

than it should be for the size root system the tree has at the time of planting, which can make it more susceptible to drought or require regular watering through establishment.

To prevent mortality from herbivory, all plantings are sprayed with an all-natural anti-browse agent, which has shown to drastically reduce browse rates on other Bank Sponsor projects. This will reduce the chance of large-scale damage from herbivores.

Maintenance mowing during the first three years will be used in the upland areas to ensure adequate tree and shrub establishment. The maintenance mowing aids in the establishment of the herbaceous understory in the uplands, prevents the establishment of invasive vegetation, and reduces competition for the trees during the first two to three years while they establish.

Lastly, if for some unforeseen reason, there was a large-scale impact to the planted tree and shrub species, and the densities per acre were below the required amount, replanting would be conducted.

14.3 Live Stakes

Based on anticipated groundwater hydrology the live stake plantings are generally planted on four-foot-approximate spacing and should establish well. If for some unforeseen reason, they did not, the reason for mortality would be evaluated, and replanting would be conducted.

14.4 Increase in the Quality or Quantity of Macroinvertebrates or Fish

Increased substrate within the channel bed, and increased habitat in the smaller tributaries should provide a basis for an expansion in the range of fish species, and increased macroinvertebrate habitat. The additional retained carbon in the floodplain should provide an increase in detritus for macroinvertebrate species to feed on. Because the macroinvertebrate and fish populations may take time to respond to these changes, no corrective actions will be taken if these metrics are not being met in the first two years.

In Year 3, if the Bank Site is not showing a trend of increasing either the quality or quantity of **macroinvertebrates or fish, the previous year's water quality data will be examined to identify factors that** may be limiting quality increases. Additionally, carbon retention within the floodplain can be visually evaluated to determine if the floodplain is capturing fine carbon material such as twigs and leaf litter. Lastly, stream elevation data, rainfall data, and floodplain hydrology data would be evaluated to determine if lower than average rainfall and associated hydrology was limiting both the macroinvertebrate and fish populations.

Of the three metrics: water quality, carbon, and flow, if a determining factor can be identified, a corrective action plan will be developed to attempt to address the limitation. In certain instances, corrective action may not be possible - for example, the sponsor cannot influence the weather to increase rainfall and flow at the site. A corrective action that could be taken is if the floodplain is found to be lacking carbon, additional fine carbon material can be brought into the restoration site and placed within the stream and floodplain complex to provide additional food sources.

14.5 Invasive Species and Native Dominance

If at any point there was a large colonization of invasive species which brought the total percent of invasive species well above the allowed performance standards, remedial action would be needed. The management technique used would be dependent on the type of invasive species colonizing the site (i.e., annual, or perennial, primary reproduction through vegetative spread or through seed). If the species are annual, they can be managed through maintenance mowing and mechanical weed control methods to stop them from re-seeding into the site. After the seed bank is depleted, they drop out of the vegetative matrix. If they are perennial in nature, chemical herbicides need to be used. Mechanical weed control is still used to stop further spreading through seed if the species has high germination rates.

Once the invasive species control has begun, additional seeding or planting would need to be conducted to re-introduce a native plant community into the area of concern. Depending on the type of invasive (i.e., broad leaf or monocot), replanting and reseeding strategies can be used to allow for continued chemical control of the invasive species in the area while still allowing the native species to germinate and develop.

The likelihood of this scenario is low; once established, native plant communities develop strong resiliency to invasion by invasive species, as long as they are not disturbed or impacted. Invasive species issues on a restoration site tend to be most problematic during the first two years because there is bare soil immediately available for germination and colonization immediately following construction. Presence of invasive species within the seed bank pose a threat as they are quick to germinate and can easily establish. As such, maintenance activities are always the most intensive during the first two to three years post-construction to control any invasive species before they can establish and become problematic.

If the site were not meeting its performance standards for native herbaceous cover, additional seeding would be conducted. Again, the most important factor for establishing a healthy stand of upland herbaceous species is proper maintenance during the first two to years of establishment, specifically mowing in upland areas. This ensures enough light is reaching the developing seedlings, while also eliminating competition from annual weedy species that may be trying to colonize the site. In the wetland areas, mowing cannot be conducted, but mechanical weed control with weed whips can be used. Based on the anticipated hydrology in the wetland areas at the site, the floodplains will have water within 12 inches of the surface for most of the growing season. These conditions will discourage the growth of most invasive species and annual weedy species usually seen at a restoration site. The primary invasive species that would react well to these conditions are reed canary grass (*Phalaris arundinacea*) and Phragmites (*Phragmites australis*). Phragmites spreads primarily through vegetative means and has not been seen or documented within the Bank Site and therefore is not a concern. Reed canary grass is prevalent throughout North America and therefore must be monitored and controlled if seen on-site. Once the wetland community is well established, it is largely self-controlling and resistant to invasive species with minimal maintenance as long as it is not significantly disturbed.

15.0 Financial Assurances

15.1 Performance Bond

A performance bond will be established to ensure that the Bank Site construction is completed and that all performance standards are met prior to Bank close-out and/or sign off by the USACE/IRT. A draft **performance bond document conforming to PSUMBI's sample document** with minor alterations is provided in Appendix I: Financial Assurances. The financial assurance mechanism will be a surety bond that will cover construction, and maintenance and monitoring costs associated with the Bank Site and will take effect after approval of the joint permit application and prior to Bank Site construction. The performance bonding entity has a rating of A+ (A.M. Best Ratings, 2010).

