UIC Guideline for Integrated Vegetation Management

PART A

Final version

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Content

1. Introduction

The “UIC Guidelines for integrated vegetation management for sealed/ unsealed surfaces and for the railway track area” has 3 objectives:

1. It puts the integrated vegetation management of railway companies and the herbicide use within this context into perspective.
2. It shows that the vegetation management of railways and especially the use of herbicides are embedded into an overall environmental strategy of railway companies aiming at improving the environmental performance and into a legal context on EU, national and local levels.
3. It demonstrates that railways are using herbicides in a responsible way governed by clearly defined principles, guidelines and quality standards and that systematic effort is put into the further reduction of the total amount of herbicides used and the areas treated.

Integrated vegetation management for railways and herbicide use

Railways are important property owners managing a great variety of different types of areas – unsealed surfaces such as embankments, protective forests, meadows; sealed surfaces such as roads, pathways, station platforms and track area with different needs and requirements for vegetation control. Vegetation growth may have positive and negative impacts depending on the type and function of these areas. On unsealed surfaces vegetation has typically positive impacts – it stabilizes the soil of embankments, supports biodiversity and has aesthetical value. The main requirement here is to support healthy local plant populations which do not interfere with the obligation of safe railway operation. These areas often form a valuable part of the landscape and they serve as important greenways, biological migration corridors and habitats for rare species.

On sealed surfaces and in the track area vegetation growth is not desired since it can destabilize supporting structures of jeopardize the safe and reliant performance of railway systems.

Railways are well aware of their responsibility towards safe operation on the one side and optimum environmental performance on the other side. Therefore they have developed dedicated and transparent guidelines and implemented integrated systems for vegetation management which comprise a great variety of methods and techniques – from constructional and mechanical to chemical, thermal and biological ones, depending on the area of application and the specific requirements with regard to railway operation. In contrast to agriculture, railway companies do not use herbicides for plant protection but for guaranteeing the safe and reliable operation of railways, which is a legal obligation for all railway companies.

The amount of herbicides used within the framework of vegetation control for railways is very small. On the national and European scale, railways have a share of less than 0.5 % of the herbicide market whereas agriculture is by far the biggest player. The overall amount of herbicides used by European railways is about 400 t of active substances p.a. in comparison to about 130,000 t of the total annual sales of active substances in Europe.

Total amount of herbicides used for railways has been already significantly reduced over the last 20 years. Today less than 50 % of amount used in the 90 ties is applied and the railways

are working hard on further reductions.

Herbicide use for railways is mostly restricted to the track area and all substances have to be approved for the specific use by the national authorities It is only applied according to strict regulations or not applied at all in areas under special protection – e.g. water protection areas or nature reserves. Vegetation control on sealed and unsealed surfaces of railways such as paths, roads, station platforms, loading zones (sealed surfaces) and embankments, meadows, protective forests (unsealed surfaces) is already mainly based on mechanical methods such as mowing and mulching.

For the railway track area there is currently no alternative to herbicide use which ensures the same level of safe operation and operational performance on the one side and is highly cost efficient and environmentally friendly on the other side. All alternatives for the track area tested and investigated so far lead to lower safety levels, negative impacts on the operational performance due to difficulties with integrating the time schedules for treatments into the tight railway schedules, are about ten or more times as expensive as herbicide treatments, are much more energy intensive and often also have negative impacts on the environment.

Nevertheless, the railways are searching for alternatives. New methods and technologies are investigated and new development for existing technologies as e.g. thermal and electrical methods are thoroughly evaluated.

A topic of increasing importance for railways is the control of invasive alien species (ias like invasive plants or fungi) since they have the potential to damage constructions and facilities, can overgrow signals and operational devices, boost maintenance efforts, threaten biodiversity and can constitute health risks e.g. due to their allergenic potential. The typical treatment consists of manual cutting, herbicides are only used as an exception in special cases. Since ias dispersal is increasing and manual treatment is cost and labor intensive, railways also look for alternative treatment methods such as biological control and e.g. start to include ias-management into the tenders of construction works.

