

**“Joint Management of Urban Wetland Areas in border region Latvia-Lithuania”  
Urb-Area Nr.LLI-472**

**Final report on monitoring of urban wetlands in Daugavpils and Anykščiai**

**“Progress in restoring green infrastructure in urban wetlands, effectiveness of joint cross-border management of urban wetlands and mitigation of environmental risks”**



### **Latvian experts involved in the Action Plan:**

*Dr. Uldis Valainis<sup>1</sup>, Head of Management Plan development*

*Dr. Mārtiņš Kalniņš<sup>1,2</sup>, freshwater habitat expert*

*Dr. Juris Soms<sup>1</sup>, hydrology expert*

*Dr Jānis Birzaks<sup>1</sup>, fish species expert*

*Dr. Maksims Balalaikins<sup>1</sup>, invertebrate species expert*

*Dr. Andris Čeirāns<sup>1</sup>, amphibian and reptile species expert*

*Dr Kristīne Dreija<sup>1</sup>, landscape specialist*

*Msc. Gaidis Grandāns<sup>1,2</sup>, bird species expert*

*Msc. Karīna Dukule - Jekušenoka<sup>1</sup>, mammal species expert*

*Msc. Dana Krasnopolska<sup>1</sup>, vascular plant species and grassland expert*

*Msc. Māris Nitcis<sup>1</sup>, GIS specialist*

### **Lithuanian experts involved in the Action Plan:**

*Dr. Aušrys Balevičius<sup>3</sup> - species and habitat expert*

*Dr. Jolanta Rimšaitė<sup>4</sup> - species and habitat expert*

1 - Daugavpils University, Daugavpils, Latvia

2 - JSC "Latvia's State Forests", Latvia

3 - UAB Senasis Ežerėlis, Lithuania

4 - Nature Research Centre, Institute of Ecology, Vilnius, Lithuania

## CONTENTS

|  |    |
|--|----|
| <b>INTRODUCTION</b> .....  | 4  |
| <b>1. EVALUATION OF THE SUCCESS OF THE MANAGEMENT MEASURES IMPLEMENTED IN THE ESPLANADE WETLAND IN DAUGAVPILS</b> .....                          | 5  |
| 1.1. TREE AND SHRUB PRUNING.....   | 7  |
| 1.2. THINNING OF SHRUB OVERGROWTH.....   | 7  |
| 1.3. THE CREATION OF A SYSTEM OF PONDS ENCLOSING OPEN WATER AREAS AND WETLAND AREAS.....   | 12 |
| 1.4. IMPROVEMENT OF THE AREA ADJACENT TO THE LATGALE ZOO.....  | 17 |
| <b>2. ASSESSMENT OF THE SUCCESS OF THE MANAGEMENT MEASURES IMPLEMENTED WITHIN THE FRAMEWORK OF THE PROJECT IN THE ANYKŠČIAI GREEN POND</b> ..... | 18 |
| 2.1. CUTTING EXCESS SHRUBS AND INVASIVE TREE SPECIES, REMOVING STUMPS  | 18 |
| 2.2. COLLECTING RUBBISH.....   | 20 |
| 2.3. CLEANING AND DEEPENING PART OF THE GREEN POND.....  | 21 |
| 2.4. IMPROVING HABITATS OF THE GREEN POND .....  | 23 |
| 2.5. CREATING INFRASTRUCTURE FOR PUBLIC ATTENDANCE AND EDUCATION.....  | 24 |
| <b>3. EVALUATION OF THE PUBLIC EDUCATION ACTIVITIES CARRIED OUT UNDER THE PROJECT</b> .....  | 24 |

## **INTRODUCTION**

Within the framework of the project LLI-472 "Joint Management of Urban Wetland Areas in border region Latvia-Lithuania" implemented by the Daugavpils City Council together with the Municipal Administration of the Anykščiai Region under the Interreg V-A Latvia-Lithuania Cross-border Cooperation Programme 2014-2020, management measures for two urban wetlands (Esplanade Wetland in Daugavpils and Green Pond in Anykščiai) have been implemented. The aim of the project is to develop a new and effective approach to joint management of urban wetlands across the border. In addition, a joint action plan has been developed, an innovative, integrated approach to observation of wetland wildlife and its inhabitants has been established, and ecological education activities have been conducted.

The management measures have been implemented in close cooperation between the project representatives, the municipality's specialists, the technical contractors, as well as nature and environmental experts. The recommendations of the Latvian and Lithuanian experts involved in the project were taken into account in the implementation of the management measures to be implemented in the project, which were included in the Daugavpils and Anykščiai Urban Wetland Management Plan. It is important that several meetings of project partners and experts were organised in Daugavpils and Anykščiai within the framework of the project, thus contributing to more effective cross-border management of wetlands and mitigating potential environmental risks during project management activities. During the meetings, the representatives of the municipalities had the opportunity not only to share their practical experience in the management of the Daugavpils and Anykščiai wetlands, but also to receive advice from qualified environmental and nature experts on the implementation of green infrastructure management measures.



