

County of Lanark

IPM Vegetation

Management Plan

CVI IPM Services

County of Lanark

IPM Vegetation Management Plan

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November 2016

Revised - June 16, 2017

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Introduction

Integrated Vegetation Management (IVM) for roadsides relies on the use of all methods of control to reduce a weed or brush concern. These include cultural practices, use of competitive vegetation, biological weed control, planting of allelopathic species, mechanical, manual and physical vegetation control; and chemical vegetation control (Monet 1992). Control is applied as required to zones of the road side as well as using targeted methods and physically or chemically selective methods to reduce herbicide use and impacts (Ballard et al. 2004).

IVM principles focus on the use of two or more methods of control, as opposed to using only one method that may disrupt natural predators or control agents. Alternative vegetation management techniques extend to a multi-level approach using the techniques listed above but also involving administrative and public relations methods including staff training, community involvement programs and public education.

Characteristics of County of Lanark Road System

Lanark County looks after the main roads within the County of Lanark (Appendix 1 provides the road names and numbers), excluding Highways 7 and 15 which are maintained by the province.

Lanark County encompasses the following Townships:

- Lanark Highlands
- Mississippi Mills
- Tay Valley
- Drummond / North Elmsley
- Beckwith
- Montague
- Carleton Place
- Perth
- Smith Falls

The Townships carry out their own maintenance programs such as weed and brush control as needed.

Description

There is a total County road distance of 561 km (1124 lane-km). Roads are two lane with paved or gravel shoulders and 12 km of urban roads which include 1 km of four lane roadway in Carleton Place. Roadside width ranges from 5 m from edge of gravel to fence line (bush line), to 15 m wide or wider. A ditch is normally present within the

roadside and usually marks the edge of the maintained area due to limits on vehicle access (such as mowers) and water location following rain events.

Area Characteristics

The soils and natural vegetation in Lanark County have a major impact on road vegetation control operations. The soils Lanark are in part rocky, limited or none soil areas in the west and north of the county with exposed sections of granite and rocky soil that are not arable land, but remain forested or covered by pockets of significant wetlands, both swamps and bogs. The southern and eastern parts of the country have more agriculturally productive areas of sandy loams or areas of more alkaline soils resulting from the lake bed of the ancient Champlain Sea.

The forested areas in Lanark County fall in the Great Lakes-St. Lawrence Forest region. The natural forests are mixed deciduous and conifer species listed below. The following native forest trees species are example of trees that are brush concerns within clear zones and wild life sight zones within roadsides.

- eastern white pine
- red pine
- eastern hemlock
- eastern white cedar
- white spruce
- balsam fir
- sugar maple
- red maple
- red oak
- basswood
- yellow birch
- white birch
- large tooth aspen

Brush species found on roadsides are commonly wind-dispersed species such as aspen, ash and maples; rhizomatous species such as aspen or white cedar which reproduces by stem layering.

Facilities

The County maintains three patrol yards, two office buildings and three gravel pits (Appendix 2)

Public Works Managed Facilities:

Administration & Public Works Building/Garage
99 Christie Lake Road, Perth, ON K7H 3C6

Almonte Depot (Leased property from MTO)
4752 County Road 29 North, Almonte, ON

Union Hall Depot, includes communication tower
1982 Wolf Grove Road, Almonte, ON

McDonald's Corners Pit, patrol yard is same location as pit.
4704 McDonald's Corners Road, McDonald's Corners, ON

King Pit, inactive sand pit north of Tatlock, ON

Bottle Lake Pit, inactive sand pit west of Lavant, ON

Trails

The County maintains four trails covering approximately 94 km in total (Appendix 3):

- Baird Trail (approx. 2 km)
- Glen Tay - Havelock Trail (approx. 30 km)
- Ottawa Valley Recreation Trail (approx. 61 km)
- Tay River Pathway (Trail) (approx. 1 km)

Vegetative Characteristics with Respect to Vegetation Management Issues

The roadsides, trails and facilities within the county have typical vegetation and specific control issues.

Agricultural areas

- grassed zone in most areas along road from 1 to 3 m wide
- typically grassed roadside right up to fence line.
- natural wet-area vegetation in zones
- Issues include
 - o Poisonous species
 - o Other noxious and site lines (tall) weeds and brush
 - Other noxious weed species including thistles, knapweed and dog-strangling vine
 - o Milkweed no longer a noxious weed

Rural property areas

- grassed zone in most areas along road from 1 to 3 m wide up to ditch line

- vegetation in zone beyond the ditch line
 - o grassed roadside right up to fence line in some areas.
 - o natural wet-area vegetation in zones
 - o natural mixed vegetation right up to fence line
 - o natural woody vegetation right up to fence line, especially in north west part of the county
- Issues include
 - o Poisonous species
 - o Site lines (tall) weeds.
 - o Adjacent to agricultural and horticultural properties
 - noxious and site lines (tall) weeds and brush
 - other noxious weed species including thistles, knapweed and dog-strangling vine

Forested areas (Great-Lake St. Lawrence forest type) with or without rural properties

- few areas with grassed zone along road from 1 to 3 m wide up to ditch line
- rock areas and rock cuts limiting vegetation along roadside and access beyond ditch line
- vegetation beyond ditch line
 - o natural woody vegetation right up to fence line
 - o natural vegetation right up to fence line
 - o natural wet-area vegetation in zones
- Issues include
 - o Poisonous species
 - o Invasive weeds in forests and natural areas such as dog-strangling vine
 - o Site lines (tall) weeds and brush
 - o Animal site lines beyond safety clear zone

Facilities (non-public) and gravel pits

- Grassed zones non-crop areas, ballast (gravel) loading areas; paved parking or equipment areas; and paved or unpaved laneway areas
- Issues include
 - o Poisonous species
 - o Noxious weeds in agricultural areas
 - o Invasive weeds in forests and natural areas such as dog-strangling vine
 - o Maintaining access
 - o Snow storage
 - o Maintenance of ditches for runoff water

Facilities and trails (public)

- Grassed, ballast (gravel) or paved parking or equipment areas and paved or unpaved laneway areas
- Natural mixed vegetation areas
- Natural wet-area vegetation in zones
- Issues include
 - o Poisonous species
 - o Noxious weeds in agricultural areas
 - o Invasive weeds in forests and natural areas such as dog-strangling vine
 - o Maintaining access
 - o Snow storage

Vegetation Goals for Different Types of Areas

It is critical to carry out control operations with the vegetation goal of each site in mind.

Within the County, there are mown grassed zones along most roadways. Beyond this strip or beyond the ditch line, the vegetation is either cultivated turf or herbaceous species or naturally occurring species.

Suitable roadside and facilities vegetation

- Grassed areas where possible
 - o Low maintenance on roadsides
 - o Medium maintenance with regular mowing in facilities
- Competitive old field species and naturalized herbaceous species
 - o Naturalized or planted or seeded
 - o List of species in Appendix 4
- Legume communities
 - o Generally planted
 - Crown vetch
 - Bird's-foot trefoil
- Shrub or short tree species of suitable mature height
 - o Naturalized or planted or seeded
 - o List of species in Appendix 4

IVM Control Methods Currently in Use in 2016

Monitoring

Monitoring is carried out on a road by road basis, or large sections of road up to 10 km long

- by road patrol staff prior to contract operations to determine road sections to treat
- manual recording and Global Positioning System (GPS) recording from vehicles with entry on the County Geographic Information System (GIS) system
- the inventory is used to prepare and direct vegetation control plans for season
- used to produce lists and maps of roads and sections of road to treat
- the sample inventory map shows roads with wild parsnip infestation and density of infestations (Appendix 5)
- planned treatment of roads for 2016 (Appendix 6)

Mechanical/Manual Weed Control

Mowing is done for weed control and for maintenance of the safety clear zone along the road generally to the ditch line using roadside mowers. In most areas the first swath is cut, but two swaths are cut where possible.

Brush cutting for control of woody species is done with mechanical equipment using a brush cutting head or attachment on a road vehicle.

Grading of the gravel shoulder is done to control weeds invading in this area as well as re-distribution of gravel on the road shoulder.

Mechanical removal of plants and debris limiting water flow in roadside ditches is carried out as needed with back-hoes and other equipment to dig and remove material.

Cultural Control

Mowing of roadside turf

Mowing is carried out in the turf zone along roadside

- reduces height of turf and any weeds/brush improving site lines
 - o Control of some annual weeds
 - o Limits height of all weeds/brush
 - o Makes soil line visible for vehicles pulling off road
- thickens up seeded turf
- promotes tillering of the grass plants which thickens the turf stand

Zones with height thresholds

Re-seeding of turf on the roadside is done following road construction

- MTO standard seeding mix is used (Appendix 7)
 - o promotes rapid grass establishment using improved turf species and nurse grasses to provide early competitive advantage and early cover

Natural vegetation grows beyond the ditch line. In many places, this results in natural competitive species occurring in monocultures and mixed plant communities.

- An initial list of compatible, competitive species has been provided in Appendix 4.
- Many of these species have been observed on roadsides in Lanark County.

Mechanical/Manual with Cultural and Chemical

Selective herbicide control of weeds is carried out on mowed grass areas. Cutting of the weeds prior to treatment helps control of some annual weeds.

Chemical Weed Control

Selective herbicide control of weeds is done on large zones of the roadside in road sections up to 10 km long, with spray widths up to 8 m wide. This is carried out with a truck mounted sprayer with manual controls and multiple spray heads.

Spot non-spray of sensitive vegetation zones include

- zones with wet areas
- steep slopes
- sensitive vegetation communities
- land-owner requested non-spray areas
- mailboxes
- trial plots

Complete IPM Program

Monitoring

The purpose of the monitoring or carrying out weed audits in an IPM program is to record the exact locations of the weeds or brush of concern for planning, for information and for contract management.

Monitoring focuses on primary weed concerns and for planning of future control work. The needs for monitoring can change from season to season. Timing can be based on program needs, weeds species stage of growth or on treatments.