Bond terms are annual and are renewed on an annual basis. The entirety of the bond is anticipated to be in place for the duration of construction. If construction exceeds 12 months, another annual bond will be renewed to cover the remaining duration of construction. Following construction, the Sponsor will request bond reduction to correlate to the maintenance and monitoring costs. If the request is approved by the IRT/USACE, the construction bond will be reduced and be replaced and will cover the costs associated with maintenance and monitoring activities.

During the active maintenance and monitoring phase of the Bank Site, the bond will be reduced proportionately each year the Bank Site meets its performance standards. The general steps to be used to review and approve any reduction in the financial assurances are as follows:

1. Determine if the Bank Site is meeting performance standards.
 - If yes, request approval for bond reduction with annual monitoring report submittal/credit release request letter.
 - If not all performance standards are attained, the Bank Sponsor may still request a bond reduction, understanding that the reduction must be approved by the IRT/USACE.

The performance bond will be released once the Bank Site receives final sign-off from the IRT. The Bank Site will only be closed upon meeting all performance standards and MBI requirements and when all credits have been sold (unless the Sponsor forfeits any remaining mitigation credits).

The bond will be closed once all performance standards are met and released credits are sold and final sign-off on the Bank Site has been provided by the IRT. The following table presents the performance bond release schedule and target milestones.

Table 7: Performance Bond Release Schedule and Target Milestones

Financial Instrument Used	Project Phase Covered	Specific Items Covered	Amount Reduced	Amount Available	Explanation
Surety Bond	Construction	Construction	0%	100%	100% of funds remain in-place until construction is complete
		Approval of As-Built Design Plans	70% ¹	30% ¹	Upon approval of the as-built plans, bond is reduced
	Maintenance and Monitoring	Year 1 - 7 Maintenance & Monitoring	30%	0%	The remaining 30% of the Bond will cover Maintenance, Monitoring, and Reporting for the remaining active phase of the Bank Site.
		Reporting			

Notes:

- Percentages are approximate and are based on the Bank **Sponsor's experience with other** project performance bond release schedules and target milestones.
- Pending review/approval by the IRT/USACE, the performance bond may be reduced by approximately 14 percent (or 1/7th) each year the Bank Site progresses towards close-out. The bond cannot be closed-out if performance standards have not been met or if credits remain available. The bond will remain open until the Bank Site is transferred to the Long-Term Steward.

15.2 Long Term Management and Catastrophic Event Fund Establishment

In addition to the performance bond, the Bank Sponsor will establish the LTMF to fund long-term maintenance, monitoring, and management of the Bank Site. The LTMF and CEF may be pooled, or a separate fund may be established for Catastrophic Events (CE). Both funds will be managed by the same third-party endowment fund manager. As described in Section 13.0 Long-Term Management Plan, the LTM and CE funds may also be used to fund corrective measures pertaining to natural disasters, invasive species outbreaks, or other unforeseen events. One instance in which funding from the CE fund may be used would be replacement of an off-site mitigation site in the event of surface impacts to the Bank Site from existing utility-related encumbrances.

As per PSUMBI "Should a catastrophic event or event of Force Majeure occur, an Adaptive Management Plan will be developed to correct the problem. The Bank Sponsor will not be responsible for Mitigation Bank Site failure that is attributed to a natural catastrophe, such as flood, drought, disease, regional pest infestation, etc., which the IRT, acting through the Chairs, determines is beyond the reasonable control of the Bank Sponsor to prevent or mitigate. The Bank Sponsor is, however, required to take corrective actions associated with catastrophic events and events of Force Majeure that do not result in Mitigation Bank Site failure and to use the Financial Assurances to fund corrective measures required to repair the Mitigation Bank Site from such events."

15.3 Long Term Management and Catastrophic Event Funding Approach

Along with the annual monitoring reports and credit release requests, the Sponsor will provide statements of deposit to show that monetary distributions have been deposited into the LTM and CE endowment accounts.

Additionally, as part of the initial credit release request, the Bank Sponsor will execute a performance bond that covers the construction and maintenance and monitoring phases of the Bank Site. As part of the initial credit release request package, the Sponsor will provide the executed bond to document implementation of the financial assurances. Prior to submitting the Year 1 monitoring report, the Sponsor will deposit 15% of the total long-term management funds into an endowment account, that will be held and managed by a third-party financial institution according to the terms of the example endowment agreement provided in

Appendix I: Financial Assurances. As shown in Table 8: Long-Term Funding Deposits, the Sponsor will deposit the remaining 85% of the long-term management funds into the endowment account over a period of 4 years (the fund will be 40% funded in Year 2, 70% funded in Year 3, and fully funded in Year 4). To document implementation of long-term financial assurances, the Sponsor will provide the executed endowment agreement with the administrative credit release request package and will provide statements of deposit with annual monitoring reports until the endowment account is fully funded in Year 4. Submittal of the statements of deposit are required as part of the credit release process.

The CEF may be pooled with the LFMF or may be established as a separate endowment fund and will be managed by the same third-party endowment fund manager as the LTM fund. The funding of the CEF will follow the same schedule as the LTM Fund (see Table 8: Long-Term Management Funding Deposits).

Along with the annual monitoring reports and credit release requests, the Sponsor will provide statement of deposits to show that funds have been deposited into the LTM and CE endowment account.

Table 8: Long-Term Management Funding Deposits		
Contribution Year	Long-Term Management Fund Deposits by Sponsor	Catastrophic Event Fund Deposits by Sponsor
Year 1	15%	
Year 2	25% (for a total 40%)	
Year 3	30% (for a total 70%)	
Year 4	30% (100% fully funded)	

Note:

1. Statements of deposit will be submitted with the annual monitoring reports.

15.4 Financial Assurance Reporting Requirements

The Sponsor is responsible for submitting financial assurance reporting requirements during the active and interim maintenance and monitoring phase. The Bank Sponsor will submit with the annual monitoring reports statements of deposits that detail deposits made as well as beginning and ending balances during the active and interim maintenance and monitoring phases. If bond reduction release is granted by the

IRT/USACE, documentation of those bond adjustments will also be provided to the IRT/USACE. If any debits are made from the financial assurance funds, documentation will be provided to the IRT/USACE accordingly.