## **1. EVALUATION OF THE SUCCESS OF THE MANAGEMENT MEASURES IMPLEMENTED IN THE ESPLANADE WETLAND IN DAUGAVPILS**

In the adjacent territory of the Latgale Zoo on the land parcel with cadastral No 05000101104, within the project, measures to restore the green infrastructure and ecosystem services of the wetlands were implemented - mowing of shoots of trees and shrubs, thinning of shrub overgrowth, as well as creation of open water areas and pond system. The management measures have been implemented in accordance with the recommendations of the experts involved in the project, as well as within the timeframe indicated by the experts.

During the project implementation works were carried out to improve the territory of Latgale Zoo - pavements, driveways and pedestrian paths were arranged, lawn was landscaped, trees and shrubs were planted. Benches, rubbish bins and a bicycle rack have been placed in the area. A video surveillance system and a visitor counter have been installed.

See Figure 1 for a map of the management measures implemented within the project.

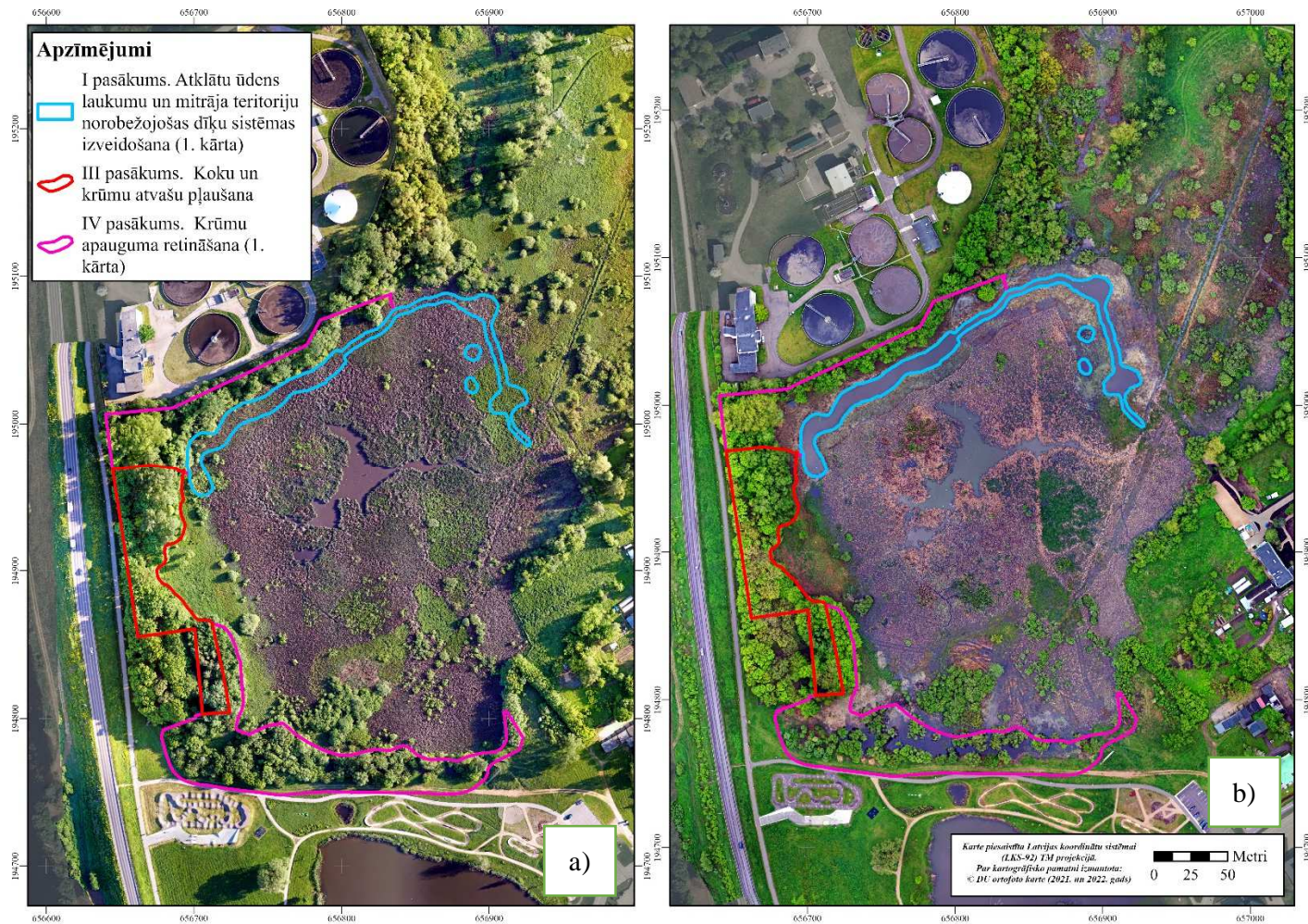


Figure 1. Picture of Esplanade Wetland from drone in 2021 before implementation of management measures (Figure a) and in 2022 after implementation of management measures (Figure a) and management measure areas



