Vegetation Management Plan (VMP)

Littleton Electric Light & Water Departments

2024-2028

Submitted on December 20, 2023

Prepared By:

Little Electric Light & Water Departments
39 Ayer Road
Littleton, MA 01460
978-540-2253

&

Comprehensive Environmental Inc.
41 Main Street
Bolton, Massachusetts 01740
508-281-5160

Table of Contents

Title **Page No.**

Tables

Appendix

1.0 Statement of Goals and Objectives

This Vegetation Management Plan (VMP) is intended to establish criteria for the Littleton Electric Light & Water Departments (LELWD) to manage vegetation along municipal Rights-of-Way (ROW) in compliance with the Rights-of-Way Management Regulations (333 CMR 11.00) as promulgated by the Massachusetts Department of Agricultural Resources (MDAR). LELWD serves the Town of Littleton and Boxborough.

The primary objective of this VMP is to provide the public and the LELWD staff with safe and unobstructed ROWs while minimizing reliance upon herbicides. Vegetation maintenance is necessary along public ROWs such as roads, sidewalks, and trails, to control vegetation that may pose a public nuisance, result in safety hazards, or inhibit access or cause damage to structures and infrastructure. The LELWD has approximately 120 miles of infrastructure to manage and maintain.

The goal of the program is to manage undesirable vegetation while minimizing impacts to the environment. Only herbicides listed on the current MDAR ROW Sensitive Areas Materials List (https://www.mass.gov/service-details/rights-of-way-sensitive-area-materials-list) will be used.

Periodic monitoring and inspection will aid in the success of the VMP which is expected to:

- Manage target vegetation while ensuring the protection of sensitive areas and the environment.
- Reduce the amount of herbicides applied over time.
- Reduce the frequency of herbicide application.
- Ensure vegetation management activities are conducted in a safe and effective manner and in compliance with regulations.

This VMP will serve as technical guidance for individuals involved in ROW vegetation management and as an accessible source of information for residents and public officials.

2.0 Target Vegetation

Vegetation targeted will be species or plants that fall into the categories described below. The LELWD will submit a Yearly Operational Plan (YOP) for MDAR to approve and which will specify the herbicide(s) to be used, target species and application locations.

Hazard Vegetation

Vegetation considered to be a hazard includes plants or plant species that pose a risk to public safety or that impede movement along public ways. Hazard vegetation may: obscure sightlines and signs, be a fall hazard, and contribute to icy roads due to winter shading.

Noxious Vegetation

This category includes vegetation that could cause problems for the general public, employees or contractors. Generally, it includes poisonous plant species and those with thorns. Target vegetation in this category is primarily poison ivy within 10 feet of the edge of pavement.

Detrimental Vegetation

Detrimental vegetation applies to all vegetation that can destroy or compromise the function of infrastructure by growing in cracks along the roadway, pavement/bridge joints, medians/traffic islands, drainage structures/drainageways, trails and bike paths.

Invasive Vegetation

Invasive plants can aggressively colonize areas along ROWs, blocking site distances and compromising infrastructure. Many invasive plants, such as Japanese knotweed and *Phragmites*, are difficult to control using mechanical means alone. Mechanical methods can also result in spreading these plants to new locations. In addition, invasive plants pose a threat to biodiversity of naturalized areas. Herbicides are the most effective method of treatment for many invasive plants. Invasive plants can include those listed on the Massachusetts Prohibited Plant List located at https://www.mass.gov/service-details/massachusetts-prohibited-plant-list.These may include plants designated as likely or potentially invasive).

3.0 Vegetation Management Methods & Actions to Minimize Herbicides

The LELWD vegetation management program will include both non-chemical techniques and chemical application where necessary. Vegetation management may involve the following methods:

- Physical – street sweeping, sealing cracks, resurfacing (led and provided by the Town of Littleton and Town of Boxborough Department of Public Works).
- Mechanical – hand-cutting, mowing, selective trimming.
- Chemical – foliar herbicide treatments, cut-stem surface treatment.

The management methods selected will be chosen based on a variety of factors (including but not limited to efficacy of method, staff safety and site accessibility) and with the goal to achieve a long-term, vegetation management program.

