IMPLEMENTATION AND INVESTMETPLANS IN GURYEVSK CASE AREA, KALININGRAD REGION, RUSSIA

CATCHMENT AREA OF THE GURYEVKA RIVER BASIN:

A study of the catchment area of the Guryevka river basin; Selection of Wetland location and its type; Discussions with farmers.

In the Waterdrive project, the Guryevka River catchment area was selected as the observation zone. The catchment basin of the Upper Pond / Lake Dambas is part of the main catchment area of the Guryevka River. The selected area includes 3 drainage channels. The total drainage canals catchment area is 1030 ha, of which 490 ha is agricultural land.

• Upper Pond Area / Lake Dambas: approximately 11.5 ha.
• The floodplain zone of the lake is about 6 hectares.
• The water level in the lake is regulated by a dam.

Investments in construction wetland will reduce the nitrogen and phosphorus content in the water, which will lead to improved water quality in the lake and the Guryevka river downstream.

I.OBJECTIVES OF THE PILOT CASE

- Reducing nutrient load from agriculture landscape in the river Guryevka.
- Field research and analysis of the drainage system of the upper catchment area of the river Guryevka, to assess the state of pollution and determine the level of the terrain relief.
- The study of practical examples of the use of wetlands.
- Promote collaboration between agricultural producers, private landowners and the municipality using of the Water User Partnership Model (WUP).
- Review the outcome of the results of the field research and to make the decision on the exact location and specifications of the wetland and its properties and functionalities.
- Initiate issues associated with land relations and the procedure for obtaining building permits.
- To develop a technical project and estimate documentation for construction of the wetland, followed by implementation of the project

II.TARGET GROUPS AND HOW THEY WILL USE THE INVESTMENT

The immediate target group of the investment in the municipality of Gurievsk (PP22) and the local rural community and the 'pilot-WUP'.
The secondary target groups are local and regional authorities in Kaliningrad and the downstream communities as well as rural communities and authorities across the BSR.

III.STAKEHOLDERS TO BE INVOLVED AND THEIR ROLES

Local and regional authorities - (support activities aimed at the implementation of the project);
Department of Agriculture (Interaction with farmers);
Farmers and local private landowners in the selected area (main stakeholders);
Institutions/universities and schools (an active role in the case study);
Contractors (implementation of plans and activities)
Ministries (coordination of environmental measures);
WUP - ensuring close cooperation with entire groups in the preparation and implementation of the project.

IV.THE ACTIVITY IN 2019

The following activities were implemented under the WATERDRIVE project in 2019:

1. A start-up conference was held on the project, where a project contract was signed. (Guryevsk, Russia 21-23 October 2019).
2. Creation of a working group (Order No. 378 dated 22.11.2019).
3. Consultations were held on the selection of CASE AREA with the Department of Agriculture (Guryevsk), FSBU "Kaliningradmeliovodkhoz Management", Ministry of Natural Resources of the Kaliningrad Region, WUP (Guryevsk).
4. 4. Field visits. Inspection of drainage canals and selection of the pilot area of the Wetland.
5. A work plan has been drawn up to study the terrain and biogenic load in the Guryevka river basin (catchment of the drainage canals of the Verkhnyi Pond) and contracts have been signed:
   - research into the biogenic load of the drainage canal catchment in the Upper Pond and the Guryevka River,
   - topographic-geodesic surveys.

V.THE ACTIVITY IN 2020

1. A study of the coastal zone of the upper Guryevka River pond (Dambas Island) and the catchment area of the 3 drainage canals was carried out;
2. Topographic and geodetic surveys were carried out in the catchment area of the drainage canals of the upper pond of the Guryevka River. The works were carried out in February - November 2020.
3. Airborne video shots, panoramic shots;

4. Monitoring of the state of biogenic load in the Guryevka River basin (catchment of drainage channels in the Verkhnyi Pond);
5. The territory was determined for the construction of a Wetland with surface runoff for biological treatment of the water drainage canal MPO-11-6a.
6. Calculation of the technical characteristics of the wetland in relation to the catchment area has been carried out;
7. A plan for the location of the wetland has been drawn up
8. A permit has been obtained for the use of state-owned and municipal land for a period of 5 years (administration of the Guryevsky City District);
9. A programme of regular observations of the water body and its water protection zone has been developed (in order to obtain a Decision on the right to use the water body of the Guryevka River from the Ministry of Natural Resources);
10. The Terms of Reference for the design of engineering surveys and development of cost estimates for the construction of the Wetland have been developed.
11. Conferences and working meetings were held in Guryevsk - 4 events;
12. Participation in international conferences (Latvia) - 1 event;
13. Participation in online meetings - 14 events.

VI.DESCRIPTION OF THE PROJECT TERRITORY:

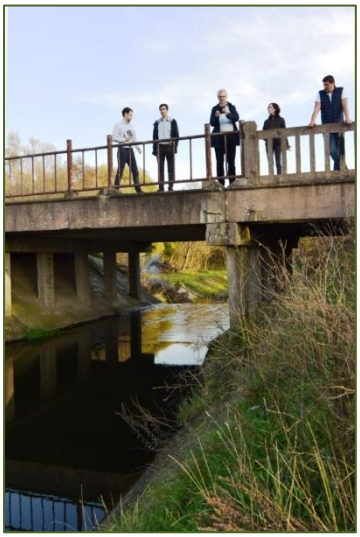
We started the WATERDRIVE project after the WaterNets-RU project under the ICLD programme (cooperation between the Guryevsk municipality, Russia and the municipality of Västervik, Sweden). As part of the WaterNets-RU project, data was collected on research into the physical and chemical parameters of the waters of the Guryevka River,

- The main sources of negative impact in the Guryevka river basin are human settlements, industrial facilities and agriculture.
- Of the 19 settlements located in the Guryevka river basin, 7 have a centralised wastewater collection and disposal system, of which only three have a wastewater treatment plant: two biological wastewater treatment plants and one mechanical wastewater treatment plant.
- All domestic wastewater enters surface watercourses either directly or through a sewerage system and treatment plant.
- Natural studies have shown that nutrient concentrations (nitrogen and phosphorus) increase as the river flows from source to mouth, which correlates with the degree of human impact and population.

- The once artificially created ponds (3 ponds) on the Guryevka River now act as natural settling ponds, thus contributing to the river's self-cleaning process. However, this is not enough to ensure that the ecosystem does not degrade.

VII.DESCRIPTION OF THE SUPPOSED PILOT AREA OF PROJECT

- The area of «Upper pond/Lake Dambas» is about 11.5 hectares
- Floodplain zone of the lake is about 6 hectares
- The water level in the lake can be adjusted by the gateway.
- 4 the drainage channels flow into the pond.



