CHAPTER 5

RECOMMENDATIONS





Fig. 5-01 *Hydrangea quercifolia, Oakleaf Hydrangea - Photo by evolveEA*

5. RECOMMENDATIONS

ADMINISTRATIVE RECOMMENDATIONS

Many of the landscape strategies and recommendations described in these Landscape Design Guidelines are intended to reduce maintenance tasks that are unsafe for maintenance crews, or those that are harmful to the environment. These are also intended to improve the climate performance of these landscapes from a sustainability perspective. However, transitioning to alternative types of landscapes will not be maintenance free. Thus, it is important to identify ways in which PRT might achieve this new standard of care for its landscapes.

CONSULTANT PROCUREMENT

An **Operations and Maintenance Manual** should be prepared as part of all Design and Engineering Consultant Contracts. The development of these manuals will provide PRT formal opportunities to help guide maintenance and operations assumptions during the design process and provide a roadmap for long term landscape stewardship following construction. This document should be responsive to PRT's standards of practice and address adaptive management needs and routine maintenance and operations requirements and schedules. The preparation of this deliverable document should be clearly requested within scopes of work and the revised language of legal agreements.

A **Qualifications-Based Selection Process** will also enable PRT to select consultant teams that are best suited to fulfill all aspects of the contract requirements. Formal qualifications to consider include State of PA Professional Landscape Architect Licensure, ISI Envision Sustainability Professional Certification, National Green Infrastructure Certification through the Ecological Landscape Alliance, and American Institute of Certified Planners (AICP). Often this will encourage more efficient project delivery and reduce the potential for unforeseen life-cycle costs. Ultimately this procurement approach will afford PRT the greatest control over contracting and allow PRT to develop specific selection criteria that are tailored to each contract to balance project costs with other significant priorities.

ASSET MANAGEMENT SYSTEM

It is recommended that PRT consider the use of an asset management database, that would allow PRT to track time, tasks, and location of maintenance tasks. This would then identify which sites or landscape conditions are requiring highest levels of attention or care and inform decision making for site improvements. These systems are powerful tools that are commonly used by asset managers and there are several trusted products and services available

commercially as well as the potential for PRT to develop a custom system. Further evaluation should be considered to determine if asset management tracking as suggested above can be integrated with the existing FIXX system.

The benefits of an Asset Management System include more efficient scheduling and accounting, generating data and reports that can be used for securing funding opportunities and adaptive management decision making, improved communication with decentralized field staff, and the maintenance of data quality.



Indian-grass River Grassland occurs on sand/gravel deposits and broad cobble/boulder shores along the banks of large rivers.

PILOT PROJECT

A pilot project was suggested as a way to test some of the landscape strategies, both from design and implementation, but also maintenance requirements. Allowing maintenance crews to test and learn about these alternative landscapes and their maintenance requirements in a less-visible location will create momentum and further buy-in for future implementation.

POTENTIAL SITES

Through conversations with PRT staff, we have identified the following locations as candidates for a pilot project:

- **Homewood Station** - The landscape around Homewood Station includes a large area with pathways, stairs, and ramps that are currently mowed grass with a few trees. Railings, light posts, trees, and steep slopes make mowing and maintaining this station challenging. Nearby, along Finance Street, PRT is working in partnership with Tree Pittsburgh to plant trees along the steep slope between Finance Street and the Martin Luther King Jr. East Busway.
- **Negley Station** - As a station that has recently undergone site improvements and still retains areas of lawn, particularly on steep slopes, Negley could be a strong candidate for testing the transition away from mowing on steep slopes.
- **South Hills Junction** - PRT's South Hills Junction complex includes a series of maintenance facilities, parking lots, outdoor storage areas, a segment of the South Busway, a segment of the RED, BLUE, and SILVER light rail lines, layover facilities for buses and light rail vehicles, and stations for buses and light rail vehicles. There are steep slopes, mowed lawns, and other landscapes throughout this property, some of which require substantial effort to maintain. In particular, there is a steep slope between the outdoor rail-tie storage area and the connection to Warrington Avenue.
- **Washington Junction** - This station has many of the landscape conditions identified in these guidelines, including large areas of mown lawn, steep slopes, and parking lot. As a Park and Ride with a high utilization rate, it is a strong candidate for landscape improvements.
- **Glenbury Station** - The hillside behind this station at the start of the South Busway is a good site for testing some of the landscape strategies applicable to steep slopes.

