Abington Township – Green Stormwater Infrastructure Ordinance Audit
Pennsylvania Environmental Council (PEC)
November 2021

Abington Township – Proposed Code and Policy Recommendations

ABSTRACT

This report summarizes PEC's proposed recommendations from the Barriers to Green Infrastructure audit of Abington Township's Codes and policies. PEC staff, coordinating with Abington's professional staff including former Townships Engineer Amy Montgomery, Fire Marshall, Chief John Rohrer and Code Enforcement Officer, Shaun Littlefield undertook an analysis of the zoning code, subdivision and land development ordinance and stormwater ordinance using an audit tool developed by the University of Wisconsin Sea Grant program. This tool included nearly 100 questions under twelve topic categories. The recommendations included in this report were prioritized to have the greatest impact in allowing and incentivizing green stormwater infrastructure practices within the township. These recommendations are intended to assist Township staff and elected officials in evaluating possible changes to current code language or policies.

PEC's recommendations are divided into the following five categories: reference, flexible standards, incentives, site plan and education:

Categories

1. **Reference** – include definitions and terms consistent across codes and ordinances defining green infrastructure and best management practices.
2. **Flexible Standards** – include multiple options to fulfill requirements including flexibility on regulations with direct impact to implementing green stormwater infrastructure.
3. **Incentives** – incentivize green stormwater infrastructure practices within codes and ordinances.
4. **Site Plan** – including key items on the site plan allow green stormwater infrastructure to integrate into the project design at early stages.
5. **Education** – educating staff and the public on green stormwater infrastructure can assist in management and maintenance success.

1. REFERENCE

1. Audit Question: *Are rainwater harvesting and stormwater control elements acknowledged in design standards?*
   Code Reference: Chapter 146: Subdivision and Land Development
   Current Practice: There are no design standards provided for rainwater harvesting/stormwater control elements beyond those of site drainage infrastructure.

Figure 1. Recharge Garden/Bioretention Bed (DEP BMP Manual)

   Recommendation: Section 146.33 - include cross reference to Chapter 142.401, 406 of Stormwater Ordinance related to use of Stormwater BMPs to meet stormwater volume control requirements. Consider adding specific design standards for these elements and illustrations of these practices as described in Chapter 5: Non-structural BMPs of DEP's Pennsylvania Stormwater Best Management Practices Manual.
   Why: Including illustrations of definitions of GSI options ensures that reviews and designers know which elements are allowed or encouraged.

2. Audit Question: *Have primary types of green infrastructure practices (ex. bioretention/rain gardens, vegetated swales, green roofs) been defined in the stormwater ordinance or zoning regulations?*

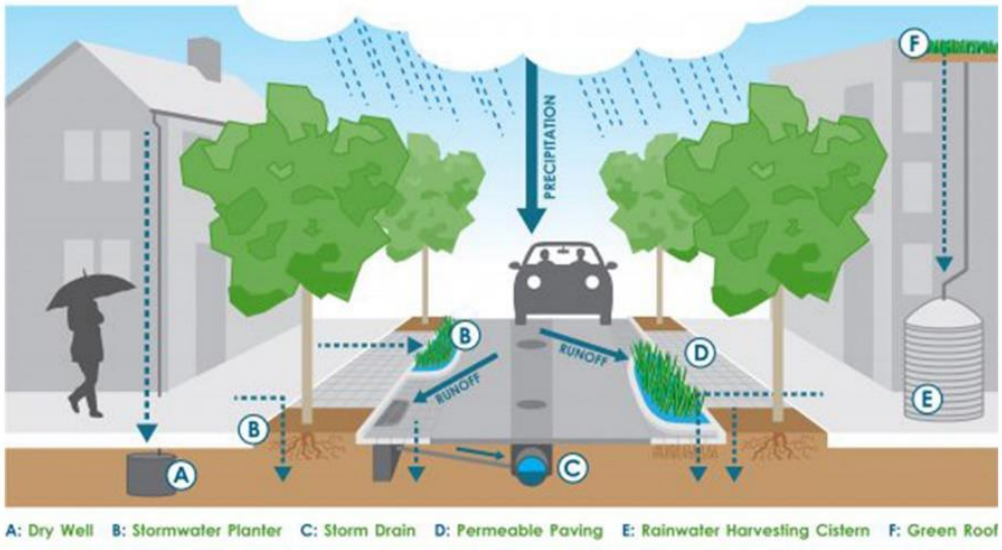

Figure 2. Green stormwater infrastructure typologies (Ensia)

   Code Reference: Chapter 142: Stormwater Management, Chapter 146: Subdivision and Land Development; Chapter 162: Zoning

Current Practice: Bioretention and swales are defined in Chapter 142 as "Best Management Practices," but the term "green infrastructure" is not specifically used/defined in any of the Township's ordinances.

