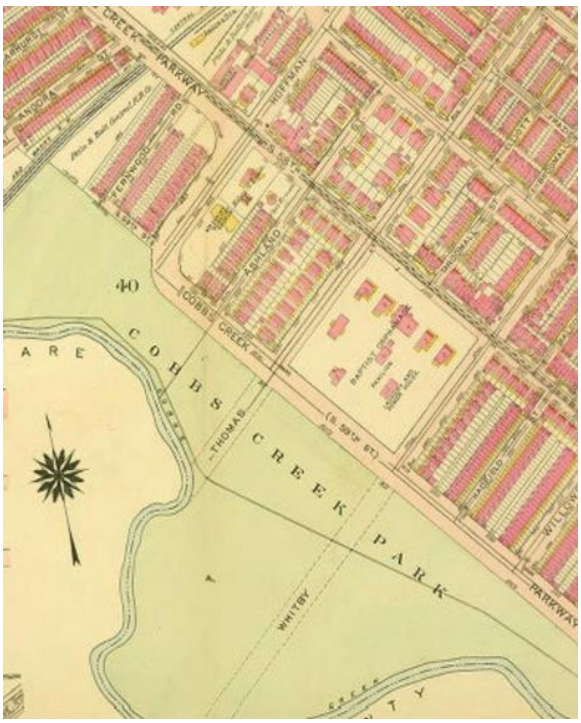
Natural Resources Inventory for the Area of Cobbs Creek Park Between the SEPTA Train Bridge and Florence Avenue, Including the Two Meadows Flanking Whitby Avenue/Longacre Boulevard



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Prepared by Land Health Institute

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I. Context and High-level Summary

Cobbs Creek constitutes part of the western border of Philadelphia, separating it from Delaware County. Cobbs Creek Park flanks Cobbs Creek on both sides and is managed by Philadelphia's Department of Parks and Recreation as part of the Fairmount Park system, an aggregation of non-contiguous parks throughout the City. This long, linear urban park is appreciated as an island of nature in a densely populated, infrastructure-heavy area, but has the potential to contribute even greater ecological and community benefits with selected restoration efforts and community engagement, including in the study area covered by this report.

During the summer of 2020, Audubon Pennsylvania engaged LandHealth Institute (henceforth, 'LandHealth') to conduct a natural resource inventory (NRI) for the area of Cobbs Creek Park proximate to the intersection of Cobbs Creek Parkway and Whitby Avenue, in the Kingsessing neighborhood of Southwest Philadelphia. General confines of the study area are the SEPTA train bridge to the north and the intersection of Cobbs Creek Parkway and Florence Ave. to the south. The actual ground studied is the land comprising Cobbs Creek Park between the aforementioned northern and southern points. A major focus of this investigation is two meadows: one on the Philadelphia/Whitby Ave. side of Cobbs Creek; the other on the Yeadon/Longacre Boulevard side of Cobbs Creek. Another focus is the riparian area along the creek throughout the entirety of the study area. The driving rationale for this NRI is to compile and provide relevant data that inform ecological restoration of meadow and riparian habitats in the study area as well as community-based restoration of safe connections and outdoor recreation within natural green space for residents of the surrounding neighborhoods.

Most of the information contained in this report was obtained through direct field analysis, carried out over a series of field visits conducted during late summer, fall, and early winter of 2020. In performing its field analysis, LandHealth applied an "ecological layer approach" in which various interconnected aspects, or "layers", of the land were studied. Among the natural layers studied were:

- Site geology
- General soil conditions
- Present plant communities
- Opportunistically observed wildlife and signs of wildlife
- General hydrology within the project area
- Ecological conditions of Cobbs Creek, including point and non-point sources of pollution.

In addition to the natural layers and features of the project area, LandHealth also analyzed the "human layers " – conditions or features of the site that are present due primarily to human activity. Among the non-natural layers studied were:

- Actively used urban infrastructure, including existing trails and adjacent and bisecting streets
- Remnant built structures
- Generally visible pollution, including purposely discarded waste, garbage, and debris
- Human usage of the project area.

In addition to data collected through direct observation, our report includes input from various individuals. First, numerous neighborhood residents, whom we randomly encountered while conducting our fieldwork, were kind enough to share their own experiences and perceptions obtained through their usage of the project area. Second, several Philadelphia high school students, participants in LandHealth's Program for Future Environmental Scientists and Stewards (ProFESS), and one Drexel University student visited the project area and produced creative pieces based on their perceptions of the site (Appendix 8). Third, various professionals working on behalf of the City, Delaware County, or non-profit organizations within or near the City contributed knowledge and advice related to the project area (Appendix 6). Some of these individuals work on other projects in Cobbs Creek Park or the adjacent area, which are in various stages of planning or implementation by government and non-profit entities, including improvements to traffic and pedestrian safety along Cobbs Creek Parkway, an extension of the Cobbs Creek Trail to Heinz National Wildlife Refuge, and citizen-led cleanup efforts.

Lastly, our NRI contains a preliminary set of recommendations which are intended to lay the foundation of and provide general guidance for the forthcoming Ecological Restoration Plan and associated Neighborhood Revitalization Plan. Details are found in Section III; the recommendations are, briefly:

1. Implement an ecological restoration plan that increases biodiversity and enhances habitat within the two meadows.
2. In conjunction with the meadow restoration plan, implement an ecological restoration plan that fosters biodiversity and increases woody plant mass in the riparian area between each meadow and Cobbs Creek.
3. Apply a holistic, selective governing approach toward non-native and invasive species.
4. Permanently cease the use of chemical herbicides/pesticides throughout the study area.
5. Establish an easily accessible trail network that incorporates existing trail segments and stairways and that includes safe access around and through each meadow.
6. Enhance the restored meadows with educational signage, gathering areas, and wildlife viewing areas.
7. Take the steps required to have the meadows certified through the Audubon Bird-Friendly Habitat Recognition Program.
8. Reuse the boulders in the rock piles lying between Whitby Ave. and the South Meadow.

9. Create a safe pedestrian crossing across Whitby Ave. to connect trail segments (Philadelphia side).
10. Create a safe pedestrian crossing across Longacre Blvd. to connect park entrances (Yeadon side).
11. Establish a safe, well-marked, continuous pedestrian walkway on the south side of Whitby Ave./Longacre Blvd. from Cobbs Creek Parkway to Parkview Blvd. In addition, restore the design intent of this historic park crossing.
12. Implement a site management plan marked by proactive monitoring with resident and student involvement.
13. Conduct monthly thematic walks and neighborhood events tied to the park.
14. Start a neighborhood "trash talks" group with regular sessions. Apply an urban archaeology approach to litter, debris, and other types of pollution.
15. Create a trail maintenance volunteer group to help maintain safe and aesthetically pleasant conditions along trails.
16. Implement a red-backed salamander monitoring project as an indicator of forest health, led by residents and/or students.
17. Invite local residents to name each of the meadows.
18. Start a local Cobbs Creek Park walkers group with regular group walks through the park.
19. Create and implement a student- and resident-executed wayfinding signage program for park trails, connecting streets, and points of interest.
20. Invite the Philadelphia Water Department to consider constructing green stormwater infrastructure to capture sheetflow from Cobbs Creek Parkway and direct it into the meadow for infiltration or detention.
21. Revitalize a nearby vacant lot by transforming it into a "green stepping-stone" to Cobbs Creek Park.
22. Consider building a pedestrian bridge or crossing across Cobbs Creek downstream of the bend around the Yeadon schist outcrop.

Figure 1: Map of Current Conditions

Figure 2: Map of Suggested Improvements

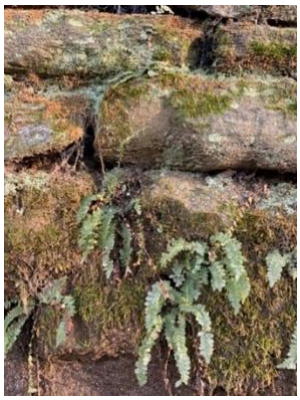
Figure 3: Historic Map From 1927

Historic map of Cobbs Creek area showing proposed extensions of Whitby and Thomas Avenues through/into the park and sewer line.

II. Natural Resources Inventory

A. Site Geology

The project site sits close to the Fall Line, the boundary between the Atlantic Coastal Plain and the Piedmont. A steep outcrop of Wissahickon schist is prominent on the Yeadon side of Cobbs Creek. Mica schist, or Wissahickon schist, is the predominant bedrock type underlying most of Philadelphia. The metamorphic schist of Philadelphia was formed millions of years ago, when the African tectonic plate collided with the North American plate, thereby forming the Appalachian Mountains. Our project site has the distinction of sitting at or very near the eastern edge of the Piedmont. Rocky sediments comprise bars and islands alongside and within the creek. Most of these rocks are pieces of bedrock that have eroded from upstream sites and been transported downstream over time by both the perennial stream current and intermittent storms. Rock types that are abundant on the edge and the bed of the stream include metamorphic schist, quartzite, and gneiss, and igneous pegmatite and quartz.



Fern, moss, and lichen growing on schist retaining wall

Detail of geology and urban archaeology of the point bar

Schist outcrop in Yeadon

B. General Soil Conditions

A soil map showing the predominant soil compositions within the vicinity of our project site is provided in Appendix 1. Specific conditions of the soils found on the study site are consistent with conditions typically found in remnant natural areas located within dense, highly urbanized surroundings in this area. The native soils of the original upper soil profile have long since been either eroded or excavated away. What remains at present is a loamy mixture containing high amounts of clay and/or silt. Sandy deposits are found in various spots near the creek. Such deposits are created by sandy sediments left behind after flooding events.

Urban soil profile, including a layer of asphalt

While soil sample transects are beyond the scope of our study, field investigation strongly suggests that specific soil conditions vary from place to place within the site. Various fill materials appear prevalent or abundant throughout much of the project area. In several places, rubble, such as construction debris or non-native rock, is visible. Near the footpath that runs north, from Whitby Ave, paralleling the creek, erosion has revealed that a layer of asphalt is now an actual layer of the soil profile, lying several inches below loamy material. In many places, the terrain appears distinctly unnatural, suggesting a history of significant cutting and filling activities. Both meadows in our project area sit on land that formerly contained ballfields and recreational infrastructure. Differences between plant establishment in each meadow suggests that soil composition beneath the meadows is not uniform. For instance, established growth of big bluestem grass and switchgrass is noticeably more widespread in the Philadelphia meadow compared with the Yeadon meadow.

From a soil profile perspective, our analysis suggests that the C and B horizons of the soil profile are generally well established throughout the site. In contrast, A and O (organic) horizons are generally poorly developed. Several factors contribute to the poor accumulation of organic matter in the upper layers of the soil profile. For example, sheet flow of stormwater coursing over the steep slopes of the site tends to quickly erode most newly forming topsoil. Over-abundant white-tailed deer cause both soil compaction in areas of flatter terrain and erosion in steeper areas. Further, Asian earthworm activity is pronounced throughout the site, thereby negatively impacting soil chemistry and soil structure at the top of the soil profile.

C. Plant Communities

A driving impetus behind this study and subsequent restoration plan is the visible lack of plant biodiversity in both meadows on the site, as well as in the riparian areas near or adjacent to Cobbs Creek. Three types of plant communities exist within the project area: tallgrass meadow, riparian floodplain forest, and upland eastern deciduous forest.

<u>Tall-Grass Meadow</u>

Big bluestem grass

In 2009, Philadelphia Parks and Recreation performed work at two sites on either side of Whitby Ave./Longacre Blvd., removing three baseball backstops and the remains of a basketball court, cutting or mowing and chipping brush and trees, removing tree stumps, and applying herbicides to the

Meadow after mowing, March 2020

work area. In 2010, both sites were drill-seeded with a mix of meadow/prairie grasses and forbs, provided by Ernst Conservation Seeds Inc. (species list in Appendix 2). Some trees and shrubs were also likely planted. According to Tom Witmer, Operations Manager, Natural Lands Restoration at Philadelphia Parks and Recreation, the early years following seed installation were marked by aggressive exotic plant invasion, prompting a regimen of regular herbicide treatment. Broad-leaf herbicide was used and resulted in eliminating most of the seeded forbs. Until a few years ago, both meadow areas were mowed annually in March. Some amount of herbicide treatment has continued to the present day.

Poorly established native plant growth in Yeadon meadow

Meadow under heavy snow

Meadow in October

From a vegetative structure standpoint, the upshot of the seed installation project and site management strategy employed over the past decade is two tall-grass meadows of very low species diversity. In each site, big bluestem grass (*Andropogon gerardii*) is most prevalent, followed by switchgrass (*Panicum virgatum*). The other grasses that were part of the specified seed mix are rare to nonexistent. Very occasionally, a small patch of purpletop (*Tridens flavus*), Virginia wild rye (*Elymus virginicus*), deer-tongue grass (*Panicum clandestinum*), or Indian grass (*Sorghastrum nutans*) may be spotted. Surprisingly, little bluestem grass (*Schizachyrium scoparium*), typically a hardy grass in many areas in Philadelphia, is essentially absent from both meadows. Non-native grasses presently growing in the meadows include Japanese stiltgrass (*Microstegium vimineum*), miscanthus grass (*Miscanthus sp*), and foxtail grass (*Setaria sp*).

Presumably due to regular applications of broadleaf herbicide over the years, native forbs are essentially absent from both meadows. Some patches of white snakeroot (*Ageratina altissima*) and hyssop-leaved thoroughwort (*Eupatorium hyssopifolium*) are present in the meadow. One small patch of common milkweed (*Asclepias syriaca*) was observed in the Yeadon meadow. In some edge areas of the meadows, invasive vines, including Japanese hops (*Humulus japonicus*),

mile-a-minute (*Persicaria perfoliata*), and Japanese honeysuckle (*Lonicera japonica*), were observed.