2. General Principles of Vegetation Control

2.1. REGULATORY AND LEGISLATION FRAMEWORK FOR WEED CONTROL AND MANAGEMENT

Vegetation control for unsealed surfaces, sealed surfaces and track areas on the premises of railway companies is governed by legislation and regulation on different levels:

1. European level
2. National level
3. Federal level (if applicable)
4. Regional and Local level

All applicable legislation and regulation is derived from four obligations for railway companies, the obligation of

1. Safe and reliable railway operation
2. Preventing the endangerment of customers and personnel
3. Protecting the environment
4. Preventing negative impacts on neighbouring property

Vegetation control for railways generally governed by the Precautionary Principle. This principle is one of the fundamental principles of the European Union governing policies related to the environment, health and food safety. The **characteristic feature of the precautionary principle is risk prevention in the face of scientific uncertainty**. The precautionary principle aims to prevent harm before a hazard has come into existence. The precautionary principle is detailed in Article 191 of the Treaty on the Functioning of the European Union.

The precautionary principle is related to three specific principles:

- the fullest possible scientific evaluation, the determination, as far as possible, of the degree of scientific uncertainty;
- a risk evaluation and an evaluation of the potential consequences of inaction;
- participation of all interested parties in the study of precautionary measures, once the results of the scientific evaluation and/or the risk evaluation are available.

The environmental performance of railway companies regarding integrated vegetation control and management can be improved significantly by implementing the precautionary principle within the framework of risk assessment and management (a) risk evaluation, (b) risk management and (c) risk communication.

Within the context of integrated vegetation management of railways a great variety of methods and technologies is applied – constructional, mechanical, biological, chemical, thermal and electrical. Within this spectrum, the chemical methods which are based on the application of herbicides are the ones which have a tight legislative and regulative framework.

On European level, applicable legislation is defined by directive 2009/128/EC of the European Parliament and of the Council of 21st October 2009 **"Establishing a framework for Community action to achieve the sustainable use of pesticides"**. This Directive sets out a framework to achieve a sustainable use of pesticides by reducing the risks and impacts of pesticide use on human health and the environment and promoting the use of integrated pest management and of alternative approaches or techniques, such as non-chemical alternatives to pesticides. The Directive stipulates that these provisions do not prevent Member States from applying the precautionary principle in restricting or prohibiting the use of pesticides in specific circumstances. The directive requests the Member States of the European Union to introduce National Action Plans while setting quantitative objectives, measures and timelines to reduce risks for human health and environment (Article 4 of the Sustainable Use Directive). The Member States had to submit their respective National Action Plans to the EU Commission and the other Member States of the EU by end of 2012.

On national level, the legislation and regulation framework for vegetation control is defined by

- **National railway legislation focusing at safe and reliable operation of railway services**
- **National action plans for sustainable use of pesticides** with regards to directive 2009/128/EC
- **National Civil Codes** defining obligations to prevent negative impacts on people and property of third parties
- **National environmental protection laws** defining obligations with respect to the protection of soil, water, air, forests, biodiversity, nature in general as well as national nature preserves.

On local (and federal) **level**, the legislation and regulation framework for vegetation control is defined by

- **Local (or federal) environmental regulation** with respect to the protection of soil, water, air, forests, biodiversity, as well as local conservation areas.

2.2. MANAGEMENT PROCESS FOR VEGETATION CONTROL

An important success factor for an efficient vegetation control is the establishment of a management process for vegetation control covering 5 phases:

1. **Inspection** of status quo of vegetation growth on the different surfaces and structures
2. **Assessment** of the status of vegetation growth and selection of adequate vegetation control measures by experts
3. **Planning and application** of the selected vegetation control measures
4. **Evaluation** of the success of the vegetation control measures by qualified personnel
5. **Documentation and communication** of performed vegetation control measures.

Inspection

The first phase of the management cycle – inspection – aims at determining the status quo of vegetation growth on the different types of surfaces by qualified personnel as basis for the assessment.

Assessment

The second phase covers the detailed assessment of the status of vegetation growth by internal or external experts comprising (1) the identification of the need for vegetation control measures, (2) the selection of the appropriate vegetation control measures taking into account all relevant legal, technical and operational requirements and aspects (3) Incorporation of all preventive measures or direct treatments performed before for the respective area. This can include the determination of appropriate preventive measure for the future in order to avoid or minimize direct treatment.