Recommendation: Include Green Stormwater Infrastructure Definition in Chapter 142: Stormwater Management, Chapter 146: Subdivision and Land Development; Chapter 162: Zoning. Definition language can include: "Green stormwater infrastructure refers to those methods of stormwater treatment and control that use the natural capacities of soil and vegetation to prevent or reduce stormwater runoff and associated nonpoint source pollution. Green stormwater infrastructure methods often are combined with conventional or structural stormwater treatment systems, such as separators, ponds, or underground systems, to create stormwater "treatment trains" that enhance stormwater treatment and water quality" (TBGSI Wisconsin, page 43).

Why: Adding definitions of different green infrastructure practices is important to provide guidance and encourage applicants to use effective stormwater measures that are appropriate for the community.

2. FLEXIBLE STANDARDS

1. Audit Question: *Do allowable uses for parks and other open space areas specifically include stormwater retrofits or green infrastructure projects?*

   Code Reference: Chapter 162: Zoning

   Current Practice: A connection between parks and stormwater management is made in Chapter 162: Zoning, Article XVI: Steep Slope Conservation Overlay District, but not in other parts of the zoning ordinance.

   Recommendation: The list of permitted uses for parks/open space outlined in Zoning Ch.2601 K.1.2 (d) could be expanded to include "stormwater management and green stormwater infrastructure installations". Stormwater is a permitted use in open space areas, regardless of district.

Figure 3. Rain Garden -Lukens Park - Horsham Township (PEC)

Figure 4. Naturalized Basin in Aiden Lair Park, Upper Dublin (PEC)

Why: The list of permitted uses for parks/open space may need to include "stormwater management and green infrastructure installations" or a similar use to enable stand-alone projects.

2. Audit Question: *Is there a process or standard to waive numerical, spacing, and species requirements from stormwater-control measure in required landscape areas?*
   Code Reference: Chapter 162: Zoning
   Current Practice: Only exception is for the grade of planting islands/strips (ZO Section 2402 Parking Lot Landscaping and Street Trees).
   Recommendation: Modify Section 2403. B.4 (a) (buffer specifications) to add new subsection 10 - Stormwater Treatment Buffer as an option which may include a combination of fencing and plant material for screening and stormwater treatment.

Figure 5. Typical buffer vs. enhanced stormwater management function (MCPC Parking Guide)

Why: Codes often require buffers between properties or uses to be composed of a "dense evergreen hedge" or similar. Codes can be modified to provide an option for integrating vegetated stormwater-control measure where needed using a combination of fencing and plants for screen and buffer areas.

3. Audit Question: *Are there minimum landscaping requirements for parking lot perimeters or islands?*

Figure 6. Anatomy of a Green Parking Lot (MCPC Parking Guide)

Code Reference: Chapter 162: Zoning – Section 2402

Current Practice: Yes, for any new or existing parking lots where >50% of the spaces are being modified and there are at least 50 parking stalls, planting islands must be installed every 15 stalls. Parking lots in residential districts must also be divided by planting strips.

Recommendation: Recommend adding more options for bioretention areas within in parking strips, islands, and perimeter landscaped areas. Require parking islands for every 10 spaces with a minimum area of 340 sf and minimum width of 9 feet. Planting strips of 10 ft. minimum width for lots over 100 spaces (equal to or less than 40,000 sf). Include language encouraging use of curb cuts and inlets to provide rainwater to enter planting area. Planting islands, strips and bioretention areas should have soils improved to depth of 30". Consider lowering threshold for green parking lot standards when 25% or more of building square footage is subject to redevelopment or 10 or more spaces added to existing lot.

Figure 7. Rain Garden Features - Wegman's Parking Lot, Montgomeryville PA (PEC)

See Appendix for sample code language.

Why: Parking lot landscaping can mitigate urban heat island effects and can be co-designed as green infrastructure for stormwater treatment.

4. Audit Question: *Is turfgrass required in new subdivisions or construction? Could deep-rooted plants be substituted?*

   Code Reference: Chapter 146: Subdivision and Land Development

   Current Practice: Turfgrass is not the only option suggested, however, no alternative types of groundcovers are *incentivized*. Property maintenance codes do not allow for vegetation (i.e., grass) to be higher than 10".

   Recommendation: Encourage use of native plants and soil amendments for non-recreation areas. Allow use of native plantings and rain gardens for residential properties with standards of care.

   See Appendix for sample code language.

   Why: Subdivision regulation often require lots to be "sodded," but native or deep-rooted plantings can be a better option for stormwater management.