- Weed/brush species and locations
 - o In safety clear zone
 - any species of weeds or brush above 0.6 m mature height
 - o On other roadside areas and facilities
 - poisonous plants, primarily wild parsnip and poison ivy are the top weeds of concern
 - noxious weeds in agricultural areas,
 - problem invasive plants such as common reed grass (phragmites)
 - new invasive/noxious weeds that are of concern including giant hogweed and dog-strangling vine species that are both present in neighbouring municipalities
 - tall herbaceous plants and brush
 - that can obscure entry of deer, moose and other animals onto road or attract these animals.
 - that can spread into safety clear zone
 - o Other items to potentially monitor
 - sensitive areas such a wetlands and other non-spray zones
 - desirable vegetation that should not be damaged by operations if possible
 - any or all may be permanently located on the County GIS

Regular required monitoring

- Timing of monitoring
 - o Pre-season control plan
 - o Contract preparation
 - o Weed species based timing
 - Wild parsnip
 - fall after seedling emergence
 - spring from early to mid-May

- Poison ivy, sumac and dog-strangling vine visible in September/October with fall red/yellow colour
- Common reed grass (phragmites) in July ahead of fall treatment
- Giant hogweed in early summer with large leaves and flower heads
- Quality control and post-season/pre-season timing
 - Treatment based timing
 - Where weed was previously recorded
 - Where treated previous year
 - Intervals with respect to treatment
 - Two months after treatment
 - Weed species based for timing
 - For wild parsnip, poison ivy and sumac evaluate August to September
 - For wild parsnip (fall treated), dog-strangling vine, common reed grass (phragmites) and giant hogweed evaluate in early summer after emergence
- Revision to control plan
 - evaluate weed control and new invasions
 - In-house field review of program
 - preliminary contract information

Monitoring Process

Monitoring process will be different on facilities and trails, but will follow similar procedure.

All monitoring information should be entered in yearly layers on the Country GIS system. This allows for reference and for comparison between monitoring periods.

Quality control and post-season/pre-season monitoring is done to evaluate control programs, review control result and for planning operations the following season. The purpose is to review:

- Effectiveness of each herbicide program
- Application concerns
 - Weather
 - Applicator
 - Buffers
 - Non-spray zones
- Consider IPM needs such as herbicide rotation
- Adjustments to programs for next season
- Follow-up control if required in treated area
- Compare control from year to year and over period of years

Monitoring Process on Roadsides

Monitoring (auditing) is carried out on specific weed and brush species as well as the location of sensitive areas and non-spray zones:

- weed/brush species
- non-treat zones
 - o 5 m is a workable length that can be left untreated
- road section identifiers,
 - o latitude and longitude (using GPS)
- methods used to identify weed patches
 - o start/stop (linear), point or polygon (most accurate, time consuming)
 - o additional information on width across the road side or size of control area, weed/brush species, characteristics

Linear method is commonly used because it relates to on/off control of application equipment. Additional information is required on the width of the weed patch as to whether additional far-reaching nozzles need to be operated on application equipment or if off-road equipment or back pack equipment is required.

If only the zone along the roadside is to be treated, then this additional information may not be required.

Monitoring Process on Trails and at Facilities

Monitoring on trails and around facilities would be carried out for similar reasons, but control operations may be done on a manual basis, with hose and hand-gun or back-pack sprayers. Monitoring would be done of specific weed and brush species as well as the location of sensitive areas and non-spray zones.

- weed/brush species
- non-treat zones
 - o 1 m is a workable length that can be left untreated
- location identifiers
 - o latitude and longitude (using GPS)
 - o how to identify
 - start/stop, polygon, point
 - information on size, width across trail, laneway or area of control
 - recording of hard features to use as location markers (or use of ones previously recorded) such as rail lines, buildings, fences

The linear method of data collection would be suitable for monitoring weeds on trails. Additional information is required on the width or area of the weed patches (or use of polygon method) for contract management and planning.

Weed/Brush Recording Sheets

It is recommended that digital Weed/Brush Recording Sheets be created to be filled in during regular monitoring or patrol operations.

- can be printed off if required
- suggested information
 - o physical location (unless recorded by GPS)
 - o weed species (botanical and/or common name)
 - take photo if not sure of species
 - o zone along road
 - o estimated or measured width of area (indicated which)
 - o density
 - o control concern
 - o person requesting control and contact info

Storage of Collected Information

- Recording weed/brush locations
 - o Use of GIS in County Mapping System
 - o building on the program already in place
 - locations
 - using road section identifiers (up to 10 km long)
 - using GPS (or other identifiers) – way points (latitude and longitude)
 - all entered into County GIS program

Use of monitoring (audit) information

- Pre-season planning
 - o Program planning
 - o Budgeting
- Contract management
 - o contract preparation based on areas needing treatment
 - o use for information to contractor
 - digital or hard copies
- Herbicide application
 - o Control of GPS operated sprayers
 - o Exact treatment locations can be programmed
 - Also sensitive and non-spray zones
 - o Sprayers can also take records
 - exactly where treatments applied
 - amount of herbicide used
 - date and time of application
 - information provided to client

- Quality control
 - o Program revision and planning
 - in fall or early spring for treatments required following season
- Track progress from year to year and over period of years

Zone Management with Height Thresholds

Vegetation control and maintenance activities can be done in linear zones along the roadsides or in spots (from point A to point B as an example) to reduce the total area of control activities and to provide a natural transition to the neighbouring vegetative cover. This will reduce the amount of herbicide used, will reduce the area for mechanical activities and reduce costs. Appendix 9 shows a zoned cross-section of a typical road in Lanark County with the zone designations for the turf/clear zone and wildlife zone with acceptable heights of mature vegetation within each zone.

Monitoring should reflect these zones or spot designations. These zonal designations can be recorded on County GIS maps for reference and for contract management.

Zones

Zones will be defined based on acceptable mature plant heights based on specific roadside/trail geometry and usage.

- Linear roadside requirements
 - o Width of turf/clear zone 1 to 7 m or ditch line
 - Mature plant height limit of 0.6 m
 - o Width of wild life sight zone – width of 1 to 15 m or to fence line if less
 - Mature woody plant height limit of 1.2 m
 - o Remaining zone to fence line
 - No mature plant height limit
- Intersection, horizontal curves or large areas requirements
 - o Width of sight line zone 1 to 30 m
 - Mature plant height limit of 0.6 m
 - o Width of wild life sight zone – width of 1 to 15 m or to fence line if less
 - Mature woody plant height limit of 1.2 m
 - o Remaining zone to fence line
 - No mature plant height limit
- Recreational trails
 - o 1.2 m height within 2 m of trail
 - o Any height of vegetation beyond 2 m of trail

- Safety barrier requirements
 - o clear of all vegetation
 - o suggested standard of 2 m wide and 1 m wide in sensitive areas
- Non-spray zones
 - o Land owner requests
 - o Areas being maintained and clean of weeds of concern
 - o Location of sensitive areas

Vegetation Characteristics in Zones

Suitable vegetation characteristics will be used to designate zones

- based on parameters such as physical qualities, height, site location, usage of site
 - o mature height (see below)
 - o poisonous or thorniness
 - o competitive ability

Knowing compatible, competitive species is important for the following reasons:

- Established stands of compatible species can be encouraged to thrive and spread within the roadside.
 - o when 5 m or longer areas of these species are not infested with weeds of concern, roadside herbicide application or maintenance operations can avoid these stands as 'sensitive' areas (non-spray zones).
 - o many of these competitive species are suitable for planting or seeding.
 - this is based on their level of competitiveness against invading tree species, their successful establishment from seeding and/or their availability as planting stock.
 - o goal to develop a list of possible species for each zone
 - o a list of recommended species has been prepared for selective maintenance, selective control or planting/seeding (Appendices 4, 8)
 - maximum mature height of 1.2 m for woody species in wild life sight zones
 - acceptable normal height of 1.5 m for herbaceous species in wild life sight zones
 - o list for (or as training tool for) staff/contractors for monitoring

Weed Species of Concern in Lanark County

Weed control issues

Site lines (tall) weeds

Noxious weeds affecting agriculture

Brush

Weeds affecting road structures

Specific species of concern

- Wild parsnip
- Poison ivy
- Sumach
- Common reed grass (phragmites)
- Dog-strangling vine
- Giant hogweed (not yet present but in neighbouring County)

Weed Control Needs in Specific Areas

Production agriculture areas within county

- Identified limits for control activities based on neighbouring land use
- Poisonous weeds - parsnip, poison ivy, giant hogweed
- Noxious weeds in Ontario
 - Include Canada thistles, some biennial thistles, knapweed, dog-strangling vine, European buckthorn, leafy spurge, kochia, sow-thistle
http://www.omafra.gov.on.ca/english/crops/facts/noxious_weeds.htm
 - In areas affecting agricultural (including horticultural) operations
 - Milkweed species are not noxious weeds
- Site lines (tall) weeds

Rural residential areas and towns

- Poisonous weeds – wild parsnip, poison ivy, giant hogweed
- Site lines (tall) weeds

Recreational trails and maintenance facilities

- Poisonous weeds – wild parsnip, poison ivy, giant hogweed
- Zone width each side of trail or facility
 - (change as required or as per location)
 - 2 m on each side of trail

Safety barriers

- Common reed grass (phragmites), sumach

- Common safety barrier weeds that hide barriers – sweet clover, ragweed, common reed grass (phragmites), grasses
- Site lines (tall) weeds

Information on problem weeds

Wild parsnip

- Biology relating to control and spread
 - o Short-live perennial, dies the year that it flowers (sometimes called a biennial)
 - o Has a crown and a tap-root
 - o Spread by seed only, seed lasts 2 to 3 years
 - o Seed wind dispersed a short distance of about 5 m up to a maximum of 13 m.
 - o Produces a low rosette until the year of flowering, up to 6 years in low light, poor or crowded conditions
 - o Susceptible to disturbance
 - o Foliar herbicides absorbed by green, rosette foliage
- Source of infestations to be aware of as related to control
 - o Local, nearby infestations on neighbouring properties up to 10 m away from fence line
 - o Possibly water dispersal of seed
 - o Soil movement due to ditching, cultivation, and capital projects
 - o Movement of seed by maintenance equipment, vehicles, recreational vehicles, and workers or visitors to site. Especially in wet or dewy conditions

Poison ivy

- Biology relating to control and spread
 - o Perennial woody species with different forms – low or tree climbing
 - o Flowers in late May or early June
 - o Main spread is by birds dispersing seeds
 - Horizontal spread of stems is minor, reportedly less than 10 cm per year (Mulligan and Jenkins 1977)
 - o Movement of seed by maintenance equipment, vehicles, recreational vehicles, and workers or visitors to site
 - Especially in wet or dewy conditions
 - o Forms patches by rhizomes or viney stems that can transfer systemic herbicides
 - o Herbicide uptake is effective at time of full leaf emergence, flowering or later

- Source of infestations to be aware of as related to control
 - o Local, nearby infestations on neighbouring properties as far as local birds fly.
 - o Movement of seed by maintenance equipment, vehicles, recreational vehicles, and workers or visitors to site and along paths.

