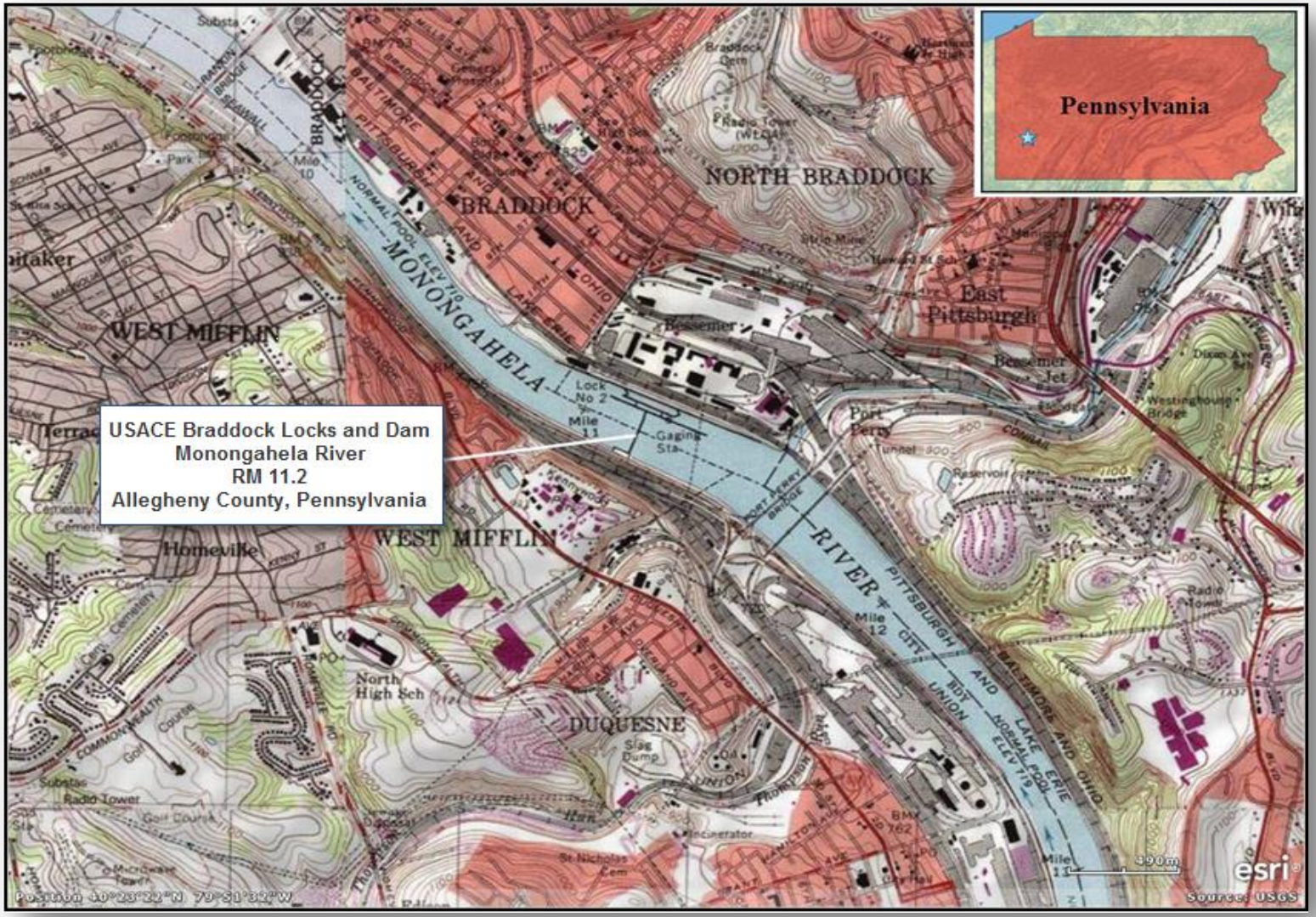


Project Site

Braddock L&D Facts

- Dam built in early 2000s after removal of old dam
- Located at river mile 11.2 in Allegheny County
- Maintains the pool to L&D No. 3 at Elizabeth, PA
- Emsworth L&D creates the downstream pool
- 721-foot gated dam
- Two locks
  - 720-foot long x 110-foot wide
  - 360-foot long x 56-foot wide
- Upstream water elevation 718.7-feet msl – increasing with possible removal of Elizabeth Dam
- Downstream water elevation 710-feet msl
- L&D is accessed from 11th Street in Braddock