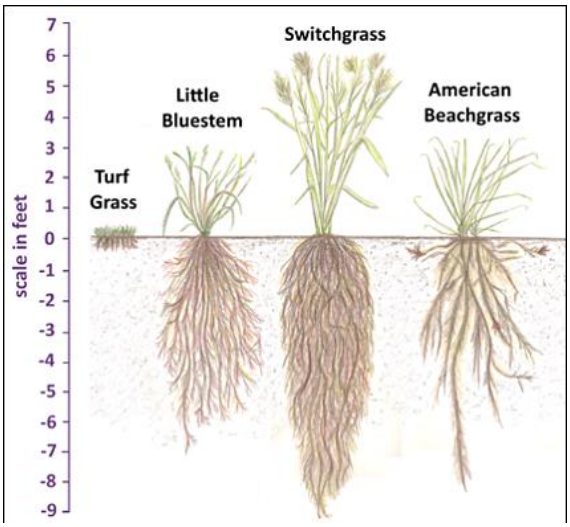

Figure 8. Native Plants vs. Turf Grass Root Depths (Mass.Gov)

5. Audit Question: *Are flexible space sized and/or compact parking spaces allowed or encouraged? What percentage or limits?*
   Code Reference: Chapter 162: Zoning
   Current Practice: Article 23 - allows reduction to 9X18 for certain residential uses - Section 2304. H.4, H.7, H.9.
   Recommendation: **In lieu of changing standard stall size, encourage set aside of 20- 25% of parking lots for compact cars in all zoning categories.**
   See Appendix for sample code language.
   Why: Allowing a certain number or percentage of spaces (often 20 to 25%) to have reduced sized and to be labeled "compact" can reduce total parking surface area.

6. Audit Question: *Can traffic calming measures be co-designed as stormwater control measures?*
   Code Reference: Chapter 146: Subdivision and Land Development; Chapter 162: Zoning
   Current Practice: Section 2501. Traffic Calming: Does not include reference to possible dual function as stormwater management best management practice.

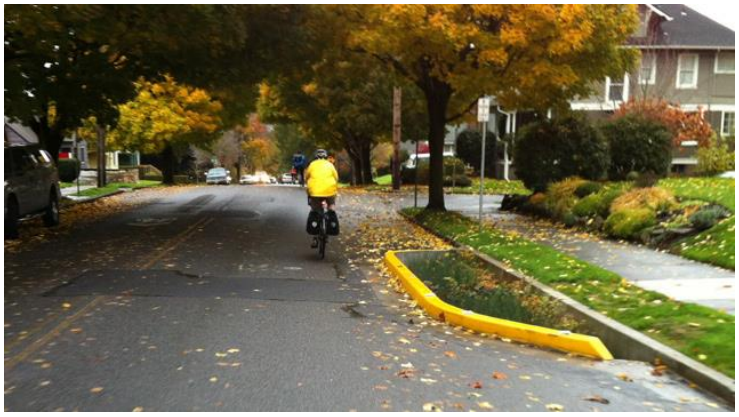

Figure 9. Stormwater curb extension, Portland OR (NACTO)

Figure 10. Mid-block Stormwater Bump-out – Philadelphia Water Department

   Recommendation: **Amend Section 2501 to include reference and design standards for green stormwater management for traffic calming measures. Consider incentives for projects that go beyond minimum infiltration standards. Abington Township will assume maintenance responsibility.** Maintenance requirements and standards of care resources such as the Philadelphia Water Department GSI Maintenance Manual are included in the Appendix.
   See Appendix for sample code language.
   Why: It is helpful to state specifically that islands and bump-outs that act as traffic calming measures are encouraged to be co-designed to provide stormwater management or green infrastructure functions.

7. *Audit Question: Is a standard review process defined for removing impervious surface?*
   Code Reference: None
   Current Practice: There is currently no standard review process. Stormwater ordinance refers to "reconstruction" which is demolition and rebuilding of impervious surface. Redevelopment is any development that requires demolition or removal of existing structures or impervious surfaces at a site and replacement with new impervious surfaces.
   Recommendation: Create a standard or incentive to prioritize replacing impervious surface with pervious alternatives. Any changes must remain consistent with designated zoning use.
   Patios, walkways, parking areas, and driveways can all be converted to pervious areas that increase infiltration to groundwater. Gardens, lawns, and permeable pavers all can be used in place of the impervious area removed.
   Other municipalities are removing impervious surface with programs such as:
   - Philadelphia Water Department: De-pave Your Yard
   - Virginia's Soil & Water Conservation Districts: Impervious Surface Removal
   - Chesapeake Bay Foundation Report: Recommendations to Disconnect Impervious Areas from Stormwater System

   Why: In communities that are redeveloping, it is useful to have a standard for demolition or removal of imperious surface and replacement with sufficient soil and vegetation to enable stormwater infiltration.

