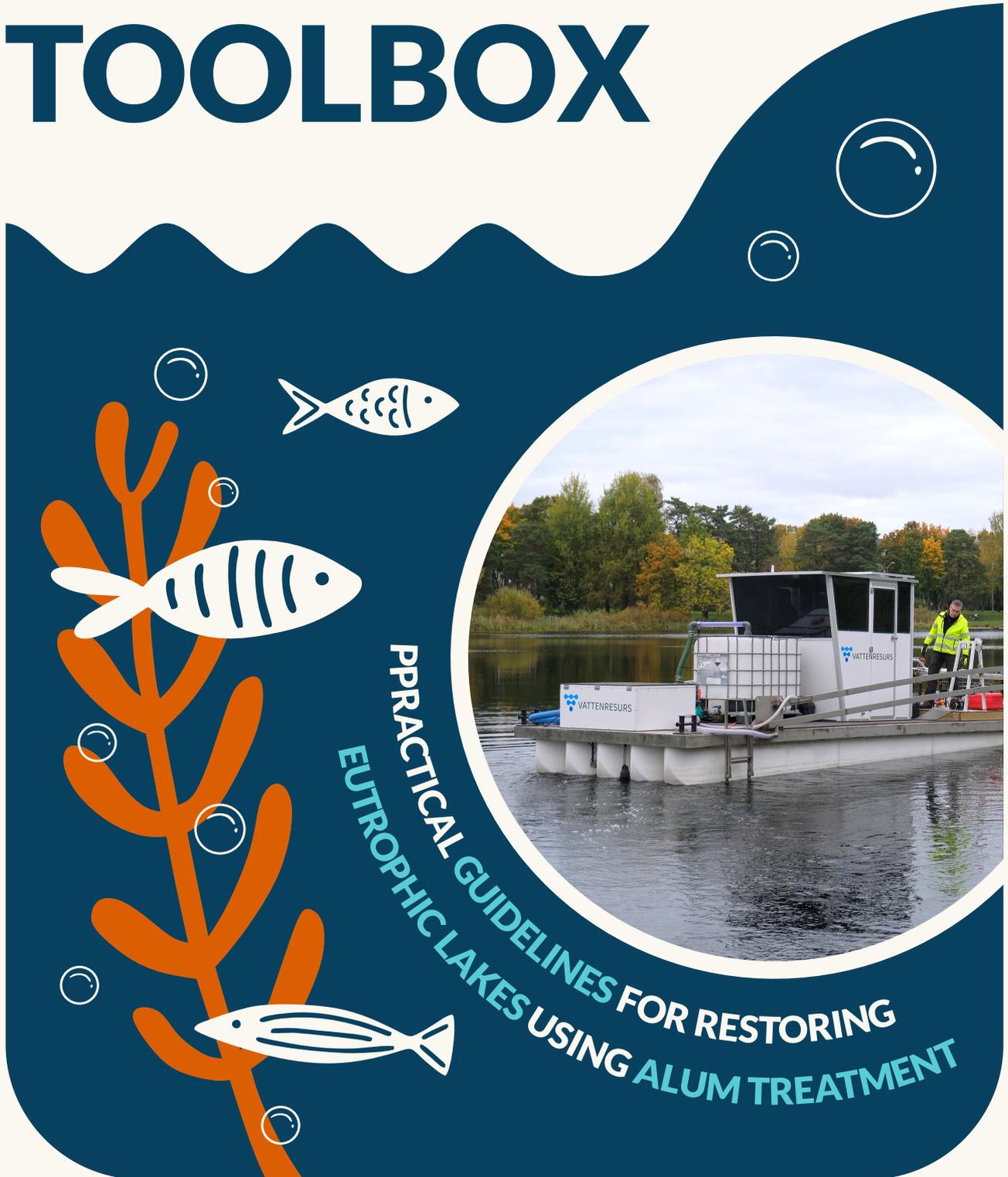


# ALUM TREATMENT TOOLBOX



## TABLE OF CONTENTS

RECOMMENDATIONS	3
TECHNICAL DOCUMENTATION AND MONITORING REQUIREMENTS	6
ROADMAP	10



[interreg-baltic.eu/project/trust-alum](https://interreg-baltic.eu/project/trust-alum)

Interreg Baltic Sea Region 2021-2027 Programme's funded project «Building trust in target groups for ALUM treatment – an effective, yet misunderstood method for water quality improvement» TRUSTALUM.