Physical (led and provided by the Towns of Littleton and Boxborough Department of Public Works)

Physical management methods will rely primarily on pavement maintenance. Pavement maintenance will consist of sealing cracks and general ROW repairs including resurfacing and installing new sidewalks. This helps to eliminate weeds by preventing seeds from imbedding in pavement cracks. The towns also completes routine street sweeping. The build-up of sediment and other material can provide a medium for plant growth. Regular street sweeping helps eliminate this material from accumulating as a base for weed establishment.

Mechanical

Mechanical management methods may include hand-cutting, mowing, and/or selective trimming.

Hand-Cutting

Hand-cutting consists of the mechanical cutting of target species using chainsaws and brush saws. Target species are cut as close to the ground as practical. Hand-cutting is used to protect environmentally sensitive sites. It is also used on target vegetation greater than twelve feet in height. Hand-cutting is used on those restricted sites where terrain, site size, or environmental sensitivity renders mowing impossible or impractical. Hand-cutting may be practiced at any time during the year.

Mowing

Mowing consists of the mechanical cutting of target vegetation using push mowers, large rider mowers, rear deck mowers, brush mowers, brush cutters, pole-saws, edgers and line trimmers. Selection of specific equipment is based on terrain, target vegetation species, size and density of target vegetation area, and equipment availability. Mowing will be used in areas where terrain and target stem size permit safe and efficient use of the above machinery. Mowing will be the principal method for vegetation management along road shoulders and where herbicide use is prohibited. Mowing will be conducted seasonally when weather conditions allow.

Selective Trimming

Selective trimming consists of the mechanical pruning of encroaching limbs of tall trees that may block roadway, sidewalk, and trail and bike path access. Trimming

will be accomplished using aerial lifts via trucks or tractors, or by climbing crews if terrain or obstruction prevents equipment access.

Chemical

Chemical management may include foliar treatment and/or cut stem surface treatments. Selected chemicals are limited to those listed on the MDAR Rights-of-Way Sensitive Area Materials List.

Foliar Treatment

Foliar treatments involve the selective application of an herbicide, in accordance with manufacturers' directions, to the foliage. Several types of equipment for foliar treatments may be used. These could include: backpack sprayers, hand-held pump sprayers, or a motorized truck-mounted sprayer. Foliar treatments with backpack and hand-held pump sprayers are used on low-density target vegetation. No more than the minimum labeled rate of the herbicide for the site, plant targeted, and application method shall be applied. Motorized application equipment may be used for foliar treatment on areas where the vegetation density is high and the use of a backpack sprayer may not be as effective.

These foliar applications will take place when plants are in full leaf and actively growing, and in accordance with the product label. When used according to the label, foliar treatments are an effective and efficient method to manage the whole target plant. Managing the whole target plant reduces the potential of resprout from root and/or rhizome systems.

Cut-Stem Treatment

Cut-stem treatments consist of mechanical cutting of target species using chainsaws immediately followed by herbicide treatment applied with a squirt bottle, a hand-held pump sprayer, or painted on the freshly cut surface of the stump. Treatment will include spraying the root collar area, sides of the stump, and the outer portion of the cut surface, including the cambium, until thoroughly wet, but not to the point of runoff. Cut-stem application can be effective during the dormant period, however, it may not be effective during times of sap flow (i.e., maple and birches during the months of February through early April), as flowing sap will limit the herbicide from being absorbed into the stump down to the roots. All herbicides are to be applied to freshly cut stems to be effective.

Monitoring

All roadsides proposed for chemical management will be visually surveyed by the LELWD to determine the method of control prior to any scheduled treatment program. Monitoring will be conducted by the LELWD on foot and/or by vehicle. Monitoring of areas may result from requests from the public. All monitoring records will be maintained by the LELWD.

Record Keeping

A log of areas surveyed will be maintained by the LELWD for future planning and reference. Areas maintained either through physical repair, mechanical or chemical management will be recorded.

Management Tactics

The decision to use one or a combination of vegetation management techniques will depend on the site-specific situation. The management techniques selected will efficiently control target vegetation while keeping environmental impacts to a minimum.

4.0 Justification of Herbicide Use

As discussed in this VMP, physical and mechanical methods are sufficient to manage most plants that interfere with traffic, visibility and safety. However, chemical treatment is necessary where topography, access, growth and reproduction characteristics or concerns regarding worker safety limit the potential for management by physical or mechanical methods.

