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DEVELOPMENT OF REGIONAL IMPACT GUIDELINES FOR INVASIVE PLANT SPECIES MANAGEMENT PLAN

BACKGROUND

The Regional Policy Plan (RPP) specifies that “Applications for Developments of Regional Impact that propose to alter undeveloped areas shall contain a natural resources inventory.” The RPP also specifies that such an inventory shall identify the presence and abundance of invasive plant species on sites proposed for development. If no invasive plant species are found on site, then no invasive species management plan is required. No landscaping or revegetation plans associated with new development or redevelopment should propose the use of plant species listed on the Invasive Plant List.

These guidelines summarize the recommended content of a DRI Invasive Species Management Plan for sites that contain invasive species. The information required by these guidelines should be submitted in narrative form and documented on plans. Only invasive plant species on the attached list need be addressed in an invasive species management plan.

CONTENT OF INVASIVE PLANT MANAGEMENT PLANS

Inventory

Projects proposing to alter undeveloped areas should provide an inventory of invasive species on the proposed site. These inventories should include the percent cover of each species and should delineate each species on a site map. Invasive plants should be identified by genus and species names. Where identified state-listed rare or endangered species are present on a project site, a detailed narrative discussing potential threats to the endangered species from the more aggressive and/or successful invasive species should be provided. This narrative should also address

potential problems associated with managing invasive species in proximity to endangered species or in ecologically sensitive areas.

Potential Impact of Invasive Plant Species

The management plan should describe:

- how the invasive plants could be expected to spread if left unmanaged in an undeveloped area and the impacts (if any) to the surrounding plant and wildlife community.
- how the invasive plants could be expected to spread if left unmanaged after the proposed development was constructed.
- alternative management options for the invasive plants on site. These options should include examples of mechanical, chemical, and biological control with a full explanation of any potential adverse effects from control measures.

Development of a Preferred Management Plan

A preferred management plan should use a strategy that best manages the invasive species on site with the minimum adverse impacts from control measures. Wherever possible, the goal of the management plan should be to eradicate the species from the site.

Mechanical control, such as cutting or pulling, generally has the least adverse impacts, however, it is not effective on some deciduous woody plant species.

When chemical control is the only viable option, modest applications to cut stems or frill cuts are recommended. Foliar spraying is generally not recommended because of the negative impact to non-target plant and animal species.

Biological control, or use of living organisms as a control agent, has been proven effective on some species. However, only well tested, scientifically documented biological control agents should be considered. The goal of biological control strategies should not be to eradicate the species, because if the target species is eradicated, the biological control agent often moves to a non-target species.

Where plant removal is proposed, an alternative planting plan, using plants native to the region, should be provided.

AVAILABLE INFORMATION

Staff is available to consult with applicants to determine the best management plan for invasive species. A variety of information which may assist in developing management plans is available on-line.

Suggested websites:

<http://invasives.eeb.uconn.edu/ipane/>

<http://tncweeds.ucdavis.edu/>

<http://www.mdflora.org/publications/invasives.htm#control>

**Invasive, Likely Invasive, and Potentially Invasive Plants in Massachusetts:
Findings from the Assessment Process by the
Massachusetts Invasive Plant Advisory Group**

Plants voted as: INVASIVE

"Invasive plants" are non-native species that have spread into native or minimally managed plant systems in Massachusetts. These plants cause economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems. As defined here, "species" includes all synonyms, subspecies, varieties, forms, and cultivars of that species unless proven otherwise by a process of scientific evaluation.

Acer platanoides L. (Norway maple)

A tree occurring in all regions of the state in upland and wetland habitats, and especially common in woodlands with colluvial soils. It grows in full sun to full shade. Escapes from cultivation; can form dense stands; outcompetes native vegetation, including sugar maple; dispersed by water, wind and vehicles.

Acer pseudoplatanus L. (Sycamore maple)

A tree occurring mostly in southeastern counties of Massachusetts, primarily in woodlands and especially near the coast. It grows in full sun to partial shade. Escapes from cultivation inland as well as along the coast; salt-spray tolerant; dispersed by wind, water and vehicles.