SHORT, MEDIUM, AND LONG TERM INTERVENTIONS

Short Term

Short term interventions should be focused on the implementation of easily achievable strategies that will have the biggest impact on reducing maintenance efforts. These opportunities are primarily related to the conversion of mowed lawn areas, which currently comprise one of the most significant maintenance efforts during the growing season.

Transitioning mowed lawn areas on slopes in particular will help to improve the efficiency and reduce the level of effort for maintenance efforts. **Seeding Meadow Mix**, **No - Mow Grasses**, and **Low Woody Shrub Planting** are all strategies that can be implemented on a short timeline.

Planning efforts for the implementation of mid and long-term strategies should also be considered in the near term. When future project priorities are established early, they can be strategically funded and more effectively delivered.

Medium Term

Medium term goals will include efforts that are identified early on as high priorities but may require some time to initiate. These investments will target opportunities for improvements where the long-term benefits will increase with a shorter implementation timeline. This includes transitioning larger areas at the edges of existing lawn to successional Native Planting areas such as **Layered Woodland** and **Hedge Thicket**. These strategies can be combined with **Invasive Species Management** and **Forest Rehabilitation** at the edge of existing woodlands and along railway corridors. These investments will be well suited to reduce overall area of mowing while also buffering more public facing landscapes from invasive weeds in the future.

Small-scale **Traffic Calming** and **Public Amenity** improvements should also be considered for medium-term investments. These strategies will help support public safety and wellbeing, while also providing opportunities to grow relationships with stakeholders and advocacy organizations.

Long Term

Long term goals include opportunities for transformational projects that implement full scale design guidelines through new station design and large-scale station improvement projects. These efforts will layer several benefits to maximize the performance of the PRT landscape. Through these projects, several strategies can be realized, including **Green Stormwater Infrastructure**, **Slope Stabilization**, and **Riparian Zone Restoration**, which benefit most from being integrated with additional design and planning efforts. Priorities that are addressed in the long term have the greatest potential for advancing several PRT goals and objectives within a single project.



Converting lawn to no-mow or meadow areas reduces maintenance and supports long-term landscape goals.

MAINTENANCE RECOMMENDATIONS

Many of the landscape strategies and recommendations described in these Landscape Design Guidelines are intended to reduce maintenance tasks that are unsafe for maintenance crews, or those that are harmful to the environment. However, transitioning to alternative types of landscapes will not be maintenance free. Thus, it is important to identify ways in which PRT might achieve this new standard of care for its landscapes.

Native landscapes, lawns, and stormwater infrastructure each have distinct maintenance needs that support their function and longevity. Native landscapes require periodic weeding, especially during establishment, to control invasive species and prevent encroachment by aggressive weeds; once mature, they need minimal inputs beyond annual mowing or cutting to simulate natural disturbance. Lawns, by contrast, demand more frequent care, including regular mowing, fertilization, weed control, and often irrigation to maintain a uniform appearance. Stormwater infrastructure such as rain gardens, bioswales, and retention basins must be routinely inspected and maintained to ensure proper flow and infiltration; this includes removing sediment and debris, managing vegetation to prevent clogging, and repairing erosion or structural damage. Together, these practices help maintain ecological function, aesthetic quality, and regulatory compliance.

The following maintenance recommendations may be referred to for guidance on each of the proposed landscaping strategies covered within this document.