Staghorn sumac (sumach)

- Benefits of sumac (sumach) on roadsides
 - o Strong soil and bank stabilizer that out-competes invading weeds and brush due to dense, shading canopy.
 - o Total control on roadsides is not recommended.
 - o Zonal plantings along fence line/forest edge are desirable on roadsides for brush control and erosion protection.
 - o Concerns about animal visibility could require control of as much as 50% of the roadside depth of sumac or in specific areas such as corners with wildlife sightline concerns.
 - Control in these areas will be a regular on-going operation
- Biology relating to control and spread
 - o Perennial species with extensive, spreading root system
 - o Forms dense thickets due to suckering from roots
 - o Red, showy fruits that remain on stems over winter
 - o Cut stems break down and seal over within an hour after cutting
 - o Herbicide uptake best when flower bud present, also in winter
 - Application timing not as critical, since winter or spring applications can be effective
- Source of infestations as related to control
 - o Local, nearby infestations on same or neighbouring properties
Underground roots sending up new shoots from root suckers
 - o Capital projects
 - Important to provide input to limit locations of designed plantings of sumac
 - Use of alternative species such as grey dogwood.

Common reed grass (phragmites)

- Biology relating to control and spread
 - o Perennial, grass species with aggressive rhizomes/ stolons
 - o Flowers late in year from September on
 - o Prefers wet sites, but will grow in range of conditions including dry, gravel maintenance yards
 - o Almost impossible to physically remove plants and rhizomes
 - o Herbicide uptake at time of flowering or later. All foliage required for optimum herbicide uptake

- Mowing or cutting plants before treatment reduces foliar area and in turn reduces amount of herbicide plant takes up
- Source of infestations to be aware of as related to control
 - Movement of rhizomes/stolons and seed by road maintenance equipment (ditching equipment), road vehicles and recreational vehicles that drive through plants disturb the soil
 - Capital projects
 - Bringing in or movement of contaminated soil

Dog-strangling vine

- Biology relating to control and spread
 - Perennial plant propagated only by seed
 - One older publication indicates that dog-strangling vine has rhizomes but this is not true
 - Only reproduces by seed which is wind dispersed
 - Plant has a crown that produces multiple, viney stems each season
 - Important to remove isolated plants or groups of plants first which are easiest to control and will limit spread to new areas
 - Large infestations difficult to control due to dense growth that limits walking and seed bank; require 2 year program of control treatments with follow-up monitoring
- Source of infestations to be aware of as related to control
 - Local, nearby infestations on neighbouring properties especially on windward side due to wind dispersal of seed
 - Movement of seed by maintenance equipment, vehicles, recreational vehicles, and workers or visitors to site. Especially in wet or dewy conditions

Giant hogweed

- Biology relating to control and spread
 - Short-live perennial, dies the year that it flowers
 - Has a crown and a deep tap-root
 - Spread by seed only, but 98% of seed germinates in the first year
 - Seed wind or water dispersed a short distance of about 10 m but will float longer distances in water
- Source of infestations to be aware of as related to control
 - Local, nearby infestations on neighbouring properties up to 10 m away from fence line
 - Due to water dispersal of seed, look for locations around water bodies
 - Soil movement due to ditching, cultivation, and capital projects

- Movement of seed by maintenance equipment, vehicles, recreational vehicles, and workers or visitors to site. Especially in wet or dewy conditions
- Important to remove isolated plants or groups of plants first which will reduce further spread.
- Concentrate on high-priority areas such as popular natural areas, area along water ways or areas at sides of trails where people may come into contact with plants

Vegetation Control Operations

PPE concerns

For any work in poisonous weeds use of personal protective equipment (PPE) to prevent skin exposure is important for staff, contractors, volunteers and any public working on their properties.

The Ontario Invasive Plant Council's (OIPC) "Wild Parsnip Best Management Practices in Ontario" contains a detailed guide of safety gear, proper use and removal procedure and clean-up in case of accidental exposure.

[http://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/OIPC BMP WildParsnip Feb182014 FINAL2.pdf](http://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/OIPC_BMP_WildParsnip_Feb182014_FINAL2.pdf)

Pattern of Operations and Equipment Cleaning with Invasive Weeds

Organization of operations along with equipment cleaning is essential for wild parsnip and common reed grass (Phragmites) control and will assist in poison-ivy control. Both these minimize equipment movement of seed or other plants parts to new areas.

Mechanical operations such as mowing and ditching must be done during the appropriate times from least infested sites to more heavily infested sites where any invasive weed species are located.

- This will minimize equipment and people movement of seed and rhizomes of invasive and poisonous plants such as wild parsnip, common reed grass (phragmites) and poison ivy.
- Use county map of weeds audits to determine operations priority on an annual basis.
- In general, work will proceed from the northwest of the County to the southwest.

- A wild parsnip audit was completed in 2015 prior to 2015 and 2016 work (Appendix 5) and should be completed as part of monitoring prior to work each year

Equipment cleaning should be required for all mechanical operations coming in contact with weedy vegetation, including mowing and ditching.

- Highly recommend that equipment cleaning be compulsory for all County staff and a contract requirement for all contract staff.
 - o At minimum provide Ontario Invasive Plant Council's (OIPC) "Clean Equipment Protocol for Industry" as part of all contracts and work protocols http://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/Clean-Equipment-Protocol_June2016_D3_WEB-1.pdf
 - o Highly recommend to hold yearly, compulsory, training sessions for any operators doing work mowing or ditching work or hand application for County.
 - o OIPC will put on training sessions for a cost

Herbicide Choice and Rotation

For optimum results, it is important to match herbicide used to the weed/brush species being controlled. Post treatment monitoring will indicate whether control was effective.

Rotation of herbicides used is important to preventing resistance from building up.

- Products with combinations of two herbicides will help in delaying resistance.
- Rotate to herbicides with different families of chemicals or change to a different method of control every few years to control any herbicide resistant plants that are present
-

Control in Areas with Public Access

Herbicide use is limited in these areas so control must be focused on mechanical and cultural methods including use of competitive vegetation.

Options for Control of Specific Weeds

Control of Site Line (Tall) Weeds and Noxious Weeds

- Annual and biennial weeds, perennial weeds and brush species (see below)

Mechanical/manual control

- Mowing or manual cutting
 - Regular mowing or cutting can reduce the height of vegetation in the safety clear zone. It will not control many biennial and perennial species so these will regrow, but it will maintain a safe height for safe road operations if done regularly.

Herbicide control

- Spot applications of post-emergence selective products to control emerged weeds and retain the grasses. Spot applications should be used to target and reduce herbicide application where competitive species are present.
 - Can be done with vehicle mounted sprayer, turning spray on and off
 - Can also be done with hose and hand-gun from a vehicle or with back-pack sprayers. Hose and hand-gun or back-pack applications are suitable for control of individual weeds or groups of weeds within desirable/competitive vegetation or within sensitive sites.

Combination programs

- Mowing followed by herbicide application once weeds have regrown to proper stage for effective herbicide control.
- Combinations of herbicide treatments to control a wider range of weed species.

Resistant vegetation communities

- Regularly mown, medium to high maintenance turf
 - Note that low maintenance, thin, un-mown turf is not competitive against weed invasion
 - Yearly fall fertilization is an option to thicken turf
 - Over-seeding with MTO mix is an option for thin areas (Appendix 7)
- Planted species that will survive in gravelly areas adjacent to roadsides
- Planted species beyond ditch line – bird's-foot trefoil, crown vetch, native competitive species (Appendix 7 and 8)
- Naturally occurring, competitive species.

Natural vegetation has grown beyond ditch line where planting had not occurred. In many places, this results in natural competitive species occurring in monocultures and mixed plant communities. An initial list of suitable, competitive species has been provided in Appendix 4.

Knowing these competitive species is important for a number of reasons:

- Established stands of these competitive species can compete with adjacent weedy infestations
-
- Established stands can be encouraged to thrive and spread within the roadside
- When 5 m long or larger areas of these species are not infested with weeds of concern, roadside herbicide application or maintenance operations can easily avoid these stands as 'sensitive' areas (non-spray zones)
- Many of these species are suitable for planting or seeding.
- Suitability is based on their level of competitiveness against invading tree species, whether they readily establish by seeding/planting and/or their availability as seed/planting stock.

Control of Brush

Mechanical/manual control

- Mechanical mowing
 - Regular mowing of scattered brush can reduce the height of woody vegetation in the safety clear zone. It will not control woody species, but it will maintain a safe height for safe road operations. Low mowing less than 5 cm will kill conifers.
 - Mechanical mowing when brush becomes very dense does not control the trees, since there will be vigorous regrowth the following year.
- Manual cutting of trees will reduce the stand but there will be vigorous regrowth the following year.

Herbicide control

- Spot applications of foliar post-emergence products will control brush during the growing season.
 - Can be done with hose and hand-gun from a vehicle or with backpack sprayers. Spot applications are suitable for control of

- individual or small groups of woody weeds within desirable/ competitive vegetation or within sensitive sites.
- Basal bark stem applications of herbicides will control individual trees at any time of the year. This application uses less herbicide than foliar herbicide applications and results in less brown-out.