Aegopodium podagraria L. (Bishop's goutweed; bishop's weed; goutweed)

A perennial herb occurring in all regions of the state in uplands and wetlands. Grows in full sun to full shade. Escapes from cultivation; spreads aggressively by roots; forms dense colonies in flood plains.

Ailanthus altissima (P. Miller) Swingle (Tree of heaven)

This tree occurs in all regions of the state in upland, wetland, & coastal habitats. Grows in full sun to full shade. Spreads aggressively from root suckers, especially in disturbed areas.

Alliaria petiolata (Bieb.) Cavara & Grande (Garlic mustard)

Synonym: *Alliaria officinalis* Andr. Ex Bieb.

A biennial herb occurring in all regions of the state in uplands. Grows in full sun to full shade. Spreads aggressively by seed, especially in wooded areas.

Berberis thunbergii DC. (Japanese barberry)

A shrub occurring in all regions of the state in open and wooded uplands and wetlands. Grows in full sun to full shade. Escaping from cultivation; spread by birds; forms dense stands.

Cabomba caroliniana A.Gray (Carolina fanwort; fanwort)

A perennial herb occurring in all regions of the state in aquatic habitats. Common in the aquarium trade; chokes waterways.

Celastrus orbiculatus Thunb. (Oriental bittersweet; Asian or Asiatic bittersweet)

A perennial vine occurring in all regions of the state in uplands. Grows in full sun to partial shade. Escaping from cultivation; berries spread by birds and humans; overwhelms and kills vegetation.

Plants voted as: INVASIVE (continued)

Cynanchum louiseae Kartesz & Gandhi (Black swallow-wort, Louise's swallow-wort)

Synonyms: *Cynanchum nigrum* (L.) Pers. non Cav.; *Vincetoxicum nigrum* (L.) Moench

A perennial vine occurring in all regions of the state in upland, wetland, and coastal habitats.

Grows in full sun to partial shade. Forms dense stands, out-competing native species: deadly to Monarch butterflies.

Elaeagnus umbellata Thunb. (Autumn olive)

A shrub occurring in uplands in all regions of the state. Grows in full sun. Escaping from cultivation; berries spread by birds; aggressive in open areas; has the ability to change soil.

Euonymus alatus (Thunb.) Sieb. (Winged euonymus; Burning bush)

A shrub occurring in all regions of the state and capable of germinating prolifically in many different habitats. It grows in full sun to full shade. Escaping from cultivation and can form dense thickets and dominate the understory; seeds are dispersed by birds.

Euphorbia esula L. (Leafy spurge; wolf's milk)

A perennial herb occurring in all regions of the state in grasslands and coastal habitats. Grows in full sun. An aggressive herbaceous perennial and a notable problem in western USA.

Frangula alnus P. Mill. (European buckthorn; glossy buckthorn)

Synonyms: *Rhamnus frangula* L.; *R. frangula* var. *angustifolia* Loud.

Shrub or tree occurring in all regions of the state in upland, wetland, and coastal habitats. Grows in full sun to full shade. Produces fruit throughout the growing season; grows in multiple habitats; forms thickets.

Glaucium flavum Crantz (Sea or horned poppy; yellow hornpoppy)

A biennial and perennial herb occurring in southeastern MA in coastal habitats. Grows in full sun. Seeds float; spreads along rocky beaches; primarily Cape Cod and Islands.

Hesperis matronalis L. (Dame's rocket)

A biennial and perennial herb occurring in all regions of the state in upland and wetland habitats. Grows in full sun to full shade. Spreads by seed; can form dense stands, particularly in flood plains.

Iris pseudacorus L. (Yellow iris)

A perennial herb occurring in all regions of the state in wetland habitats, primarily in flood plains. Grows in full sun to partial shade. Out-competes native plant communities.