Planning & application

The vegetation control measures determined in phase 2 are planned and implemented in phase 3. If measures based on herbicide use have been selected, applications are submitted to the relevant authorities in order to receive the required permits. These applications have to justify the need for herbicide use and have to conclusively establish the lack of viable alternatives. Vegetation control based on herbicide treatments have to be carried out by qualified and certified personnel. The qualification comprises knowledge with regard to responsible handling of herbicides as well as knowledge with regard to the appropriate application techniques. This personnel has to fully understand and respect all requirements and obligations arising from EU directive 2009/128/EC and the respective national action plan for the sustainable use of pesticides. The railway companies are responsible for guaranteeing high quality standards for the application of herbicides on their premises. This can either be ensured by constant qualification of own personnel or by long-term agreements with experienced contractors where the compliance with high quality standards is an integrated part of the contracts. Furthermore, it requires regular quality monitoring in both cases. The responsible handling of herbicides comprises not only the treatments and application techniques as such, but also the limitation of the amount of herbicides to the absolutely necessary level as well as professional cleaning of equipment and disposal of residual amounts.

Evaluation

Phase 4 – evaluation – covers the rating of impact and especially success of the treatment and the formal approval of the achieved results by experts. The personnel responsible for the evaluation possess the required knowledge and experiences for the legal, technical and operational aspects of vegetation control and are qualified on a regular basis. This includes acquiring knowledge about the current status of development of active substances, technologies and applications methods as well as good and best practices.

Documentation and communication

The final phase consists of the detailed documentation of all implemented vegetation control measures (type, size and location of treated area, amount of active substances, application technology, used resources) and their respective results and impacts as the basis for

- Evaluation of the mid- and long-term results and impact of vegetation control
- Reporting and documentation of herbicide use
- Establishing the benefit of vegetation control and justifying the need for vegetation control
- Communication to external and internal stakeholders.

3. Guideline for Vegetation Management on unsealed Surfaces

3.1. CHARACTERIZATION OF UNSEALED SURFACES

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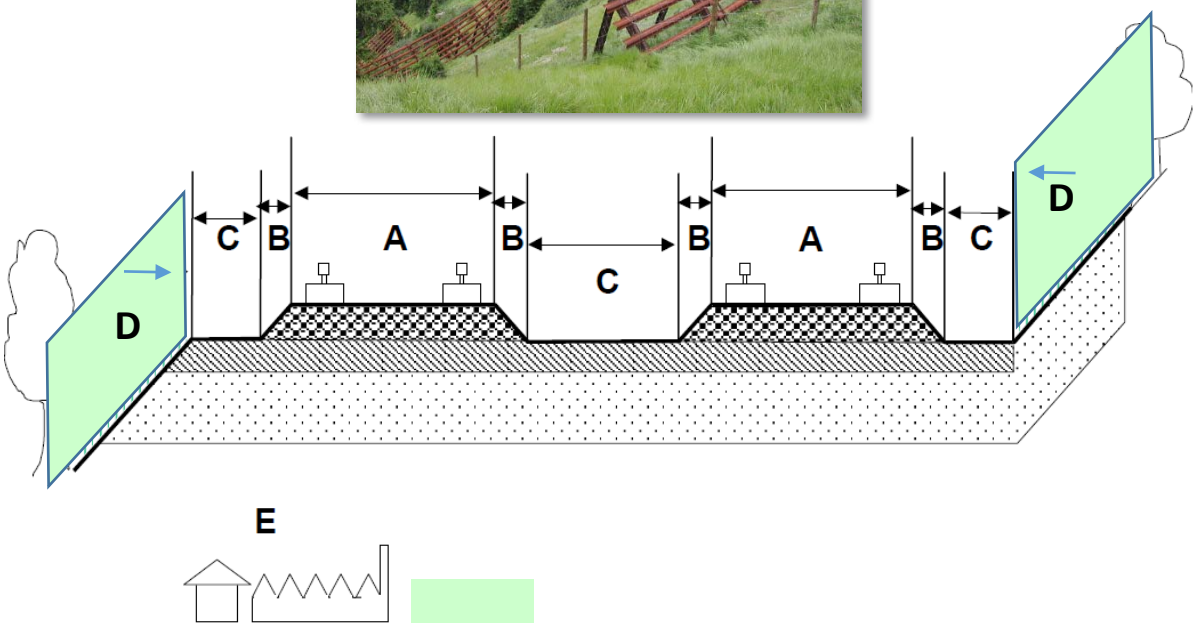

Figure 1: Areas of Application for Vegetation Control Methods on unsealed surfaces – Areas D and unsealed parts of areas E

The unsealed surfaces relevant for vegetation control comprise the embankments (Area D in figure 1) and the unsealed areas outside the tracks and not directly linked with the tracks (unsealed part of Area E). Examples are embankments, unsealed paths, areas around substations, unsealed areas around railway stations, forest land, meadows, unsealed fallow land.