## 1.1. TREE AND SHRUB PRUNING

The project involved cutting and removal of overgrown shoots in the tree stand along Daugavas Street (Figure 1), covering a total area of 0.51 ha (Figures 2 and 3). Prior to the management measures, the area was densely overgrown with tree and shrub shoots (including expansive and invasive species). As a result of the implemented management measures, lighting conditions on the vegetation layer have improved, which will contribute to an increase in vascular plant diversity. To ensure the long-term effectiveness of the implemented management measures, mowing of regrowth should be repeated at least once every 3-5 years. It is mandatory to remove the cut material from the site.



*Figures 2 and 3. Birch stand along Daugavas Street, where shoot mowing has been implemented (Photo: U. Valainis)*

## 1.2. THINNING OF SHRUB OVERGROWTH

According to the Daugavpils and Anykšćiai Urban Wetlands Management Plan, developed within the project, the implementation of this particular management measure was planned in two phases to reduce the impact on scrub-dwelling animal species. The project implemented the first phase of shrub thinning (see Figure 1) over a total area of 1.86 ha. In the areas where shrub thinning was carried out (Figures 4 and 5), the works were planned and implemented by consulting with the expert team of the Urb-Area project No LLI-472. In July 2021, the project experts ensured the marking of the shrub vegetation to be cleared in the field as part of the planning works. In order to reduce the spread of invasive species in the areas, the clearance of invasive species (mainly Ashleaf Maple) present in the area was planned as a priority. Taking into account the urban location of the site and the high potential of the wetland periphery to develop as a recreational area, the impact of the planned activities on the landscape was also taken into account when planning the thinning of shrub growth, therefore the most scenic groups of trees and shrubs were primary retained during implementation of management measures.

To reduce the potential impact of the management measures on the bird species present in the area, tree and shrub clearance was carried out outside the bird nesting season. The felled shrubs and trees were collected and removed from the site. Where tree stumps could impede future management, tree stumps and roots were removed (Figures 6 and 7). In areas adjacent to pond and canal excavation sites, as well as in areas accessible by heavy machinery, machinery involved in pond excavation was used to remove the roots of shrubs. In the rest of the area, milling of cut bush roots was carried out.

In the wetland areas of the grassland, individual trees and shrubs have been left in place during the implementation of management measures (Figures 8 and 9), as this increases the overall species diversity of the grassland. A small amount of shrubs and trees in a meadow increases the number of

plant, bird and invertebrate species, as shrubs can provide shade for plants that cannot exist in full light.

During the clearing of trees and shrubs in the densely overgrown area adjacent to the Esplanade Park and the water treatment plants the oldest and most biologically scenic trees and shrubs, as well as some dead trees and shrubs were left to encourage the presence of species associated with dead wood in the area. The fragmentation of the dense vegetation has created new potential habitats for many species of vascular plants, birds and invertebrates.

Management measures payed particular attention to spring-flooded areas, which are usually characterised by specific flora and fauna. In the Esplanade Wetland, before the implementation of management measures, the densely vegetated overflow areas had become of low biodiversity value as a result of shading. The clearing of shrubs primarily cleared low-lying areas of vegetation (Figures 10 and 11), which will increase light and make the open water areas warmer and more suitable for many aquatic organisms in spring. The areas cleared of shrubs have increased the amount of open water and riparian areas used by birds for resting and feeding, and have had a positive effect on the area of suitable nesting slopes (the reduction in shrub and tree cover increases the proportion of areas suitable for nesting water birds) (Figures 14 and 15). The mosaic location of maintained trees and shrubs along the S edge of the site reduces the impact of human disturbance.

In the first year after the management measures, tree and shrub shoots have grown back. In the first years after the implementation of shrub and tree thinning, it is necessary to ensure the clearing of the regrowth (Figure 12) at least once every 3-5 years. It is recommended to control sprouts on stumps by stump and root pruning.

In areas of grassland where shrub and tree thinning has been carried out, mowing should be carried out at least once a year to ensure the long-term effectiveness of the management measures implemented. It is mandatory to remove the mowed hay from the site in order to reduce soil eutrophication. Mowing at least once a year in the first years after management is necessary to reduce the spread of expansive species in the remaining area cleared of vegetation (Figure 13).

In Phase 2 of the management measures, thinning of trees and shrubs is also recommended in other land units within the Esplanade Wetland (Figure 16) where rapid overgrowth with shrubs has been observed.