Lepidium latifolium L. (Broad-leaved pepperweed; tall pepperweed)

A perennial herb occurring in eastern and southeastern regions of the state in coastal habitats.

Grows in full sun. Primarily coastal at upper edge of wetlands; also found in disturbed areas; salt tolerant.

Lonicera japonica Thunb. (Japanese honeysuckle)

A perennial vine occurring in all regions of the state in upland, wetland, and coastal habitats.

Grows in full sun to full shade. Rapidly growing, dense stands climb and overwhelm native vegetation; produces many seeds that are bird dispersed; more common in southeastern Massachusetts.

Plants voted as: INVASIVE (continued)

Lonicera morrowii A.Gray (Morrow's honeysuckle) A shrub occurring in all regions of the state in upland, wetland, and coastal habitats. Grows in full sun to full shade. Part of a confusing hybrid complex of nonnative honeysuckles commonly planted and escaping from cultivation via bird dispersal.

Lonicera x bella Zabel [*morrowii x tatarica*] (Bell's honeysuckle)

This shrub occurs in all regions of the state in upland, wetland, and coastal habitats. Grows in full sun to full shade. Part of a confusing hybrid complex of nonnative honeysuckles commonly planted and escaping from cultivation via bird dispersal.

Lysimachia nummularia L. (Creeping jenny; moneywort)

A perennial herb occurring in all regions of the state in upland and wetland habitats. Grows in full sun to full shade. Escaping from cultivation; problematic in flood plains, forests and wetlands; forms dense mats.

Lythrum salicaria L. (Purple loosestrife)

A perennial herb or subshrub occurring in all regions of the state in upland and wetland habitats. Grows in full sun to partial shade. Escaping from cultivation; overtakes wetlands; high seed production and longevity.

Myriophyllum heterophyllum Michx. (Variable water-milfoil; Two-leaved water-milfoil)

A perennial herb occurring in all regions of the state in aquatic habitats. Chokes waterways, spread by humans and possibly birds.

Myriophyllum spicatum L. (Eurasian or European water-milfoil; spike water-milfoil)

A perennial herb found in all regions of the state in aquatic habitats. Chokes waterways, spread by humans and possibly birds.

Phalaris arundinacea L. (Reed canary-grass)

This perennial grass occurs in all regions of the state in wetlands and open uplands. Grows in full sun to partial shade. Can form huge colonies and overwhelm wetlands; flourishes in disturbed areas; native and introduced strains; common in agricultural settings and in forage crops.

Phragmites australis (Cav.) Trin. ex Steud. subsp. *australis* (Common reed)

A perennial grass (USDA lists as subshrub, shrub) found in all regions of the state. Grows in upland and wetland habitats in full sun to full shade. Overwhelms wetlands forming huge, dense stands; flourishes in disturbed areas; native and introduced strains.

Polygonum cuspidatum Sieb. & Zucc. (Japanese knotweed; Japanese or Mexican Bamboo)

Synonym: *Fallopia japonica* (Houtt.) Dcne.; *Reynoutria japonica* Houtt.

A perennial herbaceous subshrub or shrub occurring in all regions of the state in upland, wetland, and coastal habitats. Grows in full sun to full shade, but hardier in full sun. Spreads vegetatively and by seed; forms dense thickets.

Potamogeton crispus L. (Crisped pondweed; curly pondweed)

A perennial herb occurring in all regions of the state in aquatic habitats. Forms dense mats in the spring and persists vegetatively.

Plants voted as: INVASIVE (continued)

Ranunculus ficaria L. (Lesser celandine; fig buttercup)

A perennial herb occurring on stream banks, and in lowland and uplands woods in all regions of the state. Grows in full sun to full shade. Propagates vegetatively and by seed; forms dense stands especially in riparian woodlands; an ephemeral that outcompetes native spring wildflowers.

Rhamnus cathartica L. (Common buckthorn)

A shrub or tree occurring in all regions of the state in upland and wetland habitats. Grows in full sun to full shade. Produces fruit in fall; grows in multiple habitats; forms dense thickets.

