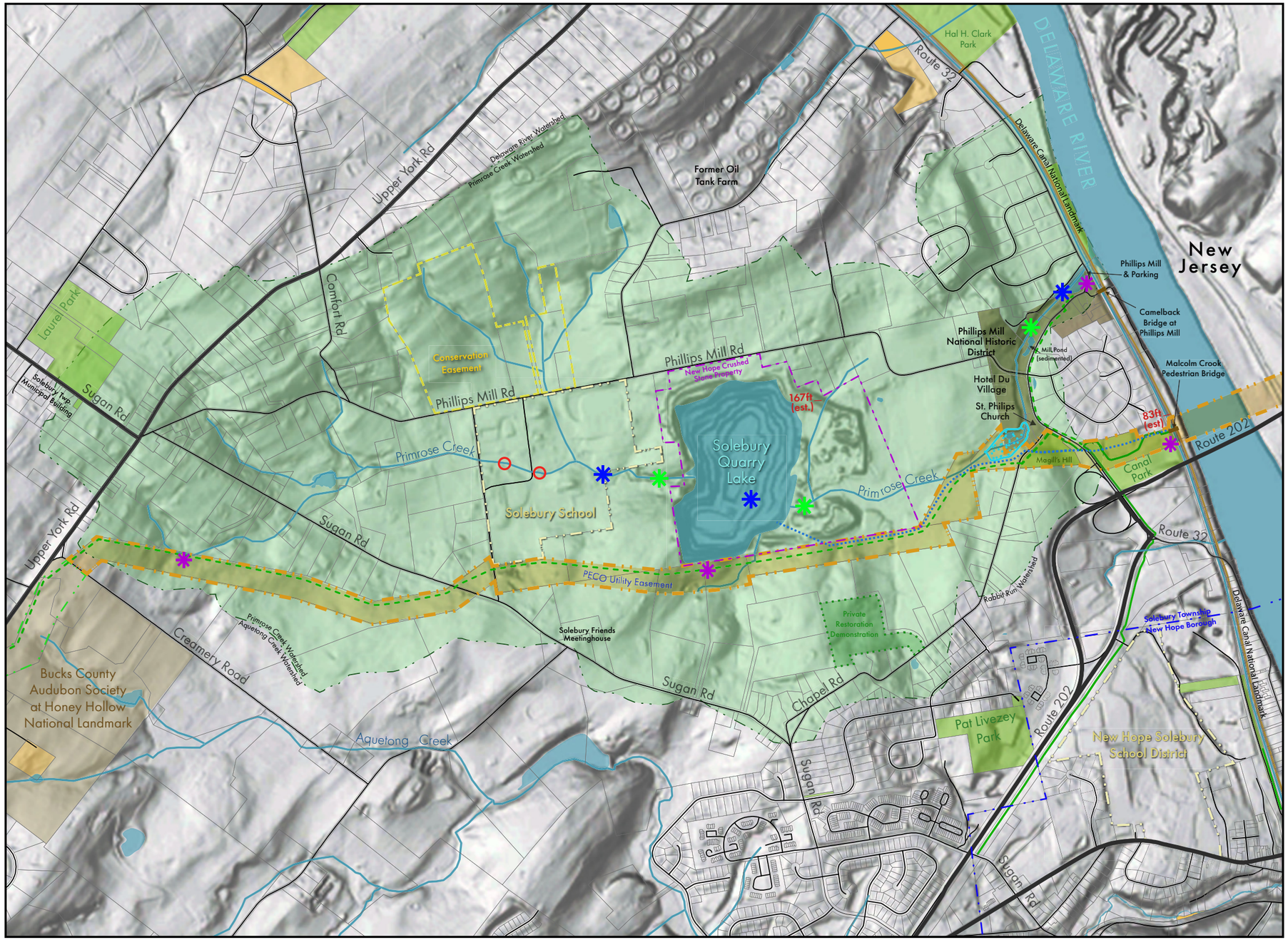
ZONE 1 - HEADWATERS REACH | ZONE 2 - QUARRY SITE | ZONE 3 - CONFLUENCE REACH



PRIMROSE CREEK WATERSHED

SOLEBURY TOWNSHIP, BUCKS COUNTY, PA

RESTORATION MAP

SIMONE COLLINS LANDSCAPE ARCHITECTURE

2024-05-07
SC #: 23071.00

0' 250' 500' 1000'

NORTH

MAP LEGEND

- Primrose Watershed
- New Hope Quarry
- National Historic District
- School District
- Conservation Easement
- Bucks County Land Trust Parcels
- Bucks Municipal Parks & Open Space
- PECO Utility Easement
- Municipal Boundary
- Recent Beaver Habitat
- Private restoration demonstration
- Street Centerlines
- Existing Trail
- Potential Trail
- Potential supplemental water to Delaware Canal
- Water Sensor
- Educational signage
- Fish Ladder
- Sinkhole

MAP NARRATIVE

Primrose Creek Watershed Association (PCWA) was formed in 2011, in response to ecological damages that resulted both downstream and upstream of the privately-owned New Hope Crushed Stone quarry, which had astonishingly been allowed by the Commonwealth to mine across the original creek bed. **Primrose Creek Coalition (PCC)** was formed in 2023 as a collaboration between three non-profit organizations with direct interests in the ecological sustainability of Primrose Creek – PCWA, Phillips Mill Community Association, and New Hope Colony for the Arts.