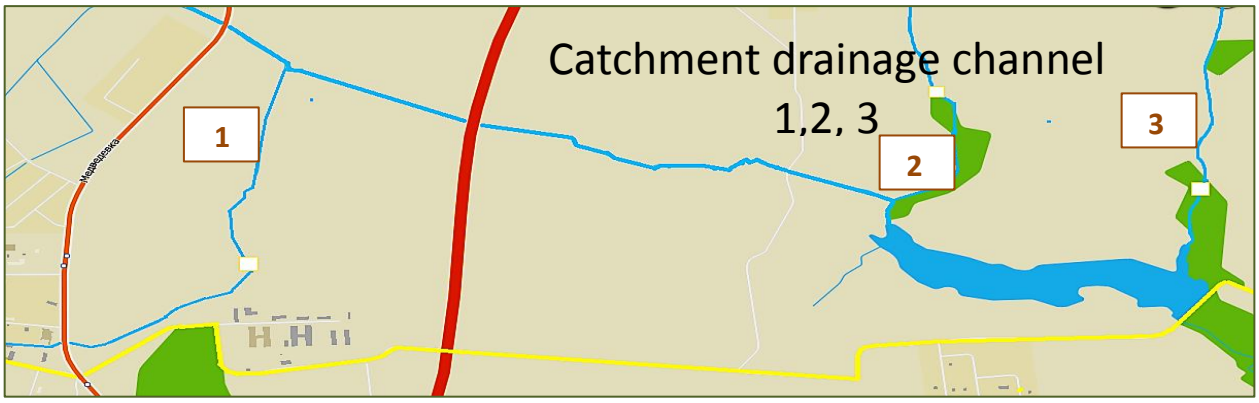
Settlements

- The number of settlements in the Pilot area of basin river Guryevka – 4
- Total area of settlements – 643,5 ha
- Number of inhabitants – 2065 person

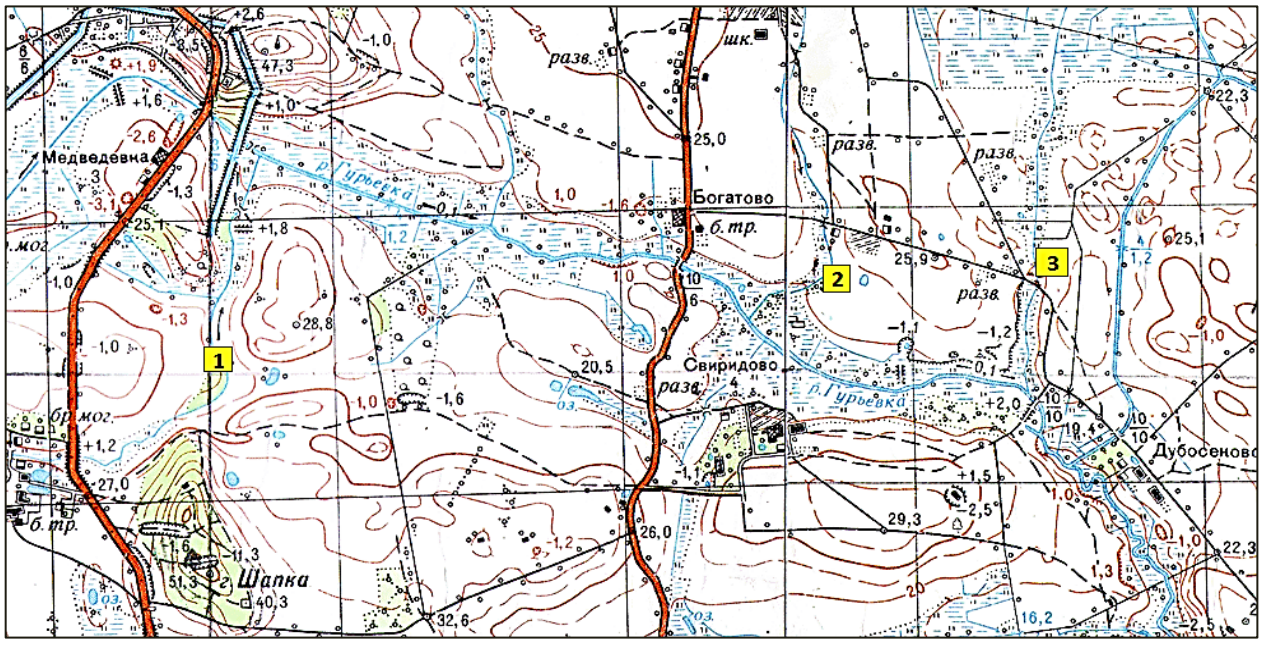
№	Name of sett.	S,ha	Population/person
1.	Orlovka	184	795
2.	Medvedevka	58,2	85
3.	Dorognyi	406,8	892
4.	Riabinovka	3,1	293

VIII. LOCATION OF CASE AREA

In the Waterdrive project, the Guryevka River catchment area was selected as the observation zone. The catchment basin of the Upper Pond / Lake Dambas is part of the main catchment area of the Guryevka River. The selected area includes 3 drainage channels. The total drainage canals catchment area is 1030 ha, of which 490 ha is agricultural land.



Water catchment area of the drainage channels of the upper pond and the Guryevka River on the topographic map.



Parameters of surveyed drainage channels in the Verkhnyi Pond, Guryevka River

Drainage channel 1 (6)
Площадь водосбора: 627 га
Расход: 12,1 m3 / c
Длина до впадения в пруд: 4 км
Территориальная зона:
Сельскохозяйственные земли и земли поселений

Drainage channel 2(7a)
Площадь водосбора: 393 га
Расход: 1,07 m3 / s
Длина до впадения в пруд: 3,5 км
Территориальная зона:
Сельскохозяйственные земли

Drainage channel 3 (6a)
Площадь водосбора: 431 га
Расход: 1,23m3 / s
Длина до впадения в пруд: 3,2 км
Территориальная зона:
Сельскохозяйственные земли

A closed network of reclamation canals territory of the Verkhny Pond catchment area of the Guryevka River on a Google map.

IX. ANALYSIS OF THE STATE OF BIOGENIC LOAD IN THE GURYEVKA RIVER BASIN (CATCHMENT OF DRAINAGE CANALS IN THE UPPER POND)

Work on the topic "Analysis of the state of biogenic load in the Guryevka River basin (catchment of drainage canals in the Upper Pond)" is carried out in accordance with municipal contract No. 436 dated 30 December 2019 between the Administration of the Guryevsk and Baltic Institute of Hydrosphere Ecology Limited Liability Company.

Schedule of field works

Drafted plan for monitoring the state of the nutrient load in catchment drainage channels (Upper pond of Guryevka river) for 2020.
Implementer: Baltic Institute of Ecology and the hydrosphere, AO13
Schedule:
In the period of January - March 2020 (once a month- 6 points).
In the period April - December 2020 (once a month - 4 points).
Indicators: ammonia nitrogen (N-NH4), nitrate-nitrogen (N-NO3), nitrite nitrogen (N-NO2), total nitrogen (N Society.), Phosphorus phosphate (P-PO4), total phosphorous (P Society.).

The catchment of the UpperPond (44 km^2 in area) is allocated within the catchment of the Gurievka River (amounting to 114 km2). The drainage system of the catchment is represented by the main channel of the Gurievka river, streams, drainage channels and ditches, and their total length within the catchment is 112 km. Currently, the drainage system is designed in such a way that its watercourses collect water mainly from forest areas and agricultural lands (Fig.1).