Riparian Floodplain Forest

Throughout most of the project area, established forested areas adjacent to or near Cobbs Creek are generally spotty or absent. Below the Whitby Ave. bridge, on both sides of the creek, Japanese knotweed (*Polygonum cuspidatum*) is well established in several streambank areas. In the areas between the lower parts of each meadow and the creek, Japanese stiltgrass grows robustly. On the Philadelphia side of the creek above Whitby Ave, riparian vegetation is very limited due to the proximity of the footpath to the creek. Consistent with the sparse riparian vegetation and correspondingly sparse root mass, streambank erosion is pronounced in many places.

Sparse woody vegetation in the floodplain

In places along the stream between each meadow and Cobbs Creek, thin bands of mature trees are established.

- On the Philadelphia side of the creek:
  - Native tree species include black walnut (*Juglans nigra*), silver maple (*Acer saccharinum*), red maple (*Acer rubrum*), box elder maple (*Acer negundo*), American sweetgum (*Liquidambar styraciflua*), green ash (*Fraxinus pennsylvanicus*), swamp white oak (*Quercus bicolor*), and tulip poplar (*Tulipifera liriodendron*).
  - Non-native trees include white mulberry (*Morus alba*) and tree of heaven (*Ailanthus altissima*).

Japanese knotweed in bloom in the floodplain

- On the Yeadon side of the creek:
  - Native species include American sycamore (*Platanus occidentalis*), basswood (*Tilia americana*), honey locust (*Gleditsia triacanthos*), northern catalpa (*Catalpa speciosa*), green ash, black walnut, American sweetgum, red maple, silver maple, box elder maple, and osage orange (*Maclura pomifera*).
  - Non-native species include Norway maple (*Acer platanoides*), Siberian elm (*Ulmus pumila*), European hornbeam (*Carpinus betulus*), and little-leaf linden (*Tilia cordata*).

  Interestingly, the caliper of several of these trees is very large. The appearance, massive size, and particular species mix of the streamside trees on the Yeadon side of the creek above Longacre Blvd. suggest a planned planting of specimen trees at least a century ago.

Meadow giving way to Japanese Stiltgrass in the riparian zone

Emerging leaves and tubers of lesser celandine

View of Yeadon meadow through sparse woody floodplain cover

Aside from a very occasional arrowwood viburnum (*Viburnum dentatum*) or spicebush (*Lindera benzoin*), shrub growth in riparian areas is essentially absent. Other woody growth in riparian areas includes some grapevine (*Vitis sp*) and non-native wineberry (*Rubus phoenicolasius*). Native herbaceous cover in riparian areas includes clearweed (*Pilea pumila*), white snakeroot, and sedge (*Carex* species). Non-native herbaceous cover includes copious amounts of Japanese knotweed, Japanese stiltgrass, and stinging nettle (*Urtica dioica ssp dioica*).

Eastern Deciduous Forest

In many of the generally steep-sloped areas of the study site, a mix of native and non-native trees predominates.

- On the Philadelphia side of Cobbs Creek, in the upland areas and between the SEPTA bridge and Whitby Ave, a relatively diverse area of species occupies the terrain.
  - Native tree species include red oak (*Quercus rubra*), white oak (*Quercus alba*), American sycamore, American beech (*Fagus grandifolia*), tulip poplar, cherry birch (*Betula lenta*), green ash, basswood, red maple, box elder maple, black cherry (*Prunus serotina*), and black locust (*Robinia pseudoacacia*).
  - Non-native trees include Norway maple, little-leaf linden, European hornbeam, empress tree (*Paulownia tomentosa*), and tree-of-heaven.
  - Established shrubs, generally non-native, include Amur and Tatarian honeysuckle (*Lonicera mackii* and *L. tatarica*, respectively), privet (*Ligustrum vulgaris*), beauty berry (*Callicarpa sp.*), and wineberry.
  - Vines include natives and non-natives: poison ivy (*Toxicodendron radicans*), grape, Virginia creeper (*Parthenocissus quinquefolium*), English ivy (*Hedera helix*), Japanese honeysuckle (*Lonicera japonica*), oriental bittersweet (*Celastrus orbiculatus*), and porcelainberry (*Ampelopsis brevipedunculata*).
  - Ground cover is generally sparse. Native herbaceous species noted include woodland sedge (*Carex sp*), white snakeroot, clearweed, and white wood aster (*Eurybia divaricata*, formerly *Aster divaricatus*).

- Non-native herbaceous species include Japanese stiltgrass, garlic mustard (*Alliaria petiolata*), mugwort (*Artemisia vulgaris*), golden bamboo (*Phyllostachys aurea*) and established mats of lesser celandine (*Ficaria verna*, previously *Ranunculus ficaria*).

- Below Whitby Ave, on the Philadelphia side of the creek, Norway maple and black cherry are abundant. Other tree species of note include sugar maple (*Acer saccharum*), American sycamore, and northern catalpa (*Catalpa speciosa*).
- Below Longacre Blvd., on the Yeadon side of the creek, the steep schist outcrop is largely covered by mature American beech and red oak. This remnant patch of beech-oak forest is the least disturbed ecosystem within the study area. It is likewise an area of relatively high ecological value, particularly with respect to providing forage for native wildlife, given its abundance of nut-bearing trees.

Beech-oak forest, exposed bedrock, liverwort growing on schist by the creek

American beech stabilizing the steep slope of the upland forest

Large American sycamore specimen in Yeadon just above Whitby Ave bridge

D. Opportunistically Observed Wildlife/Wildlife Signs

Surviving natural stream corridors, such as Cobbs Creek Park, serve as invaluable refugia for wildlife in densely developed urban areas such as Kingsessing and Yeadon. Opportunistically encountered mammals in our study area include white-tailed deer, red fox, groundhog, eastern gray squirrel, chipmunk, white-footed mouse, and bat (species not confirmed). Footprints of racoon were also observed. During a bird walk led by Keith Russell of Pennsylvania Audubon, over 30 bird species were observed (Appendix 3). Observed reptiles include garter snake, painted turtle, and red-bellied slider. Amphibians seen in or near the study site include redback salamander, bullfrog, green frog, and American toad. Fish sampled in or near the study site include 2 species of shiner, 3 species of sunfish, creek chub, eastern black nose dace, and sucker [Appendix 3]. Crayfish are also present in the creek. In addition, shells of Asian clam can be found among streamside sediments.

Separate listings of previously observed species of mammals, birds, fish, insects and aquatic macroinvertebrates can be found in the LandHealth Guide to Cobbs Creek Park (2018) here.

Two species of shiner caught from pool beneath Whitby Avenue Bridge

E. General Hydrology of Riparian and Upland Areas

Watershed Stewards exploring the expansive point bar across from Yeadon outcrop

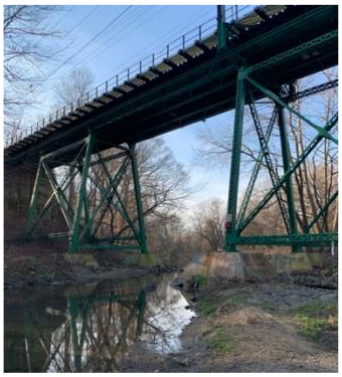
The surface hydrology of the study site is driven by a combination of factors, including topography, surface material covering the ground plain on or adjacent to the site, and alterations made to the natural land or stream areas of the site. Due to the generally steep-sloped nature of the study site, velocity of stormwater sheet flow during storm events tends to be high in many areas. This factor, combined with the general paucity of vegetative ground cover, leads to continual sediment erosion from many of the steep areas on the site. Drainage from Cobbs Creek Parkway and the Whitby/Longacre road is causing ongoing erosion in various spots. Points of hydrologic stress are the basketball courts and playground areas draining into the forested areas of Cobbs Creek Park on the Philadelphia side of the study area. On the Yeadon side, suburban backyards border the natural area and contribute concentrated runoff in several spots.

Other points of concentrated runoff are the result of built structures or features within Cobbs Creek Park. Examples of these include a retaining wall near Whitby Ave., the downward-sloping section of the paved Cobbs Creek Trail that extends from the adjacent neighborhood to the footpath along Cobbs Creek, and the framework of the SEPTA bridge. An area of pronounced overland flow due to built structures is the forested area and northwestern section of the meadow on the Philadelphia side of the creek, just below Whitby Ave. The source of this excessive flow is the funnel-like opening of the Whitby Ave. bridge. During storm events, stormwater mixed with base flow backs up behind the bridge opening, eventually flowing through the bridge opening at a much higher velocity, and to a much higher level above the floodplain, than it would were the bridge impediment not present.

F. Ecological Conditions of Cobbs Creek

In general, Cobbs Creek is a significantly impaired urban stream. Most of the creek flows through densely populated urban areas covered primarily by impervious hardscape surfaces. Natural vegetative buffer within the stream corridor and adjacent areas is typically quite narrow. In various places along Cobbs Creek and its main tributaries, such as the eastern and western branches of Indian Run and Naylor's Run, vegetative buffer is essentially absent. Within Philadelphia, the water quality of Cobbs Creek is severely compromised by raw sewage entering the stream through Philadelphia's antiquated combined sewer overflow (CSO) system. Specifically, within our study area, the water quality and structural integrity of Cobbs Creek are negatively impacted by three major factors: urban infrastructure impediments (described below separately for stream segments upstream and downstream of the Whitby Ave. bridge), point-source pollution, and non-point-source pollution.

<u>Infrastructure Between SEPTA Bridge and Whitby Avenue Bridge</u>



SEPTA bridge, piers anchored in Cobbs Creek

The segment of Cobbs Creek between the SEPTA bridge and the Whitby Ave. bridge is, overall, severely degraded in terms of ecological health and structural integrity. This scenario is largely due to the presence of the two bridges and the CSO structure comprised of both small outfall (or discharge point) C16 and large outfall CFRTR. Predominating poor conditions in this stream segment include:

View of SEPTA bridge from Yeadon meadow

One source of runoff

- deeply cut, highly eroded streambanks, largely denuded of vegetation;
- banks replaced, in places, by artificial gabion structures (wire frames containing rocks, or 'riprap'), causing channelized conditions;
- overly wide, overly shallow stream conditions, causing relatively slow flow areas, which are prone to low dissolved oxygen levels during hot weather conditions;
- persistent deposits of plastic debris and other litter, deposited during flash flood events and CSO discharge events.

The combined impact of the above conditions has produced overall degraded habitat opportunity for aquatic wildlife along this stream segment.

SEPTA Bridge Abutments and Piers

CSO outfalls C16 (on left) and CFRTR (large rectangular opening)

Several piers supporting the SEPTA train bridge that spans the Cobbs Creek corridor are located both directly within the stream itself and upon its banks. Bridge abutments located on either high point of the stream valley also support the bridge. Downstream of the bridge, streambank erosion is substantial. This erosion is directly caused by high-volume, high-velocity streamflow during storm events. Below the bridge on the Yeadon side, banks are marked by severe gradient. Mass wasting of the banks, which contain minimal established root mass, is continual. Debris carried by streamflow during storm events, notably plastic bags and other plastic litter, is abundant in tree branches and on streamsides. Erosion in the riparian areas on both sides of the stream can also be observed in the form of drainage gullies formed by runoff emanating from stormwater that drains from or is diverted around the bridge abutments.

Sewer Outfalls C16 and CFRTR

Between the SEPTA bridge and Whitby Ave. is a very large Philadelphia Water Department CSO outfall structure labeled CFRTR; connected to that structure is a small outfall pipe labeled C16. This overall structure occupies a large section of streambank on the Philadelphia side of the creek. Gabion baskets have been placed adjacent to this massive structure to help stabilize the structure and the adjacent streambank. Streambank erosion downstream of C16 and CFRTR is significant, comparable to the erosion caused by the SEPTA bridge piers. To help limit erosion on the Yeadon side of the creek, gabion baskets have been built into the streambank there. While some erosion is prevented by the gabions, erosion is evident around and behind them. The erosion precipitated by CFRTR is two-fold. First, the structure itself acts as a hard barrier that confines the stream and reroutes its flow, which scours out soil on the opposite bank. Second, during sizable storm events, high volumes of combined sewer overflow water, mixed with raw sewage, rushes from the outfall pipe at high velocities, thereby causing significant erosion. Debris, largely plastic, contained within the overflow discharge water becomes stuck on branches and between rocks downstream of CFRTR.

Base flow coming out of CFRTR

Gabions hugging both banks; still water

Looking into CFRTR

Whitby Avenue Bridge: Upstream Impacts

Another serious infrastructural impediment to stream health is the Whitby Ave. bridge that spans Cobbs Creek. The arched opening of the bridge is much too small to accommodate floodwater produced during many storm events regularly experienced in the Philadelphia region. In effect, the Whitby Ave. bridge serves as a partial dam to Cobbs Creek. Former natural conditions of the creek just upstream of the bridge have been completely altered by the funnel-like opening of the bridge. Stream features above the bridge caused, at least partially, by the effects of the relatively narrow bridge opening include slow-moving, lake-like conditions in spots, an "island" of rocks deposited by receding storm water in the middle of the stream, and a bar or "mini-beach" of sandy sediments on the Yeadon side of the creek just upstream of the bridge.

View of sandy beach from Whitby Ave bridge

Infrastructure Downstream of Whitby Avenue Bridge

The segment of Cobbs Creek downstream of the Whitby Ave. bridge is also generally degraded in terms of ecological health and structural integrity, although one subsegment, described below, is both relatively structurally stable and ecologically healthier than the remainder of the creek within the study area.