Combination programs

- Mechanical mowing or cutting of brush followed by herbicide cut-stem applications (cut-surface applications) or foliar applications in subsequent years will kill and prevent regrowth of brush
- Depending on herbicide, application may need to be done immediately after cutting.
- It is more efficient to do a cut-surface application at the time of cutting
 - only one contract visit to the site is needed
 - the location of cut stumps is known to the contractor doing the work

Resistant vegetation communities

- Planted species or naturally occurring species beyond ditch line will reduce the invasion of trees
- It is important to observe what local species have the impact of reducing problem weeds and brush and to add them to the list of compatible vegetation. For example, in Figure 1, the thick cover of red raspberry effectively reduced the red maple seedling establishment on this site
- Competitive species include bird's-foot trefoil, crown vetch, specific aster and goldenrod species, dense low tree/shrub species and other native competitive species (Appendix 4)
- Native herbaceous (Figure 2) and short tree and shrub woody communities that provide thick cover and dense shade, shading out wild parsnip seedlings and promote herbivory of woody plants due to dense protective cover for rodents (Niering and Egler 1955, Bramble et al. 1990)
 - Goldenrods and aster species have allelopathic qualities that reduce tree establishment by seeds (due to chemicals left by plant debris) (Brown 1967, Horsley 1977) as well as aggressively competing with and shading out tree seedlings (Figure 2)
 - Physically selective control of any invading trees in these native zones will need to be carried out to limit injury to the planted or naturally occurring competitive species
 - Spot applications (foliar, basal bark or cut stem treatments).
 - Foliar treatments can be with back-packs or HTV/truck mounted sprayers with hose and hand-gun



Figure 1. Stand of red raspberry on right reducing infestation of red maple that has seeded in on a highway in central Ontario.



Figure 2. Zone of allelopathic flat-topped aster and goldenrod species under a power line on a roadside in Ontario

Control of Weeds Affecting Roadside Barriers and Other Structures

Mechanical/manual control

- Mechanical and manual mowing
 - Regular cutting or mowing can reduce the height of vegetation around structures. It will not control many biennial and perennial species, but if done regularly, it can maintain a safe height for operations.
- Mechanical removal from ditches
 - Mechanical removal of plants and debris limiting water flow in roadside ditches (ditching) is carried to remove dense or tall plants and other material

Herbicide control

- Spot applications of foliar post-emergence products with residual control will provide season-long control around structures and in maintenance yards.
 - If products are used with no residual control, repeated applications will be needed during the year.

Control of Wild Parsnip

Mechanical/manual control

- Does not control wild parsnip seed in soil
- Cleaning of equipment critical between sites to reduce movement of seed
 - Mow from less densely infested to more densely infested areas
 - Need to clean toxic plant juices from equipment to protect workers
- PPE important for worker protection from toxic plant juices
- Mowing Wild Parsnip to Prevent Seed Production
 - Wild parsnip plants die after flowering, so mowing flowering plants is not necessary to control the plants
 - To prevent seed set, it is necessary to mow after each cluster (umbel) has flowered but before seed set
 - Timing one or two mowing operations per season is extremely difficult, especially with contract mowing of many roads
 - Wild parsnip plants have variable flowering times starting late May, peaks in July and August in Lanark County area, continuing to late summer
 - Within each plant, flowering of different umbels varies over 10 to 14 days

- In addition, seeds are shed on primary umbels up to a month before tertiary umbels, so some umbels will have seeds when others are starting to flower
- If mown too early the plant just re-flowers
- If mown too late, the operation ends up spreading seed and spreading the infestation
- Regular weekly or bi-monthly mowing of turf will prevent flowering and seeding
 - Only suitable for turf
 - Mowing is not suitable for sites with established herbaceous and woody short tree/shrub species, since mowing decreases the competitive ability of these companion species or even kills them
- Mowing to Control Wild Parsnip
 - Low mowing of wild parsnip is only suitable for smooth sites, with turf cover
 - Mowing must be low enough to cut the rosettes
 - Not suitable for sites with established herbaceous and woody short tree/shrub species
 - During this period, wild parsnip will be present in the turf, so still presents a safety concern for people in bare feet or sitting on the turf
 - Low mowing will starve existing wild parsnip plants over a multiple year period
 - Bi-monthly mowing will allow the wild parsnip to re-grow leaves, using up stored reserves
 - Mowing then removes this new growth before the leaves mature and produce new reserves as well as preventing flowering
 - Forces the plants to re-grow new leaves, eventually starving the plants
 - After a period of months or years, the plants will die
 - Low mowing has been observed to kill wild parsnip seedlings, thus preventing new infestations
 - Low mowing of new seedlings below the cotyledons will kill the seedlings, but could be as low as 2 cm
 - Effective seedling control would require at least 2 years of mowing, since 80% of wild parsnip seed emerges in first year and 20% in second year.
 - Higher mowing does not control seedlings, disperses wild parsnip seed and has been reported to increase plant flowering in emerged plants and plant numbers the following year

- Mowing is not suitable for sites with established herbaceous and woody short tree/shrub species, since mowing decreases the competitive ability of these companion species or even kills them as well as increasing the density of wild parsnip.
- Hand grubbing (using a spade for example) or mechanical cultivation are both very effective in killing established wild parsnip if root cut
- Hand pulling plants is very effective especially in wet or very dry soil conditions which makes the root easier to pull out
 - Black garbage bag mulching of pulled plants is important especially if seed present

Herbicide control

- Post-emergence product to control rosettes, preferable before flowering in last spring or fall
 - City of Quinte West doing fall treatment in 2016
 - Originally planned for September but moved to October (since not frost sensitive) (Scott Olan, OMECC, personal communication)
- Two consecutive years of herbicide application required to control seed bank and break cycle of re-infestation
 - The Counties of Stormont, Dundas and Glengarry found a program of two consecutive years of treatment followed by two years of mowing to be effective
- Ideal to combine (tank-mix with) with residual product to control new seedlings

Resistant vegetation communities

- Regularly mown, medium to high maintenance turf
 - Note that low maintenance, thin, un-mown turf is not competitive against wild parsnip
 - Use mowing, over seeding of thin areas and yearly fertilization to thicken up turf areas
- Crown vetch
- Native herbaceous and short tree and shrub woody communities that provide thick cover and dense shade, shading out wild parsnip seedlings
 - Goldenrods and aster species have allelopathic qualities that reduce wild parsnip seed establishment (due to chemicals left by plant debris) as well as aggressively competing with and shading out wild parsnip seedlings

- It is important to observe what local species have the impact of reducing problem weeds and brush and to add them to the list of compatible vegetation.

Public relations

- Signage of problem areas or include on trail information signs
 - Identification characteristics with photos
 - Steps to prevent movement of seed
- Scrubbing stations for vehicle/bicycle/shoe cleaning

Control of Common Reed Grass (phragmites)

Mechanical/manual control

- Mowing or cutting is effective if done at least 4 to 5 times per year
 - Clean of equipment critical between sites
- Physical removal of root/rhizome not effective.
- Movement of contaminated soil is a serious issue.

Herbicide control

- Foliar herbicide application using effective herbicides to plants that have started to flower is most effective
 - Narrow window from September until frost.
- Cutting before herbicide reduces amount of foliage and thus amount of herbicide taken up.
 - If cut, let plants regrow to full height before treating

Replant with resistant vegetation communities

- Using transplants for fast establishment
- Re-vegetation as soon as possible after total control or to sections as controlled
- Plant communities suitable for wet areas
 - Native wet area herbaceous or low height woody communities that provide dense shade and aggressive growth
 - Goal would be competitive wet area species such as joe-pye weed, wet area asters and goldenrods (all suitable for seeding), meadowsweet spirea, steeple bush spirea (Appendix 4)
 - Regularly mown, medium to high maintenance turf
 - Solid bird's-foot trefoil, tall fescue along wet areas (both suitable for seeding)

Control of Poison Ivy

Mechanical/manual control

- Repeated cultivation provides effective control since poison-ivy does not readily establish from stem fragments

Herbicide control

- Foliar herbicides at appropriate time of year to fully emerged leaves, preferably before flowering
- Combined with residual product to control new seedlings.

Replant with resistant vegetation communities

- As with wild parsnip, replant with communities that prevent poison ivy establishment from seed

Public Relations

- Signage of problem areas or include on trail information signs
 - Identification with photos
 - Steps to prevent movement of seed
- Scrubbing stations for vehicle/ bicycle/shoe cleaning

Control of Sumac

Mechanical/manual control

- Mowing or brush mowing or hand cutting
 - Mowing will reduce height, but large root remains and plants will regrow and branch to produce thicker, denser stands
 - Needs to be repeated 2-3 times per year

Herbicide control

- Foliar systemic herbicides applied in late summer or fall, once flower buds have formed are most effective since translocation will kill whole plant even if part treated
 - Treatment at any time of year provides good control

- If less than a quarter of the plant is treated, then only part of the plant will be controlled.

Combination treatments

- Brush cutting followed by stem herbicide treatments within 7 days (oil carrier) or ideally within an hour only control the part of the sumac plant that was cut, but rest of plant remains viable.
- Example of Garlon cut-surface control – 3 to 5 years of control then seedlings or rhizomes moved back in, but plants never grew back to original size.
- Possibility of Wet-Blade technology to equipment-accessible sites. This equipment makes application of herbicide at time of cutting by wiping on stems in one pass.

Cultural Control

- Provide information on alternative species to plant instead of sumac for designers choosing plant material for Capital contracts or other developments
 - Other shrubs or low tree species (See Appendix 4)

Control of Dog-strangling Vine

Mechanical/manual control

- Mechanical equipment nor manual control do not control dog-strangling vine seed in soil; follow-up monitoring required
- Cleaning of equipment is critical between sites to reduce movement of seed
 - Mow from less densely infested to more densely infested areas
 -
- Mowing
 - Single mowing will not kill dog-strangling vine plants
 - Mowing at least 2 times per season will keep viney growth down to allow access to areas and control new seedlings.
 - In order to kill plants, mowing would need to be repeated on whole area at least 4 times per year for a number of years
 - Mowing is not suitable for sites with established herbaceous and woody short tree/shrub species, since mowing decreases the competitive ability of these companion species or even kills them
- Hand pulling stems can control small stands with repeated pulling over a number of years
- Clipping to remove seed pods before dispersal eliminates seed production

- Hand digging of crowns is very effective in killing established dog-strangling vine if all of each crown is removed
 - Black garbage bag mulching of pulled or cut plants is important especially if seed present

Herbicide control

- Post-emergence herbicide program is required to control plants
- Two consecutive years of herbicide application required to control all emerged plants on medium dense and densely covered sites
 - In very heavy stands, a second application in first year will kill plants shaded from spray in first application
 - Application the second year is required to control escapes and new seedlings
- Follow-up monitoring and control necessary to control any new seedlings
- Identifying sources of wind-blown seed and control of these other areas is critical for permanent dog-strangling vine control.