During the Long-Term Management phase of the Bank Site, the Long-Term Steward will be responsible for coordinating financial assurance reporting to the IRT/USACE. This reporting may include information on the status of the funding accounts including any credits to or debits from the funds, as well as expenditures that go above the annual allocated amount.

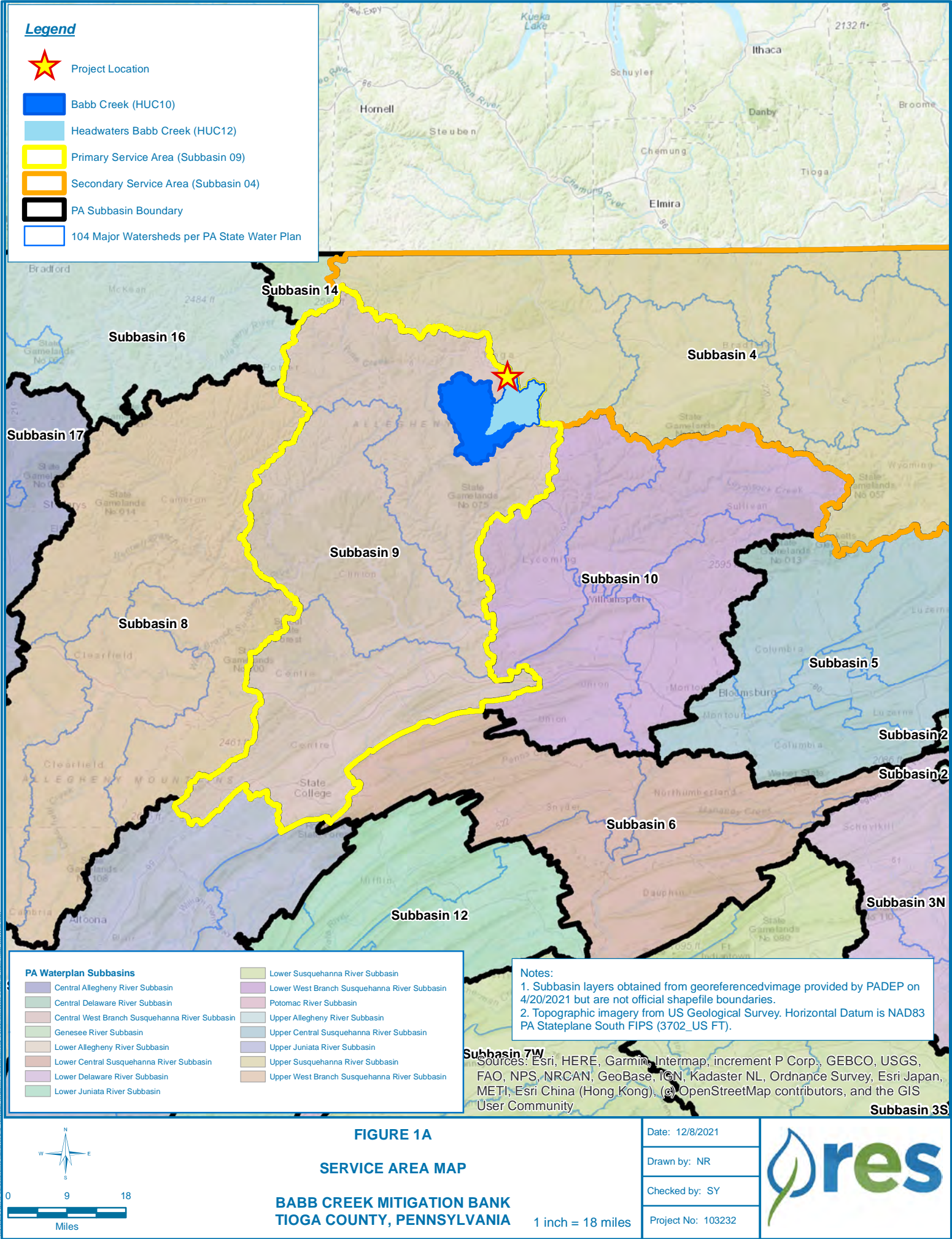
16.0 References

- Bunte, K. and Abt, S. R. 2001. Sampling Frame for Improving Pebble Count Accuracy in Coarse Gravel-Bed Streams. *Journal of the American Water Resources Association*, 37: 1001–1014. Chalfant, Brian. 2013.
- Chesapeake Bay Program. 2012. Discover the Chesapeake. Accessed April 2021. From <http://www.chesapeakebay.net/discover/bayecosystem>.
- Compensatory Mitigation for Losses of Aquatic Resources; Final Rule. 33 CFR Parts 325 and 332, Department of the Army, Corps of Engineers and 40 CFR Part 230, Environmental Protection Agency, April 10, 2008
- Eastern Pennsylvania Coalition for Abandoned Mine Reclamation. Website. Pine Creek Watershed Overview. Available online at <http://epcamr.org/home/current-initiatives/technical-assistance/watershed-assessment/watersheds/pine-creek-watershed/>. Accessed May 2021.
- Fischenich, C. 2001. Stability Thresholds for Stream Restoration Materials. EMRRP Technical Notes Collection (ERDC TNEMRRP-SR-29), U.S. Army Engineer Research and Development Center, Vicksburg, MS. Accessed at www.wes.army.mil/el/emrrp
- Hedman, C.W., D.H. Van Lear, and W.T. Swank. 1996. In-stream large woody debris loading and riparian forest seral stage associations in the southern Appalachian Mountains. *Canadian Journal of Forest Research* 26:1218-1227.
- Loza, A.M. and E. Richman. 2013. Stewardship Costs Calculator. Pennsylvania Land Trust Association. Application. Web. August 2018. http://conservationtools.org/libraries/1/library_items.
- Model My Watershed. Website. <https://modelmywatershed.org/> Assessed May 5, 2021.
- PA-Share. Pennsylvania's Historic and Archaeological Resource Exchange. Website:** <https://share.phmc.pa.gov/> accessed May 5, 2021.
- Pennsylvania Department of Conservation and National Resources. Physiographic Provinces of Pennsylvania. 2018. Available online at http://elibrary.dcnr.pa.gov/GetDocument?docId=1752507&DocName=Map13_PhysProvs_Pa.pdf. Accessed April 2021.
- Pennsylvania Department of Environmental Protection. 2002. Information Sheet- TMDL for the Babb Creek Watershed. Available online https://www.dep.state.pa.us/dep/deputate/watermgt/wqp/wqstandards/tmdl/Babb_info.pdf