# ALUM TREATMENT RECOMMENDATIONS

## SUMMARY

This section provides concise, evidence-based recommendations to assist national authorities in making informed decisions about funding and regulating the use of the ALUM method—an effective but underutilized water treatment solution for reducing phosphorus pollution in lakes. In this document you will find information what are necessary steps to implement ALUM treatment in your country, it will showcase the cost-efficiency of ALUM treatment based on TRUST ALUM project results, outline funding opportunities, highlight the need for legal documents updates to accommodate ALUM treatment within national legal framework, emphasizing practical steps for integrating ALUM treatment in national lake management strategies.

Contact person from national authorities with Interreg BSR TRUST ALUM project experience:

**Laura Jukame-Kerus**, project coordinator  
The Ministry of Climate and Energy of the Republic of Latvia  
e-mail: [laura.jukame-kerus@kem.gov.lv](mailto:laura.jukame-kerus@kem.gov.lv)

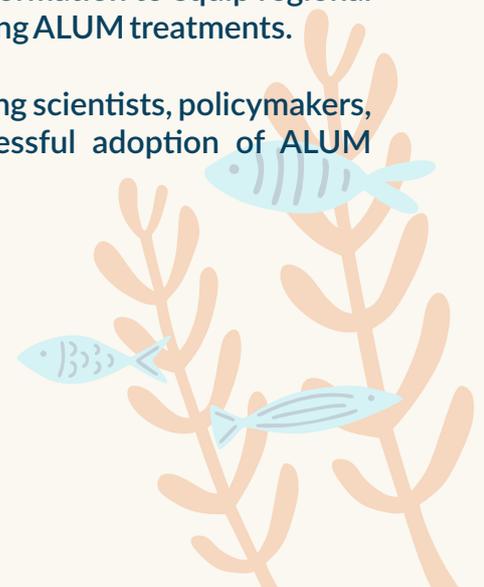


**Eutrophication** remains a pressing **environmental challenge** across the **Baltic Sea Region**, often driven by **historical phosphorus accumulation** in lake sediments. This nutrient enrichment leads to excessive algal blooms, deteriorating water quality, harming aquatic ecosystems, and posing risks to human health. While various **mitigation strategies** exist, the application of **aluminium-based compounds**, notably polyaluminum chloride (PAC), has emerged as a proven method to **bind and immobilize phosphorus in sediments**.

Despite its **successful implementation** in countries like Sweden, Finland and USA, ALUM treatment remains relatively unknown in the Baltic States. **Barriers** such as limited awareness, misconceptions about costs, and concerns over chemical safety have restricted its broader adoption. The **TRUST ALUM project** seeks to address these challenges by fostering **trust** and providing clear, evidence-based **recommendations** to national, regional and local authorities.

### **HERE ARE THE MAJOR STEPS HOW TO BEGIN IMPLEMENTING ALUM TREATMENT IN YOUR COUNTRY IF THIS HAS NEVER BEEN DONE BEFORE OR HAS BEEN DONE WITH LITTLE SUCCESS:**