Control of Giant Hogweed

Mechanical/manual control

- Mechanical control is not recommended due to the risk of sap on the equipment, risk to workers and movement of seed on equipment
- Hand digging (using a spade for example) is very effective in killing first or second year giant hogweed plants
 - Best to carry out and most effective when done early in spring when foliage is small
 - Critical to remove all the crown and entire tap root or plants will re-grow
 - Only effective with young plants since tap root up to 1 m deep in older plants
- PPE important for worker protection from toxic plant juices especially considering plant height

Herbicide control

- Post-emergence herbicide program to control established plants
 - Foliar application once leaves are full size in late spring/early summer
 - Follow-up application later in season and in subsequent years to control escapes and new seedlings
- Follow-up monitoring and control necessary to control any new seedlings

- PPE important for worker protection from toxic plant juices especially considering plant height



Figure 3. Giant hogweed growing along a trail in central Ontario. The establishment of new plants along the trail as a result of seed dispersal is evident in the photo.

Herbicide Information

- Publication 75 Guide to Weed Control
- Produced by OMAFRA
 - <http://www.omafra.gov.on.ca/english/crops/pub75/pub75ch18.pdf>
 - Registered herbicide and control recommendations for roadside vegetation management
 - Sections on wild parsnip, poison ivy and other poisonous and invasive weeds
 - effectiveness of rating of herbicides of weed species and brush species
 - Updated every two years

Decision Trees for Primary Weeds of Concern

Wild Parsnip Decision Tree					
Limits of Location	Infestation	Vegetation Goal	Method	Issues	Effectiveness and follow-up
Any area or No spray zone due to homeowner or environmental sensitivity	Less than 50 plants	Turf with accessible wild parsnip*	Low mowing at least 4 times per year, bi-monthly preferable	Homeowner or contractor – cleaning of equipment for safety and spread	Good to poor* Repeat required at least 1 to 3 years for rosettes and new seedlings
Any area or No spray zone due to homeowner or environmental sensitivity	Less than 50 plants	Herbaceous species or shrubs	Spudding or hand pulling*	PPE and disposal of poisonous plants	Excellent Repeat required at least 1 year to missed rosettes and new seedlings
Any area that is flat and accessible for mowing equipment, 3:1 slope or flatter	Patches or solid zones of infestation	Turf with accessible wild parsnip*	Low mowing at least 4 times per year, bi-monthly preferable	Contractor – cleaning of equipment for safety and spread	Good to poor* Repeat required at least 1 to 3 years for rosettes and new seedlings
Any area	Patches or solid zones of infestation	Turf, herbaceous species or shrubs	Targeted herbicide application, product with selectivity if possible	Re-vegetation of areas where majority of plants injured	Excellent Repeat required at least 1 year to missed rosettes and new seedlings.
Area suitable for re-seeding	Any size of infestation	Turf, tall herbaceous species, shrubs	Glyphosate applications for spring/fall and following spring at pre-planting; cultivation	Establishment with plugs/ plants established site sooner. Seedling less expensive.	Excellent As indicated, repeat herbicide application required at least 1 year to missed rosettes and new seedlings.

*Field observations have found that mowing sites with established herbaceous and woody shrub species decreases competitive ability of companion species and increases density of flowering wild parsnip stems. Poorly timed mowing can increase the number of wild parsnip the following year.

Poison Ivy Decision Tree					
Limits of Location	Infestation	Vegetation Goal	Method	Issues	Effectiveness and follow-up
No spray zone due to homeowner or environmental sensitivity	Less than 20 plants	Herbaceous species or shrubs	Hand cutting	PPE, poisonous sap on equipment and disposal of poisonous plant material	Suppression Repeat required yearly until infestation controlled
Any area	Patches or solid zones of infestation	Herbaceous species or shrubs	Targeted herbicide application, product with selectivity if possible.	Pre-emergence control as part of product to prevent seeding-in	Good to excellent Repeat required yearly to get misses and new seedlings

Glyphosate is less effect in fall. Truivist provides foliar control as well as pre-emergence control to prevent selective control of new seedlings and is option for fall control in turf areas.

Sumac Decision Tree					
Limits of Location	Infestation	Vegetation Goal	Method	Issues	Effectiveness and follow-up
Any area or no spray zone due to homeowner or environmental sensitivity	Small patches	Turf with access	Mowing 2-3 times per year		Good - suppression Repeat yearly
Any area or No spray zone due to homeowner or environmental sensitivity	Small patches	Herbaceous species or shrubs	Manual cutting 2-3 times per year		Good - suppression Repeat yearly
Any area	Patches or solid zones of infestation	Turf with access	Low mowing 1 or 2 times per year- check with Murray		Good - suppression Repeat yearly
Any area	Patches or solid zones of infestation	Turf, herbaceous species or shrubs	Targeted herbicide application, product with selectivity if possible.		Excellent to suppression, depending on application Repeat every 2 nd to 3 rd year

Foliar spray less effective due to hairy foliage. Cut and treat to fresh cut stems most effective.

Common reed grass (phragmites) Decision Tree					
Limits of Location	Infestation	Vegetation Goal	Method	Issues	Effectiveness and follow-up
Any area or No spray zone due to homeowner or environmental sensitivity	Small patches	Turf with access	Low mowing 4-5 times per year		Good - suppression Repeat yearly
Any area or No spray zone due to homeowner or environmental sensitivity	Small patches	Herbaceous species or shrubs	Manual cutting 4-5 times per year		Good - suppression Repeat yearly
Any area	Patches or solid zones of infestation	Turf with access	Low mowing 4 times per year		Good - suppression Repeat yearly
Any area	Patches or solid zones of infestation	Turf, herbaceous species or shrubs	Targeted herbicide application in fall to un-cut plants	Re-vegetation of areas where majority of plants injured	Excellent to suppression, depending on application Repeat every 2 nd to 3 rd year

Re-vegetation with transplants is possible after total control. Goal to have competitive wet area species.

Legislation Specific to Weed Control Programs

Pesticide and Application Legislation

Federal Pest Control Products Act

- Deals with sale, storage, use, transportation and disposal of pesticides
- Registered pesticides have specific weeds listed
- Health Canada/ PMRA has a label search site
<http://pr-rp.hc-sc.gc.ca/lr-re/index-eng.php>

Provincial Pesticides Act and Ontario Regulation 63/09

- Applicators must have required licence
- Roadside herbicide control operations and recommendations require an Industrial Exterminators Licence including Public Works IPM Certification
- Public trail control operations require a Landscape Exterminators licence including applicable IPM certification (confirm with local OMECC representative based on site characteristics)
- Also determines posting requirements and worker training requirements
<https://www.ontario.ca/page/pesticide-licences-and-permits>
- IPM Reporting
 - OMECC requirement for each Property Operator
 - copies of herbicide usage on all properties on file by March 31 each year
 - to meet April deadline

Timing legislation

- Migratory Birds Convention Act limits herbicide application or maintenance work including cutting or mowing in areas frequented by migratory birds during nesting.
 - These areas should be marked as environmentally sensitive areas.

Buffer requirements

- Specific buffers are laid out on each herbicide label
 - Product and site specific
 - Relates to specific conditions such as location of water bodies, soil type or sensitive vegetation
- Avoid specific designated protected areas and wetlands

Noxious weed legislation

- Control of noxious weeds is required in areas affecting agricultural (including horticultural) operations
- There are currently 25 weeds considered noxious in Ontario. These include wild parsnip and poison ivy
 - o Listed on OMAFRA Noxious Weed site
http://www.omafra.gov.on.ca/english/crops/facts/noxious_weeds.htm

Seeding/Re-vegetation of Disturbed Areas

Both low maintenance turf and legume communities such as crown vetch or bird's-foot trefoil can be seeded in. Other seed mixes can be used to establish native herbaceous or low height woody communities.

The type of seed selected for planting will depend on the property use adjacent to the road (farm, residential, rural homes or forested).

In low maintenance sites such as road sides, unmaintained zones around facilities and along trails, seeding will not replace the natural regenerating vegetation, but will mix in with natural regeneration to provide the desired character. Even when seeding turf or legumes, there will be naturalized species mixed in to the final vegetation.

Seeding with Competitive Species that Reduce Weed and Tree Infestation

- Options for establishment that may be quicker than natural regeneration
 - o Seeding/planting with natural regeneration
 - enriching the natural site so that new vegetation will dominate.
- A sample seed native aster goldenrod Old Field seed mix has been included (Appendix 8) (Cain 1997). A similar mix is found in MTO OPSS 804 specifications with incorrect seeding rate.
 - o use of native aster and goldenrod species that establish easily from seed
 - o longer establishment period compared to improved turf species
 - erosion mats or other products maintain site and provide cover
 - low rates of short-lived, clumping nurse grasses such as perennial ryegrass give way to perennials once they establish
 - o nurse grasses provide early competitive advantage against annual and biennial weeds and provide early cover

Re-seeding of Road Side Turf Following Road Construction or Disturbance

- MTO seeding turf seed mixes and the standard seeding specification (OPSS 804) have been provided in Appendix 7

- these mixes promote rapid grass establishment using improved turf species
 - these are vigorous species compared to native species and have been improved by breeding and selection for various qualities
- these mixes use fast germinating nurse grasses to provide early competitive advantage and early cover
- MTO standard seeding mix which has been used in Lanark produces a fine fescue mixed stand for drier areas with a finer turf texture

Public Education and Information

Public and Internal Communications Program

Regular communications

- Internal update regularly on operations with all operations staff
 - Mechanical control and other staff need to be part of the program
 - Safety concerns
 - Value of equipment cleaning
 - Methods of equipment cleaning, suggest yearly training by OIPC group
 - Working from least infested to most infested areas
- Making sure these staff and any staff who area dealing with the public are up-to-date on all aspects of the control project
- Possible location on web-site
 - Suggestion of weekly or bi-monthly reminders of current growth stage of wild parsnip, common reed grass (phragmites), poison ivy with sample photos
 - During herbicide application regular updates on progress
 - Recommended by Scott Olan, OMECC
 - Update of herbicide program progress used in 2016 was excellent
 - Update as often as is convenient, but the more often, the better

Herbicide posting

- Newspaper
- Possibility of signs in special locations
 - public use areas
 - areas with heavy concerns
 - near schools
- Provide supporting information on website (already being done)

- Recommended to continue to update public as often as realistic on current locations of control work.