3.2. SPECIFIC NEEDS AND REQUIREMENTS FOR VEGETATION CONTROL MEASURES FOR UNSEALED SURFACES

Vegetation on unsealed surfaces can have positive and negative impacts. Positive impacts are connected with the stabilization of surfaces and especially the prevention of soil erosion caused by vegetation growth, negative impacts are connected with potential hazards for railway operation and safety of people. Needs and requirements for vegetation control on unsealed surfaces are depending heavily on the concreate type and use of the area concerned as well as on its location and exposition. This results in specific operational and technical requirements. The main focus for vegetation control regarding the positive impact of vegetation growth is to maintain vital, healthy and robust vegetation with high biodiversity on all unsealed areas where vegetation growth is desired.

The need for vegetation control for unsealed surfaces arises from the obligation of safe and reliable railway operation and the obligation of preventing the endangerment of customers and personnel as well as negative impacts on neighbouring property. With respect to these three obligations, the negative impacts of vegetation on unsealed surfaces and the resulting requirements for vegetation control can be divided into five categories (a) operational safety & reliability and technical performance, (b) structural safety and integrity of buildings and facilities (c) occupational safety and safety of third parties and (d) safety of neighbouring property:

(a) Operational safety & reliability and technical performance
- **Risk of accidents and injury and/or reduced operational performance and disruptions caused by**
  - **trees falling on tracks and overhead lines**
  - **malfunctioning of electrical equipment** due to plants growing too close to trackside equipment and facilities
  - **restricted visibility of signals** caused by high growing plants close to the track.
- Requirements: Maintain minimum distances to track area, equipment and facilities and keep healthy plant populations.

(b) Structural safety and integrity of buildings and facilities
- **Damage to buildings and structures and reduced integrity due to vegetation impacting parts of the drainage system**; requirement: Prevent growth of vegetation in and close to the drainage system.

(c) Occupational safety and safety of third parties
- **Risk of injury on unsealed paths** due to low branches and roots; requirement: Prevent growth of roots and low branches on paths.

- **Health risks for personnel and third parties due to pest infestation** (e.g. oak egger), requirement: measures for pest control.

(d) Safety of neighbouring property

- **Damage to neighbouring property** caused by falling vegetation, vegetation impacting drainage, pests and invasive species propagating from unsealed surfaces (railway property).

3.3. VEGETATION CONTROL MEASURES (WITH REFERENCE TO EU-DIRECTIVE 2009/128/EG APPENDIX III)

Preventive measures

Regarding the positive impacts of vegetation growth on unsealed surfaces such as embankments the main focus of prevention is to allow and **maintain a vital, healthy and robust vegetation** on these surfaces. A key point in this respect is the development and maintenance of locally suitable and sustainable vegetation populations.

Regarding the negative impacts of vegetation growth on unsealed surfaces (see chapter 2.2) the main focus of prevention is on **continuous monitoring of the status quo of vegetation growth** and the **assessment of its impact** by qualified personnel.

Treatments

In accordance with the precautionary principle, **vegetation control on unsealed surfaces should be generally based on non-chemical methods**. These comprise of mowing and mulching for weeds, herbs and shrubs and cutting for trees and tree-like shrubs.

The only **exception** from this principle **is the chemical treatment of certain pests or invasive neophytes if alternative methods are not successful**. These exceptions **require special permits** issued by the relevant authorities and have to be carried out by experienced and qualified personnel. Based on the **assessment of type and intensity of infestation** and using **decision support** provided e.g. by internal directives and guidelines, appropriate chemicals for treatment and methods of application are selected and communicated to the authorities. It is important that **the chemical treatment is limited to the absolutely necessary level**. If repeated application is needed, an **appropriate resistance management** has to be implemented. **A detailed documentation of all vegetation control measures based on herbicides** (time & location, active substances, dosage, applied technology etc.) **is mandatory**.