STREET TREES

Spring	▪ Remove mulch from trunk flare and refresh mulch rings to a 2–4” depth, keeping clear of bark; ▪ Prune dead, damaged, or structurally weak branches before leaf-out; ▪ Inspect for pest/disease pressure as leaves emerge and treat only if necessary; ▪ Re-stake and adjust ties if still required; remove staking materials after first or second year if tree is stable.
Summer	▪ Deep water trees during extended dry periods (especially trees <5 years post-planting). This can be accomplished with traditional irrigation and/or through passive watering technologies such as Treegator watering bags or hydration rings, which slow releases water over an extended period; ▪ Monitor for signs of stress (e.g., leaf scorch, wilt, early color change); ▪ Control invasive vines and weeds at the base of trees manually or chemically.
Fall	▪ Perform structural pruning after leaf drop; ▪ Plant new/replacement trees during dormancy (October–November). Alternatively, replacement trees can be planted in the spring (April-May), but fall plantings typically have a higher rate of success; ▪ Install deer protection or trunk guards as needed; ▪ Apply slow-release fertilizer in areas with degraded or compromised soil and/or compacted soils.
Annual / As-Needed	▪ Inspect trees for structural hazards or limb failure risk after major storm events; ▪ Remove or replace guards or stakes if damaged.

TALL GRASS MEADOW

Spring

- Mow meadow landscapes to a height of 6–12” in early spring before active growth (March-April);
- Rotate mowing every 3–5 years to prevent woody encroachment and maintain species diversity, avoiding more than 1/3 of the total area per season;
- Remove excess clippings to reduce nutrient buildup and expose soil to sunlight;
- Apply pre-emergent herbicide in March if invasive grasses or annuals are a recurring issue.

Summer

- Monitor for weed pressure, particularly from warm-season invasives like Johnson grass (Sorghum halepense) or Canada thistle (Cirsium arvense);
- Spot-mow or weed-whack patches of invasive vegetation before seed set as this reduces spread and size of the available seed bank for invasive species.

Fall

- Spot treat invasive vegetation with systemic herbicide (e.g., glyphosate or triclopyr) before frost, typically in late October and as plants are heading into their dormant state;
- Seed bare or disturbed areas with appropriate native grasses and forbs; delay seeding at least one week after herbicide application;
- Plant plug replacements or add structural elements like native shrubs if desired.

Annual / As-Needed

- Conduct visual inspection during growing season to identify invasive plants and vegetative dieback;
- Avoid nutrient or irrigation inputs except during establishment;
- Order/restock landscape maintenance supplies as needed;
- Maintain signage or barriers to prevent mowing or trampling by maintenance crews or public.



Fig. 5-04

SHRUB THICKET/WOODY GROUND COVER

Spring	▪ Prune damaged or dead wood from woody plants after winter dieback or after bloom (i.e., once flowers have wilted and/or faded). Lightly shear or shape plants to encourage dense growth and control spread; ▪ Apply pre-emergent herbicide or mulch to reduce early weed competition. Mulch around base of shrubs if establishing new thickets to suppress weeds; ▪ Inspect and repair any protective fencing or deer exclusion measures.
Summer	▪ Deep water trees during extended dry periods (especially trees <5 years post-planting). This can be accomplished with traditional irrigation and/or through passive watering technologies such as Treegator watering bags or hydration rings, which slow releases water over an extended period.
Fall	▪ Replant or gap-fill with additional plugs or divisions to maintain ground cover continuity; leaf mulch is optimal if establishing a planting bed using plugs; ▪ Inspect for and remove invasive species through mechanical or chemical treatment; ▪ Plant replacement shrubs and install deer fencing or cages at time of planting.
Annual / As-Needed	▪ Monitor for die-off or bare spots and address as needed through supplemental planting; ▪ Maintain clearances along paths or structures by trimming growth that extends beyond bounds; ▪ Inspect for erosion on slopes and apply soil stabilization measures if needed; ▪ Remove dead or declining stems to maintain structure and promote vigor.