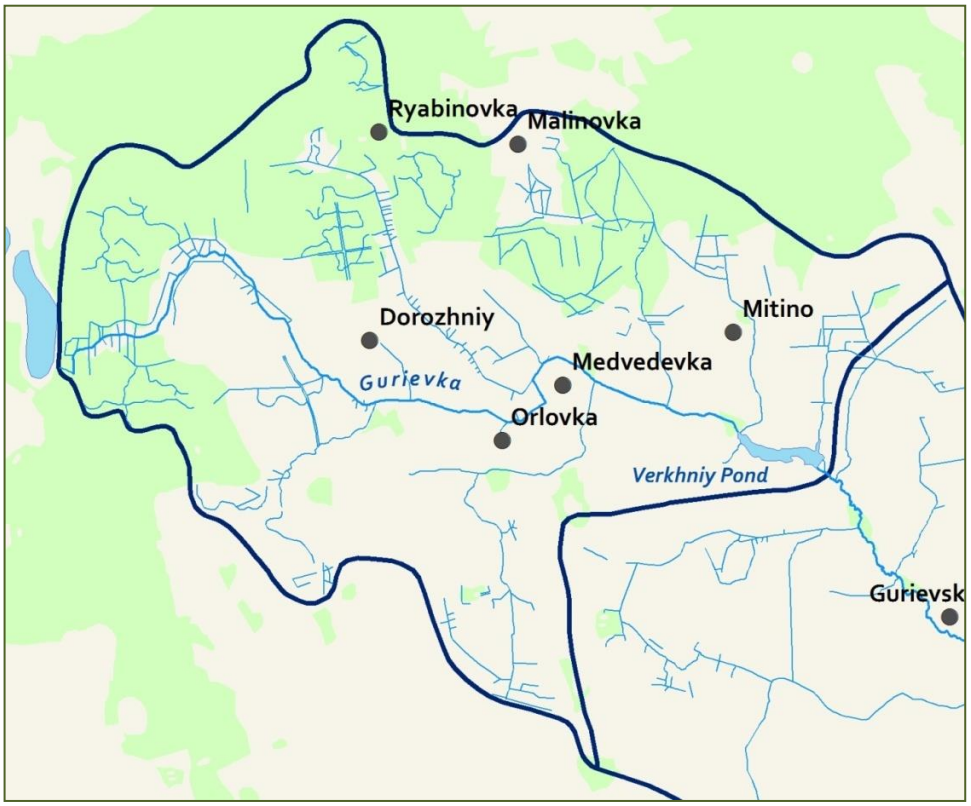


Figure 1 – The drainage system of the drainage basin of the Upper Pond

The network density of the Gurievka River is 0.95 km per km^2. The average annual runoff in the river basin ranges from 8 liters per sec. from km^2 (in the upper reaches) to 6 liters per sec. from km^2 (in the estuary). According to the simulation results, the water discharge in the closing section is 0.7 m^3 per sec. (0.8 m^3 per sec. according to publications. The river's food is mixed, groundwater is located at a depth of 0.4-1.8 meters. The aquifer connected to the river system of Pregolya is at a depth of 8-15 meters. The Gurievka River has many small tributaries. The largest tributary is the Bolshaya Moryanka River.

The river system of the Gurievka river includes ponds (downstream): Upperpond, Guryevskiy pond, Chistiy pond. Water is purified when it passes through the ponds (Fig. 2).

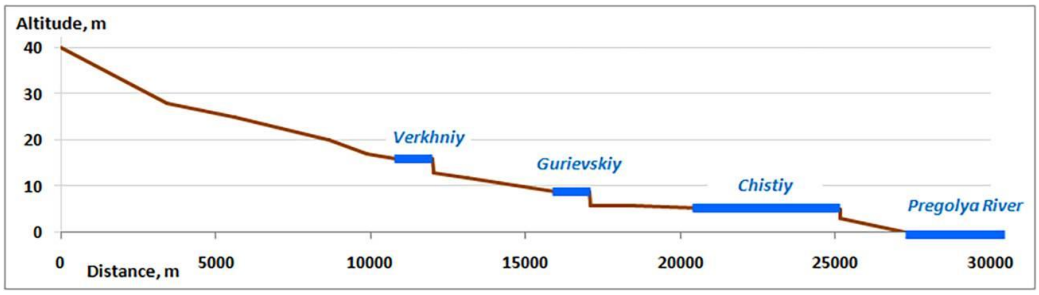


Figure 2 – Location of ponds on the Gurievka riverbed profile

The land use structure of the UpperPond catchment has the following form (Fig. 3): about 50% of the land within the catchment area is meadows and pastures, 10% of the catchment area is occupied by arable land.

Grassland, pastures and arable land are unevenly distributed. Forests located in the north and east of the catchment occupy 26% (Fig. 4).

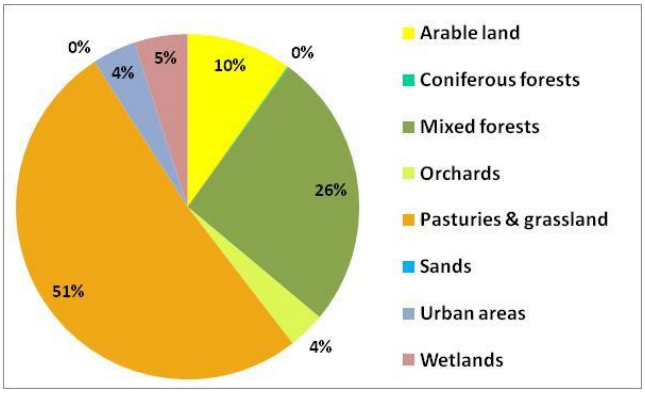


Figure 3 – The land use structure of the UpperPond catchment

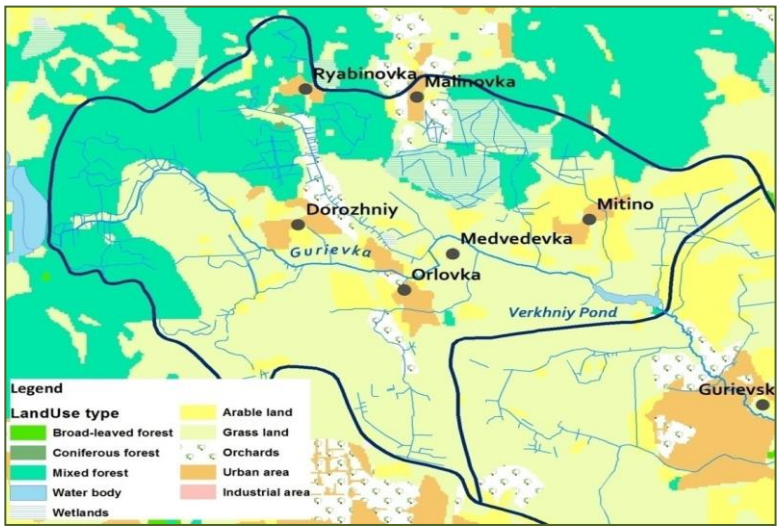


Figure 4 – Scheme of the land use structure of the UpperPond catchment

All the main tributaries of the Gurievka River originate from this territory. Built-up land makes up 4% of the territory. Gardens and marshes together comprise about 5% of the catchment area. A drainage network exists to combat waterlogging.