Chemical management is the preferred method or only method of management for plants that pose a health hazard for the technician in the field. For example, Poison Ivy, the primary noxious plant targeted, is extremely hazardous to handle and resprouts after cutting, making it difficult to achieve cost-effective management using mechanical methods. In addition, manual and mechanical management of the vine along roadsides can put worker safety at risk due to high-speed traffic. Moreover, because poison ivy climbs over stone walls, up tree trunks, and around guardrails/guiderails, make mechanical management impractical for safety and economic reasons.

Mowing will manage most herbaceous species. Herbicide applications, however, are used where mechanical management is not feasible due to location, stem density, and/or height. Although herbaceous species are more often a desirable vegetative cover along public ways, herbicide is used in areas where it is difficult and sometimes dangerous to remove by mechanical treatment methods, herbicide is used. These areas include, but are not limited to, cracks in asphalt, along guardrails/guiderails, paved traffic islands, sidewalks, and curbs. In these instances, herbaceous species are considered target vegetation.

Woody vegetation growing along the ROW that interfere with pedestrian or vehicle safety is managed by a variety of techniques. Pruning or ground cutting using hand tools or chainsaws is typically sufficient to manage large woody vegetation. Depending upon the species of plant removed and its proximity to other vegetation, these stumps may be treated with an herbicide to prevent resprouting.

Small woody plants that are growing along the road shoulder in an accessible location will usually be mowed along with the roadside grass. Woody plants that are growing over obstacles that would impede the mower or have a viney growth habit and are not practical to hand-cut or chip, or that grow very rapidly can be managed with foliar application of herbicides.

Finally, invasive plant management is usually required along ROWs for sight distances and to prevent destruction of infrastructure. Treatment can allow native, more stable vegetation to establish. Managing invasive plants via mechanical means can be ineffective and depending on the species, may encourage the spread of an existing population or inadvertently result in the introduction of a new population. In these situations, the use of an herbicide can be the most effective method of managing invasive plants. Working in conjunction with the Conservation Commission, the LELWD may treat invasive plants to encourage the growth of native species.

5.0 Identification of Sensitive Areas

Sensitive areas are defined within 333 CMR 11.00 as areas within ROWs in which public health and environmental concerns warrant special protection to further minimize risks of unreasonable adverse effects of herbicides. These include public groundwater sources, Class A public surface water sources, associated surface water bodies, tributaries, Class B drinking water intakes, private wells, state listed species habitat, wetlands, waters over wetlands, riverfront areas, certified vernal pools, inhabited areas and agricultural areas. Sensitive areas will be identified through the use of existing data and verified, in the field.

Sensitive Areas Basemap

There are several readily available sources of information that can be used to develop a draft sensitive areas basemap. These sources include:

- Massachusetts Department of Environmental Protection (MassDEP) Water Supply Maps (1:25,000).
- Aerial Photographs.
- MassDEP Wetlands Conservancy Maps (scale 1:1,000).
- Municipal maps and records including those from the Littleton and Boxborough Health Department to identify private water supplies.
- Regional Planning Agency maps and records.
- U.S. Fish and Wildlife Service National Wetlands Inventory Maps.
- Ortho Photo Information – MassDEP (1:5,000).
- Massachusetts Division of Fisheries and Wildlife Natural Heritage and Endangered Species Program (NHESP).
- Available MassGIS maps.

Identification of Sensitive Areas

With the sensitive areas basemap complete, the LELWD staff will identify and mark the proposed treatment zones on the basemap. LELWD staff will visually survey treatment zones in the field for any additional sensitive areas not already on the basemap. Sensitive areas identified in the field that are not already on the basemap will be added or adjusted as needed. Similarly, treatment zones located within sensitive areas will be adjusted according to the Sensitive Areas Restrictions listed in Table 1. An updated basemap will be developed, as needed.

Field Verification of Sensitive Areas

With the draft sensitive areas basemap complete, LELWD staff will deploy in advance of treatment crews to identify the treatment areas in the field. All treatment areas will be identified and marked on the sensitive areas' maps. Sensitive areas in the vicinity of the treatment areas will be confirmed during this field effort, if possible, and any additional sensitive areas identified in the field or corrections will be applied to the basemap. Treatment areas located within limited spray areas will be adjusted according to the Sensitive Areas Restrictions listed in Table 2.