4. Guideline for Vegetation Control on sealed Surfaces

4.1. CHARACTERIZATION OF SEALED SURFACES

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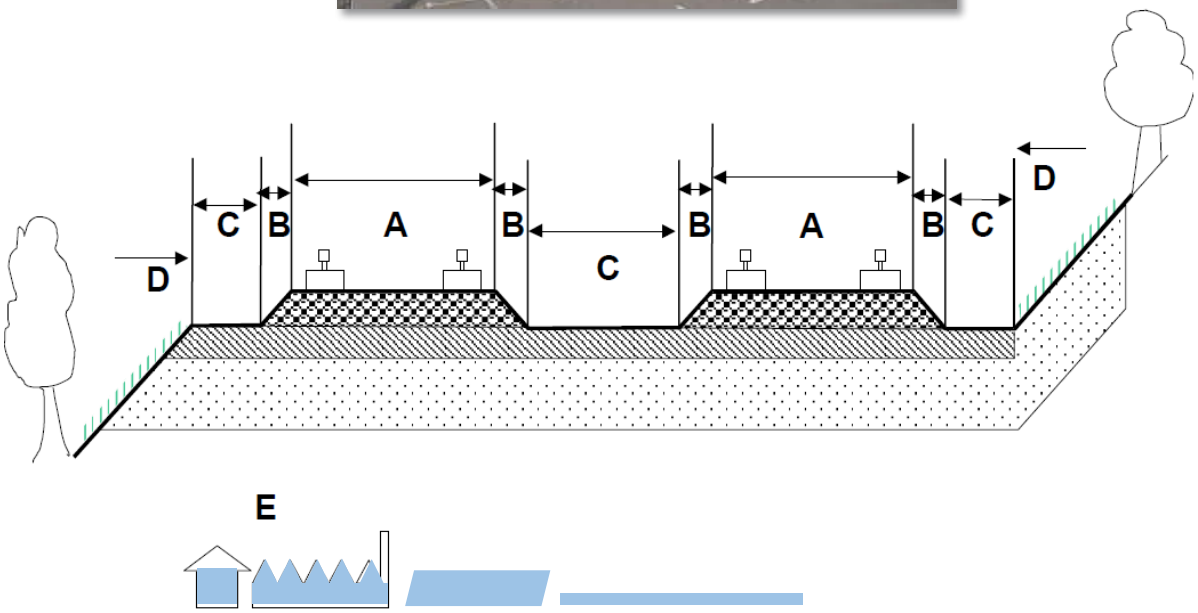

Figure 2: Areas of Application for Vegetation Control Methods on sealed surfaces – Areas E

Sealed surfaces relevant for vegetation control comprise the sealed areas outside the tracks and not directly linked with the tracks (sealed part of Area E in figure 2). Examples are sealed streets, paths and driveways, loading areas, storage areas, parking lots, station platforms.

4.2. SPECIFIC NEEDS AND REQUIREMENTS FOR VEGETATION CONTROL MEASURES FOR SEALED SURFACES

The need for vegetation control for sealed surfaces arises from the obligation of safe and reliable railway operation and the obligation of preventing the endangerment of customers and personnel. With regard to these two obligations, the impacts of vegetation on sealed surfaces and the resulting requirements for vegetation control can be divided into four categories (a) operational safety and reliability, (b) transport safety (c) occupational safety (d) structural safety and integrity of buildings:

(a) Operational safety and reliability

- **Reduced operational performance and disruptions due to reduced stability of support structures** caused by degraded or damaged drainage systems causing restrictions and instabilities for operation; requirements: Prevent and restrict vegetation growth in drainage systems and close to drainage systems.

(b) Transport safety

- **Reduced transport safety of sealed areas** such as paths, access roads, parking areas, loading areas due to degraded and tilted surfaces caused by vegetation growth; requirement: Prevent or restrict plant growth in joints and cracks.

(c) Occupational safety

- **Risk of injury on sealed service paths** due to low branches and roots; requirement: Prevent growth of roots and low branches on paths.