Robinia pseudoacacia L. (Black locust)

A tree that occurs in all regions of the state in upland habitats. Grows in full sun to full shade. While the species is native to central portions of Eastern North America, it is not indigenous to Massachusetts. It has been planted throughout the state since the 1700's and is now widely naturalized. It behaves as an invasive species in areas with sandy soils.

Rosa multiflora Thunb. (Multiflora rose)

A perennial vine or shrub occurring in all regions of the state in upland, wetland and coastal habitats. Grows in full sun to full shade. Forms impenetrable thorny thickets that can overwhelm other vegetation; bird dispersed.

Trapa natans L. (Water-chestnut)

An annual herb occurring in the western, central, and eastern regions of the state in aquatic habitats. Forms dense floating mats on water.

Plants voted as: LIKELY INVASIVE

"Likely Invasive plants" are non-native species that are naturalized in Massachusetts but do not meet the full criteria that would trigger an "Invasive plant" designation. As defined here, "species" includes all synonyms, subspecies, varieties, forms, and cultivars of that species unless proven otherwise by a process of scientific evaluation.

Ampelopsis brevipedunculata (Maxim.) Trautv. (Porcelain-berry; Amur peppervine)

A woody vine found primarily in southeastern counties of Massachusetts but known from some western counties as well. Occurs in upland woodland edges and thickets and grows in full sun to partial shade. Escapes from cultivation and is bird dispersed.

Anthriscus sylvestris (L.) Hoffmann (Wild chervil)

Synonym: *Chaerophyllum sylvestre* L.

A biennial or short-lived perennial herb with a few reported sites in minimally managed habitats scattered across the state. It occurs in old fields, wetlands, roadsides and proliferates in floodplain soils. Grows in full sun to partial shade. It has a very long taproot and is reported to be spreading in Vermont and Connecticut.

Plants voted as: LIKELY INVASIVE (continued)

Berberis vulgaris L. (Common barberry; European barberry)

A shrub occurring in all regions of the state, primarily in uplands. It grows in full sun to full shade. The potential of this plant to spread is high; once common but widely eradicated because it is an alternate host for wheat rust; it hybridizes with Japanese barberry.

Cardamine impatiens L. (Bushy rock-cress; narrowleaf bittercress)

A winter annual or biennial herb found in western Massachusetts occurring in rich woods, rocky ledges, roadsides, and stream banks. It grows in full sun to full shade. Disperses seeds easily and is spreading rapidly in other parts of New England.

Centaurea biebersteinii DC. (Spotted knapweed)

Synonym: *Centaurea maculosa* auct. non Lam.

A biennial or perennial herb occurring in all regions of the state in upland and coastal habitats. Grows in full sun. Aggressively grows in well-drained, disturbed soils; serious problem in western states where it out-competes native grassland species, literature reports are currently lacking for this in the northeast.

Cynanchum rossicum (Kleopov) Borhidi (European swallow-wort; pale swallow-wort)

Synonym: *Vincetoxicum rossicum* (Kleopov) Barbarich

A perennial herb occurring in the western region of the state in upland habitats. Grows in full sun to partial shade. Forms dense stands; found primarily in the lower Connecticut River Valley.

Egeria densa Planchon (Brazilian waterweed; Brazilian elodea)

Synonyms: *Anacharis densa* (Planch.) Victorin; *Elodea densa* (Planch.) Caspary

A perennial herb occurring in the eastern and southeastern regions of the state in aquatic habitats. Common in the aquarium trade; chokes waterways; currently only found in a few MA ponds.

Epilobium hirsutum L. (Hairy willow-herb; Codlins and cream)

A perennial herb occurring in all regions of the state in wetlands. Grows in full sun. Seeds dispersed by wind and water; evidence currently lacking that this species out-competes other vegetation in minimally managed habitats.