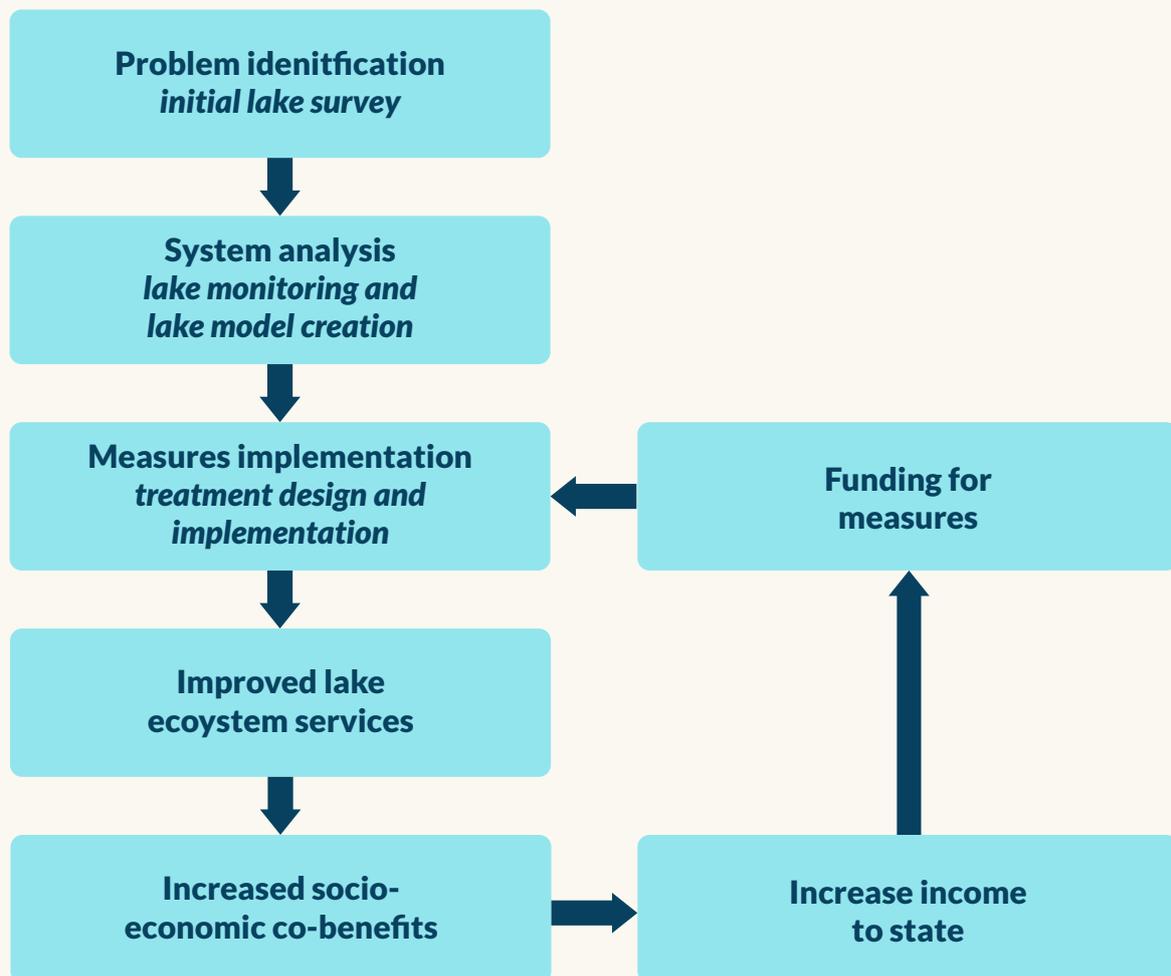
- 1. Recognise ALUM treatment as an efficient solution:** Acknowledge the benefits of ALUM treatment in reducing internal phosphorus loading, leading to improved water quality and ecosystem health.
- 2. Evaluate whether changes in national regulations are necessary to legalise ALUM treatment:** Often current legal documents do not support ALUM treatment simply because of the reason it has never been relevant and differs from other traditionally applied treatment methods, e.g. dredging, aeration, etc. Consider including ALUM treatment as one of the methods for phosphorus mitigation in River Basin (District) Management Plans.
- 3. Develop clear regulatory frameworks:** Establish guidelines and standards for the application of ALUM treatment, ensuring environmental safety and consistency across the country.
- 4. Allocate dedicated funding:** Provide financial support for pilot projects and full-scale implementations of ALUM treatment or at least for parts of the treatment, i.e. monitoring or aluminium dose modelling, considering long-term cost-effectiveness and environmental benefits. Often ALUM treatment costs are not feasible for smaller municipalities. Such projects could be supported by small national grants intended for ecosystem services, fisheries resources improvement, lake cleaning and similar activities.
- 5. Promote knowledge sharing:** Invest in the dissemination of information to equip regional and local authorities with the necessary knowledge for implementing ALUM treatments.
- 6. Encourage stakeholder engagement:** Foster collaboration among scientists, policymakers, and community members to build trust and ensure the successful adoption of ALUM treatments.



# COST EXAMPLES FROM THE INTERREG BSR TRUST ALUM PROJECT, BASED ON THE ALUM TREATMENT PILOT DONE IN A LATVIAN LAKE IN OCTOBER 2024\*



# POTENTIAL SELF-SUSTAINING FUNDING MECHANISM FOR LAKE RESTORATION USING THE ALUM TREATMENT METHOD\*



## Socio-economic benefits may include:

- Increased property value.
- Increased recreational activities and incoming visitors.
- Increased community engagement.
- Cultural heritage preservation.
- Reduced greenhouse gas emissions.
- Improved flood control.
- Improved public health.
- Increasing lake environmental services (eg. fish and freshwater supply).
- Avoiding economic losses linked to degraded ecosystems.