- Pennsylvania Department of Environmental Protection. 2004. Historic Streams. Pennsylvania Spatial Data Access (PASDA). Accessed April 2021.
- Pennsylvania Department of Environmental Protection. 2013. Bureau of Point and Non-Point Source Management. Wadeable Semi-Quantitative Fish Sampling Protocol for Streams.
- Pennsylvania Department of Environmental Protection. 2016 Pennsylvania Integrated Monitoring and Assessment Report Integrated Report. 2016. PADEP Historic Streams GIS Data. 2004. PASDA. Accessed April 2021.
- The Nature Conservancy. 2006. A Natural Areas Inventory of Tioga County, Pennsylvania.
- Rosgen, D.L. 2001. [A Practical Method of Computing Streambank Erosion Rate](#). Proceedings of the Seventh Federal Interagency Sedimentation Conference, Vol. 2, pp. II - 9-15, March 25-29, 2001, Reno, NV. Available on the Wildland Hydrology website: http://www.wildlandhydrology.com/html/references_.html

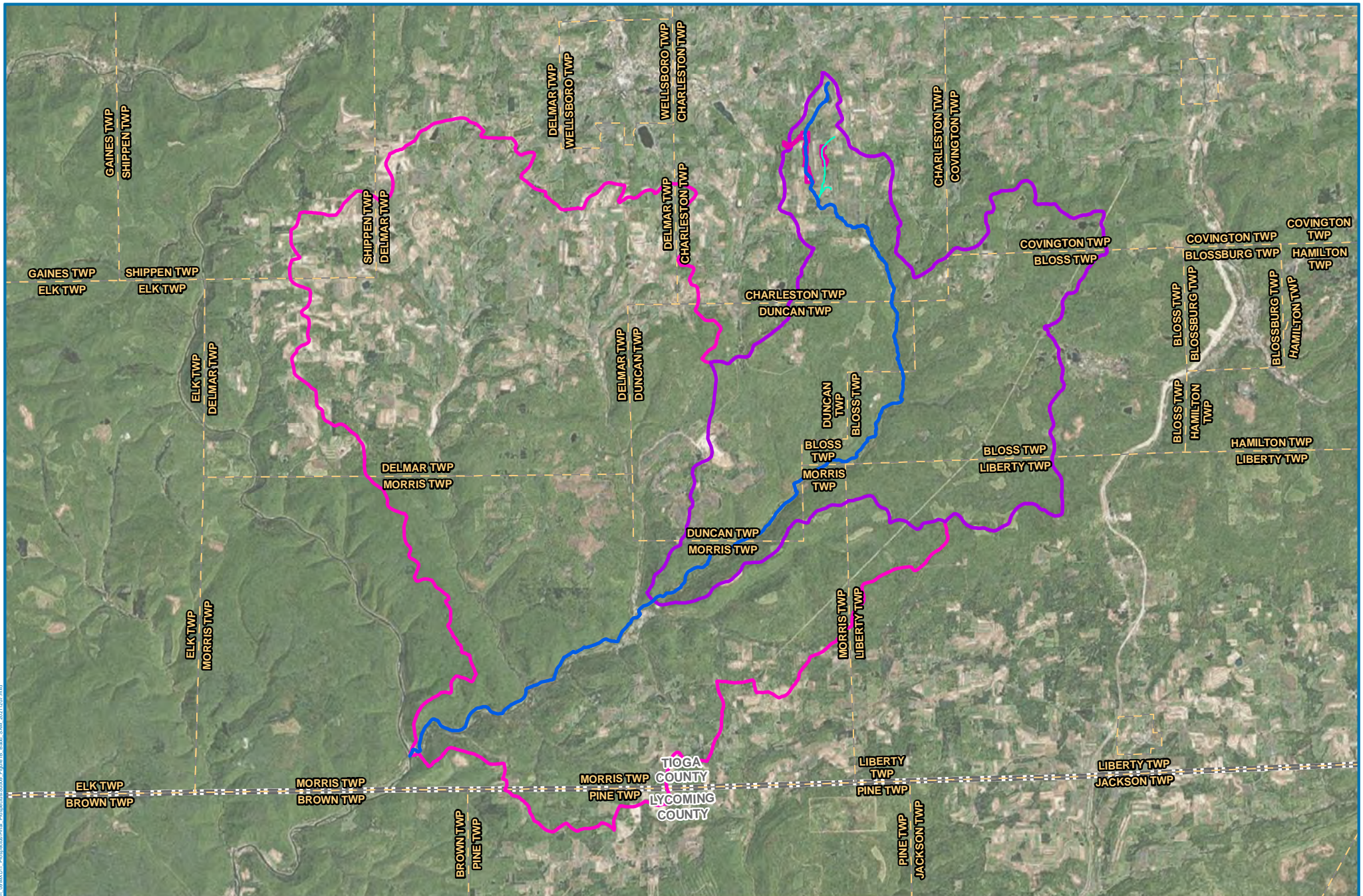
- Soil Survey - Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at <http://websoilsurvey.nrcs.usda.gov/>. Accessed April 2021.
- Susquehanna Greenway Partnership. About the Greenway. Accessed October 7, 2015. From <http://www.susquehannagreenway.org/about-greenway>
- Susquehanna River Basin Commission. Susquehanna River Basin Commission Overview. Accessed October 7, 2015. From <http://www.srbcc.net/about/geninfo.htm#top>
- Tioga County Conservation District. Website. 2021. Available Online at http://www.tiogacountypa.us/Departments/Conservation_District/Pages/ConservationDistrict.aspx. Accessed May 2021.
- United States Environmental Protection Agency. 2015. Section 319 Nonpoint Source Program Success Story . Installing Active and Passive Treatment Systems Restores Water Quality. Available online at https://19january2017snapshot.epa.gov/sites/production/files/2015-10/documents/2009_12_14_nps_success319_state_pa_babb.pdf. Accessed May 2021.
- University of Vermont Spatial Analysis Laboratory. Modeled Primary Wetlands, Commonwealth of Pennsylvania, Statewide. 2013. <https://www.pasda.psu.edu/uci/>
- University of Vermont, Patrick A. Raney¹, Sean MacFaden², Jarlath O'Neil-Dunne².** A LiDAR -aided hydrogeologic modeling and object-based wetland mapping approach for Pennsylvania. 2017.
- West Branch Susquehanna Restoration Coalition (WBSRC). 2016. Website. The Restoration of the Babb Creek Watershed. Available online at http://www.wbsrc.org/uploads/2/5/6/0/25607137/babb_creek_overview.pdf. Accessed May 2021.