Rocky island and streambank erosion downstream of Whitby Ave bridge

Whitby Avenue Bridge: Downstream Impacts

During storm events of a certain intensity, water flowing down Cobbs Creek is impeded by the opening of the Whitby Ave. bridge and backs up behind the bridge opening on the upstream side of the bridge. Eventually, the backed-up water flows through the bridge opening. When it does, it does so with increased force, intensity, and velocity compared with normal streamflow conditions. The orientation of the Whitby

Looking upstream from long point bar toward Whitby Ave bridge

Ave. bridge in relation to the channel of Cobbs Creek is such that the accelerated streamflow heads directly toward the streambank on the Philadelphia side of the stream, downstream of the bridge. The impact of the stormwater-charged streamflow on the land is severe. Erosion of the streambank around the center of impact is substantial. Overall, this section of streambank is in a perpetual state of mass wasting. Also, flood water passing through the Whitby Ave. bridge bottleneck often washes high above the top of the bank, into the patch of riparian forest there and, sometimes, onto the lower portion of the Philadelphia-side meadow. In its wake, the flashy flow leaves a pronounced trail of debris. On the Yeadon side, across the creek from this high impact/high erosion area, is a prominent zone of accretion, marked by a large mass of medium-sized rocky sediments.

Of particular ecological note, the stormflow-powered forces that erode the streambank on the Philadelphia side, described above, have also scoured out the creek bed near the center of impact on the streambank. As a result, a deep pool, protected by the streambank on one side, has developed. This pool serves as habitat for fish of various sizes. This protected pool further benefits from the shading effect of mature broadleaf trees established in the adjacent upland forest area. On one field day in late December 2020, our fish specialist observed many fish of various species gathered in and near this pool. In a short period of time, he caught and released two species of shiner.

The Stream Bend by the Yeadon Outcrop

Just beyond the area heavily influenced by storm flow passing under the Whitby Ave. bridge is the most stable stream segment of Cobbs Creek within our study area. This stretch is also of the highest ecological health within the study area. The controlling factor in this segment of stream is the protruding outcrop of Wissahickon schist on the Yeadon side, which extends from the uppermost part of the valley to the creek bed. The presence of this prominent bedrock formation has caused the creek to form a natural bend, such that the stream flows around the erosion-resistant outcrop; this stability is further reinforced by an intact American beech forest growing there. On the opposite/Philadelphia side of the creek is an established patch of riparian forest, which provides soil stabilization in the floodplain, as well as shade over the stream. This forested floodplain area slopes down relatively gradually to a long, well-established point bar of sand and rocky sediments. The effect of relatively stable banks on each side of the creek is to enable beneficial stream mechanics, which include at least one complete riffle-run-pool sequence. Thus, in this relatively healthy stream segment, habitat structure is varied, fast-moving riffles oxygenate the water, rocky substrate in riffle and run zones serves as beneficial habitat for macro-invertebrates and crayfish, and micro-climate is

somewhat cooler than many other areas of the creek. This segment is also the most scenic and most easily accessible stretch of stream in our study area.

Below the Bend

Beyond the rocky bend in Cobbs Creek, the bedrock recedes and tree cover on both sides of the creek diminishes significantly. As a result, erosion is once again predominant, and the stream both widens and straightens. Accordingly, ecological conditions along this stretch of stream, the lowest section of our study area, are generally impaired.

Point-Source Pollution

Point sources of pollution along Cobbs Creek within the study area are the CSO discharge points noted above. During storm events that produce a certain threshold level of stormwater, that stormwater drains from city streets, carrying various pollutants, mixes with untreated raw sewage from nearby residences, and flows through city sewer pipes. This mixture eventually flows through outfalls directly into Cobbs Creek. Three CSO outfalls are located on the Philadelphia side of the creek within the study area, and one lies immediately beyond the study area. CFRTR and C16, just downstream of the SEPTA bridge, are described above. Based on numerous field visits, our observations, including that of a rich growth of algae at the base of the CFRTR outfall, suggest that water flows constantly from CFRTR. No detectable sewage odor was detected from this base flow during dry weather. Perhaps this base flow is groundwater flowing as an underground spring. During one site visit, an odor of laundry detergent was detected in the vicinity of CFRTR and C16.

Adam Levine analyzing the area below C17 from atop a smaller outfall just below C17

Between this dual discharge point and the Whitby Ave. bridge, a small (architecturally beautiful) oval-shaped, brick-and-stone outfall is built into the streambank. No label or CSO marking accompanies this outfall, although it is apparently active, as evidenced by a small amount of growth on rocks immediately below the mouth.

Elegant Outfall

Outfall C17

Just beyond the study area is a very large outfall, marked C17, surrounded by a stone structure on a scale similar to that of CFRTR, although it appears older and is of greater architectural interest. According to Adam Levine, this outfall is connected to a sewer line that encapsulates Thomas Run, an historic tributary of Cobbs Creek.

Sewer infrastructure is located in various spots along the Yeadon side of Cobbs Creek. However, none of this infrastructure appears to be in active use.

Non-Point-Source Pollution

Substantial negative impacts on water quality within Cobbs Creek, including the presence of various pollutants, are caused by non-point-source pollution emanating both from within and outside of the study site.

Within the study area, chemical pollutants from adjacent roads, including Cobbs Creek Parkway, Whitby Ave., and Longacre Blvd., and from the SEPTA rail bed that spans the stream corridor, regularly wash into the creek during storm events. Residential lawns and driveways lie atop the watershed. Any chemical substances applied to these surfaces may eventually end up in the creek. When Philadelphia Parks and Recreation applies broadleaf herbicide to the meadows, much of this chemical pollutant is ultimately transported to the stream by way of overland flow. In addition to chemical pollutants, sediments from eroding upland areas are regularly washed into the creek during storm events.

Additional non-point-source pollution originates well upstream of the study area. For example, several large swaths of turf exist within golf courses, school campuses, a hospital campus, a condominium complex, and miscellaneous athletic and recreational fields bordering Cobbs Creek. A substantial proportion of any fertilizer, herbicide, or other chemical substance applied to these grassy areas is washed into the creek. From near the headwaters of the main stem of Cobbs Creek in Bryn Mawr to the 69th Street SEPTA Terminal, tracks of the Norristown High Speed Line lie close to or right next to the creek banks. Beyond the terminal, the Market-Frankford Line borders Cobbs Creek. Pollutants from these transit lines undoubtedly mix with the waters of Cobbs Creek regularly.

G. Visible Man-made Structures, Human Impacts and Human Usage

While Cobbs Creek Park, including our study area, is considered a valuable, protected natural area in Philadelphia and nearby municipalities, human influence on the park's ecology is substantial and often visible. In addition, accessibility, safety, and aesthetics are heavily, if not primarily, influenced by human intervention. Some of this influence is positive; much is negative. All of it is part of both the natural history and the urban ecology of an invaluable natural resource in our city.

It is noteworthy that the median household income in the Kingsessing neighborhood on the Philadelphia side of the study area is substantially lower than that of Yeadon or of Philadelphia as a whole (Appendix 5). That area is also more densely populated and has less tree cover and green space than the area of Delaware County bordering Cobbs Creek. Making Cobbs Creek Park as accessible and inviting as possible to its human neighbors, while maintaining its ecological integrity, is therefore an important need in this area.

Actively Used Urban Infrastructure

To a large degree, urban infrastructure impacts the use and enjoyment of the park area within the study site. The SEPTA train bridge spans the stream valley high overhead, carrying commuters in and out of Philadelphia. Massive piers supporting the bridge sit in the creek and its floodplain. Massive abutments supporting the bridge displace upland forest and impede natural hydrology.

The bridge that crosses Cobbs Creek, connecting Whitby Ave. and Longacre Blvd. as well as Philadelphia and Yeadon, wields a palpable presence over our study area. Street crossings over Cobbs Creek are relatively few. Accordingly, the Whitby Ave. bridge carries a large amount of car traffic. In addition to serving as a bottleneck to the natural flow of Cobbs Creek, the bridge also acts as a major impediment to pedestrians using this area of Cobbs Creek Park for walking or hiking. The siting of the bridge structure itself has created a situation in which the only way for pedestrians to walk between the areas of the park on either side of the Whitby/Longacre road, and to follow the trail that is bisected by that road, is to cross the street itself – at grade and without the benefit of any pedestrian crossing signage or other pedestrian safety infrastructure. The road and bridge positioning make it impossible for pedestrians to safely pass under the bridge.

Philadelphia Side

Sewer System: An active line of Philadelphia's combined sewer system parallels Cobbs Creek. Other active pipes, running beneath streets perpendicular to Cobbs Creek Parkway, intersect with this main line. The significant impacts of the discharges from the outfalls located within the study area have already been summarized. Throughout the study area, one frequently comes in contact with manholes, pipes, riprap, gabions, and other hard elements that are part of or associated with the sewer system. One noteworthy structure, located in the upland forest above CSO outfalls C16 and CFRTR, is a large vertical manhole structure, approximately 20 feet tall. The presence of this tall structure suggests that plans to encapsulate Cobbs Creek in sewer piping and fill the stream valley to the height denoted by the manhole cover may have been in place prior to Cobbs Creek Park being permanently preserved and added to the Fairmount Park system early in the 20th century.

Old sewer indicating level to which stream valley could have been filled

Paved Trails: In the vicinity of the SEPTA bridge, parts of the footpath along Cobbs Creek and the Cobbs Creek Trail itself are constructed of asphalt. This impervious surface material was presumably chosen for its durability, however, these hard-surface trails contribute to over-abundant runoff entering the creek. In several spots, culverts under the asphalt paths transport

stormwater during storm events. In connection with the siting of the hard paths, a few areas of saturated conditions have developed, in effect adding some wetland habitat in such areas.

Playground/Athletic Courts/Parking Facilities: Immediately adjacent to Cobbs Creek Parkway, between Thomas and Whitby Aves., are (from north to south) a parking area, athletic courts, and a playground/picnic area. A footpath leads from the playground area to the creek-side trail, although there is no signage there.

- The parking area is graveled and accommodates approximately 2 dozen cars.
- The playground equipment is intended primarily for 2- to 5-year-old children, with swings for older children; several metal benches for adults are also present.
- Several picnic areas are integrated into the playground area: 3 groups of 3 concrete tables/benches each.
- Tennis courts are dilapidated (no net, deteriorated asphalt) and not usable as such.
- A basketball court is in use.

Grant money was received by Pennsylvania state legislators (Rep. Joanna McClinton and Sen. Anthony H. Williams) in summer 2019, from the Commonwealth Financing Authority/ Department of Community and Economic Development for renovation of the playground and athletic facilities. We have been in touch with a representative from Rep. Joanna McClinton's office and hope to coordinate planning across both projects.

Yeadon Side

In the Yeadon meadow, close to Longacre Blvd., sits a single concrete bench, a lone reminder of the baseball diamond that preceded the meadow.

Watershed Stewards by the lone bench in the former ball field/current meadow in Yeadon

Remnant Built Structures

Various remnants of built structures are found within the study area and help tell the story of human usage of the area over the past century.

Site of former pedestrian bridge

Structural remnants below the outcrop

Philadelphia Side

- Not far downstream from the SEPTA bridge, a large concrete pad sits within the upland forest on the Philadelphia side, perhaps a relic of industry. Near the same area, a flat layer of asphalt can be detected within the soil profile, indicating that a paved road close to the creek once existed; part of this is now the footpath noted above.

Beautiful stairway near Whitby Ave bridge

- On the downstream end of the bend in the creek that wraps around the schist outcrop, remnants of stone support structures are found on opposite sides of the creek. An old photograph supplied by Adam Levine shows a pedestrian bridge in this vicinity early in the 20th century. Hence, these structures may have once supported a pedestrian bridge over Cobbs Creek between Philadelphia and Yeadon.

Bridge over Cobbs Creek at Whitby Ave. Built by members of the Sherwood Improvement Company.

- Immediately downstream of these remnants is a flat, low dam-like structure that spans the creek.

Dam-like structure near bridge ruins

- Three stone stairways exist on the Philadelphia side of the park, each still in relatively fine condition: one is adjacent to the northeast side of the Whitby Ave. bridge, leading to short woodland trails and, ultimately, the playground and athletic courts. Another is located close to the southwest corner of Cobbs Creek Parkway and Whitby Ave. A third

stairway, elegantly long and winding, connects the existing footpath along the creek to Cobbs Creek Parkway at its intersection with Pentridge Street.

- Just off the south side of Whitby Ave., not far from the bridge, are two piles of boulders, at least one of which was apparently excavated during construction of a parking structure servicing the Philadelphia Art Museum.

Yeadon Side

Old sewer structure on Yeadon side of creek

- Various brick, stone, and concrete remnants of an old, apparently non-functioning sewer system can be found on the Yeadon side.
- At the base of part of the schist outcrop area, remnants of a stone platform, likely a slate material, are visible.
- Large boulders, seemingly of a geological type different from the nearby exposed bedrock, sit in the park adjacent to Yeadon backyards, south of Longacre Blvd.

For nearly the entire extent of the roadway comprised of Whitby Ave. and Longacre Blvd., which crosses through Cobbs Creek Park, the pedestrian sections of the roadway are unsafe and uninviting for walkers. There is not a single, easily deciphered sidewalk that runs the entire length. Also, for essentially the entire length of Whitby Ave./Longacre Blvd., the guiderails lining the roadway are in serious states of disrepair. Given that pedestrians are generally walking between those guiderails and the road, the current lack of a well-marked pedestrian path adds to the insecure feeling along that stretch of roadway.

Visible Pollution

Various forms of pollution are visible throughout the study site. Household litter can be found scattered to some degree throughout most of the area. In a few places, concentrated masses of litter are prominent. One such place is the wooded area near the southwest corner of Cobbs Creek Parkway and Whitby Ave.; another is along the border of the Yeadon backyards and Cobbs Creek Park, south of Longacre Blvd. Areas of concentrated litter, marked by a preponderance of plastic bags, exist in three sections of Cobbs Creek and its corresponding floodplain area. These sections occur just downstream of the SEPTA bridge piers, the CSO outfall CFRTR, and the opening beneath the Whitby Ave. bridge. The patterns of these three riparian litter zones are directly connected to periodic flash flooding and combined sewer overflow discharge.