Braddock Locks & Dam Project

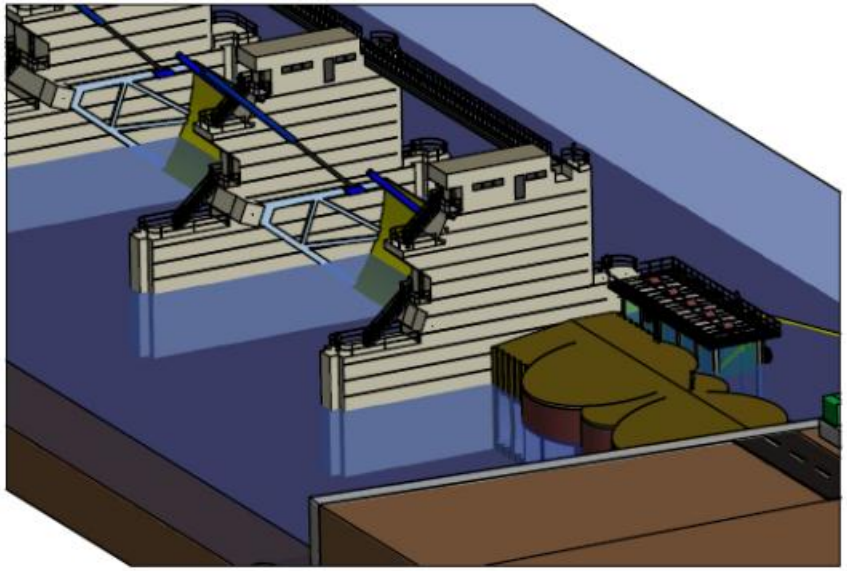
- Low-head, low-impact, small hydropower facility
- Five 750 kW turbines
- Nameplate capacity is 3.75 MW
- Expected capacity factor of 72 percent – will generate more electricity on an annual basis than a 15 MW solar project or 10 MW wind project
- Will provide enough annual power for approximately 2,200 homes
- HGE will operate in “run-of-release” mode
- Deployed entirely in USACE security zone where no public access or recreation takes place

Braddock Locks & Dam Project

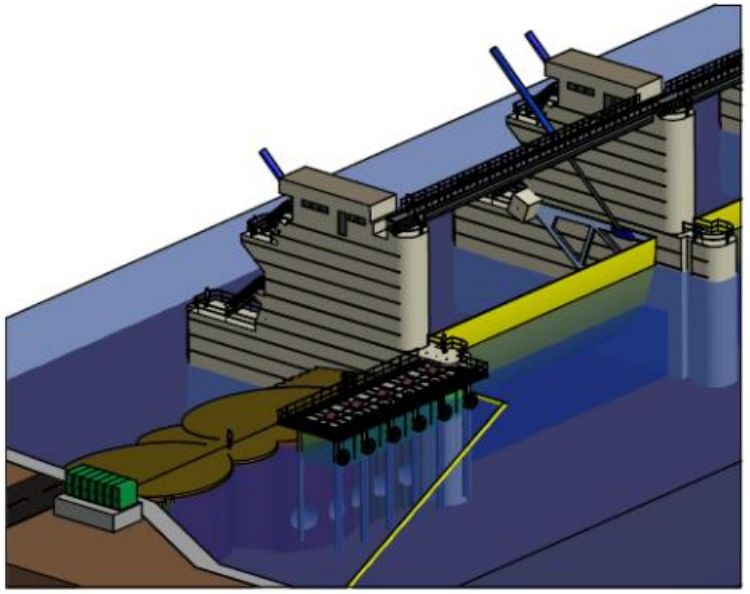
- Will use ~5,500 cfs for maximum power output (river flow averages ~13,000 cfs)
- System flexibility – can operate one to five turbines depending on flows, USACE needs
- Project footprint is ~1,700 square feet
- U.S. Department of Energy grant – demonstration of new, low-impact hydropower technology at non-powered dam (must use funds in 2012/2013)
- Must be on-line by 12/31/2013 to qualify for federal renewable energy tax credit (Section 45 PTC), which is expiring