APPENDIX A

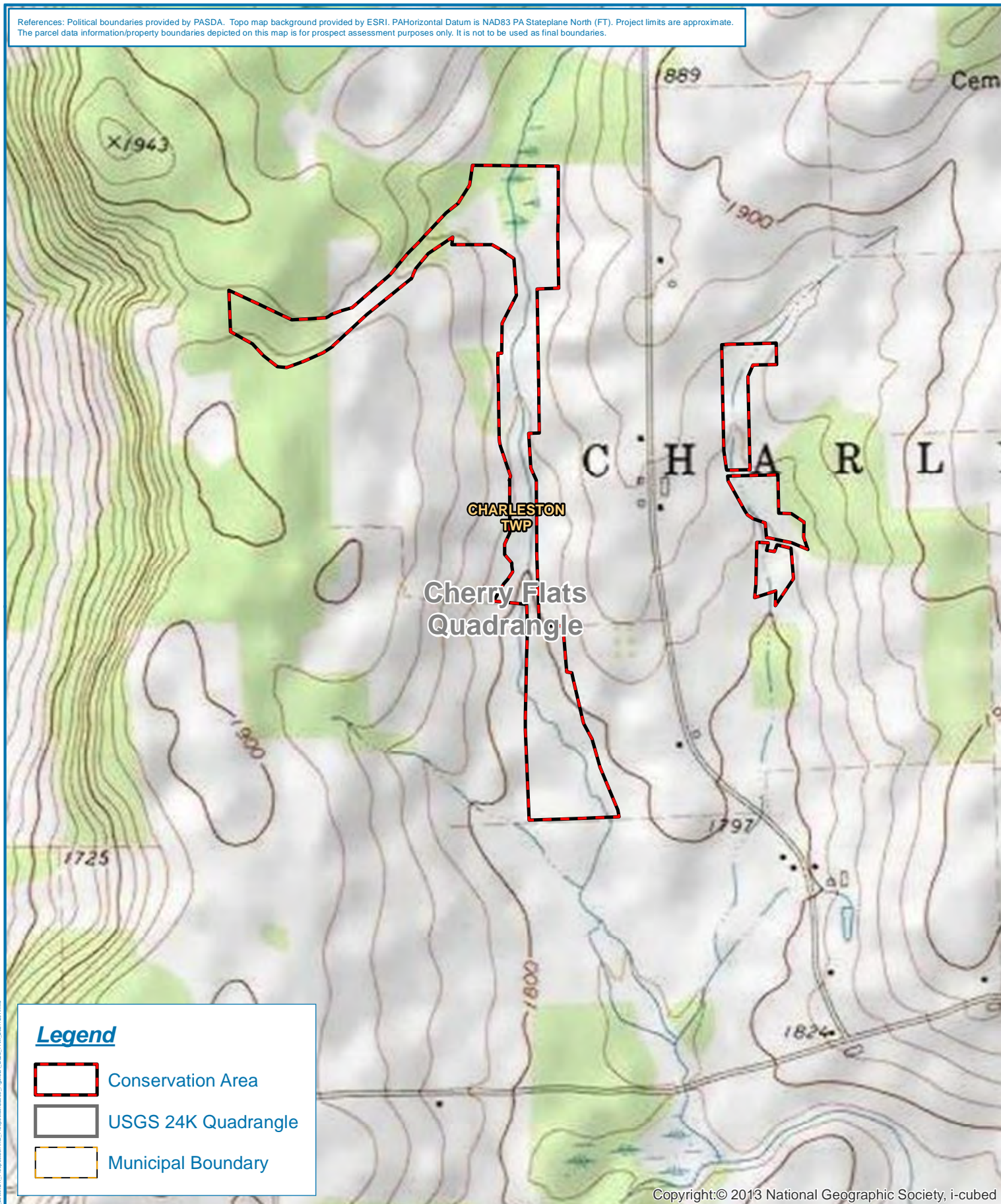
FIGURES



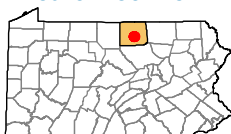
Document Path: E:\BabbCreek\BabbCreek_U03232_Sullivan_08102014_PennsylvaniaFinal_Pennsylvania\S000_Erwin18_Sabb_8AM_20211027.mxd



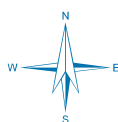
	<p>Legend</p> <ul style="list-style-type: none">Babb CreekTributary 21811 To Babb CreekConservation AreaHeadwaters Babb Creek (HUC12)Babb Creek (HUC10)Municipal BoundaryCounty Boundary	<p>WATERSHED MAP</p> <p>SERVICE AREA MAP</p> <p>BABB CREEK MITIGATION BANK</p> <p>TIOGA COUNTY, PENNSYLVANIA</p>	<p>FIGURE 1B</p> <p>Drawn by: NR Date: 12/8/2021</p> <p>Checked by: SY Project No: 103232</p> 