*Figure 4. Wetland area adjacent to Esplanade Park before shrub thinning (Photo: U. Valainis)*



*Figure 5. Wetland area adjacent to Esplanade Park during implementation of management measures (Photo: U. Valainis)*





*Figures 6 and 7. Where tree stumps could make future management difficult, tree stumps and roots are removed (Photo: U. Valainis)*



*Figure 8. Biologically older trees are preserved during clearing overgrowth in densely vegetated areas. (Photo: U. Valainis)*



*Figure 9. The most scenic groups of shrubs were primarily preserved during shrub thinning (Photo: U. Valainis)*



*Figures 10 and 11. Bush clearance was primarily performed in spring flooded areas (Photo: U. Valainis)*





*Figure 12. Dense shoots in the first year after management in cleared areas (Photo: U. Valainis)*



*Figure 13. Distribution of expansive plant species in managed areas (Photo: U. Valainis)*



*Figure 14. S part of the Esplanade area after completion of the shrub cover fragmentation (Photo: M. Nīcīsis)*



*Figure 15. W part of Esplanade area after completion of shrub cover fragmentation (Photo: M. Nīcīsis)*





Figure 16. Shrub cover thinning sites that are already implemented (Phase 1) and planned (Phase 2)



### 1.3. THE CREATION OF A SYSTEM OF PONDS ENCLOSING OPEN WATER AREAS AND WETLAND AREAS

According to the Daugavpils and Anykščiiai Urban Wetlands Management Plan developed within the project, the implementation of the specific management measure was planned in two phases to mitigate the potential environmental impacts of the planned activities. Phase 1 involved the creation of a pond system over a total area of 0.25 ha (Figure 1). In order to avoid possible negative impacts of the planned activities on the nesting of bird species in the area, the excavation of the ponds and canals was carried out outside the bird nesting season.

The works planning process included detailed planning of the works to be carried out in Phase 1, defining the desired parameters of each water body to be excavated and the desired locations of the excavated subsoil to be levelled. Prior to the start of the works, the natural experts involved in the project marked each planned water body in the field by driving stakes into the contour lines of the planned ponds (Figures 17 and 18). According to the boundaries put in nature, aquatic plants, silt and soil material were excavated and levelled (Figures 19 and 20).



*Figures 17 and 18. The boundaries of the planned water bodies are marked in the field with painted stakes (Photo: U. Valainis)*



*Figures 19 and 20. Excavation and levelling of aquatic vegetation, silt and soil material performed in accordance with boundaries put in nature (Photo: U. Valainis)*

The largest ponds, in terms of area, have an average depth of 1.5 m, while the smallest ponds, separated from the rest of the pond system, have an average depth of 0.5 m. The shores of the ponds are gently sloping, with shallow water areas, as the shallow water parts of the shoreline are more favourable for the development of zooplankton and other aquatic invertebrates, which serve as a food base for other animals.



Due to the small size and depth of the ponds to be created in the Daugavpils Esplanade, in the larger ponds 2 m deeper pits have been made in some places to prevent fish suffocation in the harsher winters.

The shapes of the ponds are designed in curved lines to resemble river meanders, thus blending more naturally into the landscape (Figures 21 and 22).



*Figures 21 and 22. The ponds created would resemble river meanders, thus blending more naturally into the landscape (Photo: U. Valainis)*

The performed management measures have had a positive impact on the vegetation of the Esplanade Wetland. Prior to the management measures, the area was dominated by monodominant stands of bulrush and reeds, which prevented the spread of other less competitive vascular plant species. The removal of bulrush and reeds from the pond banks, as well as the removal of trees and shrubs, contributed to a change in the composition of vascular plants, resulting in the spread of myrtle-loving species in the first year after the management measures, which occupied the newly created open niche on the pond banks. In the first year after the implementation of the management measures (Figures 25 and 26), the banks of the newly created ponds and canals showed a relatively poor diversity of vascular plants, but there was also no clear dominance of expansive species (Figures 23 and 24).

Following the implementation of the management measures, favourable growing conditions have also been created for a number of invasive species that were present in the area before the management measures were implemented, but in relatively small numbers. In order to maintain biodiversity, limit the spread of invasive species and limit the overgrowth of shrubs, further management of the site is required, with mowing at least once a season before the seeds of invasive species have matured.



*Figures 23 un 24. In the first year after the implementation of the management measures, the vegetation structure around the excavated ponds has already improved (Photo: U. Valainis)*



Figures 25 and 26. Bird's eye view of the pond/canal system created in the Esplanade Wetland (Photo: M. Nitcis)

The management measures have improved nesting conditions for water birds in the area. Open water areas have been increased for birds to use as resting and supplementary feeding areas. In the long term, the importance of these sites will only increase as underwater vegetation develops in the open water areas. The pond/canal excavated in the northern part of the site reduces disturbance to water birds by predators (foxes, dogs, raccoons, cats).