Two other forms of pollution are detectable within Cobbs Creek. In numerous places along the stream, buildups of silt are visible, and many of the rocks and rocky debris exposed in the creek

or lying on point bars are coated with a layer of silt. The main source of this silt is upland erosion produced by abrasive sheet flow through the adjacent forest during storm events. In addition to silt, high concentrations of algae are visible throughout Cobbs Creek. While algae themselves are generally not considered pollution, the overabundance of algae is a strong indicator of excessive concentrations of phosphorus and nitrogen. The majority of these nutrients are most likely carried into the stream by stormwater runoff.

Short dumping along Whitby Ave.

Short dumping of construction debris and other large materials is common at the park edges along Whitby Ave./Longacre Blvd. Typical materials observed in these areas include wallboard, windows, roofing materials, mattresses, appliances, furniture, plywood, plexiglass, plastics, and miscellaneous household goods. According to discussions we have had with neighborhood residents and others with knowledge of this area, short dumping along Whitby Ave./Longacre Blvd. has been a problem for many years. We also observed construction and household debris dumped in back of the parking lot adjacent to the athletic courts, just above a steep slope leading down to the Creek.

Walkers and Hikers

Within the study area, the park section that, by far, receives the most walking and hiking usage is the segment of the Cobbs Creek Trail on the Philadelphia side of Cobbs Creek Park from the SEPTA bridge to Whitby Ave. During our field visits, we encountered a fair number of trail users in this area. (In general, trail usage in Cobbs Creek Park as a whole is low to moderate, in comparison with other Philadelphia parks, such as Wissahickon, Pennypack, and FDR Parks.) Park usage by pedestrians on the Philadelphia side south of Whitby Ave. is infrequent. This scenario is consistent with the fact that no continuous footpath presently spans the stretch of park between Whitby Ave. and Florence Ave. Also, entry into and egress from the park in this area are poorly indicated, except for a trailhead near Florence Ave.

In the Philadelphia-side meadow, human activity is almost wholly absent. Litter is also very light in the meadow. In one spot within the meadow, a makeshift structure containing some packaged food and bottled water was observed over several field visits, although with no sign of current use. During one field visit, a person in a tent was observed resting at one edge of the meadow.

In the forest and meadow sections of the Yeadon side of the study area, human activity is essentially nonexistent. Consistent with this scenario is the fact that no defined trail network exists in these areas.

Park User Impressions

While conducting our fieldwork, we spoke with numerous park users whom we encountered. Many of these individuals were kind enough to share their positive and negative impressions of Cobbs Creek Park, especially within our area of study. Several of these individuals asked to be notified of future public engagement events and activities planned within the area.

In general, when reflecting on positive aspects of the park, these walkers and hikers placed high value upon the simple existence of natural green space in the city and their own connections with the natural area. They appreciated the relatively easy accessibility of the main park trail between the north side of Whitby Ave. and the Cobbs Creek Community Environmental Education Center. Some of the park users highlighted the opportunities for physical exercise. Others noted the thrill of encounters with wildlife and nature in the city. Some prided themselves on their own devised park routes, in which they connected to places like Mount Moriah Cemetery, Haddington Woods, and 69th Street. As a whole, this self-selected group clearly regards Cobbs Creek Park as a precious natural resource for neighborhood residents.

These park users were also forthcoming about their negative experiences. Recurring themes centered around safety, accessibility, and pollution. Almost everyone we engaged with expressed concern about feeling safe in the park. Several noted various areas that feel remote and remarked about feeling vulnerable in these areas in the event a crime were to be committed. Walking along Whitby Ave. at dusk, two walkers stated that the atmosphere felt "creepy." The word "danger" or "dangerous" was used repeatedly by individuals. One individual who uses the park extensively does so only while accompanied by his very large dog. Consistent with this, a conversation with a resident of nearby Lansdowne Borough[1] revealed that this individual's family, with young children, doesn't use Cobbs Creek Park, and isn't aware of their neighbors using the park, because of "a perception of danger", although the family does use the Laura Sims Skate House at the edge of Cobbs Creek Park, just north of the study area. This Lansdowne resident also noted a lack of green space in that area of Delaware County, which is densely populated.

Wayfinding was an issue referenced by almost everyone we conversed with. Walkers noted the absence of signage overall and poorly marked trails and places of interest. Whitby Ave. was viewed as an impediment by essentially all the walkers/hikers with whom we spoke. Most walkers who enjoy walking longer distances in the park begin north of Whitby Ave. and regard Whitby Ave. as their turning-back point, reluctant to cross the winding roadway, with its blind curves and speeding cars, and then figure out their way ahead on the poorly indicated, discontinuous footpath into the woods on the south side of the road. Two women from Yeadon who frequently walk the park referred to the stone stairways adjacent to the Whitby Ave. bridge as the "steps to nowhere."

[1] A family member of one of the report authors.

Many park visitors we spoke with were visibly upset about the trash they regularly encounter on their walks. Many also expressed anger and frustration at the continuing short dumping in the area. Some pointed out the persistent ugliness of plastic bags enmeshed in tree branches and shrubs along the creek. Some wished there were more park cleanups. Implied in the comments of many park users was the idea that visible littering and dumping breeds further littering and dumping and that such visible pollution constitutes disrespect toward residents in the surrounding neighborhoods.

III. Initial Recommendations

Based upon our field investigations, site observations, and discussions with various neighborhood residents and professionals, we present a preliminary set of recommendations for actions that would improve conditions within our study area from both ecological and community perspectives. In an urban natural space, such as our study area, ecological restoration and neighborhood connection to the natural space go hand-in-hand. Accordingly, most of our recommendations promote both ecological healing within the natural area and community engagement within and around the natural area. Further, wherever possible and applicable, our recommendations seek to build upon initiatives and programs, currently in progress, that are designed to improve quality of life for residents living near the project area.

The following recommendations are intended to lay the foundation for ecological restoration of habitat within the study site and to set a course of reconnection and new connection between nearby residents and other visitors and the natural area.

1. **Implement an ecological restoration plan that increases biodiversity and enhances habitat within the two meadows.**

   As detailed above, both the Philadelphia (Whitby) meadow and the Yeadon (Longacre) meadow are severely lacking in species diversity and habitat opportunity. About 10 years ago, Philadelphia Parks and Recreation made a decision to replace recreational infrastructure within Cobbs Creek Park with meadow habitat. Meadow habitat is not generally a native ecotype in the Philadelphia region. (Although there are rare cases in which pockets of grassland have grown over time naturally in eastern Pennsylvania, the predominant historic ecotype/biome of eastern Pennsylvania is eastern deciduous forest.) If the two meadows in our study area were left alone, without any human intervention (eg, mowing), they would each undergo a process of ecological succession, through which their vegetative structure would transform from herbaceous grasses and forbs to a woody climax community of canopy trees overtopping shrubs, seedlings/saplings, and forbs. In time, the two meadows would come to resemble the forested areas that surround them. Therefore, if the two meadow areas are to remain as meadow indefinitely, a program of perpetual human intervention is necessary.

   Notwithstanding the need for regular maintenance, we support maintaining these two areas as meadow for the foreseeable future. In urbanized regions such as the Philadelphia metropolitan area, nature generally survives as remnants or patches of green within the vast urban matrix. Given the fragmented state of natural lands in our region, habitat diversification and variation of vegetative structure generally promote wildlife and plant biodiversity within these surviving patches of nature. Accordingly, in our specific area of study, the continued presence of meadow habitat, in addition to the more prevalent forest habitat, offers wildlife increased habitat opportunity. However, to truly serve as beneficial habitat for wildlife, the two meadows are in need of significant diversification of plant species.

To bring about a state of healthy diversity of species, healthy diversity of habitat structure, and overall enhancement of ecological well-being in both meadow areas, we propose that a broad palette of forbs, grasses, shrubs, and trees be planted in addition to the few native grasses currently growing there (suggested species in Appendix 4). Species include plants endemic to both the Atlantic coastal plain and the Piedmont, given our site's proximity to the Fall Line that forms the boundary between these ecoregions. Also, some of the suggested species are historically native to places outside eastern Pennsylvania, such as the eastern Midwest, where various remnant grasslands and meadows are found, or coastal plain areas in Delaware. The reasoning behind our recommendation of this broad species selection is the eclectic, non-native state of the soils underlying the meadows, as well as the non-native, urban-influenced microclimates of the surrounding areas, including the urban heat-island effect. Our project site is located in a truly dynamic spot: near the Fall Line, close to the Delaware River Estuary, within a highly urbanized area very sensitive and responsive to climatic changes. By planting a relatively wide array of plant species, we maximize ecosystem resilience within this dynamic urban environment.

Our broad palette of proposed plant species and plant types also promotes diversity of vegetative structure and wildlife habitat offerings. Presently, the dominant species in the meadows are tall grasses, reaching 6 feet or more in height. Our species mix consciously takes into account layering. Forbs and grasses at the 3- or 4-foot level growing together with taller forbs and grasses significantly increases habitat opportunities, while also providing increased root mass and increased carbon sequestration. Habitat diversity is further improved by 'islands' or small copses of shrubs and trees. Greater plant diversity also provides greater food options for wildlife. In addition to ecological enhancement, diversification of plant species and plant types also increases the aesthetic appeal of the meadows for visitors and plant and wildlife viewing opportunities for naturalists and hikers.

For the actual restoration planting project, we recommend a heavy seeding of the meadow areas, followed by the planting of plugs and restoration-sized shrubs and trees. Planting plugs in the meadows will enable flowering to occur during the restored meadows' first season of growth. (Only a few species in the seed mix are likely to flower during the first year following seeding.) Flowers from the plug plants will eventually yield additional seeds, many of which will serve as food for wildlife, some of which will germinate and become new plants in the meadow.

Regarding site preparation and timing of the project, we recommend that site preparation occur in late winter or early spring. Ideal preparation of the meadow sites for new planting would center around a controlled burn. Burning the meadows in late winter or early spring would kill various non-native species, which are not adapted to fire, while the native grasses currently established in the meadows will generally survive the burning. Many seeds of weedy annuals, like mile-a-minute vine and Japanese stiltgrass, would be destroyed by fire. Plant ashes remaining after the burn would be incorporated into the soil, improving its structure and water-holding capacity. Drill-seeding the site soon after the controlled burn would prime the planting area for optimal seed-to-soil contact and subsequent new plant

germination. If performing a controlled burn is not possible, we recommend that the meadow areas be mowed and brushed in such a way as to maximize seed-to-soil contact.

2. **In conjunction with the meadow restoration plan, implement an ecological restoration plan that fosters biodiversity and increases woody plant mass in the riparian area between each meadow and Cobbs Creek.**

   As noted above, the riparian forest areas bordering Cobbs Creek within our study site are generally very poorly developed. Tree cover is sparse in many spots. Established shrubs are nearly nonexistent. Herbaceous cover is predominantly non-native and invasive, comprised primarily of Japanese knotweed, Japanese stiltgrass, and lesser celandine. Overall root mass that adds structural integrity to the streambanks is severely lacking along the stream. Because of the limited tree cover in the riparian zone, shade that would help to moderate water temperature in the creek is correspondingly limited. Given the above scenario, a plan to establish a zone of intact riparian forest in the areas between the two meadows and Cobbs Creek is clearly needed.

   For reasons similar to those supporting our restoration approach to the meadows, we propose that a diverse mix of forbs, grasses, shrubs, and trees be planted in the riparian forest areas of our study site. Also, similar to our species suggestions for the meadows, our proposed species for the riparian forest areas (Appendix 4) are native to both the Atlantic coastal plain and the Piedmont.

   Given the patchy nature of the riparian areas of our study site, specific steps of the restoration plan should be determined and mapped out in the field, in conjunction with the restoration plan carried out in the adjacent meadows. For example, some sections of the riparian areas are open and fully exposed to direct sunlight, nearly devoid of woody vegetation. Other sections have very old specimen trees overhead but not much plant growth underneath, while others are marked by a monoculture of an exotic species, such as Japanese knotweed. By detailing the riparian restoration plan in the field, we can properly address the patchy nature of vegetation that presently occupies the areas between the meadows and the creek. We can also be specific in planning out the ecotone, or transition area, between meadow habitat and riparian forest habitat.

   In general, our plan calls for both seed mixes and live plants. Mechanical seeding should occur wherever a drill seeder can safely access areas in need of replanting without causing damage to any areas of established plant cover. Because of frequent flash flooding in the riparian zone, germination success from seeding alone should not be expected to be high. To bring about vegetative structure improvement in the riparian zones, it will be necessary to establish growth from plugs, restoration-sized shrubs and trees, and live stakes.

   We also urge caution regarding removal of invasive plant growth in the riparian zones. Physical removal of established plants tends to cause significant disturbance to the established soil profile, along with its established living ecosystem of micro-organisms and larger organisms. Removal of invasive patches of vegetation in riparian areas is best done on a case-by-case basis, following careful analysis in the field. Invasive establishment in urban

stream ecosystems, such as Cobbs Creek, needs to be considered inevitable. Each flood event brings new seeds and viable plant propagules from upstream areas of the watershed. A realistic restoration goal in urban riparian zones, such as those in our study site, is to establish healthy, long-lived native shrub and tree cover co-existing with exotic species.

3. **Apply a holistic, selective governing approach toward non-native and invasive species.**

   As mentioned above, pressure from newly arriving invasive plants in the riparian areas is constant for the entire Cobbs Creek corridor. Exotic plants and animals are sizable components of urban ecosystems throughout the Philadelphia region. Often, their removal comes with an ecological cost, such as soil erosion or herbicides entering the water cycle. Our view is that decisions regarding non-native species should be situational. If a patch of invasive plants can be removed with minimal disturbance and immediately replaced by site-appropriate native species, such a decision could yield ecological benefit. In general, optimal decisions regarding ecological enhancement are those that improve native biodiversity that sustains itself in the face of continuing pressure from invading species. We recommend that this type of reasoning be employed when analyzing areas containing established growth of non-native species.