--	---	--	--



PROJECT LOCATION



TIOGA COUNTY, PA



PROJECT AREA MAP

BABB CREEK MITIGATION BANK



1 inch = 1,000 feet

FIGURE 2A

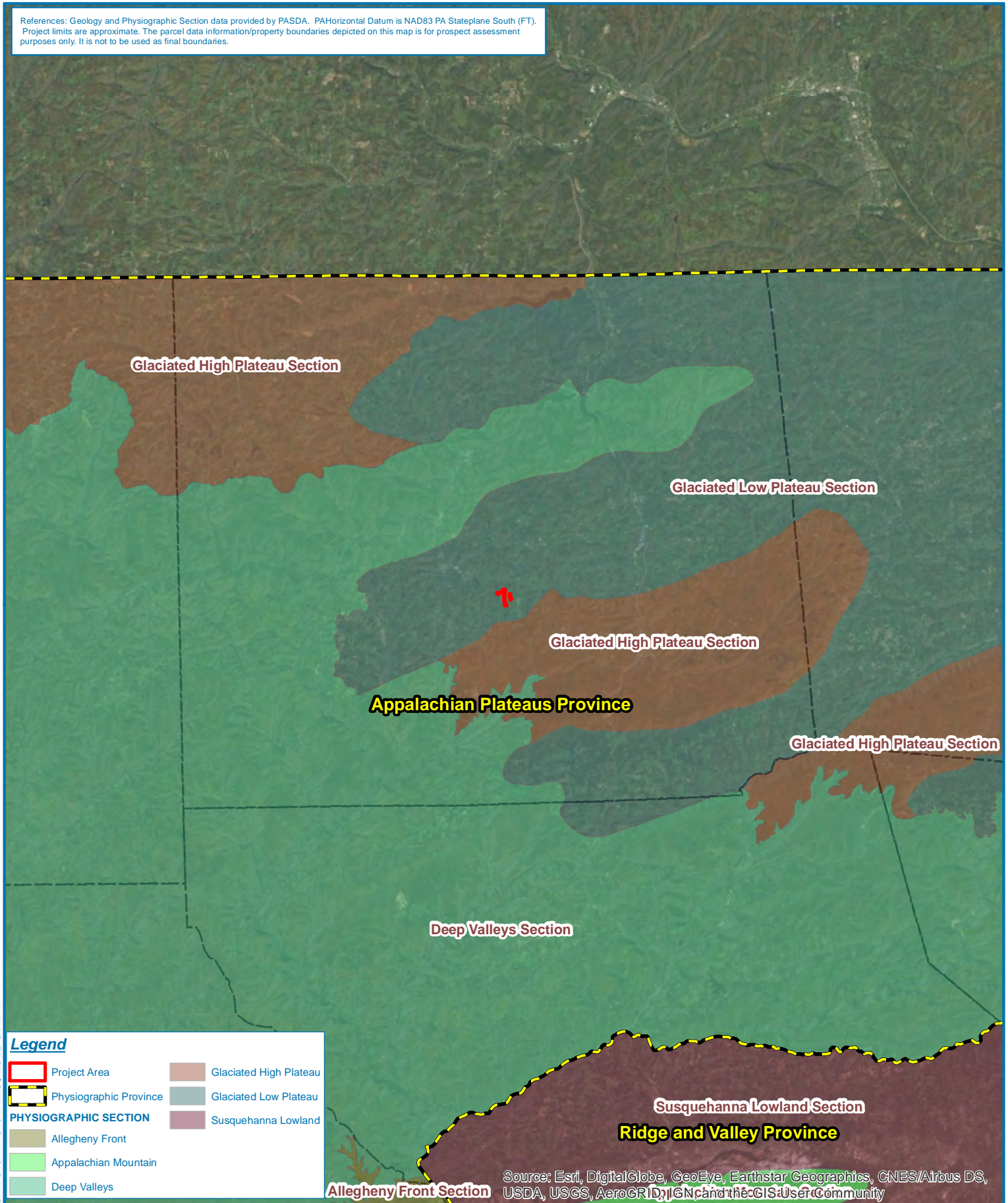
Date: 12/8/2021

Drawn by: NDR

Checked by: SY



References: Geology and Physiographic Section data provided by PASDA. PAHorizontal Datum is NAD83 PA Stateplane South (FT). Project limits are approximate. The parcel data information/property boundaries depicted on this map is for prospect assessment purposes only. It is not to be used as final boundaries.