Public educations programs

- Information that would assist landowners in wild parsnip or poison ivy control or prevention on their roadside sites and properties
 - Currently found on Lanark County health site and OIPC site
 - Put direct links to the control pages on these sites
 - PDF of OICP Best Management Practices for Wild parsnip, and possibly Phragmites
 - Any other sites
- Reporting site
 - For people to report locations of wild parsnip
 - example on City of Ottawa site, form to fill out
 - Possibly use of Early Detection and Distribution Mapping System (EDDMapS) which is an Ontario site run by Federation of Anglers and Hunters, provincially supported
 - Phone app for reporting
- Meetings
 - Have a regular yearly meeting on Wild Parsnip Program
 - Timing prior to herbicide application program
 - Update on progress of control operations
 - Progress of control
 - Plans for current season
 - Have new topics to do with wild parsnip
 - Involve the community in wild parsnip program
 - Control on their properties; methods of control
 - Reporting new stands
 - Other aspects
 - Focus on how to control wild parsnip on their own properties
 - Preventing Weed Spread
 - Promotion of alternative method operations
 - Emphasizing PPE
 - Presentation on Lanark County Adopt a Road Noxious Weed trial results
 - Results of mowing and digging trial
 - Suggest one year - have a presentation on specific herbicide uptake by plants, volatility & breakdown.
 - Agricultural meetings
 - Communicate with the local weed inspector and Agricultural researchers and outreach staff to make presentations about or write articles or promote somehow to farmers about the importance and how to control wild parsnip.

- Especially control on non-crop areas around farms to help limit its spread and establishment.

Brochures or publications

- Have PDF's available online and at information desks
 - Direct links online
 - Fact sheets, colour brochures
 - Include OIPC publications

Web based information

- easily accessible with biological, control and useful health and safety information
- Focus on poisonous nature and control methods in public areas
- Preventing Weed Spread
- Promotion of alternative control methods
- Information with links to multiple sources
 - Leeds, Grenville and Lanark health unit – have a direct link to their wild parsnip page
 - OIPC – Best Management Practices for many invasive weeds
 - OMAFRA weed pages
 - Possibly other community wild parsnip pages

Required Reporting to Council and OMECC

OMECC IPM reporting

- Annual report required on herbicide used in the county
- Copy of report kept in County

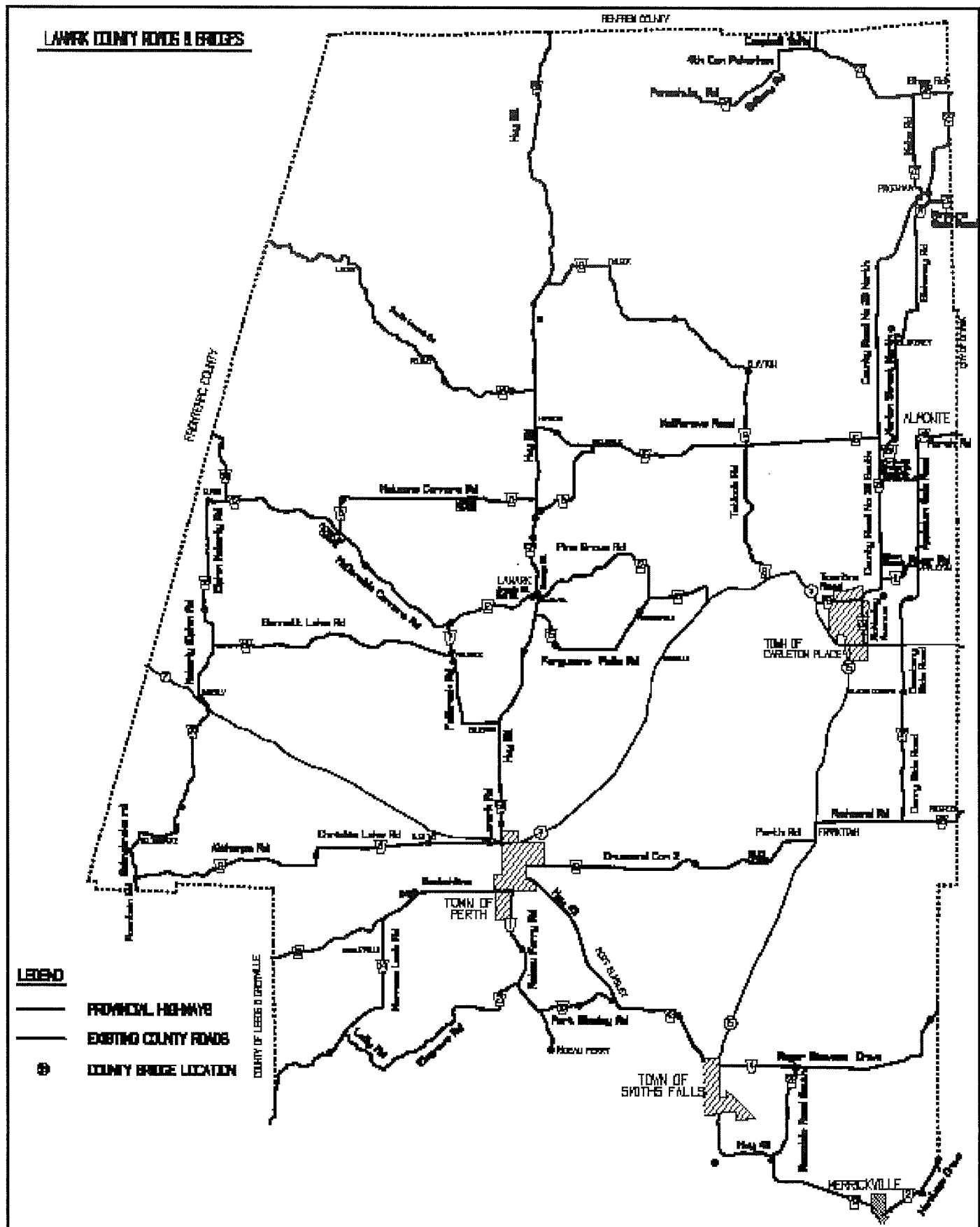
Council reporting

- Suggest quality control wild parsnip/other weed monitoring be done to have information on the progress of control programs
 - Areas treated
 - Control results of treatments
- Ideally post-season/pre-season tool for revision of wild parsnip/other weed control plans for subsequent growing season

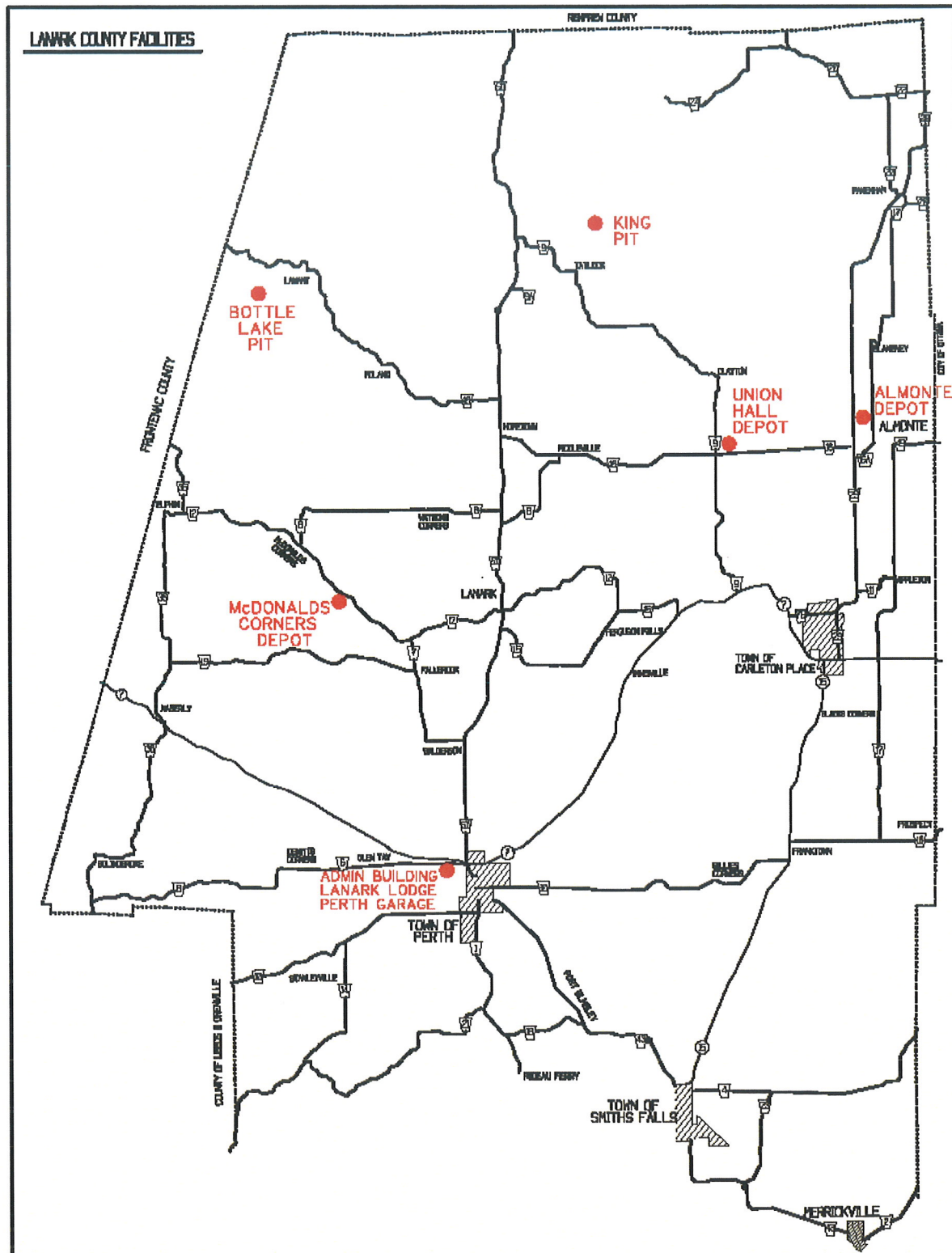
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APPENDIX 1. Lanark County Road System



APPENDIX 2. Lanark County Facilities



This map of Perth County, Ontario, displays its geographical features and administrative boundaries. Major roads are shown as solid lines with route numbers, while trails are indicated by dashed lines. Towns and municipalities are labeled throughout the county. The map also shows the locations of the Glen Tay to Havelock Trail, Tay River Pathway, and Ottawa Valley Recreational Trail. The county is bordered by Frontenac County to the north, Algonquin to the east, and the County of Leeds & Grenville to the south and west.