\* Modified after: Tammeorg, O., et al. (2025). Towards sustainable lake restoration. The Science of the Total Environment, 994, 180001.

# ALUM TREATMENT TECHNICAL DOCUMENTATION AND MONITORING REQUIREMENTS

## SUMMARY

This document provides step-by-step technical guidance for regional authorities responsible for implementing the ALUM treatment method in lake restoration projects. It translates the complex scientific and procedural knowledge gathered during the TRUST ALUM project into practical instructions and monitoring protocols. In this document you will find information about permit acquisition, treatment planning, the monitoring application procedure and needed documents based on the example from the treatment case in Latvia, monitoring framework for pre-, during- and post-treatment, including a list of obligatory, optional and supplementary analyses and sampling frequency.

Contact person from national/regional authorities with Interreg BSR TRUST ALUM project experience:

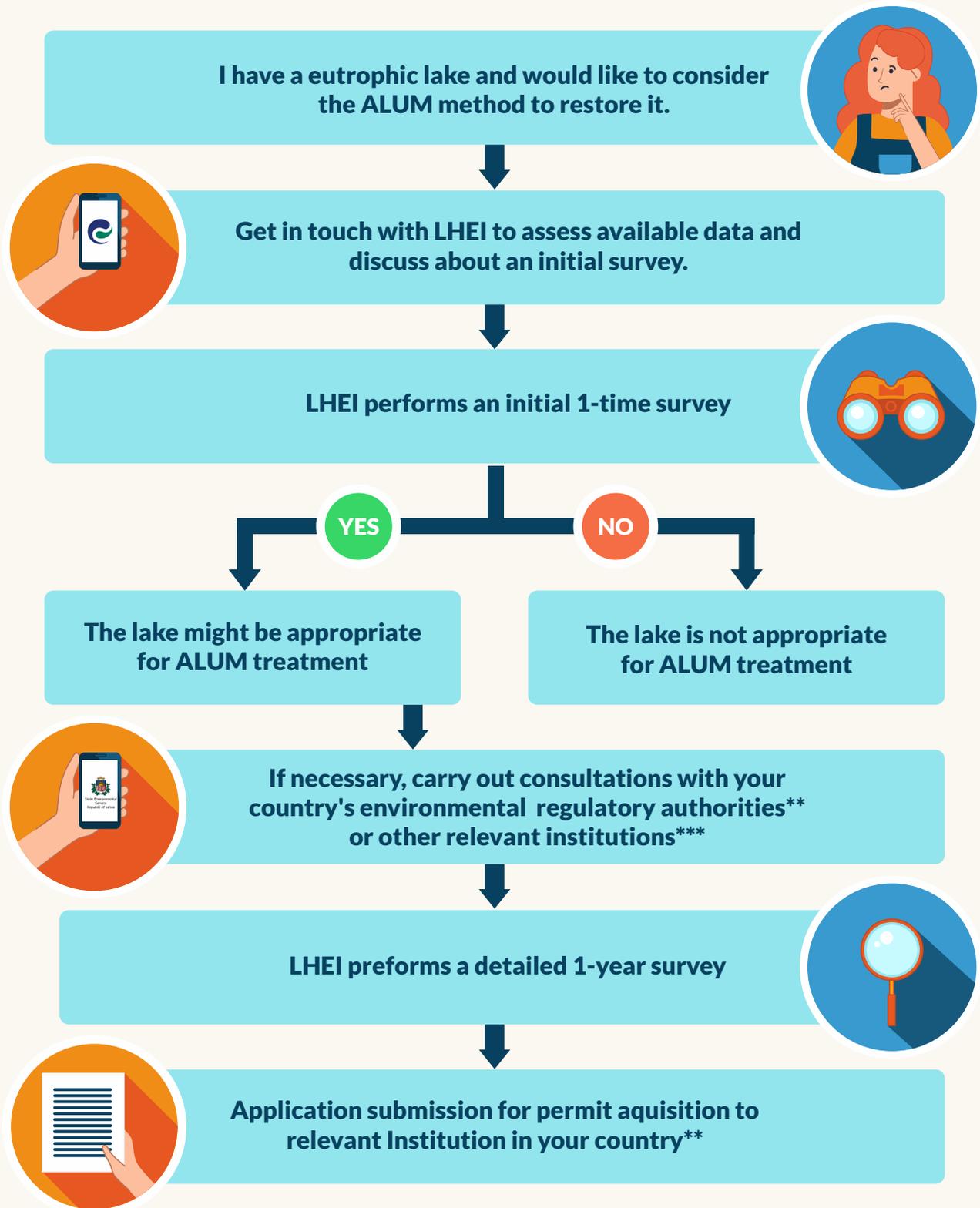
**State Environmental Service  
Permit Administration**  
e-mail: [ap@vvd.gov.lv](mailto:ap@vvd.gov.lv)