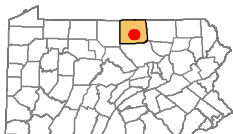


Legend

- | | |
|------------------------------|------------------------|
| Project Area | Glaciated High Plateau |
| Physiographic Province | Glaciated Low Plateau |
| PHYSIOGRAPHIC SECTION | |
| Allegheny Front | Susquehanna Lowland |
| Appalachian Mountain | |
| Deep Valleys | |

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

PROJECT LOCATION



TIOGA COUNTY, PA



PHYSIOGRAPHIC AREA MAP BABB CREEK MITIGATION BANK

0 3.75 7.5 Miles
1 inch = 7.5 miles

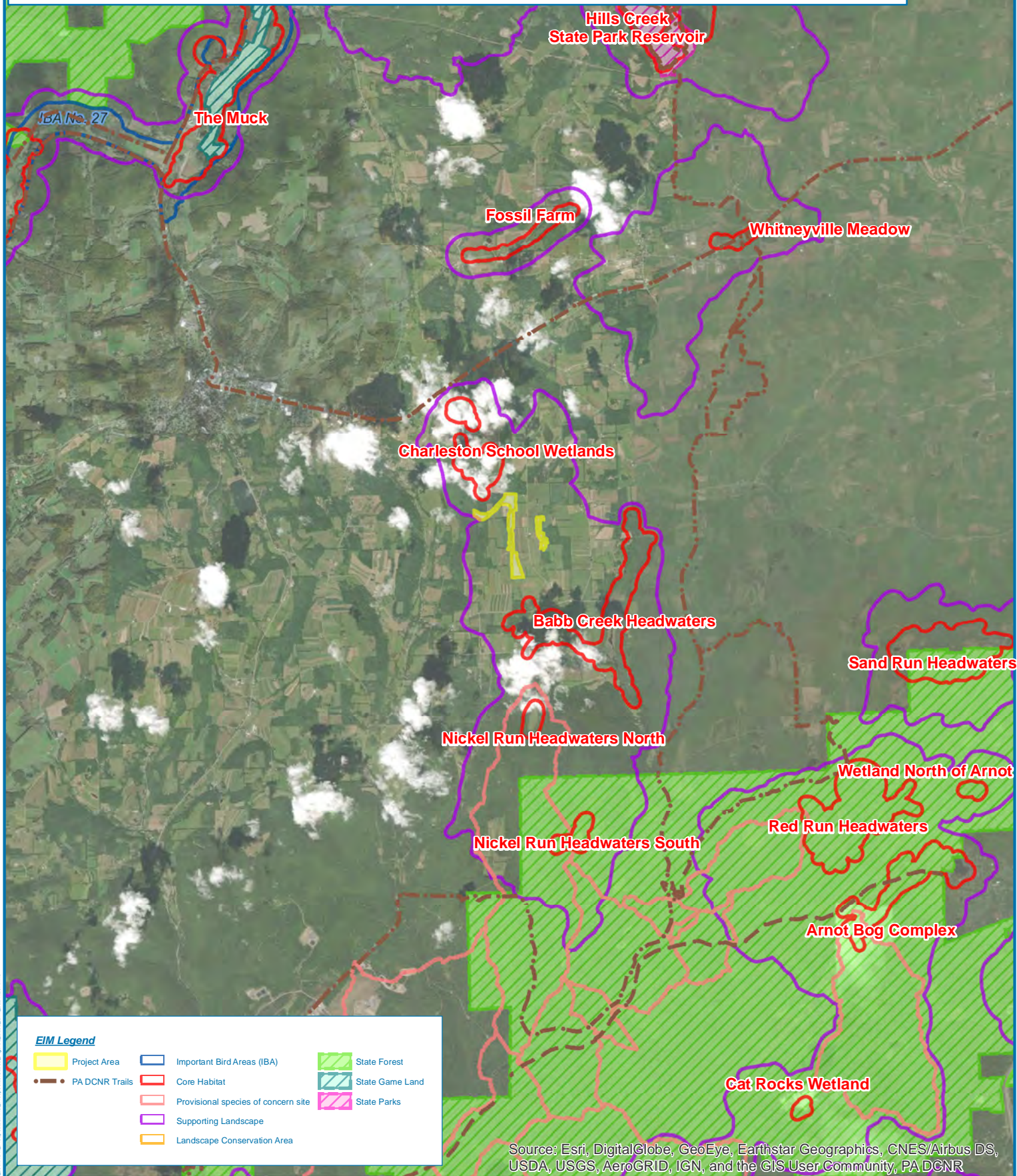
FIGURE 2B

Date: 12/8/2021

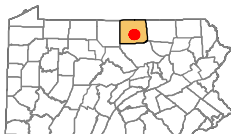
Drawn by: NR

Checked by: SY

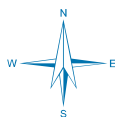




PROJECT LOCATION



TIOGA COUNTY, PA



ECOLOGICAL INVENTORY MAP

BABB CREEK MITIGATION BANK

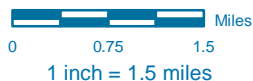


FIGURE 3

Date: 12/8/2021

Drawn by: NDR

Checked by: KW



020502050303
Marsh Creek-Pine Creek

020501040601
Catlin Hollow

020501040903
Elk Run

020502050301
Charleston Creek

020502050401
Headwaters Babb Creek

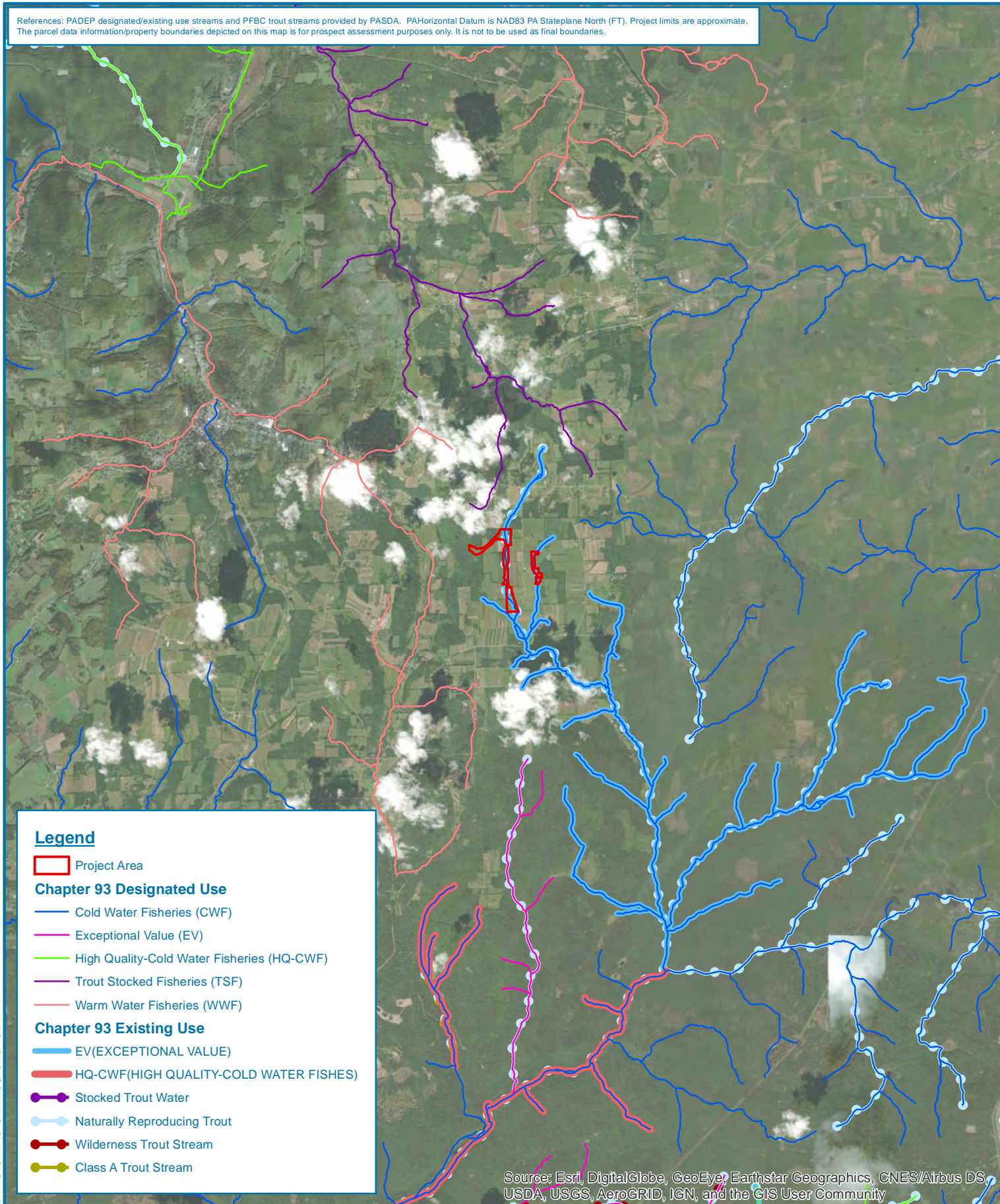
020502050402
Wilson Creek

Legend

- Project Area
- 12 Digit HUC
- Enhancement Watersheds
 - 1 - Enhancement Tier (Highest quality of intermediate quality watersheds)