LAYERED WOODLAND

Spring	▪ Remove aggressive non-native vines and early sprouting invasives by hand-pulling or spot treating with herbicide (e.g., glyphosate or triclopyr); ▪ Conduct light pruning of shrubs or saplings after they have flowered (i.e., flowers have wilted and/or faded) to promote desired growth forms and allow light to understory; ▪ Refresh mulch only in critical access paths or erosion-prone areas, not across forest floor (i.e., avoid disturbing duff layer once established).
Summer	▪ Deep water trees during extended dry periods (especially trees <5 years post-planting). This can be accomplished with traditional irrigation and/or through passive watering technologies such as Treegator watering bags or hydration rings, which slow releases water over an extended period; ▪ Monitor forest edge and canopy gaps for invasive colonization; ▪ Control aggressive groundcover invasives such as Japanese stiltgrass (Microstegium vimineum) through mowing or herbicide treatment before seed set.
Fall	▪ Spot treat woody invasive vegetation using cut-stump or foliar herbicide; ▪ Install new or replacement native understory plantings and apply deer protection as needed; ▪ Collect and remove trash or debris, especially within urban woodlands.
Annual / As-Needed	▪ Conduct visual inspection for tree hazards (i.e., leaning trunks, hanging limbs) and remove if risk to safety and/or infrastructure. Allow snags and logs to remain where safe to support wildlife habitat.

DEER EXCLUSION MEASURES

Deer exclusion measures are critical to the success of ecological restoration projects, particularly in regions with high deer populations. Overbrowsing by deer can severely limit the survival and growth of native trees, shrubs, and understory plants, leading to delayed site establishment, reduced plant diversity, and increased vulnerability to invasive species. By implementing cost-effective exclusion methods—such as tree shelters, welded wire cages, or temporary fencing—restoration practitioners can protect young vegetation during its most vulnerable stages. These measures help ensure that native plantings reach maturity, enabling the restored landscape to provide long-term ecological benefits such as erosion control, habitat creation, and stormwater management.



Wire cages can be used to protect individual trees from deer damage.

TURF GRASS

Spring

- Apply pre-emergent herbicide in early spring to control annual weeds (e.g., crabgrass);
- Begin mowing once grass reaches 3–4”, maintaining a mowing height of ~3”;
- Test soil pH every 2–3 years and apply lime if needed.

Summer

- Mow as needed to maintain consistent height (typically 3-4”); avoid cutting more than 1/3 of grass blade at once;
- Water deeply and infrequently, preferably early in the morning;
- Monitor for pests, diseases, and drought stress, and address promptly.

Fall

- Core aerate compacted turf areas to improve water and nutrient infiltration;
- Apply fall fertilizer per soil test recommendations;
- Reseed or overseed as needed to increase turf density;
- Remove leaf litter and debris to prevent smothering.

Annual / As-Needed

- Maintain sharp mower blades and service equipment regularly;
- Adjust irrigation schedules based on weather and turf needs;
- Apply selective herbicides to control persistent broadleaf weeds;
- Inspect for and repair erosion or bare patches due to foot traffic or compaction.

GREEN STORMWATER INFRASTRUCTURE

Applicable GSI operations and maintenance (O&M) standards are outlined in the **City of Pittsburgh Stormwater Design Manual** (March 2022), which serves as the guiding document for design, implementation, and upkeep of GSI systems within the city. Adoption of these standards throughout the entirety of the PRT system provides an opportunity for PRT to "future proof" its stormwater infrastructure, potentially reducing the need for costly retrofitting and or replacement. O&M requirements for GSI are detailed in Appendix F of the City's design manual, including an example maintenance plan checklist, sample O&M plan, and task frequencies for GSI BMPs. This document should be consulted for specific guidance on O&M tasks and the associated frequencies tailored to each specific BMP type.