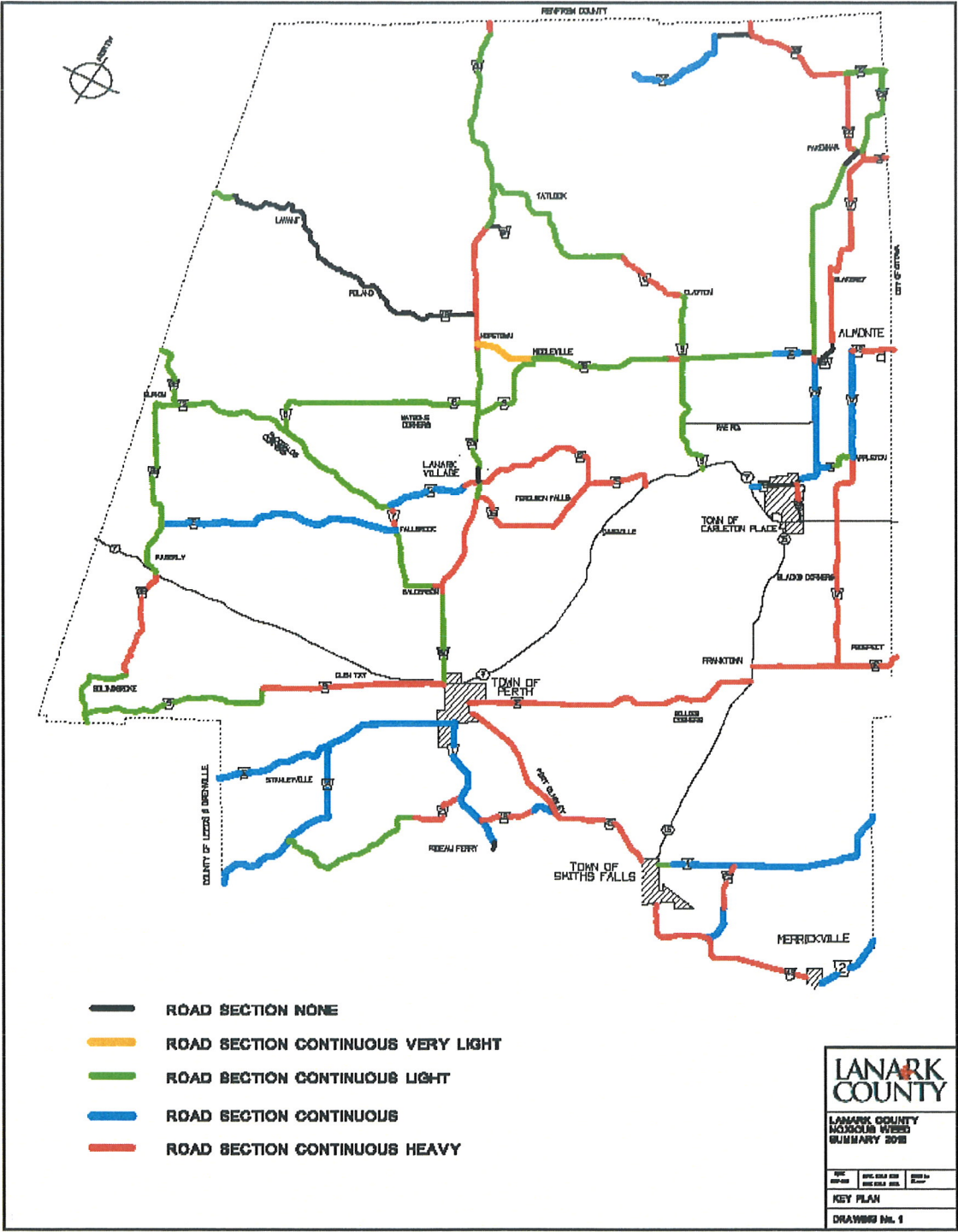
Appendix 4 Suitable plant species for roadside naturalization or planting

Revised – June 16, 2017

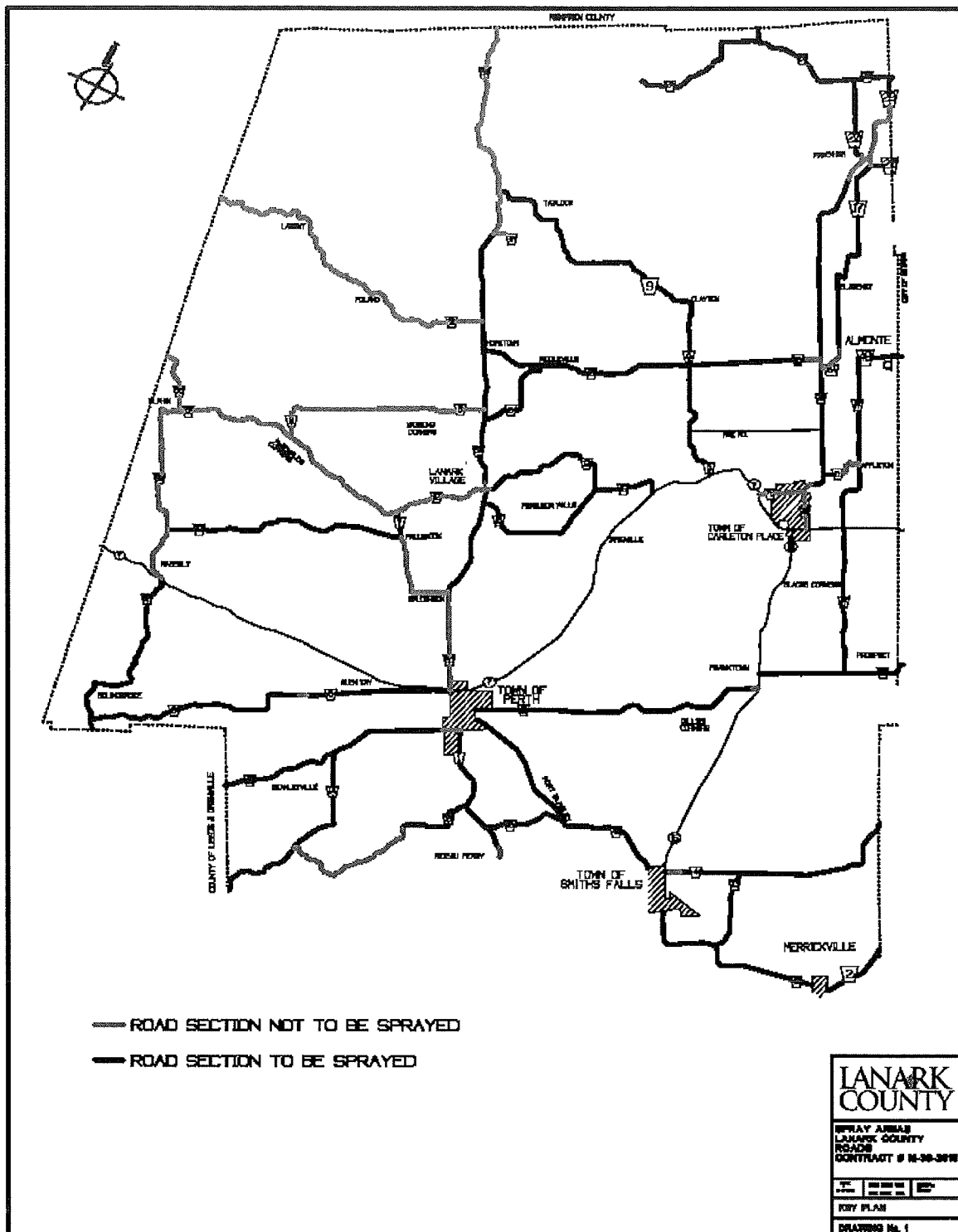
Pollinator Friendly	Common Name	Scientific Name	Pollinators Attracted
Suitable shrub and short tree species for clear zones, with mature height <0.6 m			
	bearberry	<i>Arctostaphylos uva-ursi</i>	
	bunchberry	<i>Cornus canadensis</i>	
	creeping or trailing juniper	<i>Juniperus horizontalis</i>	
	twinner	<i>Linnaea borealis</i>	
	partridgeberry	<i>Mitchella repens</i>	
	dwarf raspberry	<i>Rubus pubescens</i>	
	lowbush blueberry	<i>Vaccinium angustifolium</i>	
Suitable shrub and short tree species for wild life clear zones, with mature height 0.6 to 1.2 m			
✓	bristly sarsaparilla	<i>Aralia hispida</i>	Bees, moths
	serviceberry, juneberry	<i>Amelanchier humilis</i>	
	shadbush, serviceberry	<i>Amelanchier sanguinea</i>	
	New Jersey tea	<i>Ceanothus americanus</i>	
	narrow-leaved New Jersey tea	<i>Ceanothus herbaceus</i>	
	leatherleaf	<i>Chamaedaphne calyculata</i>	
	sweet-fern	<i>Comptonia peregrina</i>	
	bush honeysuckle	<i>Diervilla lonicera</i>	
	black huckleberry	<i>Gaylussacia baccata</i>	
	ground juniper	<i>Juniperus communis</i>	
	sheep laurel	<i>Kalmia angustifolia</i>	
	Virginia creeper	<i>Parthenocissus vitacea</i>	
	shrubby cinquefoil	<i>Potentilla fruticosa</i>	
	wild black currant	<i>Ribes americana</i>	
	prickly currant	<i>Ribes cynosbati</i>	
	wild currant	<i>Ribes hirtellum</i>	
✓ ✓ ✓	prickly wild rose	<i>Rosa acicularis</i>	Butterflies Bees Bees
	northern dewberry	<i>Rubus flagellaris</i>	
	swamp dewberry	<i>Rubus hispidus</i>	
	steeplebush	<i>Spirea tomentosa</i>	
	snowberry	<i>Symphoricarpus alba</i>	
	cranberry	<i>Vaccinium macrocarpon</i>	
	deerberry	<i>Vaccinium stamineum</i>	
	summer grape	<i>Vitis aestivalis</i>	
	fox grape	<i>Vitis labrusca</i>	
	frost grape	<i>Vitis riparia</i>	