Lower Delaware Wild and Scenic River Program (LDW&S) is administered by the National Parks Service (NPS) to assist government and non-profit partners on both sides of the lower Delaware River with efforts to conserve natural, cultural, educational, and recreational resources – generally between Morrisville and the Delaware Water Gap reach of the Delaware River. This mapping project was funded by a mini-grant from the LDW&S.

Watershed Implementation Plan (WIP) for Primrose Creek

PCC articulated four (4) goals to guide this watershed mapping project:

1. **Conservation** – riparian locations, (invasive removal, bank stabilization, native plantings)
2. **Recreation** – extend existing Solebury trails, improvements, and appropriate amenities
3. **Education** - interpretive signage / exhibit/models, restoration demonstration sites
4. **Culture** – feature the legacy the watershed importance to New Hope - Solebury art and history

PCC strategies to rehabilitate and improve the Primrose Creek watershed are divided into three (3) physical "zones of interest" along the length of the entire watershed.

Primrose Creek Watershed - Zones of Interest

General preliminary descriptions for each zone include; general streambed geologies; flow characteristics; riparian habitat, water quality / temperature, and adjacent features from headwaters to the Delaware River.

Zone 1 **Headwaters reach** *from tributary headwater sources to quarry inlet*

- *Geology*: Stockton Formation – conglomerate, pinkish gray sandstone
- *Hydrology*: Intermittent to perennial stream flow
- *Habitat*: Mixed gravel substrate aquatic habitat
- *Quality*: Temperature highly variable through year
- *Riparian*: Mixed riparian conditions and limited maintenance practices
- *Species*: Headwater-adapted species
- *Adjacent*: Residential areas, PECO ROW, Honey Hollow preserve abuts at headwaters

Goals ***Zone 1 (ongoing and future)***

- Enhance the riparian edges with plantings and cease cutting vegetation along the stream.
- Establish a minimum vegetative buffer setback from the stream edge.
- Mitigate potential effects of flooding from upland runoff.
- Design and implement in-channel habitat diversification – with physical improvements that increase the diversity of invertebrates, amphibians, reptiles, fish, and bird species.

Zone 2 **Quarry site** *private industrial quarry excavated across a Commonwealth creek*

- *Geology*: Beekmantown Group Formations - gray dolomite; Allentown Formation - gray limestone; Lockatong Formation - black argillite, shale; Brunswick Formation - reddish shale
- *Hydrology*: Perennial in-flow (surface / subsurface), future outflows need to be managed
- *Habitat*: Boulders/cobbles inlet to quarry; deep, cold pool, bedrock outcrop in quarry; sand/silt substrate accumulating within quarry reservoir. Surrounding landscape is barren tailing piles that will require environmental remediation to re-establish habitat.
- *Quality*: Temperature variability in stratified quarry pool.
- *Species*: The original aquatic habitat is lost. New aquatic species may find habitat in managed quarry pool. Exposed quarry cliffs may support avian, mammal, and reptile species.
- *Adjacent*: Solebury School, PECO ROW, Phillips Mill Road, residences

Goals ***Zone 2 (ongoing and future)***

The quarry zone is divided into three subzones – each with different conditions and opportunities for ecological restoration.

Quarry inlet (subzone 1)

- *Geology*: Coarse substrate, steep gradient at inlet location
- *Hydrology*: Disturbed channel
- *Habitat*: Create fish / aquatic life ladder to support species migration above quarry
- *Quality*: Dependent on flow from Zone 1
- *Species*: Restore vegetation
- *Adjacent*: Mixed forest, scrub-shrub and steep quarry cliffs

Quarry reservoir (subzone 2)

- *Geology*: Karst outcrops, steep cliffs
- *Hydrology*: Restore Primrose Creek flows through a re-designed inlet and outlet
- *Habitat*: Evaluate habitat conditions (e.g. temperature) and fish stocking opportunities
- *Quality*: Restore riparian/terrestrial area of site with vegetation, reduce sediment runoff
- *Species*: Design for aquatic life, including migratory fish passage up and downstream.
- *Adjacent*: Quarry waste rock, scrub-shrub, mixed forest, steep cliffs

Quarry outlet (subzone 3)