After the implementation of the management measures, no significant changes in the population of nesting black-headed gulls *Chroicocephalus ridibundus* have been detected in the Esplanade Wetland. In 2022, more than 1000 black-headed gulls have been recorded nesting in the Esplanade Wetland. The mass return of black-headed gulls to Daugavpils in 2022 was recorded on 15 March. Due to the larger area of open water, the young black-headed gulls were able to spend a longer time in the Esplanade Wetland after gaining their flight capacity.

The vegetation-poor banks of the newly created ponds were a suitable nesting habitat for two pairs of Northern lapwing *Vanellus vanellus*. The species was not known to nest in the area before the commencement of management measures. The nesting habitat of the Northern lapwing in Latvia is wet floodplain meadows, raised bogs, intensively used agricultural areas and various other open areas. The Northern lapwing belongs to the grassland wading bird community. A moderate decline of the Latvian Northern lapwing population has been observed in the period 2005-2021. According to the *IUCN* criteria, the species is assessed as being of low threat status in Latvia.

Two to three pairs of moorhens *Gallinula chloropus* have been recorded nesting in the area after the implementation of management measures. The species is not specially protected in Latvia, but is rare and unevenly distributed throughout the country. The size of the nesting population in the country is estimated at 523 - 1000 pairs. According to *IUCN* criteria, the species is assessed as vulnerable (VU) in Latvia. In the Esplanade Wetland area, 3 to 4 nesting pairs of pochards *Aythya ferina* have been recorded - females with fledglings have been observed. The species is directly associated with colonies of gulls, in the periphery of which it nests. The nesting population in Latvia and Europe has been declining in recent years; according to *IUCN* criteria, the species is assessed as endangered in Latvia.

The impact of the management measures on the bird fauna of the site is generally positive. The excavated ponds also improve birdwatching opportunities in the Esplanade Wetland, as the site is suitable for birds over a longer period (including migratory and non-nesting bird species).

If the creation of pond/canal system planned in Phase 2 (Figure 29) is implemented, the excavated ponds and canals will form a closed ring of water, thereby reducing the impact of surrounding



disturbance on wetland species and increasing the open water areas would reduce transpiration of water from the wetland.

Management has also increased habitat areas for other animal species associated with aquatic habitats - insects and other invertebrates, amphibians and fish. In relation to the total area of the site before the management measures, the proportion of the site covered by open water or underwater vegetation was considered insufficient. After the management measures (excavation of the pond/canal), it was observed that already in the first season the open water area and its shoreline started to be inhabited by amphibians, insects (e.g. dragonfly species associated with the open water surface and coastal vegetation) and fish.

Over time (2-3 years), as underwater vegetation develops, the value of the excavated pond/canal for different animal species will only increase. To accelerate this process, it is recommended to plant aquatic plant species (Figures 27 and 28) in the excavated pond/canal, which form different vegetation structures that are in turn used by different groups of organisms. The primary species to be introduced into the water body are the water soldiers *Stratiotes aloides*, the yellow water-lily *Nuphar lutea* and the common frogbit *Hydrocharis morsus-ranae*.

Taking into account historical data on the occurrence of unique European species such as the European pond turtle *Emys orbicularis* in the Esplanade Wetland, the project used innovative genetic monitoring methods, as standard methods are ineffective in identifying species with hidden lifestyle. The genetic monitoring methods used are based on the collection of environmental DNA (eDNA) samples in the aquatic environment. Complementing standard monitoring methods with genetic monitoring methods increases the chances of correctly estimating population size, distribution and other population parameters in a given area, as well as verifying or confirming results obtained by other monitoring methods. The environmental DNA samples collected during the project did not confirm the presence of the European pond turtle *Emys orbicularis* or the invasive pond slider *Trachemys scripta* in the Esplanade Wetland. Once the pond ecosystem established within the project has stabilised, it is recommended that individuals of *Emys orbicularis*, bred at Latgale Zoo, be released into the area with the aim of re-establishing the population that once existed in the area. After the reintroduction measures have been implemented, a monitoring system should be developed to monitor the success of the reintroduction.



Figures 27 and 28. Activities of planting aquatic plants to enhance aquatic invertebrate diversity (Photo from archive of M. Kalniņš)