Suitable herbaceous species for clear zones, with mature height <0.6 m			
✓ ✓	pearly everlasting	<i>Anaphalis margaritacea</i>	
	field pussytoes	<i>Antennaria neglecta</i>	
	wild strawberry	<i>Fragaria virginiana</i>	Bees, Flies
	gray goldenrod	<i>Solidago nemoralis</i>	Butterflies, Bees
Suitable competitive herbaceous species for wild life clear zones, with normal height from 0.6 to 1.5 m. (Height range indicated - normal height less than maximum); suitable for seeding			
✓	yarrow (naturalized) (0.3-0.7 m)	<i>Achillea millefolium</i>	Butterflies
✓	purple-stemmed aster (0.4-1.7 m)	<i>Aster puniceus</i>	Butterflies, Bees
	panicked aster (0.3-1.5 m)	<i>Aster lanceolatus</i>	
	flat-topped aster (0.3-2.0 m)	<i>Aster umbellatus</i>	
✓	wild bergamot (0.6 to 1.2 m)	<i>Monarda fistulosa</i>	Butterflies, Hummingbirds, Bees, Wasps
✓	black-eyed Susan (0.3 to 1.2 m)	<i>Rudbeckia hirta</i>	Bees, Butterflies, Beetles, Wasps
✓	Canada goldenrod (0.3-1.5 m)	<i>Solidago canadensis</i>	Butterflies, Bees
	grass-leaved goldenrod (0.6 to 1.2 m)	<i>Solidago graminifolia</i>	
	rough-stemmed goldenrod (0.3-1.6 m)	<i>Solidago rugosa</i>	

APPENDIX 5. Audit of Lanark County wild parsnip infestations May 4, 2015



APPENDIX 6. Lanark County wild parsnip treatment plan 2016



APPENDIX 7. OPSS 804 2014. MTO Seeding Specification (attached);

Standard Roadside Mix

<i>MTO Standard Roadside Grass Seed Mixture</i>	Percentage Composition
Creeping Red Fescue: <i>Festuca rubra</i>	52%
Kentucky Bluegrass: <i>Poa pratensis</i>	10%
Perennial Ryegrass: <i>Lolium perenne</i>	35%
White Clover: <i>Trifolium repens</i>	3%
Permanent Species Seeding Rate (kg/ha)	170
<i>Nurse Grasses</i>	
Fall Rye Grain or Winter Wheat Grain	60
Nurse Grass Seeding Rate (kg/ha)	60

APPENDIX 8. Old Field Seeding Mix

<i>Old Field Species</i>	Percentage Composition
Flat-topped Aster: <i>Aster umbellatus</i>	37%
New England Aster: <i>Aster novae-angliae</i>	15%
Purple-stemmed Aster: <i>Aster puniceus</i>	15%
Canada Goldenrod: <i>Solidago canadensis</i>	12%
Panicled Aster: <i>Aster simplex/lanceolatus</i>	8%
Heath Aster: <i>Aster ericoides</i> or Frost Aster: <i>Aster pilosus</i>	5%
Grey-stemmed Goldenrod: <i>Solidago nemoralis</i>	5%
Grass-leaved Goldenrod: <i>Solidago graminifolia</i>	3%
Permanent Species Seeding Rate (kg/ha)	2.5
<i>Nurse Grasses (rate kg/ha)</i>	
annual ryegrass	25
oats	25
perennial ryegrass	15
Nurse Grass Seeding Rate (kg/ha)	65

APPENDIX 8A: Lanark County Custom Seed Mix
 Added June 16, 2017

Lanark Native Seed Mix

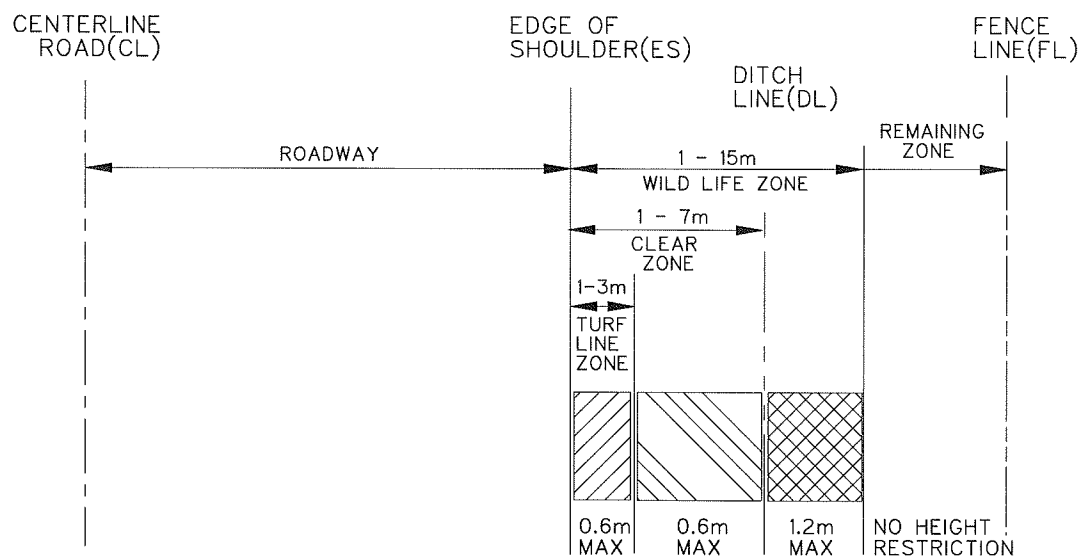
Native Species	(kg PLS per /10,000 sq.m)	Proportion of seed mix by wt. (%)
Black-eyed Suasn, <i>Rudbeckia hirta</i>	0.31	0.31
Common milkweed, <i>Asclepias syriaca</i>	2.42	2.42
Wild bergamot, <i>Monarda fistulosa</i>	0.41	0.41
Blue vervain, <i>Verbena hastata</i>	0.41	0.41
Bonset, <i>Eupatorium perfoliatum</i>	0.30	0.30
Flat-topped Aster: <i>Aster umbellatus</i>	0.90	0.90
New England Aster: <i>Aster novae-angliae</i>	0.49	0.49
Purple-stemmed Aster: <i>Aster puniceus</i>	0.50	0.50
Canada goldenrod: <i>Solidago canadensis</i>	0.50	0.50
Panicked Aster: <i>Aster simplex</i> or <i>A. lanceolatus</i>	0.30	0.30
Frost Aster or Heath Aster: <i>Aster pilosus</i> or <i>Aster ericoides</i>	0.22	0.22
Rough goldenrod, <i>Solidago rugosa</i>	0.12	0.12
Grass-leaved goldenrod: <i>Solidago graminifolia</i>	0.12	0.12
Total native species and perennial ryegrass	7 kg/10,000 sq. m.	100.0

Nurse grasses

Species	Seeding rate (kg/10,000 sq. m.)
<i>Avena sativa</i>	25
<i>Festuca ovina</i>	25
<i>Lolium multiflorum</i>	15
Total nurse grasses	65

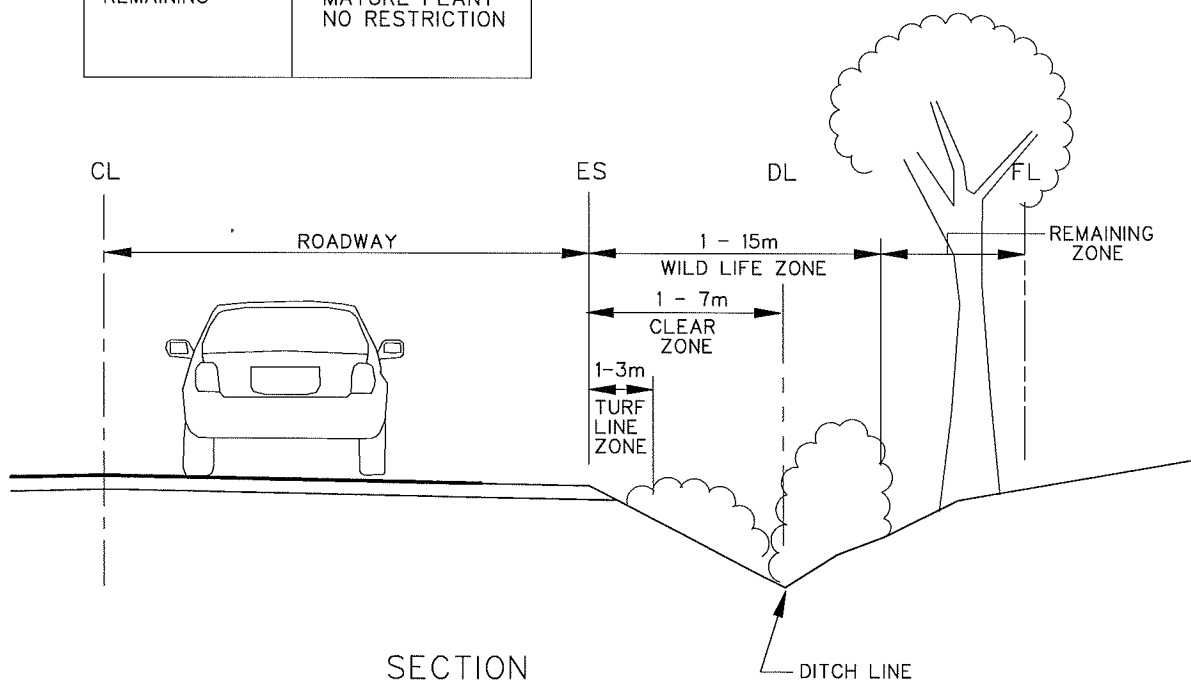
APPENDIX 9

ZONED ROADSIDE CROSS SECTION



PLAN

LINE ZONES	MATURE PLANT
TURF & CLEAR	HEIGHT LIMIT OF 0.6m
WILD LIFE	HEIGHT LIMIT OF 1.2m
REMAINING	MATURE PLANT NO RESTRICTION



SECTION