(d) Structural safety and integrity of buildings

- **Damage to buildings and structures and reduced integrity due to vegetation impacting the drainage system**, requirement: Prevent growth of vegetation in and close to the drainage system.
- **Damage to buildings and structures and reduced integrity due to vegetation growing in joints and cracks**, requirement: Prevent growth of vegetation in joints and cracks.

4.3. PLANT PROTECTION MEASURES (WITH REFERENCE TO EU-DIRECTIVE 2009/128/EG APPENDIX III)

Preventive Measures

The most important focus for prevention is to **avoid or at least significantly limit vegetation growth due to appropriate design and construction**. This can be achieved e.g. by complete sealing of a surface, which implies other negative impacts, e.g. on water run-off, microclimate, soil-degradation, etc. and should therefore be assessed carefully. Other important preventive measures are the **regular cleaning of surfaces** and especially cracks and joints as well as **preventing the colonization from neighbouring unsealed surfaces** by regular mowing and mulching of these areas in combination with **continuous monitoring** of the status of vegetation growth and the **assessment of its impact**.

Treatments

In accordance with the precautionary principle, **vegetation control on sealed surfaces such as paths, roads, platforms is generally based on non-chemical methods**. Mechanical as well as thermal methods should be applied on a regular basis and in the early stages of vegetation growth in order to minimize effort and impact. Usually this is done within the framework of standard cleaning and maintenance work. The infestation and impact assessment should be performed by qualified personnel.

For **vegetation control on sealed surfaces such support structures and buildings non-chemical methods are also the first priority**. The concrete measures for vegetation control are based on the technical requirements of the structures and buildings. Only if non chemical methods are not successful and the stability and integrity of structures and buildings is endangered with possible consequences for safe and reliable operation, **chemical treatments can be envisaged for single specific cases**. These **exceptions require special permits** issued by the relevant authorities and have to be carried out by experienced and qualified personnel. Based on the **assessment of type and intensity of infestation** and using **decision support** provided e.g. by internal directives and guidelines, appropriate chemicals for treatment and methods of application are selected and communicated to the authorities. It is important that the **chemical treatment is limited to the absolutely necessary level**. If repeated application is needed, an **appropriate resistance management** has to be implemented. **A detailed documentation of all vegetation control measures based on herbicides** (time & location, active substances, dosage, applied technology etc.) **is mandatory**.

5. Guideline for Vegetation Control on Railway Tracks

5.1. CHARACTERIZATION OF RAILWAY TRACKS

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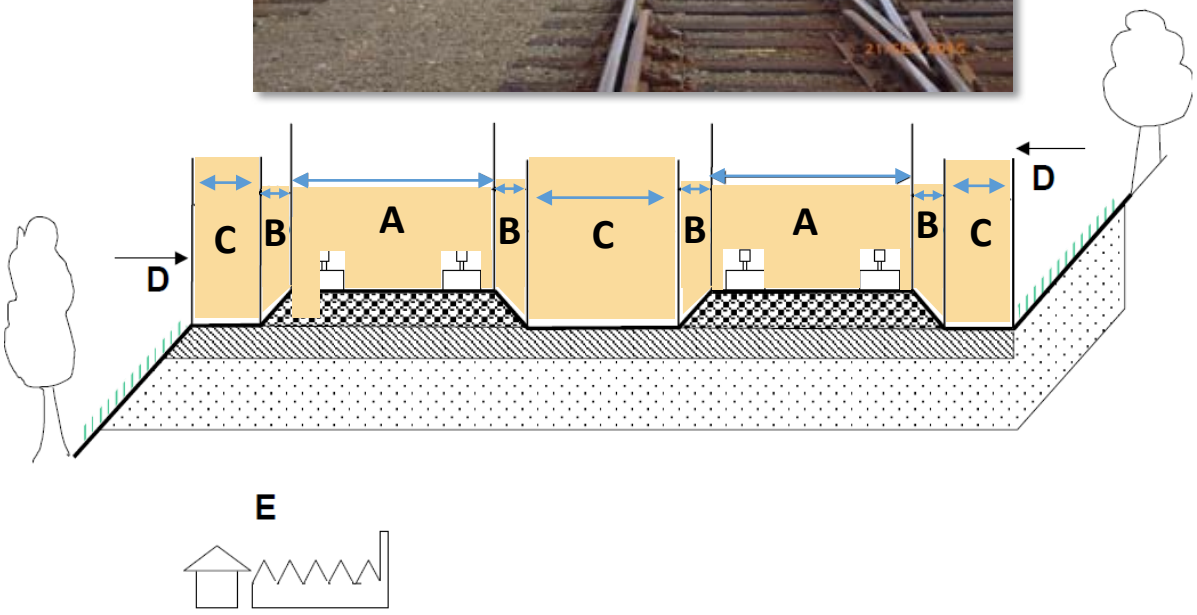