Contact person for lake monitoring:

**Inta Dimante-Deimantovica**, former senior researcher  
Latvian Institute of Aquatic Ecology  
current e-mail: [inta.deimantovica@bior.lv](mailto:inta.deimantovica@bior.lv)



# PROCEDURE FOR IMPLEMENTING ALUM TREATMENT IN LAKES DEVELOPED BASED ON THE INTERREG BSR TRUST ALUM PROJECT\*

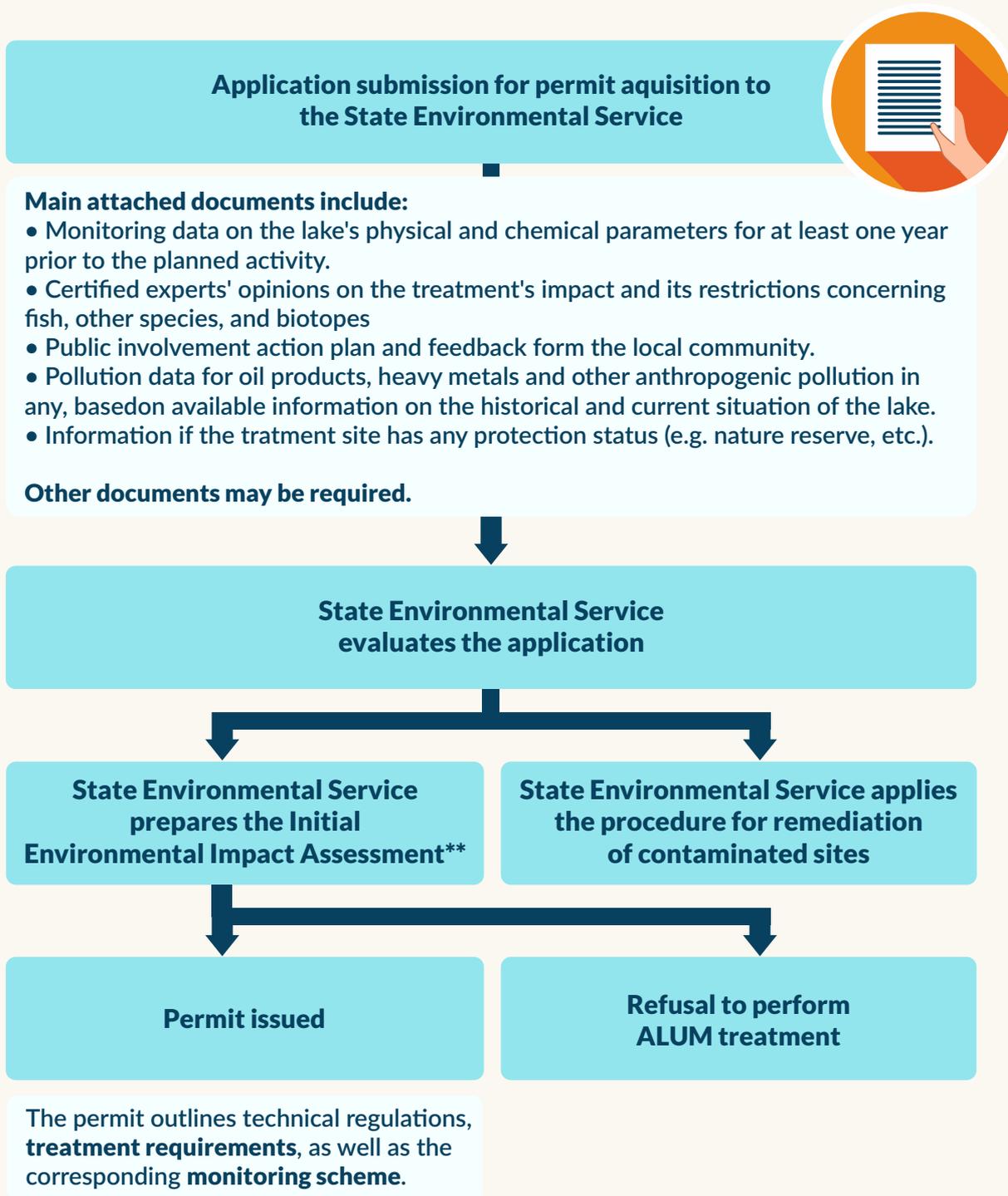


\* The procedure was developed when the pilot treatment was performed in Latvia in 2024. Procedures in other countries may differ.