The main sources of water pollution in the catchment area of the Upper Pond are agriculture (arable land and pastures) and settlements.

To analyze the nutrient load coming from different pollution sources, a monitoring network consisting of six points was proposed (Fig. 5). Three points are located on tributaries (drainage channels), two on the main watercourse (Gurievka River) and one is a trailing one (below the dam of the UpperPond). Points on the channels control the removal of them; the highest point on the riverbed controls the background content of nutrients in the water; a point above the UpperPond controls the entry of nutrients into the UpperPond; a trailing point controls the removal of nutrients from the Upper Pond.

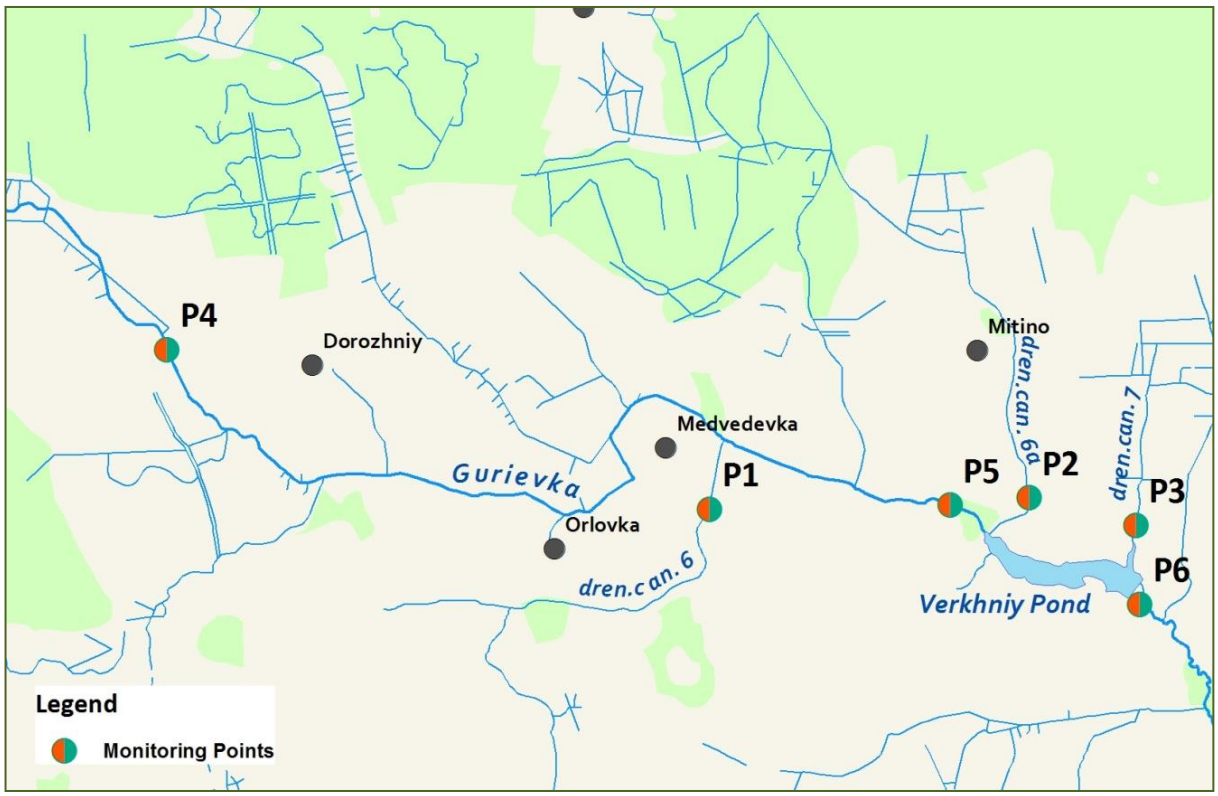


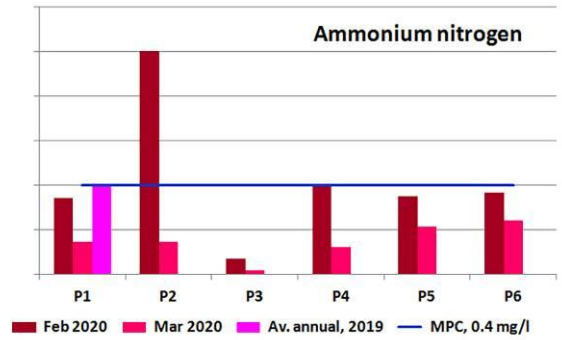
Figure 5 – Monitoring points for the catchment of the Upper Pond

The analysis of water samples was carried out on the content of elements in it: total nitrogen (N_{tot}), nitrates (NO_3), nitrites (NO_2), total phosphorus (P_{tot}), phosphorus phosphate (PO_4).

Concentrations of nitrogen and phosphorus compounds naturally increase from source to mouth. The values of the concentration of nitrogen compounds in the points of the main channel of the Gurievka river are lower compared with the values recorded in the channels (Fig. 6). It was noted that the value of the concentration of nitrates at points P2 and P3 is high in comparison with other observation points.

This indicates the impact of agriculture.

a)



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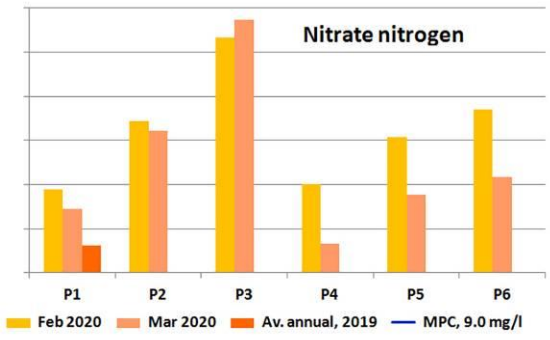

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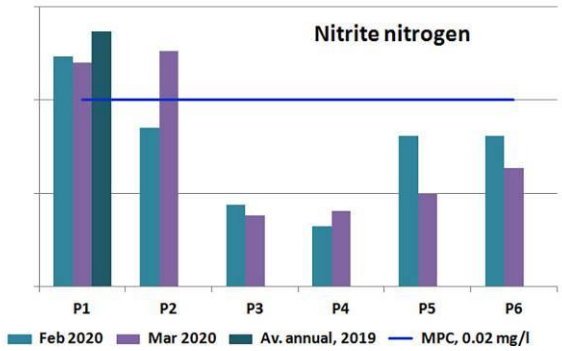

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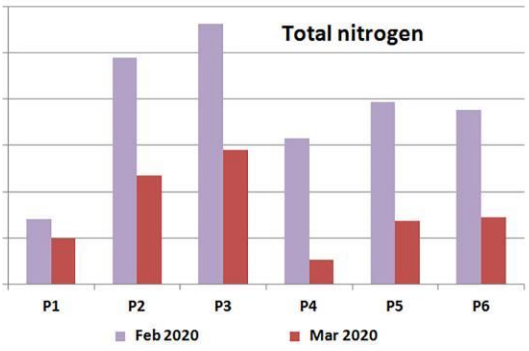
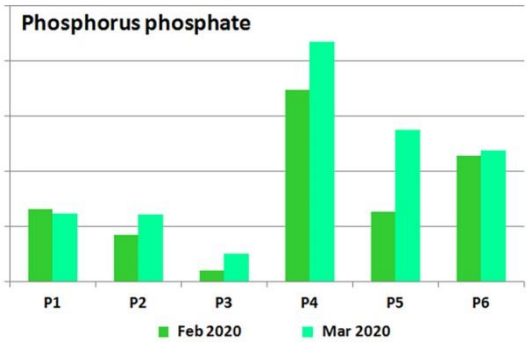