Table 2. Sensitive Area Restrictions			
Sensitive Area	**No Spray Areas**	**Limited Spray Areas**	**Where Identified**
Wetlands and Water Over Wetlands	Within 10 feet (unless provisions of 333 CMR 11.04(4)(c) are followed)	10 – 100 feet; 12 months must elapse between applications; Selective low pressure, using foliar techniques or cut-stem applications	YOP Maps and identify on site
Certified Vernal Pool	Within 10 feet	10 feet to the outer boundary of any Certified Vernal Pool Habitat; 12 months must elapse between applications; Selective low pressure, using directed spray or cut-stem applications	YOP Maps and identify on site
Public Ground Water Supply	Within 400 feet (Zone I)	Zone II or IWPA (Interim Wellhead Protection Area which is the Primary Recharge Area); 24 months must elapse between applications; Selective chemical, using directed spray or cut-stem applications	YOP Maps
Public Surface Water Supply	Within 100 feet of any Class A public surface water source	100 feet to the outer boundary of the Zone A[1]; 24 months must elapse between applications; Selective chemical, using directed spray or cut-stem applications	YOP Maps
	Within 10 feet of any tributary or associated surface water body located outside of the Zone A	10 feet to the outer boundary of the Zone A[1]; 24 months must elapse between applications; Selective chemical, using directed spray or cut-stem applications	
	Within 100 feet of any tributary or associated surface water body located within the Zone A of a Class A public surface water source		
	Within a lateral distance of 100 feet for 400 feet upstream of any Class B Drinking Water Intake	Within a lateral distance of between 100 - 200 feet for 400 feet upstream of intake; 24 months must elapse between applications; Selective chemical, using directed spray or basal or cut-stem applications	

[1] Per 310 CMR 22.02 (a) the land area between the Surface Water Source and the upper boundary of the Bank; (b) the land area within a 400 foot lateral distance from the upper boundary of the Bank of a Class A Surface Water Source, as defined in 314 CMR 4.05(3)(a): Class A; and (c) the land area within a 200 foot lateral distance from the upper boundary of the Bank of a Tributary or associated Surface Water body.

Private Water Supply	Within 50 feet	50 – 100 feet; 24 months must elapse between applications; Selective chemical, using directed spray or cut-stem applications	YOP will list and identify on site
Surface Waters	Within 10 feet from mean annual high-water line	10 feet from the mean annual high-water line and the outer boundary of the Riverfront Area; 12 months must elapse between applications; Selective chemical, using directed spray or cut-stem applications	YOP Maps and identify on site
Agricultural and Inhabited Areas	N/A	0 – 100 feet; 12 months must elapse between application; Selective chemical, using directed spray or cut-stem applications.	Identify on site
State-listed Species Habitat	No application within habitat area except in accordance with a YOP approved in writing by the Division of Fisheries and Wildlife		YOP Maps[2]

[2] Includes Estimated Habitats of Rare Wildlife and the Priority Habitats for State-Listed Species as shown on the most recent edition of the Massachusetts Natural Heritage Atlas prepared by the NHESP

6.0 Operational Guidelines for Applicators Relative to Herbicide Use

As required by regulations, applicators to roadside ROWs must hold a valid Category 40 pesticide certification from MDAR. The applicator(s) will be LELWD staff and/or a certified contractor working under the supervision of the LELWD. All applicators and their supervisors will have a copy of the VMP and YOP with them at all times for reference during the herbicide application. A Daily Vegetation Management Report form will be filed at the end of each day with the individual supervising the YOP. This will include the following information:

- Applicator or contractor name
- Weather conditions during application
- Identification of site/work area
- Type of equipment and hours used
- Method of application
- Target vegetation
  - Total amount of herbicide used (amount/concentration used)
- Identification of adjuvants or dilutants and amount/concentration used
- Unusual conditions or incidents noted
- Public inquiries noted
- Recording/verification of sensitive areas
- Lane miles treated
- Man hours (actual spray hours) vs. total herbicide used.

In addition to the applicable rules and regulations, applicators will adhere to the following operational guidelines.

<u>Weather</u>

Herbicide applications will be restricted during certain adverse weather conditions, such as rain or wind. Herbicide applications will not be conducted during periods of moderate or heavy rainfall. Foliar applications can be effective in light mist situations; however, any measurable rainfall that creates leaf runoff will wash the herbicide off target vegetation. If foliar applications are interrupted by unexpected rainfall, the treatment will not resume until the rain ends and active leaf runoff has ceased.