Braddock Locks & Dam Pre-Installation

Braddock Locks & Dam Project Images

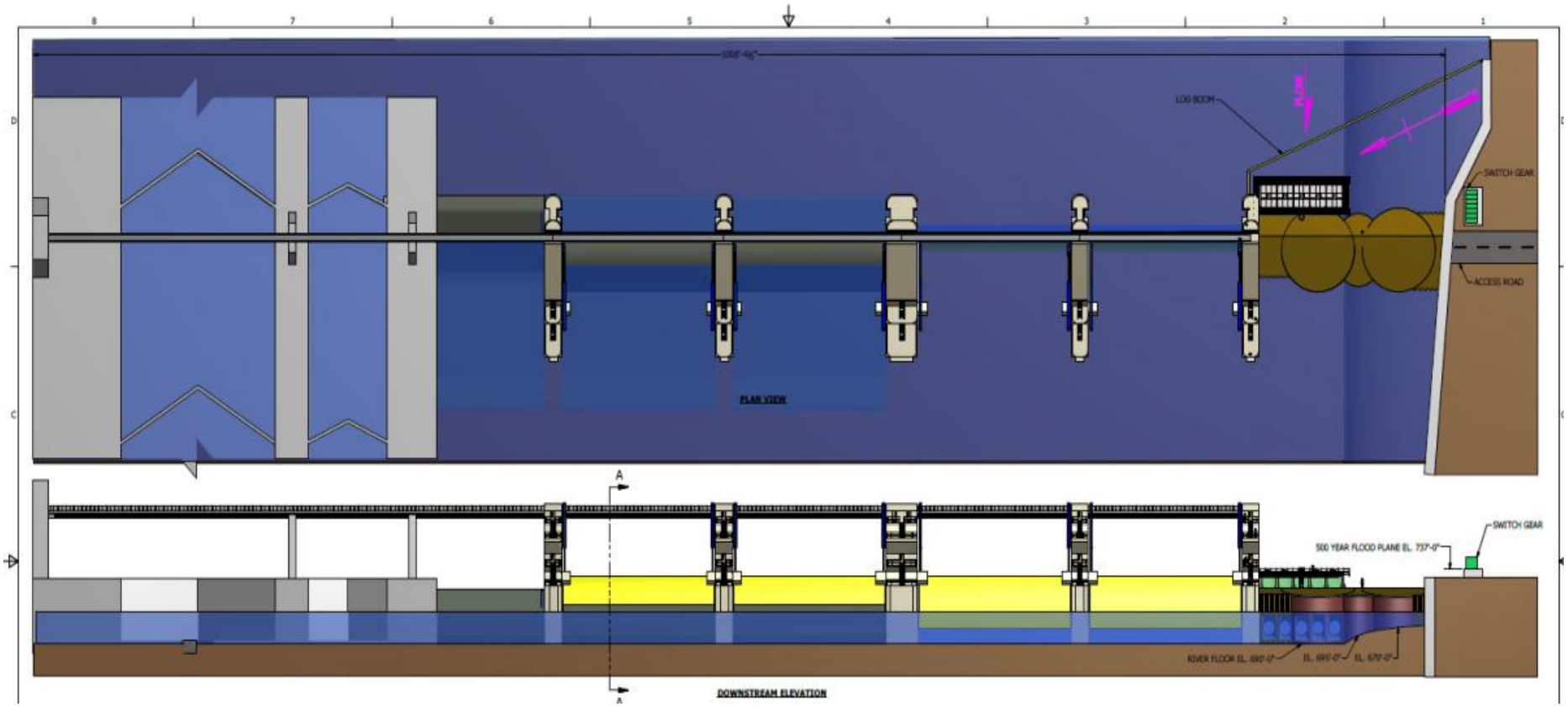


DOWNSTREAM ISO VIEW

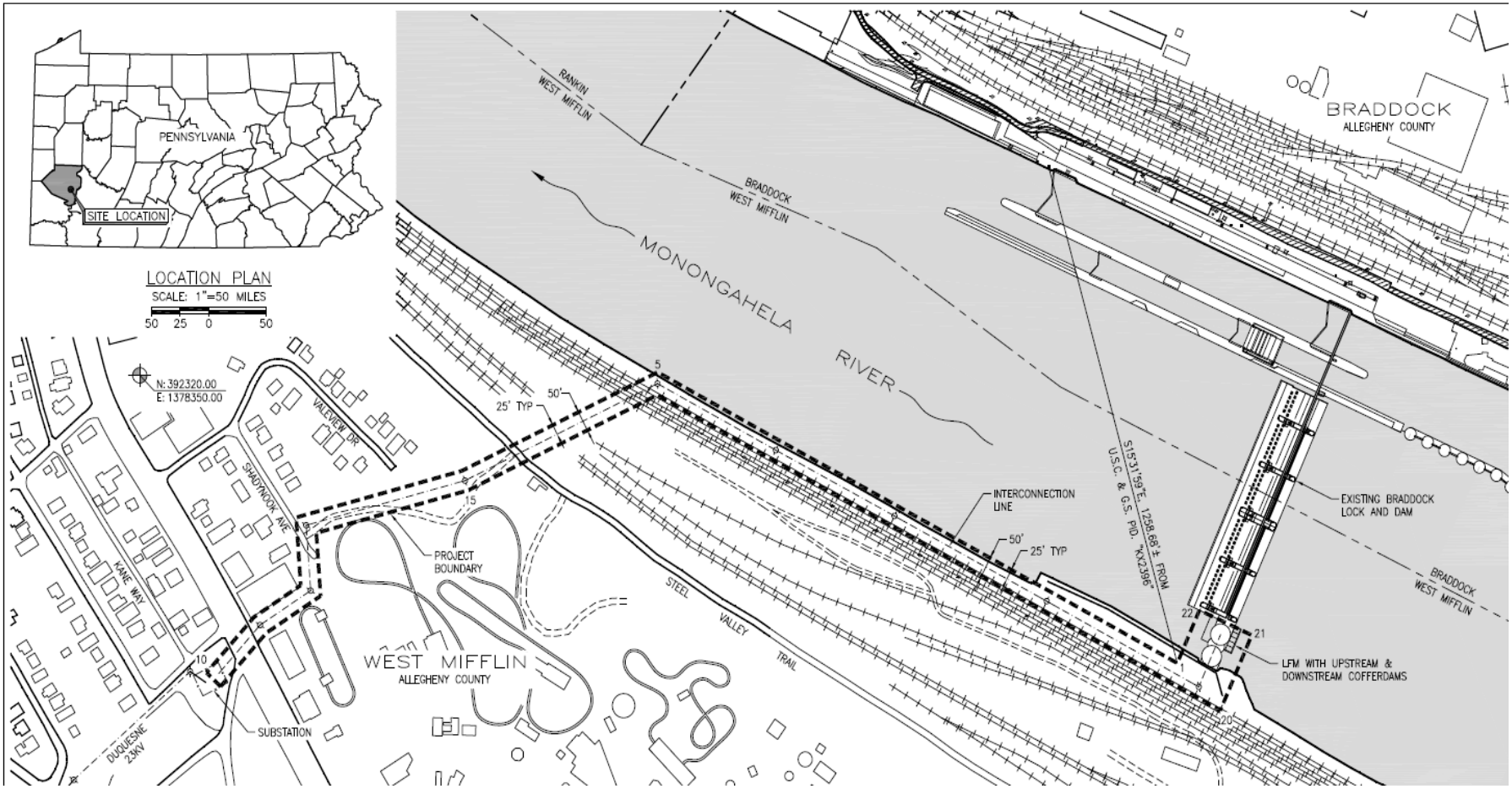


UPSTREAM ISO VIEW

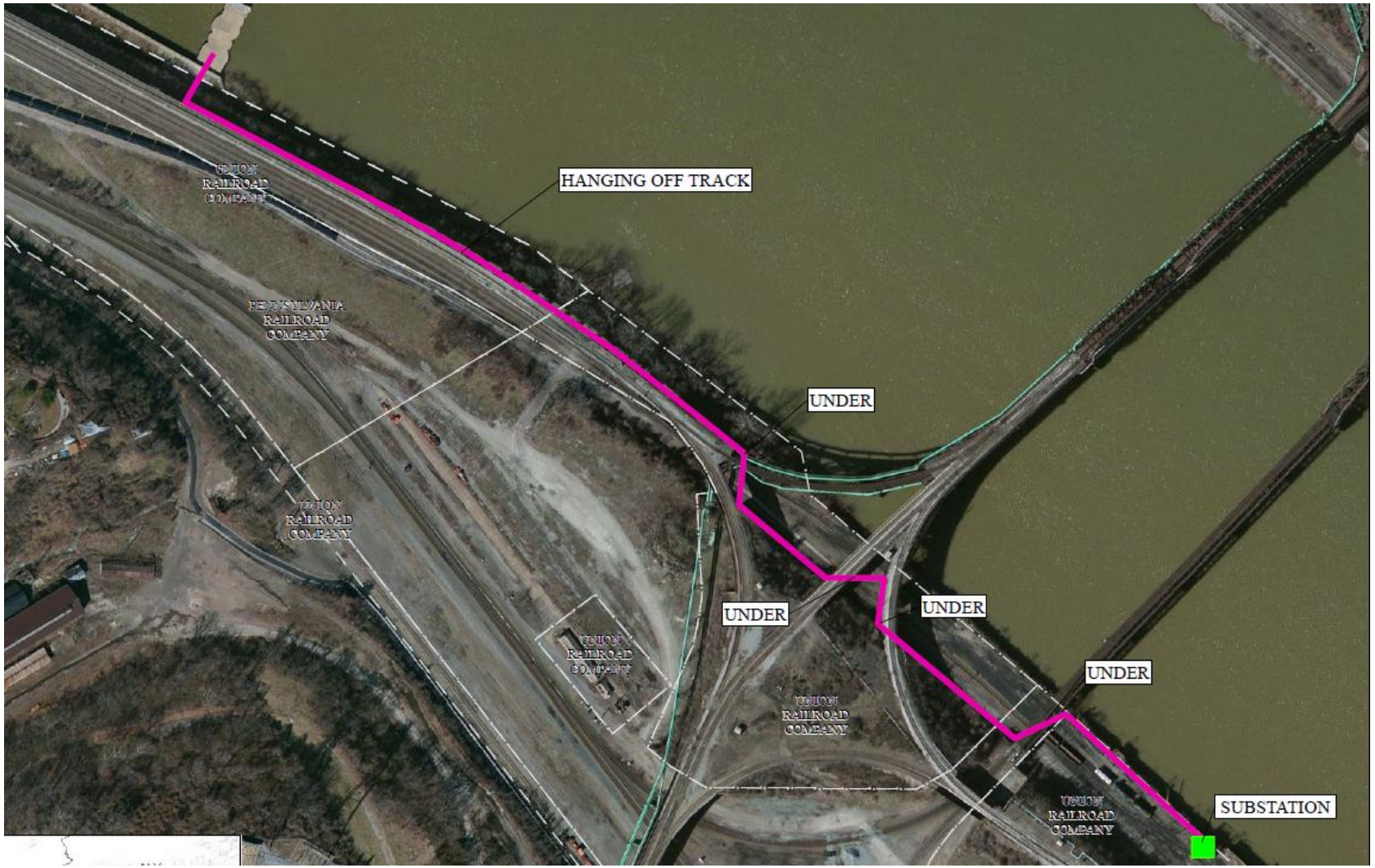
Braddock Locks & Dam Project Images



Original Boundary with Interconnection



Revised Interconnection Pathway



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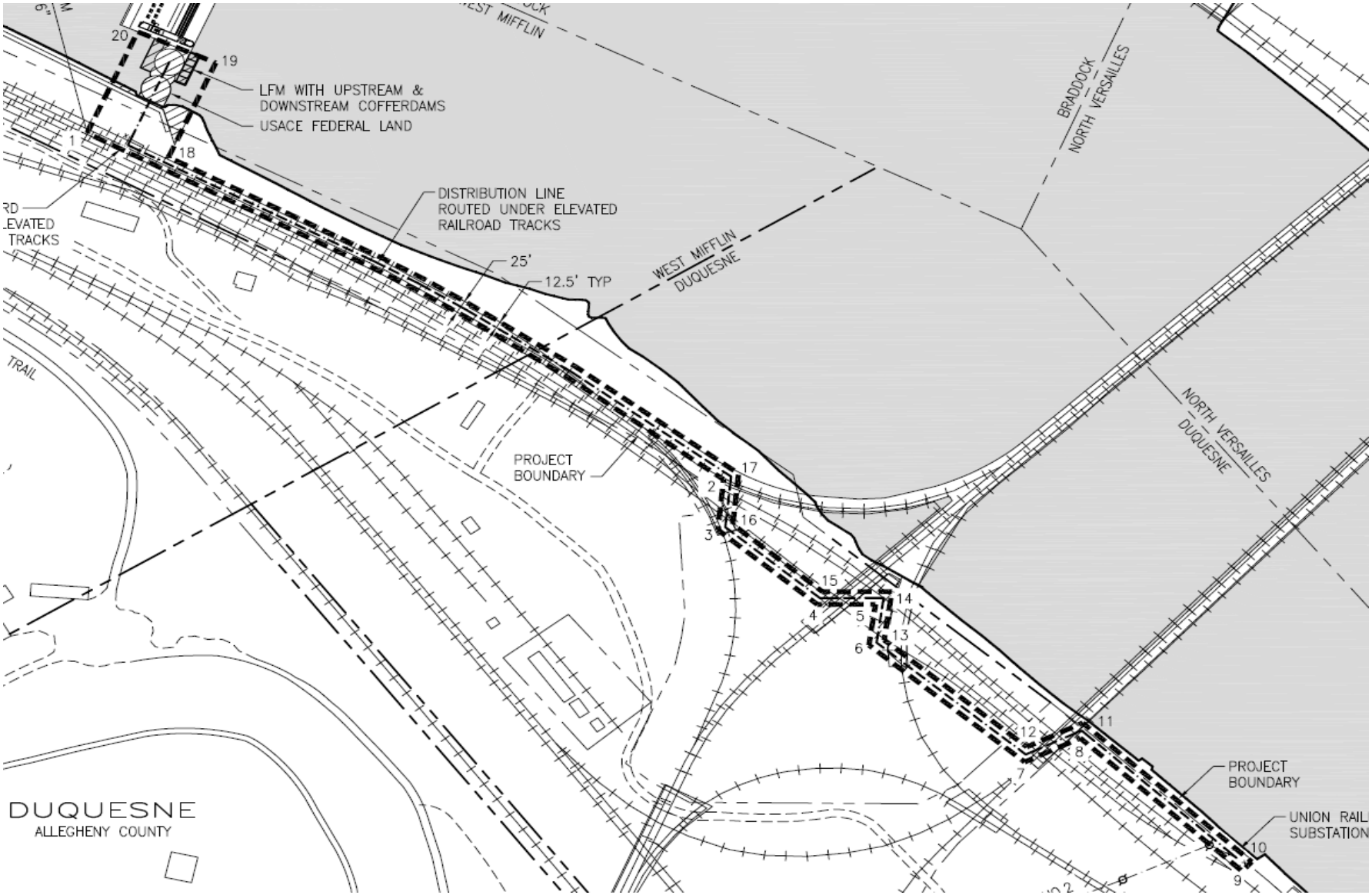

Revised Interconnection Path Pictures

The Licensing Process

- On December 23, 2011, HGE filed an NOI-PAD and requested use of the Traditional Licensing Process (TLP) in support of pursuing a license for the Project.
- FERC granted HGE authorization to use the TLP in January 2012.
- Numerous stakeholder meetings, consultations and studies from February to September 2012.
- Filed Final License Application in September 2012.
- FERC granted waiver of draft license application in October 2012.
- FERC accepted license application November 2012.
- Additional study request period ended November 17, 2012 – USACE provided comments
- Scoping meeting and site visit scheduled for December 5, 2012.
- Motions to intervene due by January 2, 2013.

Information to Date

- Project is not located within the State's coastal zone.
- Only federally listed species is limited to the Indiana Bat.
- Based on a review of information gathered from the Pennsylvania Natural Diversity Inventory (PNDI), it was determined that warmouth (*Chaenobryttus gluosus*) and lilliput (*Toxolasma parvus*) could potentially be found in the proposed Project vicinity. However, additional correspondence received from the Pennsylvania Department of Conservation and Natural Resources (PADCNR) on November 23, 2011, indicated that no impacts are likely and that no further coordination with the agency is needed for this project.