4. **Permanently cease the use of chemical herbicides/pesticides throughout the study area.**

   When herbicide is applied to plants growing in the meadows or elsewhere, most of the chemical compound ends up washing into Cobbs Creek. As discussed earlier, Cobbs Creek is already subject to significant chemical pollution from both non-point and point sources. An ecological goal for any urban natural area should be reduced pollution, of any sort, over time. We believe that no net benefit is bestowed upon Cobbs Creek Park from regular herbicide applications. Hence, we urge the immediate cessation of such treatments.

5. **Establish an easily accessible trail network that incorporates existing trail segments and stairways and that includes safe access around and through each meadow.**

   The only section of our study site that receives regular foot traffic from neighborhood residents and other visitors is the footpath that runs from the Cobbs Creek Trail just east of the SEPTA bridge to Whitby Ave. and the Cobbs Creek Trail itself, both on the Philadelphia side of the park. The meadow areas and riparian areas that we are recommending for ecological restoration receive essentially no regular human use. In an urban natural area, long-term restoration success and regular human use and enjoyment of restored areas typically depend upon one another. Presently, neither meadow contains any clearly marked access point. Further, neither meadow contains any clearly marked trail that enables a walker to pass through it or around it. Creating trail circuits within each meadow and tying the circuits into an overall trail network will significantly increase recreational opportunities. In addition, clearly marked and safely accessible trails within the meadows and connected riparian areas will enable effective regular monitoring activities, which will be crucial to ensure long-term success of the ecological restoration of these areas.

We recommend the creation of a trail network within the study area that incorporates existing footpaths and stairways and that enables safe and easy access to and within the meadows and riparian areas. Figure 2 illustrates our ideas for new trails and trail connections. Among these, we propose that mowed footpaths encircle and bisect each meadow. We also recommend creating a fully connected pathway between the stone stairs near the southwest corner of Whitby Ave./Cobbs Creek Parkway to the winding stairs that connect Pentridge Street to the park. We further recommend that a relatively short out-and-back or loop trail be created in the forested area on the south side of Longacre Blvd. This trail would connect from the existing, but poorly marked, entrance to the park to a gathering point near the schist outcrop and to a viewing area overlooking the creek. The stairways should be stabilized as needed.

Redundant trails ("desire lines") should be closed off. For example, several trails lead from the northwest corner of Whitby Ave./Cobbs Creek Parkway and Whitby Ave. to the footpath along the Creek, creating potential for erosion damage and soil compaction.

6. **Enhance the restored meadows with educational signage, gathering areas, and wildlife viewing areas.**

Park visitors would benefit immensely from thoughtfully selected signage with information about the wonders to behold within the meadow, as well as the ecological significance of the habitat. One reference area that offers useful guidance for programming both meadows in our study area is the Dixon Meadow Preserve in Whitemarsh Township. According to a posted sign near the entrance to this ecologically restored natural area, "The Dixon Meadow preserve is a 14-acre protected area that provides wildlife habitat and management of stormwater flowing to the Wissahickon Creek. The Preserve is vegetated by a diverse mix of warm season grasses and wildflowers, plus native trees and shrubs." Within the Dixon Meadow Preserve are well-marked trails, including a boardwalk. Posted along the trails are several aesthetically pleasing signs that educate visitors with minimal words and effective graphics. Subjects depicted on the signs include: Regional Open Space System (which indicates the regional context and connectivity of the site), Meadow Ecology, Birds and Other Wildlife, Environmental Education, and Stormwater Management. Such signage could be posted along trails throughout the Yeadon and Philadelphia meadows and in a few opportunistic viewing spots.

A gathering area in one or both meadows would allow for family and small-group events and also places for educational signage and quiet reflection (see also Recommendation #8 and the map in Figure 2).

7. Take the steps required to have the meadows certified through the Audubon Bird-Friendly Habitat Recognition Program.

Posted at Dixon Meadow Preserve are signs designating the area "Audubon At Home Bird Habitat." According to the signs, "Audubon Pennsylvania recognizes that the people who care for this property pledge to provide healthy habitat that supports birds, butterflies, and other wildlife." Several bird boxes are also present within the meadow at Dixon Preserve. Following the lead of Dixon Meadow Preserve, We recommend constructing bird boxes within each of the restored meadows and following the steps necessary to have the meadows certified as Audubon At Home Bird Habitat. Certification allows the installation of signs stating "Audubon Pennsylvania recognizes that the people who care for this property pledge to provide healthy habitat that supports birds, butterflies, and other wildlife", which could be a source of neighborhood pride and encourage further wildlife study and volunteering.

Audubon at Home Bird Habitat

Bird Feeder

8. Reuse the boulders in the rock piles lying between Whitby Avenue and the South Meadow.

Rock pile between Whitby Ave and meadow near park entrance

Several piles of large rocks and boulders are presently located between Whitby Ave. and the northwest edge of the Philadelphia meadow. Most of the rocks are composed of schist; some are of another rock type, possibly serpentine. Lying near a park entrance, visible from the roadway, the presence of the rock piles may invite short dumping. Many of the boulders themselves are beautiful. We believe that a good spot for a public gathering area is at the edge of the meadow, close to the rock piles. Several of the boulders are relatively long and flat, making them excellent for rustic seating. Accordingly, we suggest that some of them be used for seating in this suggested gathering area. Further, we suggest that rocks not used as seating be placed along the meadow trails, helping to mark the trails and adding visual interest along the trails.

9. Create a safe pedestrian crossing across Whitby Avenue to connect trail segments (Philadelphia side).

Whitby Ave bisecting the footpath; study area for a pedestrian crossing

In a fully implemented trail plan, such as the one we propose, the major impediment is the roadway of Whitby Ave, which serves as a barrier to walkers and hikers making their way north or south in the park. We strongly recommend that a feasibility study of the relevant area be undertaken to support the creation of a safe pedestrian crossing of the Whitby Ave. within the park. The ideal location for such a crossing would be where the two footpath segments end at Whitby Ave, across from one another. While the posted speed limit there is 25 MPH, motorists frequently greatly exceed the speed limit. Also, a relatively blind curve is located on the east (Philadelphia) side of the proposed pedestrian crossing. The ideal solution would be a pedestrian bridge over Whitby Ave. In the absence of such a safe crossing, we recommend that both professionals and neighborhood residents consider a solution that includes speed bumps, stop signs, flashing caution lights, and posted speed calming signs on both ends of the Whitby/Longacre road. Included in the planning group should also be members of the Philadelphia and Yeadon Police Departments, neither of which, apparently, enforce the speed limit. At the time of this report's preparation, Rob Armstrong, Trails and Transportation Program Manager for the City of Philadelphia, had observed this area and committed to looking into this problem further.

10. Create a safe pedestrian crossing across Longacre Boulevard to connect park entrances (Yeadon side).

Our proposed trail network plan includes creating trail segments in both of the Yeadon sections of the study area (on either side of Longacre Blvd), neither of which presently contains marked trails. Entrances to these two park areas are located across Longacre Blvd. from one another. A safe pedestrian crossing in this location would be of great benefit to walkers in the Yeadon portion of Cobbs Creek Park, and would also serve as a traffic-calming device on the Yeadon side of the busy Whitby Ave./Longacre Blvd. thoroughfare.

11. Establish a safe, well-marked, continuous pedestrian walkway on the south side of Whitby Avenue/Longacre Boulevard from Cobbs Creek Parkway to Parkview Boulevard. In addition, restore the design intent of this historic park crossing.

The sidewalk that borders the south side of the Whitby/Longacre road, running from Cobbs Creek Parkway, through the entire width of the park, to Parkview Blvd. in Yeadon, is not well marked, not well maintained, and generally unfriendly to pedestrians. Guiderails are mangled. Cars speed past, close to the walkway. Sections of sidewalk are in disrepair. The walkway is strewn with litter and consciously dumped debris. Snow is not removed from the sidewalk following snowstorms. The feeling experienced by a lone walker along this winding pathway is likely one of isolation and lack of safety.

Keith Russell leading bird walk between broken guide rail and forest edge along Whitby Ave

The original design of this roadway is actually quite thoughtful from the aesthetic sense: a gracefully curving road and walkway, winding down and up through the Cobbs Creek valley, inviting pedestrians to stroll through the greenery above and to either side, inviting passengers in slow-moving cars to enjoy the scenery. The solution that we recommend in this area is simple yet highly ameliorative: Restore the original design intent. Give the elegant park crossing the respect that it deserves. Repair the walkway. Replace the guiderails. Slow down the traffic. Clean up the messes. When the Whitby-Longacre crossing was constructed about a century ago, it was likely regarded as a gem. It would not take much to restore its luster. Two beautiful stone stairways close to the crossing are still intact. So is the beautiful stone arch that spans Cobbs Creek. Matching conditions in 2021 to the original design intent would once again make this county crossing an invaluable asset for residents of Kingsessing and Yeadon, as well as all those who visit on foot or by car.

12. Implement a site management plan marked by proactive monitoring, with resident and student involvement.

The key to long-term success of ecological restoration projects in urban environments is a proactive, regular monitoring plan and informed, engaged residents and student scientists.

Regular monitoring enables stakeholders to stay on top of occurrences, favorable or unfavorable, in an ecosystem.

Many key parameters of ecological health can confidently be monitored by trained residents and students. Examples of such parameters are emerging native plant establishment, invasive plant incursion, plant phenology, wildlife presence, macroinvertebrates in the creek, and basic water quality. Depending on the factor being observed or measured, monitoring activity may be conducted monthly or quarterly. A community-led monitoring program will empower residents and students and connect them closely to the health and well-being of the natural area.

Kathleen Martin and Watershed Steward Christian Kelly under the Norway maples after a successful park cleanup

Regular monitoring informs management and maintenance decisions: when problematic scenarios are spotted, practical discussion can then take place to consider the best course of action. This 'monitor first and then take action' approach applies to our recommended strategy regarding invasive species that enter the restored areas. Most maintenance activities can be carried out entirely by volunteer residents and students, with guidance from a restoration ecologist.

As discussed above, the meadows would benefit immensely from a controlled burn. Burning the meadows every few years would be the best course of continued maintenance. In the absence of burning, periodic removal or cutting of woody plants that emerge on their own will be necessary to maintain the meadow as meadow habitat, and to prevent it from becoming successional forest habitat.

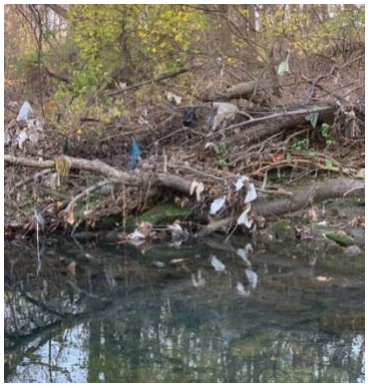
Many of the following recommendations can be considered components of a neighborhood-driven management and maintenance strategy for the restored habitats, as well as for the entire park area.

13. Conduct monthly thematic walks and neighborhood events tied to the park.

Holding regular events will invite local residents and other visitors to become familiar with the park, make use of its trails and amenities, and take an active interest in its well-being. Some may become inspired to volunteer for regular work projects, such as monitoring. Subjects of potential nature walks include birds, plants, wildlife, creek critters, and general wonders of nature. Subjects of community events could include native plant workshops, bird-box and bat-box building for installation in the Park or at participants' homes, birdfeeder making, bats and other night critters, night sky observation and s'mores, and design history of Cobbs Creek Park.

Birding in the meadow

14. Start a neighborhood "trash talks" group with regular sessions. Apply an urban archaeology approach to litter, debris, and other types of pollution.



Debris below SEPTA bridge

Issues of waste, litter, short dumping, and other pollution are prevalent in Kingsessing, Yeadon, and generally throughout the Philadelphia metropolitan area. Many residents have strong feelings about such issues. While volunteer cleanups often lead to local teamwork and can remove sizable amounts of litter from natural environments such as Cobbs Creek Park, they do not address the core of the litter issue. Discussions about the waste cycle and its challenges are found informative as well as empowering by many citizens. Community cleanup events that also include an urban archaeology component, in which the findings of a cleanup are recorded and analyzed, can offer insights about patterns and sources of urban pollution. Through incorporating an educational component to park cleanup events, residents become inspired to create novel projects and solutions to the ubiquitous problem of urban pollution. Also, a neighborhood Trash Talks group can make the specific issue of short dumping along Whitby Ave. a priority by regularly monitoring the roadsides, promptly calling 311 whenever new piles of debris are spotted, and placing constructive pressure on local leaders to do what they can to eradicate short dumping along the roadway. A Trash Talks group should also connect with the local neighborhood group which currently conducts park cleanups throughout Cobbs Creek Park, including within our study area.

15. Create a trail maintenance volunteer group to help maintain safe and aesthetically pleasant conditions along trails.

The more inviting the sense of place experienced on park trails and the safer the conditions, the more regular usage they will receive. A volunteer trails crew can be very effective in monitoring conditions such as problematic erosion, fallen trees or large branches blocking trail passage, and concentrations of litter. A crew can also be equipped to perform minor trail repair and to clear large woody debris that interferes with trail usage. The crew should have an effective direct line of contact established by the assigned Park Ranger or other appropriate representative of Philadelphia Parks and Recreation for instances when they encounter a trail problem that exceeds their capacity to remedy, such as major trail erosion, a fallen trunk too large to cut a path through with their equipment, or some other instance of imminent danger.

16. Implement a red-backed salamander monitoring project as an indicator of forest health, led by residents and/or students.