Figure 6 – Concentrations of ammonia nitrogen (a), nitrate nitrogen (b), nitrite nitrogen (c) and total nitrogen (d) in water at control points of the drainage system of the Upper Pond in February and March 2020

The change in the concentration of phosphorus phosphates in water is such that it is higher at the control points in the main channel of the Gurievka river compared with the control points in the drainage channels. However, the highest total phosphorus was recorded in the drainage channel at point P1 (Fig. 7).

a)



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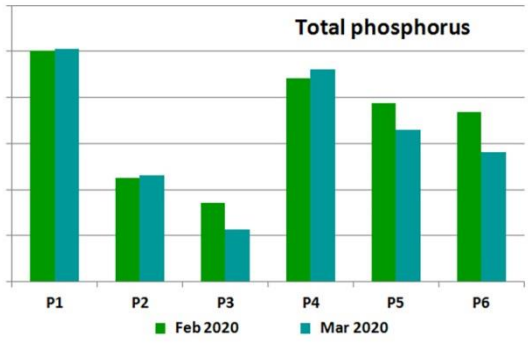


Figure 7 – Concentrations of phosphorus phosphates (a) and total phosphorus (b) in water at control points of the drainage system of the UpperPond in February and March 2020

Since there is currently no hydrological station on the Gurievka River to measure the level and discharge of water, numerical modeling can be used to obtain such data. In addition, by means of model calculations, series of hydrological data (water discharge, runoff layer) can be obtained for individual sub-basins. By means of these data, the volumes of nutrient removal can be calculated.

The HYPE (HYdrological Predictions for the Environment) model developed by the Swedish Hydrometeorological Institute (SMHI) was used for the calculations. This model is open source software for use (http://hype.sourceforge.net/, http://www.slu.se/en/collaborative-centres-and-projects/slu-water-hub/models/fyrisnp/).

The model was applied earlier for the catchments of the Pregolya, Mamonovka, Western Dvina, Luga, etc.

The HYPE model calculates the time variation of the discharge value at the outlet sections of the sub-basin system, taking into account evaporation and infiltration into the soil. Input data are: data on topography, land use structure, soil types, time series of precipitation and air temperature; for calibration, time series of the river runoff value at control points of catchments is required (Table 1).

Table 1. List of parameters used to calculate the hydrological parameters of the sub-basins of the Gurievka River system using the HYPE model.

Parameter	Unit	Source of information
Sub-basin area	km^2	Satellite radar topographic survey data, calculation using GIS
Soil types (texture)	%	Soil maps of the Russian Federation, calculation using GIS
Land use structure	%	Land Cover data, calculation using GIS
Average altitude	m	Satellite radar topographic survey data, calculation using GIS
Average slope	%	Satellite radar topographic survey data, calculation using GIS
Precipitation	mm per day	Meteorological data for the Kaliningrad station
Temperature	°C, per day	

In total, 8 sub-basins have been identified, the largest has an area of 40.9 km^2, the smallest – 1.1 km^2 (Fig. 8, 9).