Figure 3: Areas of Application for Vegetation Control Methods – Railway Tracks (Areas A, B and C)

The railway tracks comprise the ballast bed being the part of the track-bed made of ballast or gravel including embedded sleepers and rails (Area A in figure 3), the ballast shoulder being the part of the track-bed covering the slopes on both sides of the ballast bed (Area B in figure 3) – or in the case of a slab track being a concrete track-bed construction (Area A in figure 3). Additionally it comprises the transition area which is the part of the track abutting the slope on both sides of the ballast bed and includes walking path for maintenance reasons/inspection and walk ways and areas between two tracks in case of double and more tracks (Area C in figure 3).

5.2. SPECIFIC NEEDS AND REQUIREMENTS FOR VEGETATION CONTROL MEASURES FOR RAILWAY TRACKS

The need for vegetation control for the track area arises from the obligation of safe and reliable railway operation. The impacts of vegetation on the track area with relevance for the safe and reliable operation and the resulting requirements for vegetation control can be divided into three categories (a) operational safety and reliability, (b) operational and technical performance (c) economic performance:

(a) Operational safety and reliability

Risks of accidents and safety risks due to

- **Restricted visibility of signals** due to high growing plants – safety risk; requirement: limit the plant growth (height) on ballast, ballast shoulder and in transition area
- **Reduction of traction** (longer breaking distances = safety risk, less traction, secondary damage on tracks and wheels), requirement: sustain high quality of traction by ensuring minimum vegetation growth in ballast and on ballast shoulder
- **Malfunctioning of signalling equipment** caused by vegetation too close to equipment – safety risk; requirement: maintain required minimum distances between plants and electrical equipment
- **Shortcuts of electrical trackside equipment** due to vegetation too close to equipment, safety risk; requirement: maintain required minimum distances between plants and electrical equipment
- **Restricted access to emergency and rescue routes** due to excessive plant growth on pathways, requirement: keep the emergency and escape routes always accessible and safely usable.
- **Restricted access and usability of service paths** for maintenance and inspection due to excessive plant growth, requirement: keep the service pathways always accessible and safely usable

(b) Operational and technical performance

Reduced operational performance and disruptions due to

- **Degradation of track quality and stability** by softening of the sub-construction caused by formation of humus, requirement: Keep formation of humus in the track area to a minimum

- **Malfunctioning of electrical trackside equipment** due to vegetation too close to equipment causing operational problems; requirement: maintain required minimum distances between plants and electrical equipment
- **Frost damage of track area and destabilization** caused by increased humidity stored in humus; requirement: Keep formation of humus in the track area to a minimum

(c) Economic performance

- **Reduced lifetime of track construction** due to changed physical properties of the ballast (e.g. lower elasticity) caused by plant growth and humus formation and resulting reduced resilience to dynamic forces, requirement: Keep plant growth and formation of humus in the track area to a minimum.
- **Reduced operational speeds due to track area degradation** caused by vegetation resulting in delays, overall reduction of performance and productivity and operational losses; requirement: Keep plant growth and formation of humus in the track area to a minimum.
- **Increased maintenance effort and costs for track area** due to degradation of track area caused by vegetation; requirement: Preventive vegetation control measures performed on a regular basis.
- **Increased effort, costs and frequency for ballast cleaning** caused by plant growth and humus formation in the ballast, requirement: Preventive vegetation control measures performed on a regular basis.