To minimize off-target drift, the applicator will comply with the following restrictions:

- During periods of wind, which are strong enough to bend the tops of the main stems of trees on the roadside, the applicator will periodically observe the application of the foliar treatment to ensure that there is no significant movement of the herbicide. If the applicator can see the herbicide moving off target, the application will immediately stop until the wind has subsided enough to permit further applications.
- Herbicide solution to be used for a foliage application may contain low drift agents. Low drift agents may be added to the foliage herbicide solutions as per the low drift agent label. In moderate wind conditions, as per label recommendations, more low drift agent may be added, at the discretion of the applicator to manage increased drift.

- Foliar treatment will not be made to target vegetation that exceeds twelve feet in height.

Equipment Calibration

Foliar application equipment will be calibrated prior to application and in accordance with manufacturer's recommendations. Applicator nozzles will be adjusted to apply a coarse spray pattern.

Equipment will be adjusted to deliver an herbicide solution that minimizes herbicide overspray or drift.

Sensitive Area Restrictions

In defined sensitive areas, there exists a no-spray area where herbicide use is prohibited and a limited spray area where herbicide use is allowed under certain conditions. In places around sensitive areas where herbicide use is allowed, only the minimum labeled rate of application for the management of target species can be applied.

7.0 Alternative Land Use Options

Every effort will be given for alternative land use options. However, there are specific criteria to be met for adoption of alternative land use options. The alternative land use option must effectively manage vegetation as required for ROW access and safety and must not cause a negative impact to the environment.

8.0 Remedial Plan to Address Spills and Related Accidents

All mixing and loading of herbicides will be conducted at the facility where the herbicides are stored. This will be a LELWD facility if the application is completed by a LELWD employee, or offsite, if the application is being completed by an outside contractor. Only the amount of herbicide necessary to carry out the vegetation management, based on monitoring results, will be mixed daily to ensure that there will be no waste and will minimize potential problems. The vehicles carrying out the spray operations will be equipped with a bag of absorbent, activated charcoal, leak-proof containers, a broom and a shovel, in case of minor spills. A log of the herbicides on the vehicle will be kept in the vehicle. Herbicide labels and fact sheets will be carried on-site by the applicator.

Spills requiring action, include but are not limited to: herbicides, fuels, oils and other motor/hydraulic fluids. As soon as any spill is observed, immediate action will be taken to contain the spill and protect the spill area. The cause of the spill must be identified and secured. Spill containment will be accomplished by covering the spill with absorptive clay or other absorptive material or, for large spills, building clay or soil dikes to impede spill progress. Until completely remediated, the spill area will be protected by the placement of barriers and by the delineation of the spill area by crew members. If a fire is involved, care will be taken to avoid breathing fumes from any burning chemicals.

Minor spills of liquid herbicide will be remedied by soaking up the spill with adsorption clay or other absorptive material and placing it in leak-proof containers, removed from the site and disposed of properly. Minor spills involving dry herbicides, such as granulars, will be swept up or shoveled up directly in leak proof containers, removed from the site and disposed of properly. All contaminated soil will be placed in leak-proof containers, removed from the site and disposed of properly. Any minor spill will be reported to the MDAR, Division of Crop & Pest Services.

Major spills will be handled in a similar manner as minor spills, except in cases where the spill cannot be contained and/or removed by the crew. In this case, the MassDEP Emergency Response Unit and the MDAR, Division of Crop & Pest Services must be contacted.

Emergency first responders (including, but not limited to, fire and police) should be immediately notified of a major spill and/or any size incident deemed a possible risk to public health, safety and the environment.

MassDEP will be contacted when there is a spill of a reportable quantity, regardless of major or minor spill status and in accordance with 310 CMR 40.0000 Massachusetts Contingency Plan.

In the event of a spill, information on safety precautions and clean up procedures may be gathered from (but not limited to) the sources listed in Table 3.