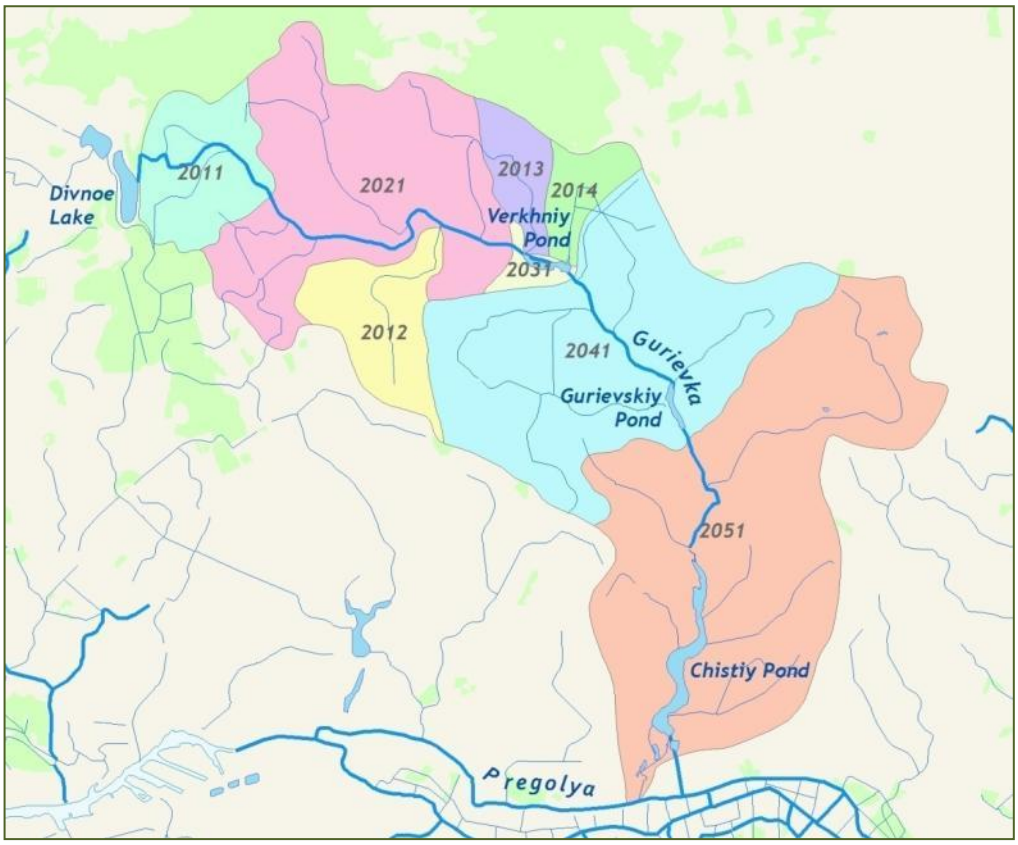


Figure 8 – Sub-basins of the Gurievka River Catchment

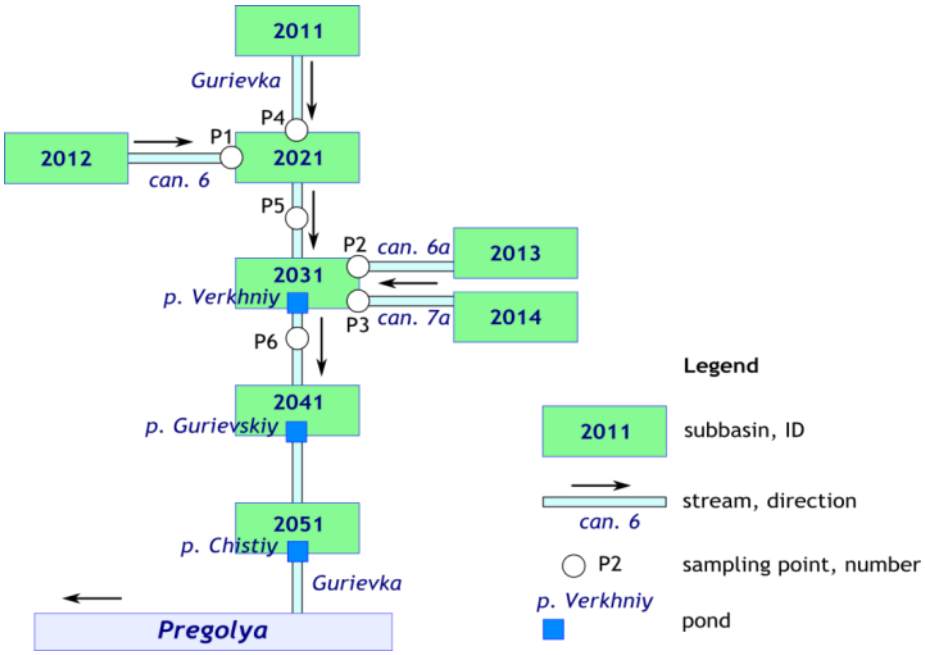


Figure 9 – Scheme of the delineation for the Gurievka River Catchment, used for model simulation

For calibrating and calculating hydrological parameters, daily data on temperature and precipitation were used. The main source of meteorological information is data from operating

meteorological stations. There are no meteorological stations within the catchment area of the Gurievka River. The nearest station is Kaliningrad. Data from it is used for modeling.

The source of information is the open server Weather Schedule (rp5.ru). For Kaliningrad station, meteorological data were collected for the period from 01.01.2016 to 30.06.2020. (Fig. 10) A long period is necessary in order to stabilize the hydrological situation in the catchment and see the dynamics of changes in water discharge during modeling. By the end of the project, the simulated range will be expanded until December 2020.

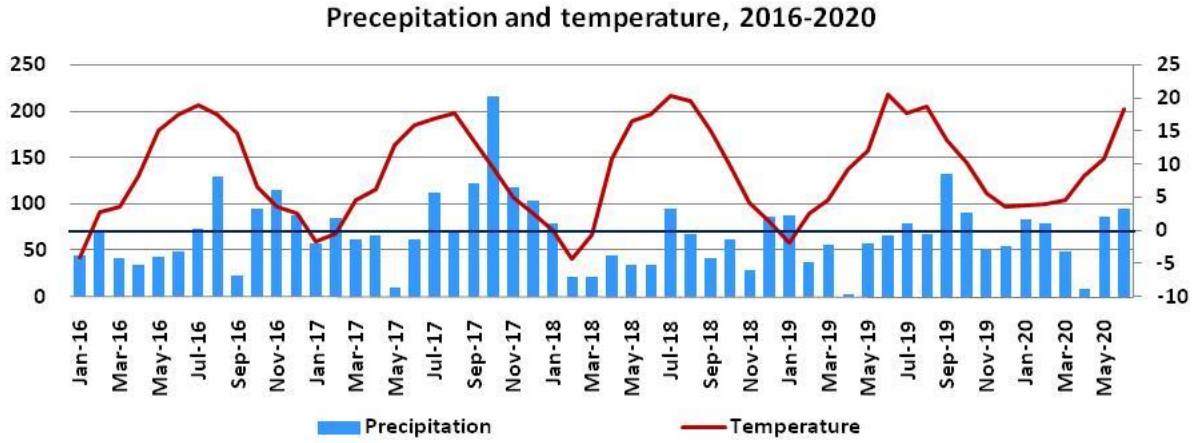


Figure 10 – Changes in average monthly temperatures and monthly precipitation for Kaliningrad station in the period from 01.01.2016 to 30.06.2020.

There are no data for calibration for the Gurievka river. Therefore, for the simulation, we used the calibration coefficients for the Pregolya River catchment (the Guryevka River is its tributary), obtained earlier.

The period of hydrological modeling covered the time interval 2016-2020.

According to the simulation data, values were obtained for each identified sub-basin. Average annual discharge of the Gurievka River in the outlet section from the entire catchment area for the period 2016-2020. amounted to 1.24 m^3/s (Tab. 2, Fig. 11).

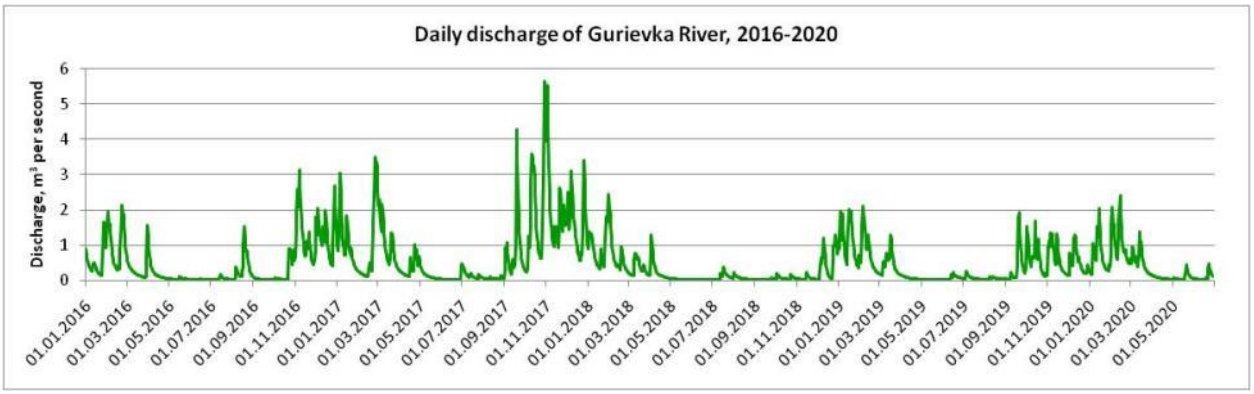


Figure 11 – Daily water consumption of the Guryevka River, according to the results of model calculations, period 2016 (January) - 2020 (June)

Below are the graphs of changes in the monthly water discharge from small sub-basins in the catchment area of the Verkhniy pond (Fig. 12). The sub-basin numbers correspond to: 2011 - the upper part of the catchment, background control, 2012 - drainage channel 6, 2013 - drainage channel 6a, 2014 - drainage channel 7a.