Northern red-back salamanders make for an excellent indicator of forest health, with their presence or absence correlated with forest ecosystem functioning. Relatively unique among amphibians, this species does not have an aquatic larval (tadpole) stage and thus does not

require a body of water to procreate. Consequently, red-back salamanders should ideally be abundant throughout most upland and lowland areas of an eastern deciduous forest such as Cobbs Creek Park, living within the leaf litter and woody debris on the forest floor. Laying out cover boards, noting their exact locations, and regularly monitoring them for salamander presence or absence are the main components of a meaningful scientific activity that can be confidently carried out by resident and student scientists.

17. Invite local residents to name each of the meadows.

Urban natural areas tend to benefit when local residents feel a sense of pride and ownership toward them. For example, meadow habitats like Houston Meadow and Andorra Meadow, both in Wissahickon Park, each have a unique sense of place. Similarly, empowering residents of Kingsessing and Yeadon to name the newly restored meadows in their own neighborhoods may lead to greater care being given to these natural habitats as they evolve over time.

18. Start a local Cobbs Creek Park walkers group with regular walks through the park.

Many walkers whom we encountered singled out feeling safe as their biggest concern when using the footpaths of Cobbs Creek Park. Walking with fellow residents in small groups is likely to increase park usage over time. As more local walkers join others, recruitment of more park hikers and walkers gets easier over time. Once the group of regular park users is large enough, a trail ambassador program, with a tailored interdisciplinary training component, can be initiated.

19. Create and implement a student- and resident-executed wayfinding signage program for park trails, connecting streets, and points of interest.

Signs and marked blazes on trails that effectively elucidate the pathways of the official trails in the park will facilitate the safety and confidence on behalf of trail users. Signs on key connecting streets, including Cobbs Creek Parkway, Whitby Ave, Longacre Boulevard, Pentridge Street, and Florence Ave, which clearly indicate official park entry points and trail connections, will also contribute significantly to safe and enjoyable park usage. Safely and easily getting into and out of Cobbs Creek Park from urban streets is essential for both neighborhood residents and visitors from other locales. Similarly, clearly marked footpaths within the park are essential for all walkers and hikers.

A comprehensive signage program should also include reference to other connecting points within Cobbs Creek Park and within hikeable or bikeable distance to the park. Noteworthy points of interest include Mount Moriah Cemetery, the Blue Bell Inn, John Heinz National Wildlife Refuge, the Baltimore Ave. trolley station, Cobbs Creek Community Environmental Center, Cobbs Creek Recreation Center, the 63rd St station of the Market-Frankford Line, Haddington Woods, Cobbs Creek and Karakung Golf Courses, Papa Playground, and Morris Park.

An illustrative map of the project area, rendered by students, would be a highly valuable resource for all who use the park. Such a map, which should include natural and cultural

points of interest in the area, would instill a sense of pride in neighborhood residents as well as in the students who create the map. This map would also be a valuable addition to the wayfinding program if posted at various trailheads.

20. Invite the Philadelphia Water Department to consider constructing green stormwater infrastructure to capture sheetflow from Cobbs Creek Parkway and direct it into the meadow for infiltration or detention.

A possible point for the capture of stormwater flowing across Cobbs Creek Parkway is near where it intersects Hadfield Street. An interesting green stormwater infrastructure project to consider would be to divert sheetflow from the street into the nearby meadow by way of a culvert structure and/or a constructed intermittent stream bed. Once in the meadow, the stormwater would become cleansed of pollutants and infiltrate over time as part of a constructed marsh or wet meadow habitat.

21. Revitalize a nearby vacant lot by transforming it into a "green stepping-stone" to Cobbs Creek Park.

Many vacant lots dot the Kingsessing landscape, including areas around 59th Street, 60th Street, and Florence Ave. Selecting at least one of these lots and turning it into a neighborhood amenity for community gathering, native plants, birds, and butterflies would serve as a meaningful urban connection to the natural area within nearby Cobbs Creek Park. It could also serve as a gathering spot for local events and as a meeting spot for park volunteer groups, such as those recommended in our report.

22. Consider building a pedestrian bridge or crossing across Cobbs Creek downstream of the bend around the Yeadon schist outcrop.

A pedestrian bridge once spanned Cobbs Creek in the vicinity of the schist outcrop on the Yeadon side of the creek. Returning a stream crossing to this area would be a tremendous amenity for walkers and hikers. Such a crossing would enable walkers traversing the meadow on the Philadelphia side of Cobbs Creek to cross the creek and make their way to the Yeadon section of Mount Moriah Cemetery. This crossing option would be an invaluable green connection for trail users because park land on the Philadelphia side of Cobbs Creek Park narrows considerably between Florence Ave. and the Philadelphia side of Mount Moriah Cemetery. In the event that a pedestrian bridge is deemed too costly, we suggest that the feasibility study of a stepping-stone crossing be studied. For reference, we recommend contacting Wissahickon Trails (formerly the Wissahickon Valley Watershed Association), which has constructed stepping-stone crossings across a few sections of the Wissahickon Creek.

IV. Appendices

Appendix 1: Soil Map

Key to Soil Types			
ByB2	Butlertown silt loam, 3 to 8 % slopes, moderately eroded	MaB	Manor loam, 3 to 8 % slopes
CeB	Chester silt loam, 3 to 8 % slopes	MaC	Manor loam, 8 to 15 % slopes
CeC	Chester silt loam, 8 to 15 % slopes	McE	Manor and Chester extremely stony loams, 25 to 50 % slopes
CeD	Chester silt loam, 15 to 25 % slopes	Mc	Made land, silt and clay materials
Ch	Chewacla silt loam	MgC	Manor loam, 8 to 15 % slopes
Cn	Congaree silt loam	MgD	Manor loam, 15 to 25 % slopes

Key to Soil Types			
GeB	Glenelg channery loam, 3 to 8 % slopes	Mn	Melvin silt loam
GeC	Glenelg channery silt loam, 8 to 15 % slopes	Ro	Rowland silt loam
GeC2	Glenelg channery silt loam, 8 to 15 % slopes, moderately eroded	Ub	Urban land
GnB	Glenville silt loam, 3 to 8 % slopes	Uh	Urban land-Howell complex
GnB2	Glenville silt loam, 3 to 8 % slopes, moderately eroded	WnA	Woodstown loam, 0 to 2 % slopes, Northern Coastal Plain

Appendix 2: Species Seeded in Whitby Meadows in 2010

13.720 lb	PLS	19.705 lb	Big Bluestem, 'Niagara' - North Whitby	Andropogon gerardii, 'Niagara'
52.770 lb	PLS	54.817 lb	Canada Wild Rye - North Whitby Meac	Elymus canadensis
34.300 lb	PLS	36.269 lb	Riverbank Wild Rye, PA Ecotype - Nor	Elymus riparius, PA Ecotype
65.340 lb	PLS	67.576 lb	Virginia Wild Rye, PA Ecotype - North	Elymus virginicus, PA Ecotype
2.740 lb	PLS	2.907 lb	Deer Tongue, 'Tioga' - North Whitby M	Panicum clandestinum (Dichantheli
5.720 lb	PLS	8.676 lb	Switchgrass, 'Blackwell' - North Whitb	Panicum virgatum, 'Blackwell'
13.720 lb	PLS	21.413 lb	Little Bluestem, 'Camper' - North Whitl	Schizachyrium scoparium, 'Camper
2.420 lb	PLS	2.646 lb	Purple Top - North Whitby Meadow	Tridens flavus
5.720 lb	PLS	6.785 lb	Indiangrass, 'Holt' - North Whitby Mea	Sorghastrum nutans, 'Holt'
3.810 lb	BLK		Common Milkweed, PA Ecotype - Nor	Asclepias syriaca, PA Ecotype

Total Packages in Shipment: _____ **Date Shipped:** 6/7/2010

QUANTITY	ALT QUANTITY	ITEMS	BOTANICAL NAME
0.460 lb	BLK	New England Aster - North Whitby Me	Aster novae-angliae (Symphyotrich
0.080 lb	BLK	Spotted Joe Pye Weed, PA Ecotype - N	Eupatorium maculatum, PA Ecotyp
0.760 lb	BLK	Swamp (Narrow Leaved) Sunflower, M	Helianthus angustifolius, MD Ecoty
1.210 lb	BLK	Ox Eye Sunflower, PA Ecotype - North	Heliopsis helianthoides, PA Ecotyp
0.690 lb	BLK	Marsh (Dense) Blazing Star (Spiked Ga	Liatris spicata
0.100 lb	BLK	Wild Bergamot - North Whitby Meado	Monarda fistulosa
0.120 lb	BLK	Tall White Beard Tongue, PA Ecotype	Penstemon digitalis, PA Ecotype
0.500 lb	BLK	Black Eyed Susan, CP NC Ecotype - N	Rudbeckia hirta, CP NC Ecotype
140.000 lb	BLK	Oats, Variety Not Stated - North Whitb	Avena sativa, Variety Not Stated
13.720 lb	PLS	19.705 lb	Big Bluestem, 'Niagara' - South Whitby	Andropogon gerardii, 'Niagara'
52.770 lb	PLS	54.817 lb	Canada Wild Rye - South Whitby Meac	Elymus canadensis
32.670 lb	PLS	33.788 lb	Virginia Wild Rye, PA Ecotype - South	Elymus virginicus, PA Ecotype
5.720 lb	PLS	8.676 lb	Switchgrass, 'Blackwell' - South Whitb	Panicum virgatum, 'Blackwell'
32.020 lb	PLS	49.975 lb	Little Bluestem, 'Camper' - South Whitl	Schizachyrium scoparium, 'Camper
11.430 lb	PLS	13.558 lb	Indiangrass, 'Holt' - South Whitby Mea	Sorghastrum nutans, 'Holt'
2.420 lb	PLS	2.646 lb	Purple Top - South Whitby Meadow	Tridens flavus
1.140 lb	BLK		Common Milkweed, PA Ecotype - Sou	Asclepias syriaca, PA Ecotype
0.440 lb	BLK		New England Aster - South Whitby Me	Aster novae-angliae (Symphyotrich
1.610 lb	BLK		Partridge Pea, PA Ecotype - South Whi	Chamaecrista fasciculata (Cassia f.)
0.080 lb	BLK		Spotted Joe Pye Weed, PA Ecotype - S	Eupatorium maculatum, PA Ecotyp

Whitby Ave. south

QUANTITY	ALT QUANTITY	ITEMS	BOTANICAL NAME
0.050 lb	BLK	Boneset, PA Ecotype - South Whitby M	Eupatorium perfoliatum, PA Ecotyp
0.080 lb	BLK	Purple Node Joe Pye Weed, IA Ecotype	Eupatorium purpureum, IA Ecotype
0.060 lb	BLK	Common Sneezeweed - South Whitby I	Helenium autumnale
0.730 lb	BLK	Ox Eye Sunflower, PA Ecotype - South	Heliopsis helianthoides, PA Ecotyp
0.100 lb	BLK	Wild Bergamot - South Whitby Meado	Monarda fistulosa
0.060 lb	BLK	Tall White Beard Tongue, PA Ecotype	Penstemon digitalis, PA Ecotype
0.660 lb	BLK	Black Eyed Susan, CP NC Ecotype - So	Rudbeckia hirta, CP NC Ecotype
140.000 lb	BLK	Oats, Variety Not Stated - South Whitb	Avena sativa, Variety Not Stated
1.000 ea	BLK	Pallet & Packaging Fees	

Appendix 3: Wildlife Species Opportunistically Observed in Study Area

Fish Species

Satinfin Shiner	Eastern Blacknose Dace	American Eel
Common Shiner	Common Carp	Channel Catfish
Green Sunfish	Tessellated Darter	Brown Bullhead
Pumpkinseed Sunfish	White Sucker	Bluegill
Redbreast Sunfish	Creek Chub	

Bird Species

Canada goose	American crow	American robin
Mourning dove	Carolina chickadee	House finch
Ring-billed gull	Tufted titmouse	American goldfinch
Turkey vulture	Golden-crowned kinglet	Pine siskin
Red-tailed hawk	White-breasted nuthatch	Dark-eyed junco
Belted kingfisher	Brown creeper	White-throated sparrow
Yellow-bellied sapsucker	Winter wren	Song sparrow
Downy woodpecker	Carolina wren	Red-winged blackbird
Hairy woodpecker	European starling	Common grackle
Northern flicker	Northern mockingbird	Northern cardinal

Appendix 4: Potential Species for Ecological Restoration of Meadows and Riparian Zones

Species that are shaded are listed for both meadow and riparian-zone restoration.