8. Audit Question: *Are flexible dimensional criteria available for developers using planned development units, open space, or cluster design options?*
   Code Reference: Chapter 146: Subdivision and Land Development
   Current Practice: The Land Preservation District Overlay provides alternative density and dimensional requirements for the R-1 Residential Zoning District if tracts are 15 acres or greater.
   Recommendation: By limiting the application of conservation design to parcels of over 15 acres only within the RI district, there are fewer opportunities and less incentives to conserve open space, which is a goal of Abington's 2006 Open Space Plan. Recommend that Conservation design where 5 or more units are built in the R1 District (this would be 5 net acres and potential for 2.5 acres of open space). In addition, if any developable land remains in the R2, R3, and R4 districts, served by public sewer and water, conservation subdivision design could apply.
   The ordinance also limits the land preservation option for under 15 acres to a Conditional Use approval process, which tends to increase costs to developers due to additional hearings and longer approval times. To encourage conservation option as the preferred choice, it should be the easiest option to follow. We recommend the District Overlay include the land preservation option by-right and conventional either by Conditional Use, or at half the underlying density.

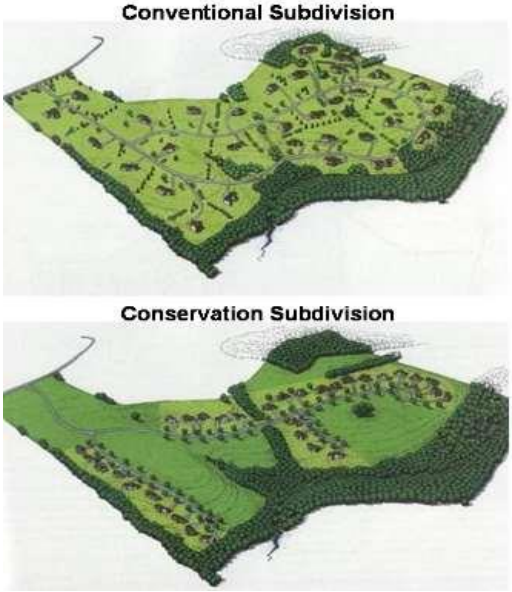

Figure 11. Conservation Subdivision (University of Manitoba)

Why: Reducing lot widths and minimum sizes reduces the amount of land area disturbed for new development, the total length of roadway and associated impervious surface required, and the amount of turf-grass for lawn, all of which reduce the volume of runoff and pollutant loads associated with new development.

3. INCENTIVES

1. Audit Question: *Do parking lot edge landscaping requirements (islands, edges) specifically allow or encourage use as stormwater control areas? Is a standard adopted?*

Figure 12. Parking lot edge bioswale (MCPC Parking Guide)

Code Reference: Chapter 146: Subdivision and Land Development
Current Practice: No, the use of islands for green infrastructure is not specifically encouraged.
Recommendation: Amend Section 2402 to state that planting islands and strips must incorporate stormwater control measures. Sample Language: "Parking lot perimeters shall be designed to accept stormwater runoff and be designed as bioretention areas if site conditions are appropriate. The bioretention area may have an inverted slope to allow infiltration and ponding of water. Curbs separating landscape areas from parking shall have cuts or other features to allow stormwater to flow to the bioretention area. Encourage use of native plants in green stormwater infrastructure practices".
Why: Actively encouraging the use of islands and perimeters for green infrastructure give important direction to site planners.

2. Audit Question: *Are incentives provided to developers who reduce impervious cover, conserve natural areas, or implement stormwater reduction practices like green roofs, rain barrels and rain gardens?*
   Code Reference: Chapter 162: Zoning, Ch 1007.O and 1108
   Current Practice: Bonus provisions allow developers in MS Main Street Districts (1007: Design, O. Bonuses; 1108 Bonuses) to accumulate points that can be used to increase density, FAR, & height as well as elimination of side yards. **Only GSI eligible for bonus are Green Roofs.** Urban Gardens as defined are not necessarily a stormwater management practice.
   Recommendation: Amend bonus provisions in Zoning Ch. 1007.O and 1108 to include specific points for other GSI - Not just Green Roofs. Consider adding Bioswales, & Rain Gardens, and naturalized stormwater basins. Do not offer incentives that allow developers to reduce open space requirements. Incentives should be considered for practices that go beyond Township's stormwater ordinance minimum required volume and water quality standards. Consider adding GSI bonuses for all mapped districts, (R, AO, SNR, CS, SI & RC).
   Why: Incentives can be more effective than intervention in encouraging implementation of GSI in new and redevelopment.

3. Audit Question: *Is there a clear process for approving green infrastructure, flood management or environmental restoration projects? Would these projects be allowed in all zoning districts?*
   Code Reference: Chapter 142: Stormwater Management, Chapter 146: Subdivision and Land Development; Chapter 162: Zoning
   Current Practice: All development subject to review procedures specified in Township SLDO. Section 1503 (B)(2)(f) of the Zoning Ordinance states "naturalized stormwater management areas" require conditional use approval, as demonstrated at the January 14, 2021 Township of Abington Conditional Use Hearing.
   Recommendation: GSI should be permitted by right in all mapped districts and not require special approvals by either ZHB or BOC. These stormwater control measures should be evaluated as part of design review by Township Engineer.
   Why: The zoning code should note whether land modifications to implement wetland or stream restoration, construct stormwater retrofits or modify landscaping and grading require planning commission, elected board or staff approval and whether approval goes through site plan, conditional use, or another approval process.