For GSI systems with a vegetated component (e.g., bioretention basins, green roofs, and bioswales), the following guidance offers both seasonal and as-needed maintenance recommendations that align with the landscaping strategies outlined in these guidelines.

Spring

- Inspect for plant dieback, erosion, or debris accumulation that may have occurred over the winter;
- Replace any damaged vegetation with appropriate native or site-specified species; establish planting beds using 4-6" of leaf mulch, especially if using plugs;
- Cut back dead stems from perennials and grasses to encourage new growth;
- Apply mulch as needed to suppress non-desirable plants (i.e., invasives) and retain moisture; avoid smothering base of plants;
- Inspect for and remove invasive species through mechanical or chemical treatment.

Summer

- Conduct inspections to assess plant health, check for pests/disease, and monitor for signs of drought stress;
- Water young plantings as needed during dry periods to ensure establishment; established plants generally require minimal watering;
- Continue to monitor and remove invasive species regularly, focusing on early removal before they establish and spread;
- Check for signs of erosion or sediment accumulation, especially after storms.

Fall

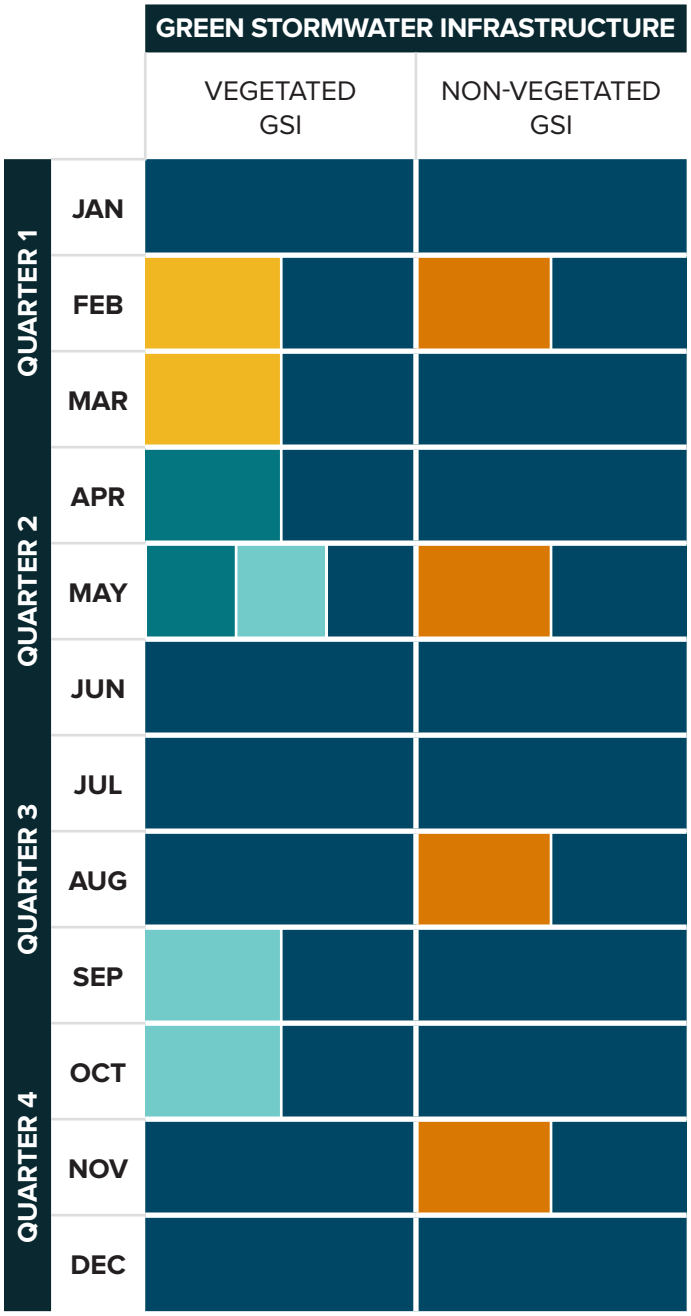
- Spot treat invasive vegetation with systemic herbicide (e.g., glyphosate or triclopyr) before frost, typically in late October and as plants are heading into their dormant state;
- Seed bare or disturbed areas with appropriate native grasses and forbs; delay seeding at least one week after herbicide application; if GSI is flashy (fast moving stormwater/runoff), plug plantings may be more appropriate rather than applying seed mix;
- Plant plug replacements or add structural elements like native shrubs if desired.