Potential Species for Meadow Restoration			
HERBACEOUS SPECIES		**SHRUBS**	**TREES**
Grasses	**Forbs**		
Agrostis perennans	*Agastache foeniculum*	*Aesculus parviflora*	*Betula populifolia*
Panicum amarum	*Allium cernuum*	*Amelanchier canadensis*	*Celtis occidentalis*
Schizachyrium scoparium	*Amsonia hubrechtii*	*Amelanchier laevis*	*Cercis canadensis*
Sorghastrum nutans	*Amsonia tabernaemontana*	*Baccharis halimifolia*	*Cornus florida*
Tridens flavus	*Asclepias incarnata*	*Clethra alnifolia*	*Ilex opaca*
	Asclepias syriaca	*Cornus racemosa*	*Juniperus virginiana*
	Asclepias tuberosa	*Cornus sericea*	*Magnolia virginiana*
	Asclepias verticillata	*Hamamelis vernalis*	*Nyssa sylvatica*
	Baptisia australis	*Ilex glabra*	*Ostrya virginiana*
	Baptisia tinctoria	*Itea virginica*	*Prunus americana*
	Chamaecrista fasiculata	*Morella pensylvanica*	*Quercus alba*
	Chelone glabra	*Photinia melanocarpa*	*Quercus coccinea*
	Chrysopsis mariana	*Photinia pyrifolia*	*Quercus phellos*
	Coreopsis lanceolata	*Rhus aromatica*	*Quercus velutina*
	Echinacea purpurea	*Rhus copallina*	*Taxodium distichum*
	Eryngium yuccifolium	*Rhus glabra*	
	Eupatorium maculatum	*Rhus typhina*	
	Eupatorium perfoliatum	*Rosa virginiana*	
	Eupatorium purpureum	*Vaccinium corymbosum*	
	Eurybia divaricata	*Viburnum trilobum*	
	Euthamia graminifolia		
	Eutrochium fistulosum		
	Helenium autumnale		
	Helianthus angustifolius		
	Heliopsis helianthoides		
	Hibiscus moscheutos		
	Iris versicolor		

Potential Species for Meadow Restoration			
HERBACEOUS SPECIES		SHRUBS	TREES
	Liatris spicata		
	Lobelia cardinalis		
	Lobelia siphilitica		
	Mimulus ringens		
	Monarda didyma		
	Monarda fistulosa		
	Monarda punctate		
	Oenothera biennis		
	Penstemon digitalis		
	Penstemon hirsutus		
	Pycnanthemum virginianum		
	Pycnanthemum tenuifolium		
	Rudbeckia fulgida		
	Rudbeckia hirta		
	Rudbeckia laciniata		
	Rudbeckia triloba		
	Solidago caesia		
	Solidago juncea		
	Solidago nemoralis		
	Solidago sempervirens		
	Symphyotrichum laeve		
	Symphyotrichum novae-angliae		
	Symphyotrichum novi-belgii		
	Symphyotrichum oblongifolium		
	Tradescantia ohioensis		
	Verbena hastata		
	Verbesina alternifolia		
	Vernonia noveborascensis		
	Veronicastrum virginicum		
	Zizia aurea		

Potential Species for Riparian Zone Restoration			
HERBACEOUS SPECIES		**SHRUBS**	**TREES**
Grasses	**Forbs**		
Andropogon gerardii	*Agastache foeniculum*	*Alnus serrulata*	*Acer rubrum*
Calamagrostis canadensis	*Asclepias incarnata*	*Amelanchier canadensis*	*Acer saccharinum*
Chasmanthium latifolium	*Chamaecrista fasciculata*	*Amelanchier laevis*	*Asimina triloba*
Elymus virginicus	*Chelone glabra*	*Cephalanthus occidentalis*	*Betula nigra*
Glyceria striata	*Conoclinium coelestinum*	*Clethra alnifolia*	*Carpinus caroliniana*
Panicum virgatum	*Eupatorium purpureum*	*Cornus amomum*	*Carya ovata*
Schizachyrium scoparium	*Helenium autumnale*	*Cornus sericea*	*Diospyros virginiana*
Sorghastrum nutans	*Heliopsis helianthoides*	*Hamamelis virginiana*	*Liquidambar styraciflua*
	Hibiscus moscheutos	*Ilex glabra*	*Magnolia virginiana*
Sedges	*Iris versicolor*	*Ilex verticillata*	*Nyssa sylvatica*
Carex crinita	*Liatris spicata*	*Lindera benzoin*	*Platanus occidentalis*
Carex lurida	*Lobelia cardinalis*	*Physocarpus opulifolius*	*Populus deltoides*
	Lobelia siphilitica	*Salix discolor*	*Populus grandidentata*
Rushes/Bulrushes	*Mertensia virginica*	*Sambucus canadensis*	*Quercus bicolor*
Juncus effusus	*Mimulus ringens*	*Vaccinium corymbosum*	*Quercus palustris*
Scirpus atrovirens	*Penstemon hirsutus*	*Viburnum dentatum*	*Salix nigra*
	Polemonium reptans		*Tilia americana*
	Rudbeckia hirta		
	Rudbeckia laciniata		
	Symphyotrichum novae-angliae		
	Symphyotrichum novi-belgii		
	Verbena hastata		
	Verbesina alternifolia		

Potential Species for Riparian Zone Restoration			
HERBACEOUS SPECIES		**SHRUBS**	**TREES**
	Vernonia noveborascensis		
	Veronicastrum virginicum		
	Zizia aurea		

Appendix 5: Demographic Data for Surrounding Neighborhoods

Comparison of Yeadon Borough With Kingsessing Neighborhood & Philadelphia Overall			
	Yeadon	**Kingsessing** [census tract 65[a]]	**Philadelphia Overall**
Overall Population / Land Area			
Population estimate[b]	11,496	4,635 ± 615	1,584,064
Population per square mile, 2010	7,174.3	-	11,379.5
Land area in square miles, 2010	1.6	-	134.1
Demography[b]			
< 5 yo	5.9%	9.5%	6.5%
< 18 yo	19.8%	25.4%	21.6%
≥ 65 yo	17.6%	13.4%	14.0%
White alone	7.0%	1.6%	44.8%
Black or African-American alone	89.5%	97.8%	43.6%
Hispanic or Latino	1.6%	0.4%	15.2%
White alone, not Hispanic or Latino	6.5%	1.6%	34.3%
Household Economics/Education (as of 2014-2018) [c]			
Owner-occupied housing unit rate	55.6%	49.3%	53.0%
Households	4,378	1,834 [2,255 housing units]	594,778
Persons per household	2.55	2.53	2.57
Median value of owner-occupied housing units	$135,600	-	$156,800
Living in same house 1 year ago	88.20%	-	85.70%
Language other than English spoken at home, persons age 5 years+	8.50%	4.2% ± 2.2%	23.10%
Households with a computer	87.30%	-	84.10%
Households with broadband Internet subscription	75.70%	-	73.70%
High school graduate or higher, age 25 yrs+	92.60%	46.8%	83.90%
Bachelor's degree or higher, age 25 yrs+	26.30%	6.0%	28.60%
With a disability, under age 65 years	10.70%		12.40%
Median household income (in 2018 dollars)	$52,968	$22,090 ± 4,800	$43,744

Comparison of Yeadon Borough With Kingsessing Neighborhood & Philadelphia Overall			
	Yeadon	**Kingsessing** [census tract 65[a]]	**Philadelphia Overall**
Persons in poverty	10.50%	40.0%[d]	24.30%
Businesses (as of 2012)			
All firms	771	-	104,439
Men-owned firms	363	-	55,745
Women-owned firms	359	-	40,906
Minority-owned firms	559	-	48,743
Non-minority-owned firms	196	-	51,842

All data/estimates from US Census Bureau (see figure below for locations).

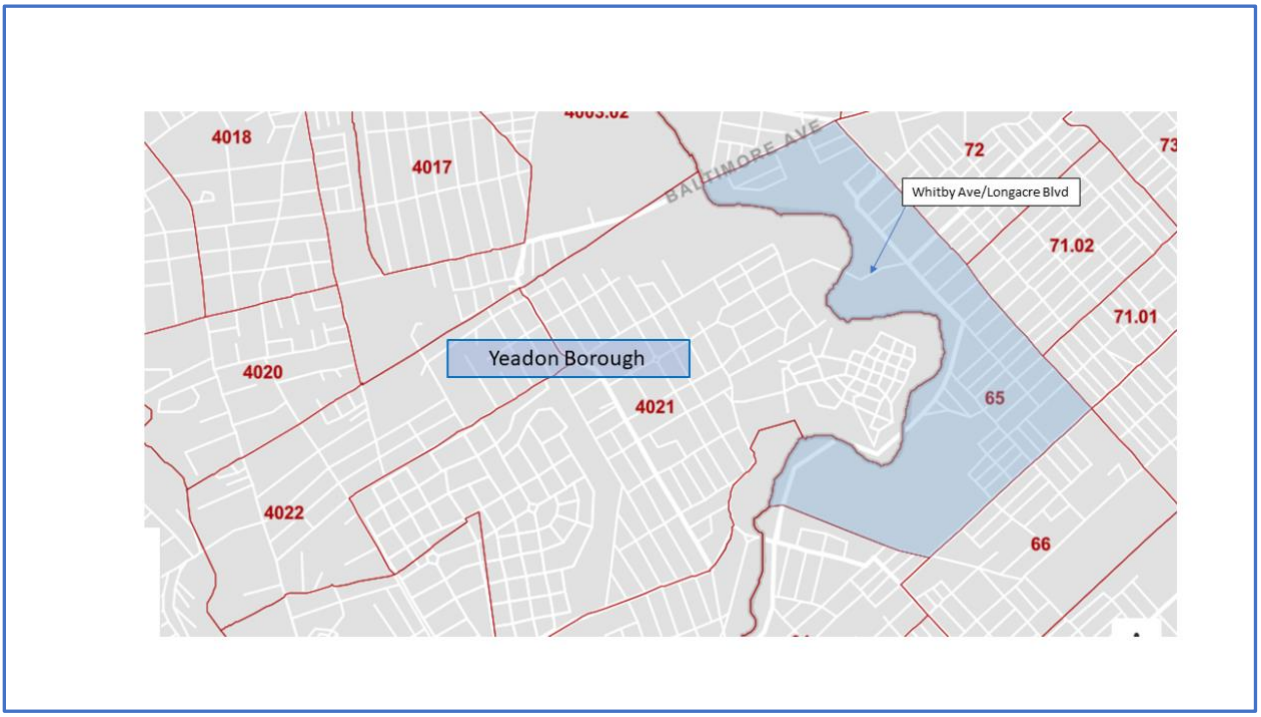
a: Census Tract 65 covering adjacent part of West Philadelphia is shown in figure below: Baltimore to Kingsessing, 58th to 59th & south of Mt. Moriah Cemetery.

b: Population, age, race estimates for Yeadon and Philadelphia overall from July 2019; for West Philadelphia, data from 2018 ACS (Census Bur. American Community Survey) 5-year estimate.

c: Education estimates for Kingsessing (Census Tract 65) from 2018 ACS 5-year estimate.

d: Defined as under poverty line (32.0%) or under 150% of poverty line (8.0%); not defined for Yeadon or Philadelphia overall.

Location of Yeadon Borough and Census Tract 65 in Philadelphia



Appendix 6: Individuals Who Provided Input for This Report

Tom Witmer	Philadelphia Parks & Recreation Dept.
Luke Rhodes	Fairmount Park Conservancy
Jason Mifflin	Philadelphia Parks & Recreation Dept.
Robert Armstrong	Philadelphia Managing Director's Office of Transportation, Infrastructure & Sustainability
Adam Levine	Philadelphia Water Dept.
Steve Beckley	Delaware County Planning Dept.
Anne Stauffer	Delaware County Planning Dept.
Keith Russell	Audubon PA
Bria Wimberly	Audubon PA
Nick Zuwiala-Rogers	Clean Air Council
Will Fraser	Clean Air Council
Larissa Mogano	Cobbs Creek Neighbors Association

Appendix 7: Community Groups, Businesses/Organizations, and Schools in Project Area

The following groups are potential partners in future projects. Some are already aware of the proposed restoration project, while others have been listed because of their proximity and potential overlap of interests and/or activities.

Organization	**Website and/or Contact Email**
Friends of Mt. Moriah Cemetery	https://friendsofmountmoriahcemetery.org/
Cobbs Creek Cleanup	RichGuffanti@yahoo.com
Cobbs Creek Community Environmental Education Center	https://ccceecinc.org/
Cobbs Creek Foundation (Cobbs Creek/Karakung Golf Course)	https://cobbscreek.org/
Neighborhood & Business Associations	
Cobbs Creek Neighbors Association	https://www.facebook.com/CobbsCreekNeighbors; cobbscreekneighbors@gmail.com
Sudanese American Community Center	https://www.sudanphilly.com/
West Phillie Produce / A&W Community Solutions	http://westphillieproduce.com/
52nd Street Business Association	https://www.theenterprisecenter.com/community/52nd-street-initiative
Baltimore Ave. Business Association	http://babawestphilly.org/about-baba/
Social Services Organizations	
ACHIEVEability	https://www.achieveability.org
Empowered CDC (Kingsessing)	empoweredcdc.mwwall@gmail.com
Southwest CDC	https://southwestcdc.org/
Miscellaneous Organizations	
Earth's Keepers Inc (Urban farm nearby; other activities in Center City)	https://www.earthskeepersinc.com
Friends of Morris Park	https://friendsofmorrispark.org/
Urban Tree Connection	http://www.urbantreeconnection.org/

Public and Private Schools	
School Name	Grade Level / Location
Philadelphia School District	
Jos. W. Catharine Elementary School	K-5 / 66th & Chester, Philadelphia
Avery D. Harrington Elementary School	K-8 / 53rd & Baltimore
WC Longstreth Elementary School	PreK-8 / 57th & Willows, Philadelphia
Wm. C. Bryant Elementary School	PreK-8 / 60th & Cedar
Add B. Anderson Elementary School	K-8 / 1034 S. 60th Street
Harrity Elementary School	K-8 / 56th & Christian
Boys Latin Charter School	9-12 / 55th & Cedar
Motivation High School	9-12 / 59th & Baltimore
Sayre High School	9-12 / 58th & Walnut
Wm. Penn School District	
PennWood Jr. High School	9 only / Baily Rd & Cypress St., Yeadon
Evans Elementary School	K-6 / 900 Baily Road, Yeadon
Private	
Cornerstone Christian Academy	K-8 / 1939 S. 58th St.

Appendix 8: Observations by High School/College Students

The following observations/essays were submitted by an undergraduate student currently doing an internship with LandHealth Institute (LHI) and 4 high-school students who completed their participation in the Program for Future Environmental Scientists and Stewards (ProFESS), through the Philadelphia Water Dept. and LHI, in December 2020.