INCENTIVES

4. SITE PLAN

1. Audit Question: *Has the community identified historic stream channels and waterways? Are any of these feature protected from modification or development?*
   Code Reference: Chapter 146: Subdivision and Land Development
   Current Practice: No direct language referencing historic streams. No community identification. Does cover preservation of natural or historic features.
   Recommendation: Amend SW Ordinance Section 142.302 b- Stormwater site plan requirements to include location of historic stream channels and ponds. Amend SLDO Section 146.11 B ((10) to add subsection d. historic stream channels and ponds to specific plan requirements. Historic stream channel data is available via the Pennsylvania Spatial Data Access Portal. Further spatial data is available via the Montgomery County Geospatial Data Hub. If historic stream channel is identified, there should be specific measures indicated to mitigate potential future flooding or ponding impacts.
   Why: Areas where historic stream channels and ponds have been filled in or modified are often prone to flooding. They may be good areas to incorporate into stormwater management features, open space, or landscaping.

2. Audit Question: *Do preliminary or sketch plans include stormwater measure and landscape techniques for initial review?*
   Code Reference: Chapter 146: Subdivision and Land Development
   Current Practice: Sketch plan is an option under SALDO Article IIA 146-8.2 Tentative Sketch Plan requirements - "(6) Proposals for control of drainage and runoff and community facilities" results in a conceptual stormwater management area, lacking detail in practice used and location sited.
   Recommendation: Amend SLDO Section 146.8.2 (6) (Tentative Sketch Plan) to provide proposed stormwater management measures for proper evaluation and recommendations of best management practices.
   Why: Early review of land use concepts help identify opportunities to integrate GSI into landscaping/drainage.

3. Audit Question: *Are snow storage areas required to be shown on site plans?*
   Code Reference: Chapter 142: Stormwater Management, Chapter 146: Subdivision and Land Development
   Current Practice: No, SWM site plans do not require snow storage areas to be shown.
   Recommendation: Amend Stormwater Ordinance Section 142.302 b- Stormwater site plan requirements to include location of proposed snow storage and snow easement areas. Amend Subdivision and Land Development Section 146.11 C (proposed Layout) to add subsection 12 - location of proposed snow storage areas.

Why: Snow storage should be in areas where melting and infiltration can occur without affecting the performance of stormwater treatment practices or leading to sedimentation and pollution in adjacent streams and wetlands.

4. Audit Question: *Are standards and requirements adopted for trash areas and dumpsters? Are trash/dumpster areas reviewed for drainage?*
   Code Reference: Chapter 142: Stormwater Management, Chapter 146: Subdivision and Land Development; Chapter 162: Zoning
   Current Practice: Although there is reference to the condition of trash units, there is not a mention of how those unit should be stored to prevent disturbances from animals or maintained to prevent stormwater runoff.
   Recommendation: Amend Zoning 2601.N 3 - to add subsection e. relating to siting of dumpster area – dumpster shall be covered, elevated, and sited to minimize potential runoff to storm sewers or surface waters.
   Subdivision and Land Use Section 146. 11.G 1.(Utility Plan) Subsection l requires that location of trash dumpsters and enclosures be specified. Could amend to also note desire that drainage is directed away from storm drains and towards grass or vegetated area.
   See Appendix for sample code language.
   Why: Ensuring that trash is covered and fully contained, and drainage is directed away from storm drains prevents animals from getting into trash and reduces polluted stormwater runoff.

5. EDUCATION

1. Audit Question: *Has green infrastructure education been provided to staff involved in plan reviews? This includes staff in public safety, engineering, parks and recreation, economic development, and planning and zoning.*
   Policy Reference: Internal Practice
   Current Practice: Township education practices are non-standardized.
   Recommendation: Recommend establishing training in partnership with local watershed groups, Pennsylvania Environmental Council, Montgomery County Planning Commission and/or Engineering Consultant.
   Why: Training provides a common base of knowledge about GSI techniques and their applicability in the community

2. Audit Question: *Has green infrastructure education been provided to planning boards and elected officials?*
   Policy Reference: Internal Practice
   Current Practice: Township education practices are non-standardized.
   Recommendation: Recommend establishing training in partnership with Township Environmental Advisory Council, local watershed groups, Pennsylvania Environmental Council, Montgomery County Planning Commission and/or Engineering Consultant.

Why: Training to elected officials helps provide a common base of knowledge about GSI techniques and their applicability and benefits to the community.