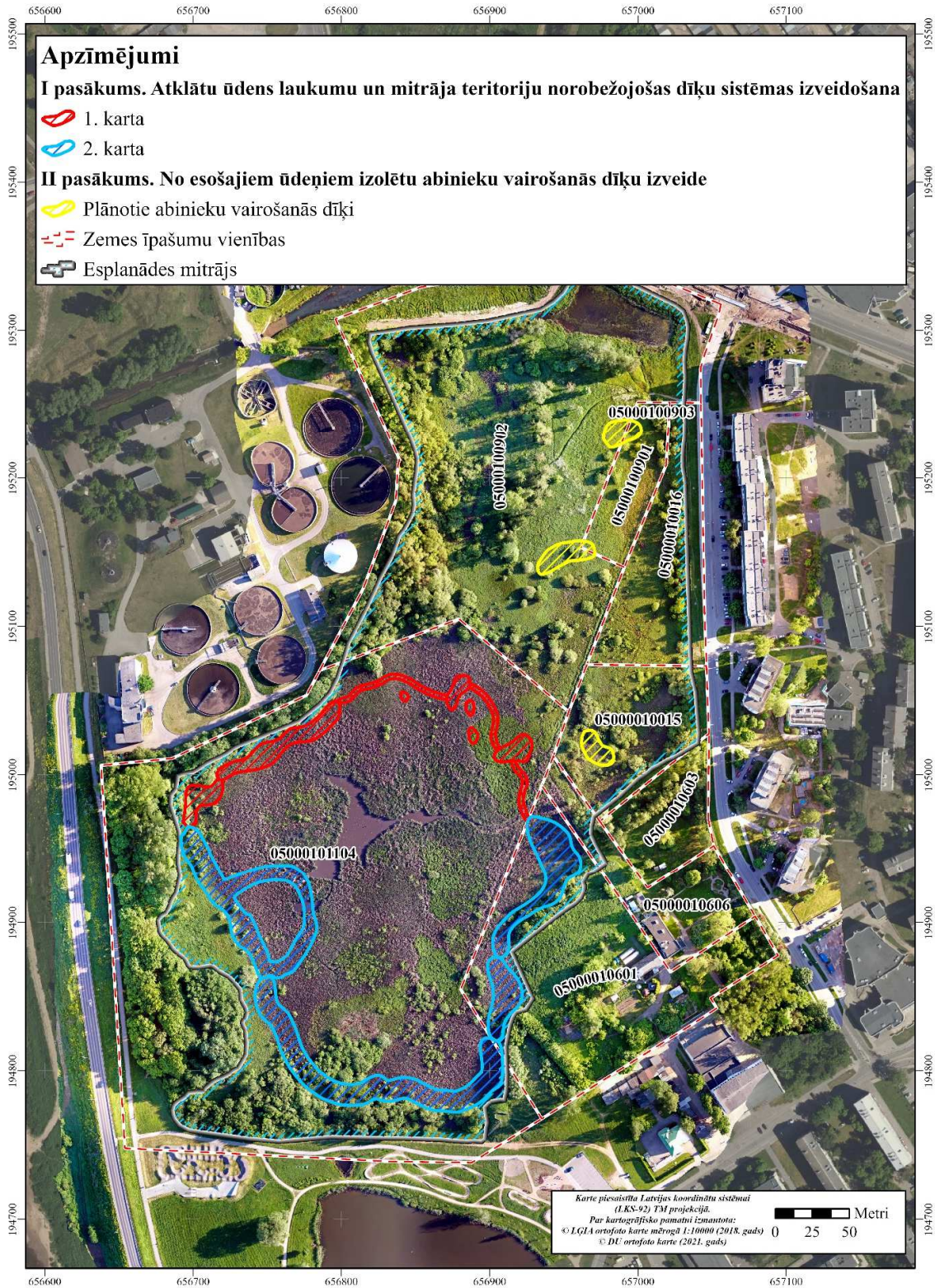


Figure 29. Already implemented (Phase 1) and planned (Phase 2) sites for the creation of open water areas and a pond system enclosing the site, as well as for the creation of amphibian breeding sites



#### 1.4. IMPROVEMENT OF THE AREA ADJACENT TO THE LATGALE ZOO

During the implementation of the project, works were carried out to improve the territory of the Latgale Zoo - pavements, entrance roads and pedestrian walkways were arranged, the lawn was landscaped, trees and shrubs were planted (Figures 30, 31, 32 and 33). Benches, waste bins and a bicycle rack have been placed in the area. A video surveillance system and a visitor counter have been installed. During the landscaping the most valuable trees and shrubs were preserved and large green areas were left, they will provide a suitable environment not only for zoo visitors but also for many species of invertebrates, birds and other groups of organisms.



*Figures 30, 31, 32 and 33. Improvement of the Latgale Zoo courtyard area (Photo: A. Rimicāns)*

## 2. ASSESSMENT OF THE SUCCESS OF THE MANAGEMENT MEASURES IMPLEMENTED WITHIN THE FRAMEWORK OF THE PROJECT IN THE ANYKŠČIAI GREEN POND

Within the framework of the project, land and waterbody management measures had been implemented in the territory of the Green pond, which is located in the Western part of Anykščiai resort town. These management measures have been implemented in accordance with the recommendations of the experts attracted within the scope of the project, as well as in conformity with the time period for the performance of work indicated by the experts.