Annual / As-Needed

- Remove litter and debris that could block flow or damage vegetation;
- Stabilize any eroded areas immediately to prevent further damage;
- Address bare spots promptly to maintain continuous vegetative cover;
- Monitor for signs of pests or diseases and address with integrated pest management (IPM) approaches;
- If vegetation is impeding water flow or causing system malfunction, trim or adjust as necessary.

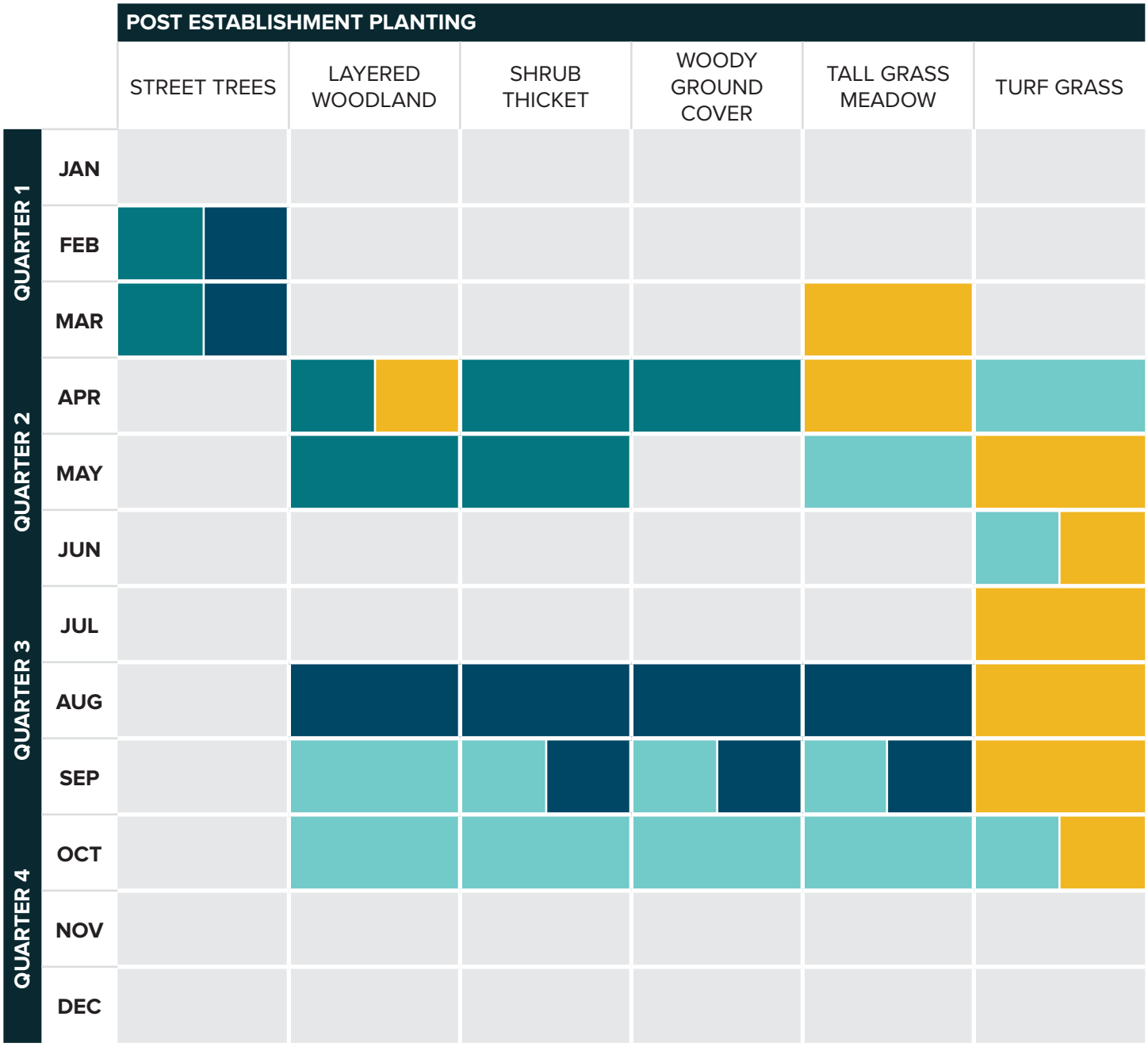
ROUTINE MAINTENANCE ACTIVITY WINDOWS

The table to the right provides a high-level overview of the typical maintenance requirements within a given year, including the general timing of activities, for the landscape strategies and GSI covered within this document. Activities shown include mowing, trimming, pruning, removal of dead wood, invasive species management, inspections, and sediment clean out. This chart not only helps provide an overview of routine maintenance activities but also provides a strategic planning tool for managing landscapes and GSI systemwide. It allows PRT to better anticipate resource needs and to optimize operations workflows. It highlights how different landscape typologies carry varying maintenance burdens, such as turf grass demanding frequent mowing, while native planting strategies offer greater levels of seasonal flexibility and generally lower long-term resource needs. This comparative insight allows PRT to make informed decisions about where to transition from high-maintenance to lower-maintenance plantings, improving ecological value, operational efficiency, and long-term sustainability across its system.



LEGEND

- PRUNING / REMOVE DEAD BRANCHES
- MOWING / TRIMMING
- INVASIVE SPECIES MANAGEMENT
- INSPECTION
- SEDIMENT CLEAN-OUT
- NO ACTIVITY


POST ESTABLISHMENT PLANTING
STREET TREES
LAYERED WOODLAND
SHRUB THICKET
WOODY GROUND COVER
TALL GRASS MEADOW
TURF GRASS
QUARTER 1
QUARTER 2
QUARTER 3
QUARTER 4
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC

CAPACITY AND BUDGET