 - 2 - Enhancement Tier (Second highest quality of intermediate quality watersheds)

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

References: PADEP designated/existing use streams and PFBC trout streams provided by PASDA. PAHorizontal Datum is NAD83 PA Stateplane North (FT). Project limits are approximate. The parcel data information/property boundaries depicted on this map is for prospect assessment purposes only. It is not to be used as final boundaries.



Legend

Project Area

Chapter 93 Designated Use

— Cold Water Fisheries (CWF)

— Exceptional Value (EV)

— High Quality-Cold Water Fisheries (HQ-CWF)

— Trout Stocked Fisheries (TSF)

— Warm Water Fisheries (WWF)

Chapter 93 Existing Use

— EV (EXCEPTIONAL VALUE)

— HQ-CWF (HIGH QUALITY-COLD WATER FISHES)

— Stocked Trout Water

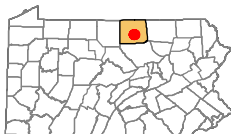
— Naturally Reproducing Trout

— Wilderness Trout Stream

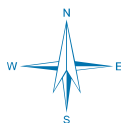
— Class A Trout Stream

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

PROJECT LOCATION



TIOGA COUNTY, PA



DESIGNATED WATERS MAP

BABB CREEK MITIGATION BANK



1 inch = 1.5 miles

FIGURE 5

Date: 12/8/2021

Drawn by: ADS

Checked by: KW