3. Audit Question: *Is a review or procedure in place for rain garden construction and planting native plans in yards and lawns?*
   Policy Reference: Internal Practice
   Current Practice: Environmental Advisory Council and Shade Tree Commission both comment on plans. Primary responsibility for technical review rests with Twp. engineer or engineering consultant. Not sure if residents provided with sample plans or instructions. Could be role for EAC.
   Recommendation: Recommend establishing workforce development training in partnership with local watershed groups/PEC, MCPC & Engineering Consultant who can provide resource guidance on design, construction, and maintenance of residential GSI. Also recommend simple small project design guidance for homeowner rain gardens and other small scale or residential green stormwater infrastructure. Note: individual homeowners are responsible for implementation and maintenance of GSI on private properties.
   Why: Having a written procedure (even if not formally adopted) for common requests facilitates the use of these techniques and helps manage neighbor inquiries and public concerns.

4. Audit Question: *Is a review or procedure in place for downspout disconnection and rain barrel installation?*
   Policy Reference: Internal Practice
   Current Practice: EAC provides guidance to homeowners requesting Rain Barrel assistance and helps install. There is no current guidance for downspout disconnection, however the EAC has resources on rain barrels for homeowners including a Rain Barrel Manual with guidance on permit applications and custom rain barrel applications.

Figure 13. Abington EAC Customized and Standard Rain Barrels

Recommendation: Continue to refer those requiring rain barrels to meet permit obligations to contact EAC. Consider adding guidance for downspout disconnect to township website.
See Appendix for sample code language.
Why: Having a written procedure (even if not formally adopted) for common requests facilitates the use of these techniques and helps manage neighbor inquiries and public concerns.

5. Audit Question: *Have maintenance needs for green infrastructure practices been communicated and understood among staff involved in plan review or inspection?*
Policy Reference: Internal Practice
Current Practice: Township current practice is unclear. Public works staff have participated in Municipal Pollution Prevention and Good Housekeeping Training workshops in past.
Recommendation: Combine with other education/training recommendations - tie to general education/training requirements of the MS4 program including yearly participation in the MCM #6 training workshops.
Why: Plan review and public works staff benefit from a working knowledge of green infrastructure maintenance needs, such as sweeping frequencies for permeable surfacing or how to identify invasive plants in bioretention areas.

APPENDIX

1. REFERENCE

1. Audit Question: *Are rainwater harvesting and stormwater control elements acknowledged in design standards?*

2. Audit Question: *Have primary types of green infrastructure practices (ex. bioretention/rain gardens, vegetated swales, green roofs) been defined in the stormwater ordinance or zoning regulations?*

2. FLEXIBLE STANDARDS

1. Audit Question: *Do allowable uses for parks and other open space areas specifically include stormwater retrofits or green infrastructure projects?*

2. Audit Question: *Is there a process or standard to waive numerical, spacing, and species requirements from stormwater-control measure in required landscape areas?*

3. Audit Question: *Are there minimum landscaping requirements for parking lot perimeters or islands?*

   Code Revision: Encouraging use of bioretention areas with curb cut inlets as parking lot landscaping

   X. Perimeter Vehicular Use Area Landscaping and
   XX. Interior Vehicular Use Area Landscaping

   The integration of depressed bioretention areas used for landscaping and stormwater management
   is strongly encouraged. Where perimeter areas are designed specifically for stormwater management, the planting and dimensional requirements of X-XX above may
   be varied as necessary to ensure that the area functions effectively for stormwater treatment, so long as in the judgment of the [plan commission]. (Wisconsin Guide: Pg. 33)

   Code Revision: Encourage use of bioretention as landscaping and landscape-based stormwater control

   1. All yards sodded or seeded on at least 4 inches of topsoil. Rain gardens defined in the Chapter may be incorporated into lawn areas where planned and designed to receive drainage or runoff.
   2. Trees and shrubbery appropriate for the development, and according to the plan approved under subsection (a) above. The incorporation of amended soil areas, stormwater trees, and other vegetative stormwater control measures into landscaping plans is encouraged.

   (c) Parking Lot Landscaping

1. Landscaping shall be provided on the perimeter and within the interior of all parking areas to provide screening, canopy cover, and stormwater treatment and control. The integration of vegetated stormwater control measures with parking lot landscaping is strongly encouraged. All landscaped areas shall be mulched or seeded in keeping with the overall landscaping plan. The Village may maintain a list of accepted species of tree and landscaping materials, including plants and trees suitable for use in vegetated stormwater control measures.
2. In parking lots, at least 5% of the interior parking area shall be landscaped with planting, and one tree of a minimum 2-inch caliper, for each 10 spaces, all as shall be submitted and approved as part of the plan provided for herein above. Planting required within the parking lot shall be in addition to, and not in lieu of, other planting requirements, such as for street trees. The planting plan may be varied to accommodate the design of vegetated stormwater control measures, so long as the total number of required trees is met within the overall parking area. The use of deciduous trees (which may function as stormwater trees, as defined in the Chapter) is encouraged to provide canopy shading within parking areas. Each interior landscaped area shall be a minimum of 75 square feet in size. (Wisconsin Guide: Pg. 43)