Landscape and ecosystem management works in order to improve the Green pond and its surroundings view and habitat quality were carried out during the last phase of implementation of the project:

1. Excess scrubs, dangerously inclined and invasive trees had been moved out as well as their stumps;
2. Collected all the rubbish;
3. Part of the pond was cleaned from accumulated sludge and deepened up to 3 m of water depth while the other part was left untouched in order to sustain biodiversity and rare species habitats;
4. In order to use territory for recreation and education in the future, ponton foot-bridge, benches, garbage bins, bicycle stand, video surveillance system and visitor counter were installed on the territory.

### 2.1. CUTTING EXCESS SHRUBS AND INVASIVE TREE SPECIES, REMOWING STUMPS

Within the framework of the project, removal of densely overgrown shoots of *Salix caprea* from the shores of the Anykščiai Green pond has been carried out (Figures 34 and 35). Unhealthy and dangerously inclined shoots and branches of other trees (e.g. *Salix fragilis*, *Tilia cordata*) had been also removed. Two individuals of invasive tree species *Acer negundo* had been cut as well. All the valuable trees were left untouched.

Stumps of cut *Salix sp.* scrubs and invasive *Acer negundo* had been removed by excavator during cleaning of the pond (Figures 36, 37, 38, 39 and 40).



A





**B**

*Figures 34, 35, 36, 37, 38, 39 un 40. Anykščiai Green pond before (A) and after (B) scrub removal (Photo: A. Balevičius un E. Abramovaitė)*

As a result of the management measures implemented, Anykščiai Green pond become visible and more attractive as well as light conditions for grass vegetation (including orchid species) have been improved.



## 2.2. COLLECTING RUBBISH

As the territory was abandoned for decade (Figures 41, 42, 43 un 44), a plenty of rubbish had been collected, sorted (glass, plastic metal, green waste) and utilized during the implementation of the project.



*Figures 41, 42, 43 un 44. Territory around the Green pond was polluted by various rubbish which was collected and sorted (Photo: A. Balevičius and E. Abramovaitė)*



### 2.3. CLEANING AND DEEPENING PART OF THE GREEN POND

About 2/3 part of the Green pond area was cleaned from accumulated sludge (Figures 45, 46, 47 and 48) and about 10 % of its' area was deepened up to 3 m of water depth in order to prevent deterioration of aquatic ecosystem which occurred because of reconstructed drainage system in the buildings nearby as well as climate change.



*Figures 45, 46, 47 un 48. Cleaning and deepening of the Anykščiai Green pond (Photo: A. Balevičius and E. Abramovaitė)*

In order to control the quality of excavation jobs, bathymetrical map had been performed after excavating finished (Figure 4).

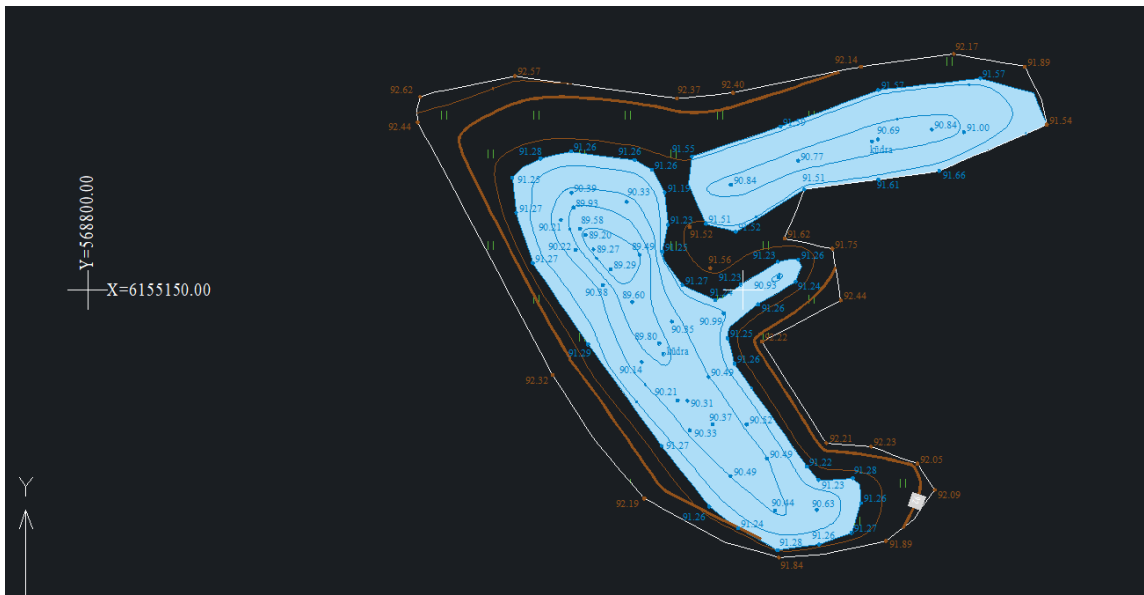


Figure 49. Bathymetric map of the Green pond after cleaning and deepening

As some rare and protected species were found in the Green pond, the other part (about 1/3) of the pond was left untouched in order to sustain rare species habitats. This step was successful – all the rare species survived during pond cleaning and were monitored in summer 2022 (Figures 50, 51, 52, 53, 54, 55 and 56). It looks like changes in scrub density positively affected population of *Dactylorhiza maculata* – 19 flowering specimens of this species were calculated in the Eastern shore of the Green pond. There were 8 specimens flowering in 2021. Further monitoring of rare species must be performed.