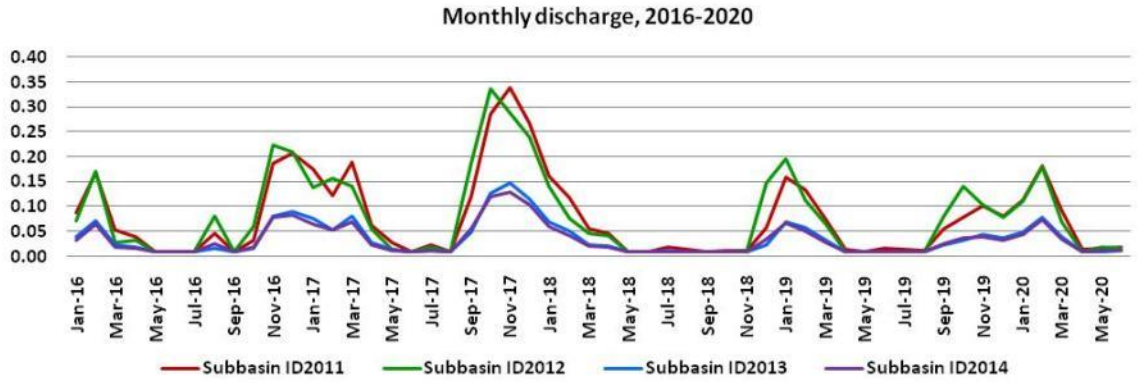


Figure 12 –Monthly discharge of water from small sub-basins of the Verkhny Pond catchment, obtained from the results of model calculations, for the period 2016 (January) – 2020 (June).

The monthly water discharge after each pond of the Gurievka River catchment corresponds to the numbers of sub-basins: 2031 – Verkhniy pond, 2041 - Gurievskiy pond, 2051 – closing section, Chistiy pond (Fig. 13).

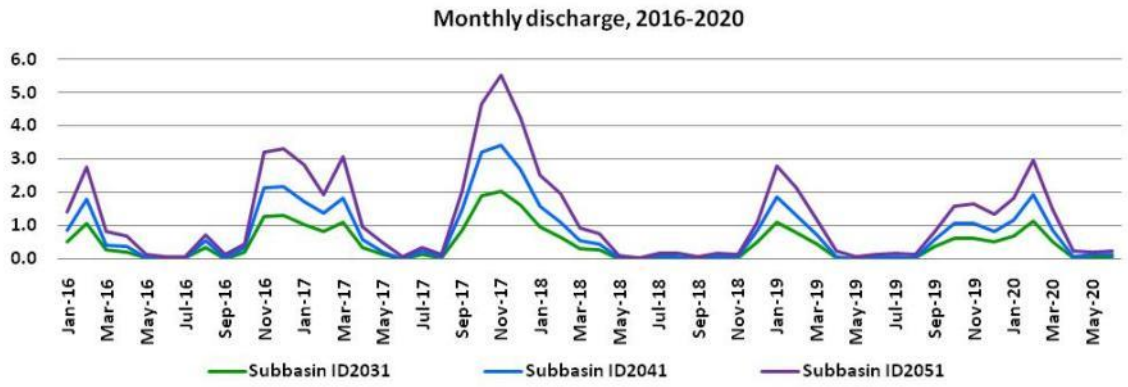


Figure 13 – Monthly discharge of water after each pond of the Gurievka River catchment, obtained from the results of model calculations, for the period 2016 (January) – 2020 (June)

The smallest amount of water flows down from the 2013 and 2014 sub-basins, formed by drainage channels 6a and 7a; discharge in the period 2016-2020 varied from 0.01 to 0.4 m^3/s, the mean discharge was 0.04 and 0.03 m^3/s, respectively. Most of the water flows down from the 2011 and 2012 sub-basins of the upper reaches of the Gurievka River and from drainage channel 6; discharge varied from 0.01 to 0.8 m^3/s; the mean discharge for both sub-basins was 0.08 m^3/s.

Average water disharge in the period 2016-2019 from the catchment area of the Verkhniy Pond was 0.48 m^3/s, and the water discharge from the entire catchment area of the Gurievka River in the outlet section was 1.24 m^3/s. Considering the intra-annual distribution of water discharge, it was noted that the maximum values are characteristic for the cold periods of the year, and in the warm periods the consumption is minimal. In the first high-water period (from January to April), the average water discharge from the drainage basin of the Verkhniy pond was 0.63 m3 / s, in the dry period (May-August) - 0.07 m3 / s, in the second high-water period (September-December) - 0.76 m3 / s (Tab. 2).

Table 2 – Averaged values (for the period 2016-2019) of the monthly water discharge from the Verkhniy Pond catchment and the Gurievka River catchment

Catchment	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Verkhniy Pond	0.91	0.85	0.54	0.24	0.05	0.03	0.08	0.12	0.33	0.68	1.00	1.00
Gurievka River	1.51	1.42	0.88	0.41	0.08	0.03	0.12	0.19	0.54	1.18	1.72	1.64

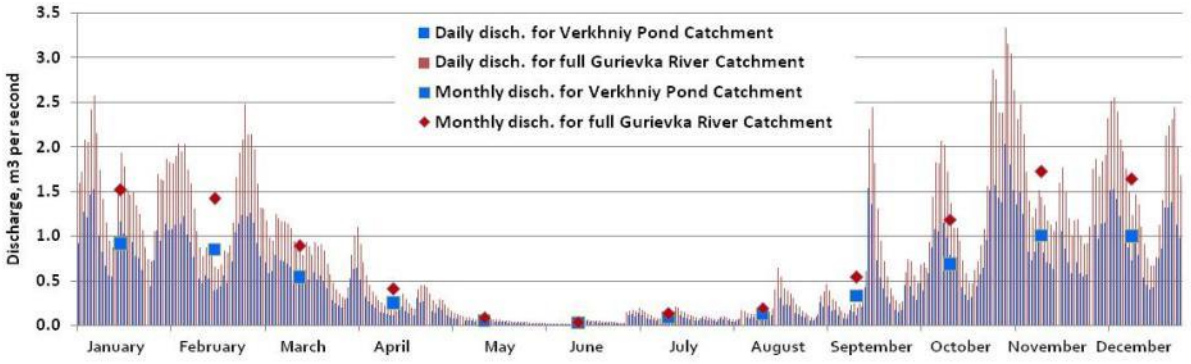


Figure 14 – Daily and monthly discharge, averaged for the period 2016-2019, for water flowing from the Verkhniy Pond catchment (blue graph) and the Gurievka River catchment (red graph).

Table 3 - Hydrological parameters for the sub-basins of the catchment of the Gurievka River, obtained from the results of model calculations.

Subbasin ID	Controlled territory	Discharge, м^3/с	Annual water flow, km^3/year	Runoff, mm
2011	Sources	0.08	0.002	340
2012	Drainage channel 6	0.08	0.003	362
2013	Drainage channel 6a	0.04	0.001	336
2014	Drainage channel 7a	0.03	0.001	346
2021	Catchment above the Verkhniy Pond	0.41	0.013	348
2031	Verkhniy Pond Catchment	0.48	0.015	371
2041	Gurievskiy Pond Catchment	0.80	0.025	345
2051	Gurievka River Catchment	1.24	0.039	339

In July 2020, the values of the concentration of nitrogen compounds are relatively low in almost all monitored points. However, point P2 stands out among others: the concentration of nitrates is 19 times higher, the concentration of nitrites is 10 times higher (Fig. 15). High values of mineral forms at point P2 affect the concentration of total nitrogen, which is 5-10 times higher than at other points in the network. At point P5, the values of nitrite concentration are high and comparable to the concentrations for point P2.

The concentration of phosphates does not differ in extreme values and is at the level of the previous period of the year. It was noted that phosphorus in the outlet section is 3 times lower than in all other points.