4. Audit Question: *Is turfgrass required in new subdivisions or construction? Could deep-rooted plants be substituted?*

   Consider language that promotes use of native plants and provide native plant lists, such as: Philadelphia Water Department's GSI Landscape Design Guidebook, Version 4, April 2020, Page 41: Plant selection section includes statement that "When selecting plants, consider the use of natives that would grow naturally in the local region. Native plants may not be appropriate for every situation in the urban environment given the site-specific location or design strategy, though should be used where effective." See guidebook including plant lists at http://documents.philadelphiawater.org/gsi/GSI_Landscape_Guidebook.pdf

   Montgomery County Planning Commission Sustainable Green Parking Lots Guidebook (see https://www.montcopa.org/DocumentCenter/View/9735/Green-Sustainable-Parking-Guide-2_10_2016-Web) Includes recommended plant lists for green parking lots including:

   - Trees and shrubs for tree islands and planting strips with raised curbing
   - Trees for bioretention areas and moist soil areas
   - Shrubs – deciduous and evergreen suitable for bioretention areas and absorbent parking lot islands
   - Grasses and sedges for meadows, bioswales, and bioretention areas
   - Perennials for meadows, bioswales, and bioretention areas

   Native Landscapes in the Neighborhood and Beyond, Zoning Practice, APA publication 2020, Page 4.20: Incudes language to use for promotion of native plants:

   - Encourage plant and tree types that complement the surrounding area, including a variety of species throughout the site, and seasonal interest. Species should be climate resilient, indigenous, or proven adaptable to the local climate and should not be invasive on native species.
   - Promote landscaping areas that include plant and tree types that address ecological function, including the interception and filtration of stormwater,

reduction of the urban heat island effect, and preservation and restoration of natural amenities.

- Encourage native and pollinator-friendly species in landscaping.

Lower Makefield Township list of native plants required to be included in SALDO landscape plans (see https://ecode360.com/attachment/LO1561/LO1561-178a%20Exhibit%201.pdf):

- Includes trees, shrubs, ferns, grasses, herbaceous perennials and herbaceous emergent. Identifies light and moisture requirements and if street tree.

5. Audit Question: *Are flexible space sized and/or compact parking spaces allowed or encouraged? What percentage or limits?*

   Upper Darby Township Zoning Ordinance § 550-33

   Parking regulations

   D. Parking Area Design (Page 64)

   Special sections may be marked off for compact cars to better utilize the entire area. Areas designated for compact cars should be minimum 20% - 25% of the required parking.

6. Audit Question: *Can traffic calming measures be co-designed as stormwater control measures?*

   Code Revision: Allow traffic calming measures to be co-designed as stormwater control measures in Zoning Ordinance and/or SALDO. Include specific definitions of practices.

   Stormwater Bumpouts

   A bumpout is a landscaped extension of the street curb. Runoff water is directed underneath the system to be stored, infiltrated, and absorbed by plants, such as grasses, perennials, and shrubs.

   A bumpout is a vegetated curb extension that protrudes into the street at mid-block or at an intersection. The system is composed of a layer of stone topped with soil and plants. An inlet or curb-cut directs runoff into the bumpout structure where it can be stored, infiltrated, and absorbed by the plants. Excess runoff is permitted to leave the system and flow to an existing inlet. The vegetation of the bumpout will be short enough to allow for open sight lines of traffic. Aside from managing stormwater, bumpouts also help with traffic calming. When located at crosswalks, they provide a safety benefit by reducing the pedestrian crossing distance. (Philadelphia Water Department).

Philadelphia Water Department – Bump-out Maintenance Guide:

(https://water.phila.gov/pool/GSI-Maintenance-Manual_v1.pdf)