The landscape design guidelines are focused on sustaining, upgrading, and developing high value landscapes that improve the operational life of individual components and materials. They reduce long term maintenance efforts while also promoting higher efficiency climate responsive landscape strategies that align with PRT's Climate Sustainability goals. These goals can be achieved through the design guidelines where opportunities are identified to efficiently and strategically combine the benefits of multiple landscape performance requirements within each proposed intervention.

Designers should be mindful of this approach when considering the functional needs, service life, and maintenance requirements of proposed landscape design deliverables. The most effective projects will incorporate these analyses at the earliest planning stages, as new opportunities for creative implementation of elements that have the potential to address future capacity and budgetary needs will become more limited as the project advances.

BUILDING INTERNAL CAPACITY

Efforts to build internal capacity for landscape improvements and management are intended to create a balance between investment in training and hiring new staff and the implementation of strategic efficiencies to accomplish more with less. Two primary opportunities have been identified to help guide future landscape investment planning.

Planning For Reduced Long-Term Maintenance

Planning for reduced long-term maintenance is an opportunity based in the design guidance for new proposed landscape strategies and includes the potential to transition existing landscapes as well. The native planting strategies proposed in these guidelines are intended to reduce long term maintenance requirements by establishing low maintenance planting areas that are analogous to local native successional communities. The specific plant species associated with these communities have evolved over thousands of years to thrive in the existing soils and climate regime of western Pennsylvania. Once established, these lower maintenance planting strategies are expected to have a better ability to self-sustain within the landscape, requiring fewer maintenance inputs than non-native planting strategies.