Euphorbia cyparissias L. (Cypress spurge)

A perennial herb occurring in all regions of the state in upland habitats. Grows in full sun. Persists in open areas; evidence currently lacking that this species out-competes other vegetation in minimally managed habitats.

Festuca filiformis Pourret (Hair fescue; fineleaf sheep fescue)

A perennial grass occurring in all regions of the state, in grasslands and open woodlands. Grows in full sun to partial shade. Common in minimally managed grassland habitats; more data needed on its ability to outcompete native species.

Glyceria maxima (Hartman) Holmburg (Tall mannagrass; reed mannagrass)

A perennial grass currently known from one marsh in Essex County. Grows in full sun to partial shade. Spreads vegetatively and produces viable seeds; forms dense stands.

Heracleum mantegazzianum Sommier & Levier (Giant hogweed)

A perennial herb occurring in scattered sites across all regions of the state; thrives in multiple habitats. Grows in full sun to full shade. Escapes from cultivation; seeds can be dispersed by water; can cause severe skin reactions.

Plants voted as: LIKELY INVASIVE (continued)

Humulus japonicus Sieb. & Zucc. (Japanese hops)

An annual herbaceous vine with current records in western MA, but historical records from all regions of the state. Grows in floodplain forests and riverbanks in full sun to partial shade. Escapes from cultivation; capable of prolific growth.

Hydrilla verticillata (L.f.) Royle (Hydrilla; water-thyme; Florida elodea)

A perennial aquatic herb occurring in the southeastern region of the state. Only found in one MA pond currently (2004); easily dispersed by birds and humans; chokes entire water bodies.

Ligustrum obtusifolium Sieb. & Zucc. (Border privet)

A shrub occurring in all regions of the state in woodlands and woodland edges. Grows in full sun to full shade. Widespread and shade tolerant, bird dispersed; more data needed on density and distribution; flowers are needed to identify species.

Lonicera tatarica L. (Tatarian honeysuckle)

A shrub found from Boston westward in thickets, woods, and edges of woods. Can grow in full sun to full shade. Commonly confused with other non-native honeysuckles; crosses with Morrow's honeysuckle (*L. morrowii*) to produce the invasive hybrid Belle's honeysuckle (*L. xbella*).

Microstegium vimineum (Trin.) A. Camus (Japanese stilt grass; Nepalese browntop)

An annual grass occurring in the western region of the state in upland and wetland habitats. Grows in full sun to full shade. Forms dense stands; currently localized in the lower Connecticut River Valley; spreads in flood plains.

Miscanthus sacchariflorus (Maxim.) Franch. (Plume grass; Amur silvergrass)

This perennial grass is currently known to occur in central MA in wetland margins and roadsides. Grows in full sun. Spreads by rhizomes and develops dense stands along roadsides and adjacent native habitats.

Myosotis scorpioides L. (Forget-me-not)

A perennial herb occurring in all regions of the state in wetlands. Grows in full sun to full shade. Escaping from cultivation; prolific in open wooded streams, stream-banks and wet meadows; evidence about its persistence is needed.

Myriophyllum aquaticum (Vell.) Verdc. (Parrot-feather; water-feather; Brazilian watermilfoil)

Synonym: *Myriophyllum brasiliense* Camb.

A perennial herbaceous aquatic occurring in southeastern MA along a shallow pond edge. Grows in full sun to partial shade. Reproduces from fragments; commonly used in the water garden trade.

Najas minor All. (Brittle water-nymph; lesser naiad)

An annual herb occurring in the western region of the state in aquatic habitats. Chokes waterways; spread by humans and possibly birds; currently found only in Berkshire County (2002).

Nymphoides peltata (Gmel.) Kuntze (Yellow floating heart)

This aquatic perennial occurs in ponds in central MA. Grows in full sun to partial shade. Can create a dense floating mat on ponds and can reproduce from fragments.