*Figures 50, 51, 52, 53, 54, 55 and 56. Part of the Green pond was left uncleaned in order to sustain biodiversity and habitats of protected species (Photo: A. Balevičius un E. Abramovaitė)*

## **2.4. IMPROVING HABITATS OF THE GREEN POND**

Shelters for amphibians and reptilians were made from locally cut timber (Figure 57). They had been installed in wet but non-floodable places.



*Figure 57. Artificial shelters for reptiles were made from cut Salix tree trunks (Photo: A. Balevičius)*

In order to attract more insect species to the Green pond surroundings, some “insects hotels” will be installed by schoolchildren during integrated lessons of biology and crafts.



## 2.5. CREATING INFRASTRUCTURE FOR PUBLIC ATTENDANCE AND EDUCATION

Area of the Green pond is compact, easily accessible, making it convenient to observe the animals and plants that live there. Architectural solutions of pathways, ponton foot-bridge, benches, information stands and other details of small architecture were elaborated by the architects of Anykščiai municipality. Ponton foot bridge was installed in summer 2022 (Figure 58).



Figure 58. Ponton foot-bridge connects the pond shore with a small isle inside it (Photo: E. Abramovaitė)

## 3. EVALUATION OF THE PUBLIC EDUCATION ACTIVITIES CARRIED OUT UNDER THE PROJECT

In order to raise environmental awareness and understanding of the need to preserve wetlands among residents and visitors of Daugavpils and Anykščiai, public education activities have been implemented as part of the project.

Within the project, an on-line application <https://urbanwetland.eu/> has been developed, which provides an electronic catalogue (<https://urbanwetland.eu/lv/elektroniskais-katalogs/>) of the most important species and biotopes of the Esplanade Wetland in Daugavpils and the Green Pond in Anykščiai. The descriptions of species and biotopes included in the electronic catalogue are available in Latvian, Lithuanian, English and Russian. The eco-education section of the application (<https://urbanwetland.eu/lv/home/#education>) includes educational games "Water Plants", "Bird Voices", "Water Inhabitants" and "European Pond Turtle Puzzle".

In the "Observations" section of the application, visitors of the Esplanade Wetland in Daugavpils and the Green Pond in Anykščiai can upload photos of their observations of the wetlands. After new observations are registered in the system, the information is sent to the experts involved in the project, who identify the species noted and publish the observations in the application. Species observed in the Esplanade Wetland are available at <https://urbanwetland.eu/lv/noverojumi/daugavpils/>, and species observed in the Green Pond of Anykščiai are available at <https://urbanwetland.eu/lv/noverojumi/aniksci/>.

Within the project, online cameras have been installed in the Esplanade Wetland in Daugavpils and the Green Pond in Anykščiai, which can be accessed and live-streamed via the application (<https://urbanwetland.eu/lv/tiesraides-putnu-verosana/tiesraides-putnu-verosana-daugavpili/>). The specific locations of the cameras in the wetlands were selected in cooperation with the experts involved in the project (Figures 59 and 60). The cameras are placed on specially designed pontoons and operate autonomously. The energy needed to operate the cameras is generated by a solar panel. The solutions chosen for the project minimise potential disturbance to the nesting bird populations in the area, as the cameras do not require regular online maintenance.



*Figures 59 and 60. Placing of online cameras in wetlands has been carried out in collaboration with the project's nature experts (Photo: U. Valainis)*

The nature and environment experts involved in the project developed methodological materials for ecological education on wetlands for different age groups. The methodological materials developed by the experts can be used after the end of the project in various environmental education activities to raise awareness about the need and importance of wetland conservation.

During the Environment Day in Daugavpils on 5 May, 2022, the nature experts involved in the project organised educational activities for different target audiences. The participants were from different age groups and interests - preschool children and schoolchildren of different ages, students and environmental specialists (Figures 61, 62, 63, 64, 65 and 66). The content of the activities was adapted to the specificities of each target audience.



*Figure 61 and 62. A lesson on aquatic organisms in the Esplanade Wetland and their importance (Photo: U. Valainis)*





*Figures 63 and 64. A lesson on the biodiversity of the Esplanade Wetland (Photo: M. Nitcis)*



*Figures 65 and 66. Guided ornithological tour around the Esplanade Wetland to learn about the bird species that inhabit the wetland (Photo: U. Valainis)*