Student contributors to our NRI are:

Thanh Vu, Drexel University 2022

Nia Mitchell, Mastery Charter Lenfest High School
Imani Mitchell, Mastery Charter Lenfest High School
Owen Moss, Masterman High School.
Saliha Steele, CAPA High School

Steward Saliha Steele sketching near bridge ruins

Steward Owen Moss taking in the view of meadow in Yeadon

Thanh Vu, Drexel Undergraduate and LandHealth Intern

Whitby Avenue Meadow NRI – First Impression

It is a warm, breezy October afternoon as we approach the intersection of Whitby Avenue and Cobbs Creek Parkway. Although the time is 2 pm, it is clear that this intersection is always busy as cars and trucks zoom by with many driving fast and dangerous speeds. I still feel the hectic and chaotic energy of the city. Scott leads our small group, including two high school students, Owen Moss and Saliha Steele, ready to explore the meadow nearby. This is my first experience in the area and one of the few times I will survey such a big green space in the city. We cross the street to approach steep steps made of bricks that lead narrowly to a wide walking path surrounded by many tall trees. Before we can make it to the opening of the meadow, we must walk through big fallen branches, very uneven terrain, and trash scattered everywhere.

As we walk further along, the overhanging tree branches perfectly shape an entrance to the meadow side. There is almost a sense of secrecy and privacy to finding it as the portion is quite hidden. It is instantly a peaceful escape from the loud noises and busy streets as we move further along. The sun glares in my eyes and I see the first glance of the vast field which is calm, still, and beautifully lit. The city noises seem to be a distant memory and far away at this point. While we survey the area, it is clear that there is not much variety in the grasses already planted as we see the same few spread across the meadow, which are all growing unrestrained. Our small group separates for a span of time to do our own investigations of the area. Pretty soon, I see them all disappear in the distance as the foliage covers their heads. I walk around the small path on the outskirts of the meadow to find mattresses, misplaced boulders, red berries, wood piles, and garbage littered everywhere. I am left with only my thoughts as I continue to walk over the uneven ground covered by flattened tall grass. As time slips by quickly, I start to look for any signs of the Watershed Stewards or Scott roaming the area. It is difficult to see anyone in the overgrown field as I scan for signs of movement. For the first time, I head into the towering grass and walk as far across the meadow as I can until I see a sign of our group. I am sporting long jeans and sneakers, but sharp and itchy plants still find their way up my leg and I wince in reaction. The unknown terrain makes me slightly hesitant and cautious. My common sense and knowledge tell me there is nothing to fear, but not seeing much of what is underneath or around me makes my brain race to snakes and other creatures. However, it is clear that there is not much sign of life in the meadow, if any. I start to think maybe fear of the unknown is a reason why we have not encountered anyone else on our exploration as the time inches toward late afternoon. I see a Steward toward the end of the path as she is hastily swiping swarms of insects off her exposed legs. They are minuscule but crawling all over her body as she reaches the end of the meadow. Our group is together once again to move further along.

Nearby, we spot Cobbs Creek, which we approach by walking over muddy and somewhat steep terrain. I jump onto a muddy landing as I examine the flowing water. Downstream, I can see an immense amount of trash being caught by low-hanging branches as the creek curves around the corner. It piles up on the creek banks and looks like a curtain of garbage draping over the horizon. Our Stewards point out the thick slab of concrete on the creek bed, which is possibly a sign of an old bridge or structure that was once there. We move along the side of the creek and jump onto the stones along the water. I feel a cool breeze on my face, the calming sounds of the water flowing, and an ammonia smell from the creek. We see exposed bedrock in the large overhanging rocks across the rippling water as we move along the rocky path. The trash is scattered along the rocks but less prominent in the water as we move further upstream.

This area deserves more attention and is practically calling people to hang along the bank and skip rocks on a beautiful autumn afternoon. It is warm, inviting, and has outcrops of big rocks and tree branches to sit and gather for people of all ages. It is yet again surprising that there is no group of kids hanging out after school or a couple strolling along the path in such a calm and quaint area. However, it is not obvious to the general public and possibly even residents of the area that it is available for use and a safe place to gather. It can be seen from the small bridge used for cars speeding through the residential area but is obscured by the meadow and overgrown foliage. We are nearing the end of our visit after walking the perimeter of the meadow and surrounding creek, then up a slope with a faint trail made by previous guests. When we reach the street where the bridge overlooks the creek and the trees hide the vast meadow, we are met with vehicles loudly whizzing by. From this view, it is unmarked and there is not an obvious entrance that looks as though it leads to a safe landing space. I can see why some city residents may fear the unknown of the meadow's curvy creek and hidden pathways.

When we approach our original meeting spot to end the NRI, there is a noticeable uptick of traffic on the road as rush hour hits. The streets are blaring and busy as many cars pass and I am immediately drawn out of the peaceful meadow and back into the frantic cityscape. Hopefully, Whitby Avenue Meadow can serve more people in the future as an escape from the city, with care and thought put into transforming its environment.

It is clear that Whitby Avenue Meadow has so much to offer but few, if any, signs to welcome guests and residents into its oasis. Although we could not speak to residents of the area because of the pandemic, I imagine that many would want to utilize its space for walks and a short escape from the noise and commotion of the city. However, there are no indications of where to enter or exit, and no signs of a clear trail people can walk on to avoid bushwhacking through tall grass. If people are unsure of what to expect, many will be discouraged from entering, so addressing those concerns can make a huge difference in gaining attraction and creating a welcoming environment.

Owen Sattar Moss, High School Student and Watershed Steward

WHITBY MEADOW

Completed as part of the graduation requirements for

LANDHEALTH INSTITUTE

December 22, 2020

The story of Whitby Meadow does not begin in the year 2020, when a Natural Resource Inventory at the site commenced in earnest. It does not begin 20-odd years ago, when the Department of Parks and Recreation cleared the Whitby ballfields, nor does it begin in the 17th century, when the Swedish first settled in the hills above the Schuylkill. In fact, our story does not even begin with the area's first Native settlers.

No, we go back even further, to about half a billion years ago, when where today lies Philadelphia was once the ocean floor. Layers of sand and clay accumulated, and came to form sandstone and shale. During the Appalachian Revolution, in which those great mountains were formed out of the Earth, heat and pressure metamorphosed that sandstone and shale combining, them into Wissahickon schist, which we find in abundance on the right bank of the Cobbs at Whitby.

Flash ahead a few hundred million years, and the land is full of those famous reptiles dinosaurs. In fact, the first dinosaur species to be identified in North America, *Hadrosaurus foulkii*, was found only 20 miles from Whitby Meadow. Though what today is meadow was then most likely forest, and indeed the topography then may have been all but unrecognizable to the contemporary observer, it's not difficult to imagine dinosaurs walking where we are writing about today.

Jump again – this time about 65 million years, to around the year 7,000 B.C.E. The land between the Cobbs and the Schuylkill, a part of Lenapehoking, the traditional Lenape lands, is richly populated with the Leni Lenape people. During the 18th century, most of these indigenous people were forced from their ancestral home. Yet, a significant amount of local toponymy is derived from Lenape words. Kingsessing, for example – the neighborhood in which Whitby lies, is the Anglicization of *Chingsessing* – "place where there is a meadow."

Zoom forward, and we are in the first half of the 19th century. Slavery is rampant in the southern United States, but Pennsylvania, for many, represents a stop on the way to Canada

and freedom. About 3 miles upstream from Whitby was Howard House, an inn. Owned by an abolitionist, slaveowners often left their slaves at this house while they conducted business in the city only to find their slaves gone when they returned. The Cobbs Creek itself played an important role in the Underground Railroad: the water, which to this day remains shallow enough to walk in, was used as a northbound byway, because the dogs of fugitive slave patrols would lose the scent at the creek.

Jump about a half-century ahead: the rise of industrial America. The lands around Cobbs Creek and the Schuylkill River came to be jam-packed with manufacturing plants and railroads; factories beyond factories. This was a bittersweet era: dense smokestacks and abundant factories meant, on one hand, that Philadelphians had jobs. But it also meant that the air and waterways around the city were more polluted than any time in prior human history. Land became poisoned, rivers went up, literally, in flames. We find remnants of this epoch at Whitby: a stone embankment – perhaps the foot of a bridge – is nearly directly southwest of the intersection of Whitby Avenue and Cobbs Creek Parkway.

By at latest the 1950s, the southeast (my focus) and northwest quadrants of Whitby Meadow (relative to the creek and the road-bridge), were baseball fields. A playground installed in the northeast quadrant remains today. Between 1996 and 2004, the ballfields were cleared, and about 10 years ago, tall grasses were planted, creating the meadow.

Today, Whitby Meadow is at a crossroads. It is imperative, perhaps above all, to hear – and listen to – the feelings, desires, and concerns of the community; the people who live around this land are a part of the land itself. But I believe it is also important to consider the rich, varied history of Whitby Meadow and the mighty Cobbs Creek.

Wrapping up Love Your Park Day

The Birds of Whitby: On November 14, 2020, a group of Audubon PA staffers, birders, and Philadelphia and Yeadon residents gathered for a Love Your Park bird walk and creek cleanup. A member of our group observed at least 30 species; they are:

- Canada goose
- Mourning dove
- Ring-billed gull
- Turkey vulture
- Red-tailed hawk
- Belted kingfisher
- Yellow-bellied sapsucker
- Downy woodpecker
- Hairy woodpecker
- Northern flicker
- American crow
- Carolina chickadee
- Tufted titmouse
- Golden-crowned kinglet
- White-breasted nuthatch
- Brown creeper
- Winter wren
- Carolina wren
- European starling
- Northern mockingbird
- American robin
- House finch
- Pine siskin
- American goldfinch
- Dark-eyed junco
- White-throated sparrow
- Song sparrow
- Red-winged blackbird
- Common grackle
- Northern cardinal.

Imani Mitchell, High School Student and Watershed Steward

Whitby Meadow

When I had first visited the meadow two years ago in June 2018 I was amazed by the fact that there was such a large green space in the city. This was because the area surrounding the meadow was not inviting. The sidewalk was cracked and falling apart, often it was overgrown and dumped upon. The street rails were also dilapidated and there weren't any street lamps. Sadly, the area surrounding the meadow is still like this today – dark, creepy, and depressing. But the meadow itself was tall and green when I had first visited it; it was flourishing. There was little pollution and the creek had seemed pretty healthy. For example, there were mayflies and fish present within the creek. We also saw a healthy amount of algae in it, which is a good sign because it shows that the creek is healthy and well sustained. In addition to the wildlife noted, the creek didn't smell bad and it had a healthy ripple, run, and pool.

Watershed Stewards hiking through the meadow, June 2018

On the other hand, when I visited the meadow in December 2020 I was taken aback by how the area had changed. Pollution and erosion were present throughout the entire creek. The bank had completely disappeared and become steep cliffs, where you would have to jump about five feet down in order to reach the water. Also, there were plastic bags within the creek and tens of them hanging on the trees like ornaments. There was glass, and there were plastic bottles in the water along with an unhealthy amount of algae. To my surprise, the creek had several tires and various shopping carts within it; some were even buried in sand. I counted around four tires and six carts, including a stroller! The creek also smelled of sewage. But animals were still able to live in the meadow, because we noticed a few animal tracks and burrows. Altogether, the meadow still has the ability to prosper and become an inviting green space for the community, but as of right now it is slowly deteriorating.

Overall, the main reason why I believe in the restoration of this meadow is because it has the potential to become a defining characteristic of the city. People will be able to visit the meadow and enjoy the peace, tranquility, and beauty that it provides. Without the restoration the meadow will become a wasted space for invasive plants and weeds to grow. The meadow will also remain a dumping ground, and the creek will continue to deteriorate. A few ideas that can be implemented into the meadow restoration are trash cans to keep the area clean, the removal of pollution within and around the creek, security cameras to prevent dumping, lamps to brighten the area, and the reconstruction of the sidewalk area. This is so that the street area

and the meadow will look more appealing and inviting to the neighborhood. I believe that the meadow can become an enjoyable attribute within the city, and because of this I support its restoration.

Nia Mitchell, High School Student and Watershed Steward

Whitby Meadow

The Mitchell family of Watershed Stewards

My first time at the meadow I was excited. However, I had trouble reaching the meeting area with the rest of the Watershed Stewards. But when I finally arrived, I was glad, it was spring and there were a lot of flourishing green trees around. Scott leads us across the street where the meadow lies behind a layer of trees. The street was wide and crowded as we crossed. As soon as we got across we were disgusted with the amount of trash and old furniture dumped in front of trees and around the area. Even as Scott tells of the disappointment of the trash littering the area, a man drops a bottle from the window of his car, driving off. We were appalled at how badly the area was treated. Later on we walk around the area exploring the varieties of plants and trees, making our way into the meadow. I even got to see one of my favorite trees, mulberry. When we finally reach the meadow we are met with a vast area of flowers and tall grass. That day was especially sunny and warm. I enjoyed the view of the open meadow. As the other Stewards and I made our way through the meadow we talked about the variety of plants we saw and of the animals and the area in general. Slowly we made our way to the creek, admiring the healthy and stable condition it was in. This was my first time visiting the meadow. It was both exciting and devastating to see. But I enjoyed it anyway.

Recently, on December 11, 2020, I visited the meadow once again. Again I met with Scott and others to visit and observe the meadow condition. However, I was taken aback by the horrid display as both the creek and the meadow had fallen into horrible conditions. No longer was the creek healthy and thriving. The creek was terrible after the storm the other night. There was a lot of algae and trash littering both the creek and the trees surrounding the water. Not to mention the erosion present on the creek banks. The meadow itself was not in good condition either: the once tall grass wilted and trampled. I also was able to see the dumping of wooden crates in the meadow. Through the meadow wasn’t in the best condition I could still see the signs of animals' presence and the preparation of the critters for winter. I hope as time goes by both the creek and meadow will improve as we strive to bring it back to life, as well as bring the community back into helping take care of their neighborhood. I vision the meadow becoming a place where more people will not only visit but will also enjoy and continue to care for it.