\*\* State Environmental Service in Latvia.

\*\*\* E.g. Nature Conservation Agency for nature protected territories, National Cultural Heritage Administration if cultural monuments or their protection zones are affected, etc.

# SIMPLIFIED SCHEME FOR ALUM TREATMENT ACQUISITION IN LATVIA\*



\* The application must be submitted not less than 1 month before the planned treatment. It should be noted that the State Environmental Service, after evaluating the application, may request additional information and documentation, in accordance with the requirements of regulatory enactments, which may require additional time to receive the permit.

\*\* The procedure must be specified in accordance with the requirements of applicable laws and regulations at the time of submission of the application, e.g. permit acquisition process. Permit acquisition process may vary in case of specific infrastructure needs.

# LAKE MONITORING FRAMEWORK FOR LAKES TREATED WITH THE ALUM METHOD



\* Some parameters are measured more or less frequently than once per month.

\*\* Parameters are measured after every hour of aluminium salt addition.

\*\*\* At least one year after treatment, but preferably longer.

# ALUM TREATMENT ROADMAP

## SUMMARY

This section aims to guide local authorities in evaluating the feasibility, safety, and cost-effectiveness of ALUM treatment. It will allow local authorities to select lakes that would strongly benefit from ALUM treatment and will provide further instruction on how to plan treatment, calculate and save costs, implement and maintain the ALUM treatment process in their administrative territory.

Contact person from local authorities with Interreg BSR TRUST ALUM project experience:

**Mārcis Zariņš**  
Riga Municipality  
e-mail: [marcis.zarins@riga.lv](mailto:marcis.zarins@riga.lv)



# HOW DO I KNOW IF THE LAKE IS APPROPRIATE FOR ALUM TREATMENT?

Appropriate	Inappropriate	Possible issues or things to consider
<p>Lakes with no considerable inflow or outflow.</p> <p>Lakes with historical phosphorus load which needs to be suppressed.</p> <p>Lake depth map and shapefiles are available.</p> <p>Temperature during planned treatment will be at least 10°C (May-October in Latvia).</p> <p>Historical and/or current monitoring data is available.</p>	<p>Lake has high external phosphorus input which cannot be managed.</p> <p>Water pH measured throughout the year is below 6.</p> <p>The lake is very shallow (water depth must be at least 2 m for treatment).</p> <p>Areas inhabited by plants with strong root systems developed in the sediment (e.g. <i>Phragmites australis</i>, <i>Nymphaeaceae</i>, etc.).</p>	<p>Underwater cable and/or pipe systems.</p> <p>Installed fountains.</p> <p>Archeological objects.</p> <p>Protected areas.</p> <p>Protected species.</p> <p>Nesting birds and spawning grounds for fish.</p> <p>Location in a swampy area.</p> <p>Location with a lot of trees and bushes.</p> <p>Hanging cables.</p> <p>Carring capacity of roads and bridges.</p> <p>Private access roads and other road barriers.</p> <p>Trash or wrecks on the bottom of the lake.</p> <p>Vegetation spread in the shallower areas of the lake.</p> <p>Permission issuance (dependant on specific site and country legislation).</p> <p>Regular monitoring before, during and after treatment.</p> <p>Informative initiatives for local people.</p>

## HOW CAN LOCAL AUTHORITIES BE INVOLVED AND POSSIBLY DECREASE COSTS?

### Collect available information

Collect archival monitoring data, bathymetric maps, lake infrastructure design plans and other information.



### Secure experts' opinions

Secure experts' opinions about treatment impact and restrictions as to fish, other species and biotopes.

### Provide practical help during sampling

Provide boat or help during measurements and sampling, etc.



### Help with data collection

Measure water level changes every week, etc.