Plants voted as: LIKELY INVASIVE (continued)

Phellodendron amurense Rupr. (sensu lato) (Amur cork-tree)

Synonyms: *Phellodendron japonicum* Maxim.; *Phellodendron amurense* var. *japonicum* (Maxim.) Ohwi; *Phellodendron sachalinense* (F. Schmidt) Sarg.; *Phellodendron amurense* var. *sachalinense* F. Schmidt; *Phellodendron lavalleyi* Dode; *Phellodendron amurense* var. *lavalleyi* (Dode) Sprague

This tree occurs in uplands of eastern to central MA. Grows in full sun to full shade. A bird dispersed species that has escaped cultivation.

Pueraria montana (Lour.) Merrill (Kudzu; Japanese arrowroot)

Synonym: *Pueraria montana* var. *lobata* (Willd.) Maesen & S. Almeida

A perennial herbaceous vine found in southeastern MA. Occurs at Arnold Arboretum; uplands. Grows in full sun to partial shade. Present in MA and subject to control; marginally hardy in MA but has the potential to invade minimally-managed areas based on its performance elsewhere.

Ranunculus repens L. (Creeping buttercup)

A perennial herb occurring in all regions of the state in wetlands. Grows in full sun to full shade. Common around springs and wetlands; evidence currently lacking that this species out-competes other vegetation in minimally managed habitats.

Rorippa amphibia (L.) Bess. (Water yellowcress; great yellowcress)

Synonyms: *Nasturtium amphibium* (L.) Ait. f.; *Sisymbrium amphibium* L.

A perennial herb occurring in central MA. Grows in wetlands in full sun to partial shade. Common and increasing in central MA river drainages; a major threat to riparian habitats forming dense stands at some locations.

Rubus phoenicolasius Maxim. (Wineberry; Japanese wineberry; wine raspberry)

A shrub found in uplands of southern MA. Can grow in full sun to partial shade. Animal and human dispersed; forms thickets.

Senecio jacobaea L. (Tansy ragwort; stinking Willie)

A biennial herb occurring in a few sites east of the Connecticut River; habitat is open uplands. Grows in sun or partial shade. This species is highly invasive in the Canadian Maritimes; may also spread from disturbed areas.

Tussilago farfara L. (Coltsfoot)

A perennial herb occurring in all regions of the state in upland and wetland habitats. Grows in full sun to full shade. Particularly problematic in lime seeps and disturbed sites; evidence currently lacking that this species outcompetes other vegetation in minimally managed habitats.

Plants voted as: POTENTIALLY INVASIVE

"Potentially invasive plants" are non-native species not currently known to be naturalized in Massachusetts, but that can be expected to become invasive within minimally managed habitats within the Commonwealth. As defined here, "species" includes all synonyms, subspecies, varieties, forms, and cultivars of that species unless proven otherwise by a process of scientific evaluation.

Arthraxon hispidus (Thunb.) Makino (Hairy joint grass; jointhead; small carpetgrass)

An annual grass historically known from Franklin County but not currently known from the state. Habitats elsewhere include roadsides, shores, ditches, and low woods and fields. Grows in full to partial shade. Is problematic in Connecticut and southward.

Carex kobomugi Ohwi (Japanese sedge; Asiatic sand sedge)

A perennial sedge established mainly in sand dunes and growing in full sun. There is only one current New England location – in Rhode Island; it can spread rapidly in dune systems.

Lonicera maackii (Rupr.) Herder (Amur honeysuckle)

A shrub having specimens and reports from a number of MA counties, but verification of naturalization at these locations is needed. The likely habitats are woods and woodland edges. Can grow in full sun or shade. Escapes from cultivation, but documentation needed regarding naturalized populations in MA; recognized as invasive in the Midwest and portions of the southeastern USA.

Polygonum perfoliatum L. (Mile-a-minute vine or weed; Asiatic tearthumb)

Synonym: *Ampelgynonum perfoliatum* (L.) Roberty & Vautier

This annual herbaceous vine is not currently known to exist in MA, but has been found in RI and CT. Habitats include streamside, fields, and road edges in full sun to partial shade. Highly aggressive; bird and human dispersed.