- *Geology*: Bedrock and quarry waste rock piles forms rim the geological overflow elevation of the quarry reservoir.
- *Hydrology*: Create modern reservoir outlet structure to serve multiple functions, including sediment transport reduction downstream; peak flow regulation to reduce potential flooding; maintain water table surrounding to reduce sink holes occurrence downstream; controls to deliver minimum conservation flow downstream.
- *Habitat*: Create fish / aquatic life ladder to support species migration below quarry.
  - Enhance riparian zone with plantings to reduce cutting along the streambank. Establish a riparian/ vegetative buffer setback from the stream.
- *Quality*: Design outlet to control outlet from reservoir water levels (temperature controls)
- *Species*: Evaluate stream flow dynamics from future quarry outlet on existing species
- *Adjacent*: Evaluate the potential to divert a percentage of peak flows from the quarry to the Delaware Canal to maintain flows in the state waterway during low flow conditions.(this concept does not imply skim flow storage pumped from the Delaware River.)

Zone 3 **Confluence reach** *from quarry site to the Delaware River*

The lowest section of Primrose Creek watershed is the "confluence" reach located below the quarry site to the confluence with the Delaware River. This section may be considered as two sub-reaches. In both the upper and lower confluence subzones, the Primrose Creek is impacted by multiple existing conditions on private properties and by structures within utility and Commonwealth of Pennsylvania rights of way.

Upper Confluence (subzone 1) – from the quarry site to St. Philips Church

- *Geology*: Alluvium floodplain with accumulation of fine mine tailings
- *Hydrology*: The average gradient of the stream is lower as it approaches St. Philips Church.
- *Habitat*: Diversify floodplain vegetation to improve habitat value and maintain stability of accumulated sediment . (compatible with the PECO easement). The area directly above St. Philips Church has been a favored beaver habitat.
- *Quality*: The flatter stretches of Primrose Creek are areas where sediment tend to deposit
- *Species*: Diversity riparian species (e.g., amphibians, reptiles, fish, birds, mammals)
- *Adjacent*: Residences, PECO ROW, Magill's Hill Park, St. Philips Church, River Road

Lower Confluence (subzone 2) – from St. Philips Church to Delaware River

- *Geology*: Above mill dam – accumulated sediment (mixed gravel covered by sand and silt with aquatic vegetation) Mill dam to River - Trenton Gravel - gray or pale reddish brown.
- *Hydrology*: Creek flow is disrupted by sediment-filled mill dam structure, which may lead to storm flooding of River Road as flows from water-filled quarry reservoir increase. St. Philips Church to Phillips Mill Road – transition from open canopy to overstory riparian zone, including accumulated fine sediments from upstream quarry operations. Dam is over 100 years old, unmaintained and at risk of failure.
  - Protect the unique high-quality riparian zone from St. Philips Church, (past Hotel du Village, mill pond dam) to Route 32.
- *Habitat*: Design enhancements to stream and riparian habitats that will increase the diversity of invertebrates, amphibians, reptiles, fish and bird species.
  - Enhance the riparian zone with plantings and cease cutting along the stream.
  - Establish a three-foot setback from the stream with educational signage describing the benefits of not cutting/mowing up to the stream).
- *Quality*: Temperature in summer is relatively elevated by flow from upstream which is not shaded. Excessive buildup of fine sediments, resulting from downstream transport of sediments accumulated below the quarry and two PECO culverts.
- Study the options for strategically breaching the extant mill pond dam and managing sediments that have accumulated behind it.
- *Species*: Dam blocks most aquatic life passage.
  - Restore stream flow through of the historic mill pond area, possibly via adaptive reuse of the former mill race for aquatic life/fish passage up and downstream.
- *Adjacent*: Mitigate potential for flooding in Phillips Mill area from both upland runoff and/or river flooding.
  - Create a cultural landscape treatment plan for the Phillips Mill National Historic District (St. Philips Church to Phillips Mill) which can address elements including:

Watershed access and education

Watershed management initiatives for improving water quality, sustainability, public access and safety can be complemented by the following actions:

Trail extensions – Partners can complete additional sections of a trail-sidewalk system that has been previously created by Solebury Township from Sugan Road – to Canal Park; the Malcom Crooks Bridge; the Delaware Canal; and Magill's Hill Park. New sections of a Solebury walkway / trail network can be extended:

- PECO ROW from Magill's Hill Park to Honey Hollow preserve
- Along River Road (Route 32) to Phillips Mill

Education venues – Partners can use the walkway / trail network to install a series of interpretive displays to educate users about:

- Ecological risks and actions
- Recreation opportunities
- Historic places (e.g., story map of Phillips Mill historic operations), artifacts, events
- Art culture of the Phillips Mill area

Prepared by Simone Collins Landscape Architecture for and in collaboration with the Primrose Creek Coalition.