5.3. PLANT PROTECTION MEASURES (WITH REFERENCE TO EU-DIRECTIVE 2009/128/EG APPENDIX III)

Preventive Measures

Ballast bed and slab track are hostile environments and therefore difficult to be colonized by plants. An important focus for prevention is the **avoidance or restriction of colonization from neighbouring unsealed and sealed surfaces** by regular mowing and mulching of weeds and shrubs and cutting of trees and tree-like shrubs in these areas in combination with **continuous monitoring** of the status of vegetation growth and the **assessment of its impact**.

Treatments

The infestation and impact assessment is performed by qualified personnel. **Main infestation criterion is the degree of vegetation cover** and at certain threshold values vegetation control measures are activated.

In accordance with the precautionary principle, **non-chemical vegetation control measures should be the first priority for the track area**. But since **currently there is no cost efficient alternative to chemical measures**, herbicide use is the commonly practiced method of vegetation control for the track area and non-chemical methods are only used to a very limited degree and only for sections of track with specific requirements. At the actual state of technology development and implementation, **vegetation control with herbicides using spraying trains is more than 10 times more cost efficient than non-chemical alternatives**.

On the basis of the detected degree of vegetation cover and composition of plant populations, the **appropriate chemicals** (herbicides/active substances) **are selected** and their dosage and the optimum time of application are decided by experienced professionals certified for herbicide-based vegetation control. Since the track area is treated on an annual basis, an **adequate resistance management** has to be implemented taking into account the spectrum of licenced herbicides available. The **dosage of application has to be limited to the absolutely necessary level**. This can be reached e.g. by **adjusting the amount of herbicides applied to the concrete level of vegetation growth**. Currently these adjustments are either done manually (on view) – by the operators of spraying equipment aboard the spraying trains or automatically based on plant detection. **Automatic plant detection coupled with dosage adjustment for spraying trains has a potential** for the further reduction of herbicide use in the future. Another consequence of the limitation of herbicide use to the absolutely necessary level, the frequency is **restricted to one** or – for problem zones – to maximum two **treatments per year**.

The most efficient and therefore most common method for the application of herbicides for the track area is the use of spraying trains. **Drift of herbicides into adjacent areas is minimized** by special design of the injectors producing big and heavy enough droplets, by limiting the operational speed of the trains (usually to 50 km/h), addition of wetting agents and by avoiding the application if strong cross winds are present.

A detailed documentation of all vegetation control measures based on herbicides (time & location, active substances, dosage, applied technology etc.) **is mandatory**.

An inventory of track **areas with special protection obligations** has to be updated annually and handed over to the railway company unit responsible for vegetation control or the certified external company contracted for this purpose. Special protection requirements are usually based on either (ground) water protection or general nature conservation legislation.

6. Outlook

The following future trends for vegetation control for railways can be identified:

- Railway's strategies and concepts for vegetation control are becoming more holistic with a stronger integration of different methods and technologies for vegetation control.
- Herbicide use will still be the dominant method for the railway track area in the near future but the importance of alternative methods for track – especially thermal ones – is increasing since the part of the networks where herbicide use is restricted or forbidden (currently about 13%) is rising due to tighter legislation and regulations in the future.
- Although the railways have already significantly reduced their usage of herbicides over the last 20 years – the current annual amount of active substances applied by railways is about 400 t corresponding to less than 0.5% of the overall annual herbicide market in Europe – the amount will be further reduced. Main focus here is the implementation technologies which allow the adjustment of dosages according to the actual status of vegetation growth.
- Railway's reporting and documentation of herbicide application will be more and more based on dedicated databases and GIS systems. These systems also allow a transparent communication of herbicide use.
- For sealed surfaces and unsealed surfaces outside the track area mechanical methods for vegetation control are already the most important ones. The majority of railway companies has already stopped or at least significantly restricted herbicide use in these areas and in a mid-term perspective herbicide use will be phased out by the remaining ones.
- Railways are increasing their efforts to search for alternatives to herbicide use in the track area. Existing methods and technologies are improved and re-evaluated and new methods as e.g. the usage of high electric fields are investigated.
- Railways are investing a lot into Research and development projects in order to get alternatives on the market.
- Railways are intensifying knowledge exchange and especially the exchange of good and best practices for integrated vegetation management.
- Railways are taking vegetation management into account from the very beginning, in terms of design and construction when infrastructure facilities or lines are built or renovated.

INTERNATIONAL UNION
OF RAILWAYS