### Prepare the site before treatment

Cut the bushes near the lake, organize the needed technical elements (e.g. fencing, tent, security, etc.) and obtain permits.



### Clear up the treatment site after treatment

Restore the surface if it became damaged during treatment, remove the technical elements, etc.

## WHAT TO DO AFTER TREATMENT?

### Avoid additional phosphorus inflow

Make sure to remove any potential sources of P to the lake (e.g. waste water management, lake side infrastructure, etc.)



### Continue monitoring the lake after treatment

Arrange post-treatment monitoring at least every other year to see any changes and assess treatment effectiveness.

### Measure pH levels

Regularly monitor pH to check if it is not considerably decreasing (below 6).



### Provide maintenance to the lake

Upkeep good health of the lake by implementing suggested measures (e.g. aeration fountain, biomanipulation, etc.).

For ALUM treatment permit acquisition in Latvia, one of the key requirements is a public involvement action plan and documented feedback from the local community. It is important not to underestimate this step, as the use of aluminium for lake restoration still carries negative associations in the public's perception. Open communication, combined with clear, science-based evidence, is essential to build trust and support for the restoration project.

## **SOME SUGGESTED ACTIVITIES FOR MUNICIPALITIES:**

**Public Information Meetings:** Organize open community meetings or workshops where experts explain the ALUM treatment process, expected benefits, safety measures, and timeline, allowing residents to ask questions and express concerns. Use the Interreg BSR TRUST ALUM webpage for useful information, including a frequently asked questions and answers section there.

**Informative Materials:** Develop and distribute flyers and posters clearly explaining the project in easy-to-understand language.

**On-Site Informative Tent:** Set up an information tent near the lake or in public spaces during the treatment period with visual displays (e.g., posters, videos, before/after examples, etc.) and experts available to answer questions (as done successfully in the TRUST ALUM project).

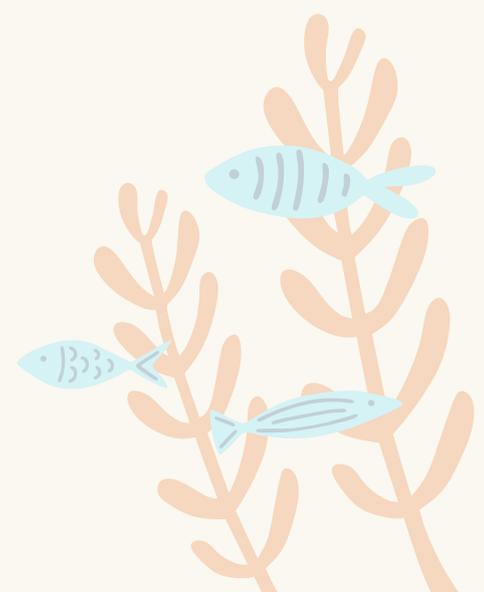
**Demonstration Activities:** Conduct simple demonstrations like the Jar Tests to visually show how the ALUM process works, helping people better understand the process and its environmental benefits.

**Online Surveys or Feedback Forms:** Create simple online or paper-based surveys to collect opinions, concerns, and suggestions from residents, ensuring that all voices are heard and documented.

**Media Outreach:** Publish articles, interviews, or announcements in local newspapers, radio to reach a wider audience.

**Stakeholder Meetings:** Involve local NGOs, fishing associations, citizen communities early in the process to build trust and partnership.

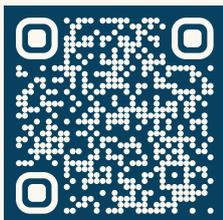
**All feedback received should be summarized and included in the public involvement report submitted with the permit application!**



# TRUST ALUM

## BUILDING TRUST IN TARGET GROUPS FOR ALUM TREATMENT - AN EFFECTIVE, YET MISUNDERSTOOD METHOD FOR WATER QUALITY IMPROVEMENT

### MORE INFORMATION ABOUT THE PROJECT



[interreg-baltic.eu/project/trust-alum](https://interreg-baltic.eu/project/trust-alum)

Interreg Baltic Sea Region 2021-2027 Programme's funded project «Building trust in target groups for ALUM treatment – an effective, yet misunderstood method for water quality improvement» TRUST ALUM.

The content of the material is solely responsibility of the authors and can in no way be taken to reflect the views of the Funding institution. Report was developed by the TRUST ALUM project team. Giving credit to the authors and TRUST ALUM project is necessary if this material is used.

### PROJECT PARTNERS