Table 3. Emergency Resources	
Resource	**Location/Phone #**
Herbicide Label	Approved YOP
Herbicide Safety Data Sheet (SDS)	Approved YOP
Herbicide Manufacturer • Corteva Agriscience (formerly Dow/Dupont) • NuFarm • Bayer	 (800) 992-5994 (877) 325-1840 (866)-99-BAYER
MDAR, Division of Crop & Pest Services Clayton Edwards	(617) 626-1700
Massachusetts Department of Environmental Protection Emergency Response	(888) 304-1133
Department of Public Health Environmental Toxicology Program	(617) 624-5286
Massachusetts Poison Control Center 24-Hour Hotline	(800) 222-1222
Littleton Electric Light & Water Department	(978) 540-2222
Littleton Fire Department	(978) 540-2302– non-emergency or 911
Boxborough Fire Department	(978) 264-1770 – non-emergency or 911
Littleton Police Department	(978) 540-2300 – non-emergency or 911
Boxborough Police Department	(978) 264-1750 – non-emergency or 911
Littleton Health Department (via Nashoba Associated Boards of Health 12 hour hotline)	(800) 698-3307
Boxborough Health Department (via Nashoba Associated Boards of Health 12 hour hotline)	(800) 698-3307
Chem-Trec	(800) 262-8200
National Pesticide Information Center	(800) 858-7378
National Animal Poison Control Center	(800) 426-4435

9.0 Notification Procedures

Once approved, a copy of the VMP will be provided to the Board of Selectmen, Board of Health and Conservation Commission. Upon approval of the VMP and YOP and 21-days in advance of the application of herbicide to a ROW, LELWD will notify the MDAR, Board of Health, water supplier, Board of Selectmen and Conservation Commission of the application. Notification will include: method and location of application, herbicide fact sheet, U.S. EPA registration number for herbicide and applicator contact information. Additionally, at least 48-hours prior to a ROW herbicide application, the applicant will publish in a local newspaper the following information: methods and location of herbicide application, approximate dates of herbicide application, name of herbicide(s) to be used, description/purpose of application and contact information for the designated individual representing LELWD whom citizens can contact. Section 9.0 was developed per 333 CMR 11.00.

10.0 Monitoring Plan

On an annual basis, LELWD will evaluate the success of this Vegetation Management Program based on the goals and objectives stated in this VMP (page 1) which include:

- Manage target vegetation while ensuring the protection of sensitive areas and the environment.
- Reduce the amount of herbicides applied over time.
- Reduce the frequency of herbicides application.
- Ensure vegetation management activities are conducted in a safe and effective manner and in compliance with regulations.

plan and assessment activities will include the following:

1. An assessment of all sites prior to treatment with regard to the estimated area and identification of target species will be mapped for future assessment.
2. Recording of amount of herbicide used during treatment for each area.
3. Evaluation of each treatment area following herbicide application. Evaluation will include a description of the overall management of target species and observation of nearby sensitive resource areas, noting impacts if any.
4. The LELWD will hold an annual VMP evaluation meeting to take place after a sufficient period of time following completion of all herbicide application activities. This meeting will evaluate efficacy and assess the following issues:
    a. Overall management of target species in each primary treatment area
    b. Amount of herbicide applied
    c. Impacts related to weather
    d. Sensitive area impacts
    e. Comments received from the public
    f. Overall program implementation including suggested changes

This meeting will result in the development of documentation needed to summarize the program annually for inclusion in the next VMP and/or YOP, should one be developed for MDAR approval.

Meeting minutes will include the above information, data and discussion points and will include comparisons to previous years' information. Recommendations on location and use will be reflected in the next year's YOP as applicable.

11.0 Qualifications of Individuals Developing & Submitting the Plan

Mr. Matt McFarland is Distribution Supervisor for LELWD with over 15 years of experience with LELWD. His first 11 years at LELWD was spent as an Electric Lineman and now supervises line crews. Additionally, he is the direct supervisor for the LELWD tree crew employees. Mr. McFarland holds the following certifications/licenses: Journeyman Lineman, Class A CDL, 1A/2A MA Hoisting License, CRP/First Aid, MA EHAP certified.

Comprehensive Environmental Inc. (CEI) is a civil engineering and environmental science firm that has served municipal, state, and Federal agencies throughout the New England area for over 35 years. CEI staff have worked with public entities to develop MDAR approved Vegetation Management Plans and Yearly Operations Plans for over 15 years. Technical staff are experienced in the areas of wetlands, water resources, stormwater, environmental permitting, and resource area protection.