Currently, the most common planted landscape cover type within the PRT system is turf grass, which is mowed on a five-week rotation during the growing season. While this planting strategy can provide value within some landscape areas, it is understood to cause a maintenance burden during the growing season, particularly along steep slopes (≥ 10%), within narrow constraints, and other locations that are challenging to mow.

Opportunities to replace turf grass and reduce the amount of turf grass planned for newly designed landscapes by installing lower maintenance native alternatives will reduce overall operations and maintenance costs. The relevant native planting strategies described within this guideline include **tall grass meadow, woody ground cover, hedge thicket, and successional layered woodland**. Each of these strategies will be appropriate in different locations depending on site specific conditions. Tall grass meadow is a particularly good substitution for replacing existing turf grass because the maintenance practice, mowing, is the same for both planting strategies; however the mowing frequency after establishment is less for tall grass meadows. The other recommended planting strategies may require some training and education to establish good pruning and weeding practices; however these planting strategies are also expected to reduce the overall long-term maintenance effort compared to turf grass, which can help offset any necessary short term investments in skill set development.

Contract Requirements

Another opportunity to help support landscape maintenance capacity and budget considerations is to review standard purchasing and construction contract requirements. This includes both the scope of work and the specification of landscape materials.

Contractor maintenance and warranty periods are common for the maintenance of plantings during the initial establishment period, typically 1-2 years. **Extending the construction contractor maintenance requirements** for newly installed landscape through a more complete period of plant establishment according to each planting strategy would help to reduce PRT maintenance efforts and afford PRT staff time to transition to potentially different types of maintenance activities. This approach will further allow for the selection of skilled subcontractors who specialize in the required plant maintenance activities. They can also perform the work more efficiently as well as reduce risk to PRT associated with potential plant failure due to plant nursery quality issues or unforeseen events, beyond what is covered within the plant warranty period.

Contract requirements should also be reviewed to **ensure high quality materials** are purchased and installed on PRT properties. In particular, soil, mulch, and seed products have a high potential to bring invasive weed species into the landscape, increasing maintenance needs. Specifying clean material will ensure that landscape maintenance activities being performed are effective and will reduce future maintenance needs. This consideration applies to construction contract specifications as well as purchasing agreements.

COSTING MODEL

The understanding of potential capacity and budget benefits associated with the recommendations of these deign guidelines is based on the understanding of current landscape maintenance efforts and capacity.

The vast majority of planting within PRT landscapes is turf grass which requires nearly the full capacity of maintenance staff to mow every 5 weeks during the growing season, May - October. This equates to mowing all turf grass areas 4-5 times annually. The recommended lower maintenance planting strategies require 2-3 maintenance activities each year, at most, following the establishment period. The difference represents a **reduction in the annual maintenance requirements of 25% - 60%**. For example, replacing turf grass areas with tall grass meadow plantings (mowing recommended only twice annually) would reduce the frequency of maintenance activities from 4 days per year to 2 days per year.

By refining quality controls during contracting and purchasing, materials costs are expected to rise. This will offset some of the benefits achieved by converting turf grass to alternative lower maintenance native planting strategies.

Extending plant establishment maintenance requirements for construction contractors will provide PRT with greater control over quality and allow for these maintenance costs to be planned in advance as part of a Capitol Improvements program. This allows for **advanced planning and fundraising opportunities while reducing annual operational expenditures**. In this way, the investment in improved landscape performance recommendations (and the resulting lower maintenance landscapes) can be aligned with other strategic financial goals.

Overall the landscape recommendations of these guidelines are not intended to result in increased total costs associated with operations and capital expenditures. The anticipated capacity and budget benefits include:

- Reduced maintenance effort;
- Enhanced rider experience;
- Environmental improvements.