Studies for Braddock Project

- Based on consultation with Project Stakeholders and input provided through the March 7, 2012 Joint Agency Public Meeting, HGE performed the following study activities:
  - Fish entrainment and impingement study
  - Desktop water quality study
  - Water quality modeling study
  - Water quality and operational simulation study
  - Cultural resources consultation
- HGE is also performing engineering studies and evaluations in support of the USACE Section 408 permit
- HGE is also consulting with local recreational stakeholders to agree upon cost-effective recreational enhancements

Studies for Braddock Project

Fish Entrainment and Impingement Study

- Performed an Electric Power Research Institute (EPRI)-based database desktop study consistent with industry standards
- Target species were selected based on consultation with Pennsylvania Fish and Boat Commission
- Study included a site specific evaluation of potential impingement, entrainment, intake avoidance, blade strike, and survival rates relative to site-specific flows and operations
- Results indicate survival rates exceeding 95% with highest mortality associated with gizzard shad, rock bass, and bluegill
- Report finalized in August 2012 and included as Appendix E-2 of the Final License Application

Studies for Braddock Project

Desktop Water Quality Study

- Reviewed an area from Emsworth L&D (RM - 6.2) to Charleroi L&D (RM 41.5)
- Obtained data from USGS, 3R2N, PADEP, ORSANCO, and USACE – including discrete spatial data, discrete vertical profile data, and continuous data
- Evaluated dissolved oxygen (DO), water temperature, pH, specific conductance, and turbidity
- Results indicate DO levels exceed instantaneous (4.0 mg/l) and daily average (5.0 mg/l) state criteria even during low flow summer conditions
- Report finalized in August 2012 and included as Appendix E-1a of the Final License Application

Studies for Braddock Project

Water Quality Modeling Study

- Performed in response to a request from the USACE and to further evaluate the potential effects on downstream dissolved oxygen (DO) resulting from proposed project operations
- Evaluated a site-specific baseline condition and the proposed operational condition
- Conservative model ran at “worst case conditions”
- With a likely oxygen transfer efficiency of 48%, results indicate a slight reduction in DO enhancement by 0.05 to 0.13 mg/l
- Report finalized in August 2012 and included as Appendix E-1b of the Final License Application

Studies for Braddock Project

Water Quality and Operational Simulation Study

- Performed in response to a request from the USACE and to further evaluate the potential effects on downstream dissolved oxygen (DO) resulting from proposed project operations
- Deployed multiple continuous DO monitors upstream and downstream of Braddock L&D late June to late September
- Performed additional DO monitoring in conjunction with diverting flows from Gate No. 1 to Gate No. 4
- Results consistent with water quality modeling effort – DO levels dependent upon percent saturation and mixing
- Report distributed in conjunction with response to Additional Information Request

Studies for Braddock Project

Cultural Resources Consultation

- HGE initiated Section 106 consultation with the Pennsylvania State Historic Preservation Office (SHPO) on October 11, 2011
- Based on further consultation and providing of information, on April 17, 2012, the SHPO provided their determination that the proposed project will have no effects of either archeological sites or on the National Registered-listed Monongahela River Navigation System
- Cultural and historical resources information is included in Section E.5 of the Final License Application

Comprehensive Plans

- USFWS, Canadian Wildlife Service, North American Waterfowl Management Plan (1986)
- Fisheries USA: The Recreational Fisheries Policy of the USFWS (1989)
- Pennsylvania Department of Environmental Resources, Pennsylvania State Water Plan (1983)
- Pennsylvania Department of Environmental Resources, Pennsylvania's Recreation Plan (1986-1990)
- Pennsylvania Department of Environmental Resources, Pennsylvania 1988 Water Quality Assessment (1988)
- Pennsylvania Historical and Museum Commission, Honoring the Past, Planning for the Future: Pennsylvania's Historic Preservation Plan 2006-2011
- Pennsylvania Fish and Boat Commission, Three Rivers Management Plan - A Strategy for Managing Fisheries Resources of the Allegheny, Monongahela and Ohio Rivers (2011)

Contact Information/Questions

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