Table 1-4. Stormwater Bump-out Routine Maintenance Tasks

Task	Description	Frequency	Protocol Reference
Remove trash, sediment, and organic debris	Remove trash, sediment, and organic debris from all SMP surfaces	Monthly	See 2.1.1; Section 2.1.1.10
	Wipe down signage	Monthly	See 2.1.1; Section 2.1.1.10
Winterize SMP	Clean and grease appurtenances	Annually in November	See 2.1.7; Section 2.1.7.10
	Place traffic delineation/snow removal bollards	Annually in November	See 2.1.7; Section 2.1.7.10
	Remove traffic delineation/snow removal bollards	Annually in April	See 2.1.7; Section 2.1.7.10
Apply mulch	Apply mulch to landscaped beds as needed	Annually in March	See 2.2.3; Section 2.2.3
Remove non-target/invasive vegetation	Remove non-target/invasive plants using one or more of the mechanical or chemical methods outlined in Tables 2-1 and 2-2	Monthly from March to November	For mechanical removal see 2.2.1; Section 2.2.3 or Table 2-1. For chemical removal see SOP 2.2.7; Section 2.2.3 or Table 2-2.
Cut back target perennials	Manually cut dead herbaceous vegetation from the previous growing season to 4-6 in. above the ground and ensure vegetation does not encroach onto the sidewalk and/or street	Annually in March	See 2.2.1; Section 2.2.1.10
Prune trees and shrubs	Elevate lower limbs and remove dead, rubbing, or crossing limbs	Annually, when trees are dormant between September and the end of December	See 2.2.6; Section 2.2.6.10
Water trees	Place water bag(s) on tree(s)	Annually in March for first 12 months after planting	See 2.2.2; Section 2.2.2.10
	Fill water bag(s)	Weekly, April - October for first 12 months after planting during any period of seven (7) or more days without rain	See 2.2.2; Section 2.2.2.10
	Remove water bag(s) from tree(s)	Annually in November	See 2.2.2; Section 2.2.2.10
Water herbaceous vegetation and shrubs	Water evenly and thoroughly at the base of vegetation so that the top of soil is saturated	Every four (4) days during any period of four (4) or more days without rain, June-August for the first 24 months after planting	See 2.2.2; Section 2.2.2.10
Vacuum clean structures	Remove trash/sediment/organic debris from subsurface access and flow control/conveyance structures	Annually	See 2.3.1; Section 2.3.1.10
Jet pipes	Jet conveyance, distribution, and underdrain pipes	Annually	See 2.3.2; Section 2.3.2.10

NACTO Urban Street Design Guide:
(https://nacto.org/publication/urban-street-design-guide/street-design-elements/curb-extensions/gateway/)

((Stormwater and traffic calming elements: https://nacto.org/publication/urban-street-stormwater-guide/stormwater-elements/))

A curb extension should generally 1 be 1–2 feet narrower than the parking lane, except where the parking lane is treated with materials that integrate it into the structure of the sidewalk. Curb extensions should be installed whenever on-street parking is present to increase **visibility**, reduce the crossing distance, provide extra queuing space, and allow for enhancements such as seating or greenery.

Combine stormwater management features, such as bioswales or rain gardens, with curb extensions to absorb rainwater and reduce the impervious surface area of a street.

7. *Audit Question: Is a standard review process defined for removing impervious surface?*

8. Audit Question: *Are flexible dimensional criteria available for developers using planned development units, open space, or cluster design options?*

3. INCENTIVES

1. Audit Question: *Do parking lot edge landscaping requirements (islands, edges) specifically allow or encourage use as stormwater control areas? Is a standard adopted?*

2. Audit Question: *Are incentives provided to developers who reduce impervious cover, conserve natural areas, or implement stormwater reduction practices like green roofs, rain barrels and rain gardens?*

3. Audit Question: *Is there a clear process for approving green infrastructure, flood management or environmental restoration projects? Would these projects be allowed in all zoning districts?*

4. SITE PLAN

1. Audit Question: *Has the community identified historic stream channels and waterways? Are any of these features protected from modification or development?*

2. Audit Question: *Do preliminary or sketch plans include stormwater measure and landscape techniques for initial review?*

3. Audit Question: *Are snow storage areas required to be shown on site plans?*

4. Audit Question: *Are standards and requirements adopted for trash areas and dumpsters? Are trash/dumpster areas reviewed for drainage?*

   Upper Darby Township: ZONING 550:21, 31, 34, 38, 50

   Refuse Areas: All commercial uses shall provide for storage of refuse either inside the building(s) or within an outdoor area enclosed by walls or opaque fencing at least six feet and not more than 12 feet high. **Refuse shall be kept within one or more lidded container(s) not to exceed six feet and graded to minimize potential runoff to storm stewers or surface waters.**

5. EDUCATION

1. Audit Question: *Has green infrastructure education been provided to staff involved in plan reviews? This includes staff in public safety, engineering, parks and recreation, economic development, and planning and zoning.*

2. Audit Question: *Has green infrastructure education been provided to planning boards and elected officials?*

3. Audit Question: *Is a review or procedure in place for rain garden construction and planting native plans in yards and lawns?*

4. Audit Question: *Is a review or procedure in place for downspout disconnection and rain barrel installation?*

   Sample Guidance for Downspout Disconnection:

   3 Rivers Wet Weather:
   https://www.3riverswetweather.org/green/green-solution-disconnected-downspout

   Pennsylvania American Water: Rain Barrel Installation: Step-by-Step Instructions:
   https://www.amwater.com/paaw/water-information/green-infrastructure/ downspout-disconnection-instructions

5. Audit Question: *Have maintenance needs for green infrastructure practices been communicated and understood among staff involved in plan review or inspection?*

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