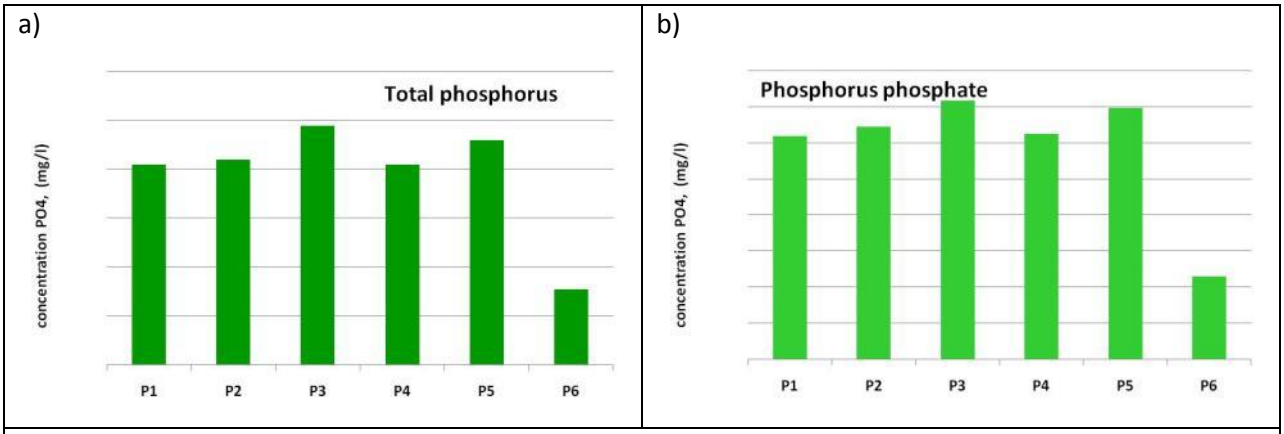


Figure 15 – Changes in the values of the concentrations of nutrients in water: a) total phosphorus, b) phosphorus phosphates, at control points located in the Verkhniy pond catchment

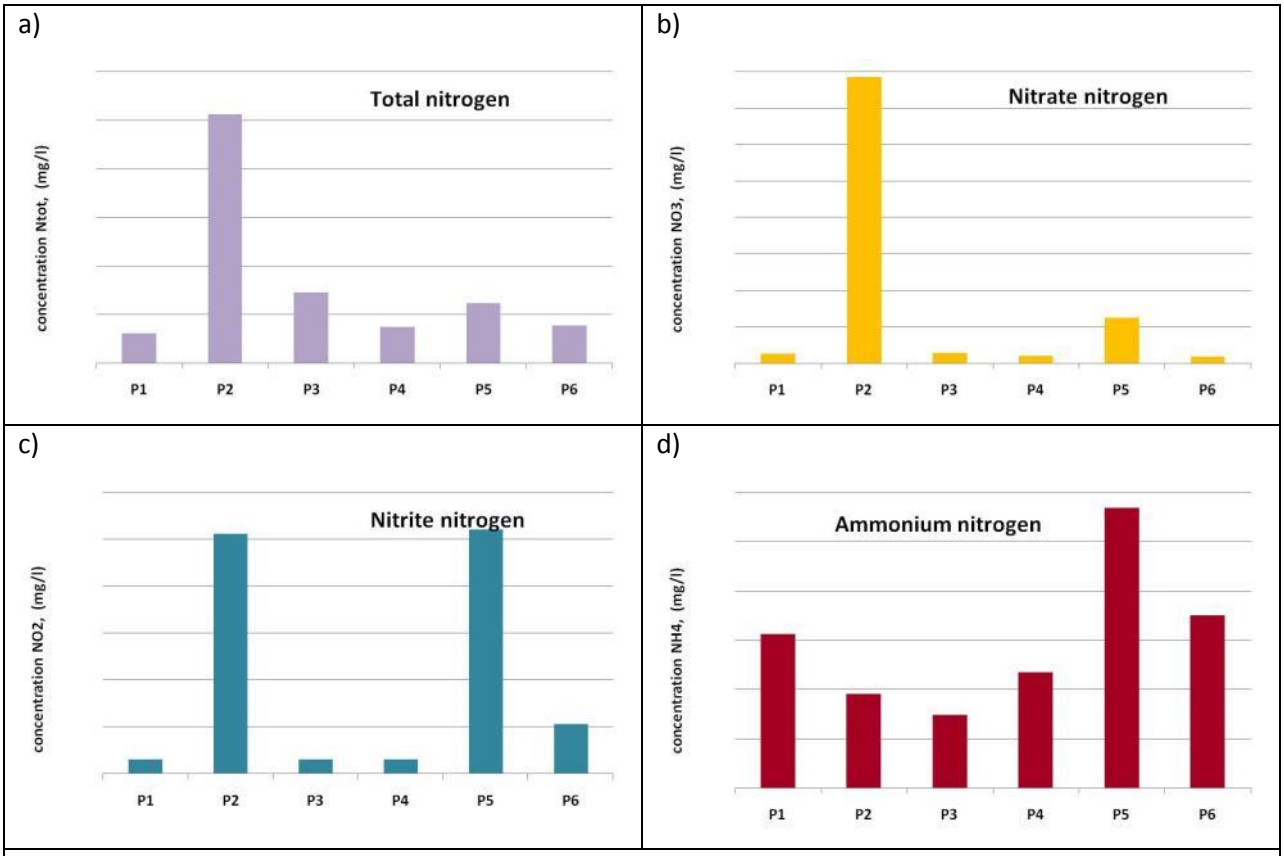


Figure 15 – Changes in the values of the concentrations of nutrients in water: a) total nitrogen, b) nitrate nitrogen, c) nitrite nitrogen, d) ammonium nitrogen, at control points located in the Verkhniy pond catchment

Thus, upon completion of work on the third stage, we received a sufficient set of data and materials for a preliminary assessment of the supply of nutrients in the catchment areas of the Verkhniy Pond and the Gurievka River.

X. JUSTIFICATION FOR THE LOCATION OF THE WETLAND, EXPECTATIONS ON WATER QUALITY

The location of the wetland in point 3 is justified because drainage channel 3 has biggest load of agricultural/nitrate pollution. That's fine, but for phosphates/phosphorus, the largest sources seem to be anthropogenic. Also the upper pond does not seem to retain phosphorus at all which is logical since most of the phosphorus is in the soluble form.

Considering this large source of phosphorus as well as the other pathways of nitrogen, what is your estimate on how much the wetland can be expected to improve the water quality in the pond or in the river downstream and when are these effects seen?

1. In general, the Upper Pond holds (albeit slightly) both nitrogen and phosphorus compounds. Only nitrates increase below the pond, as their concentrations are high in the water coming from the drainage channels from the fields (Canals 1, 2).

2. It will only be possible to estimate the proportion of biogenic inputs from drainage canals in the total water volume and to reduce the nutrient load on the Upper and Guryevka ponds after the construction of the wetland and after a data set for a long period of observations (at least a year or two) and hydrological calculations of water flow.

XI.SELECTION OF THE CASE AREA AND DETERMINATION OF THE TYPE OF WETLAND

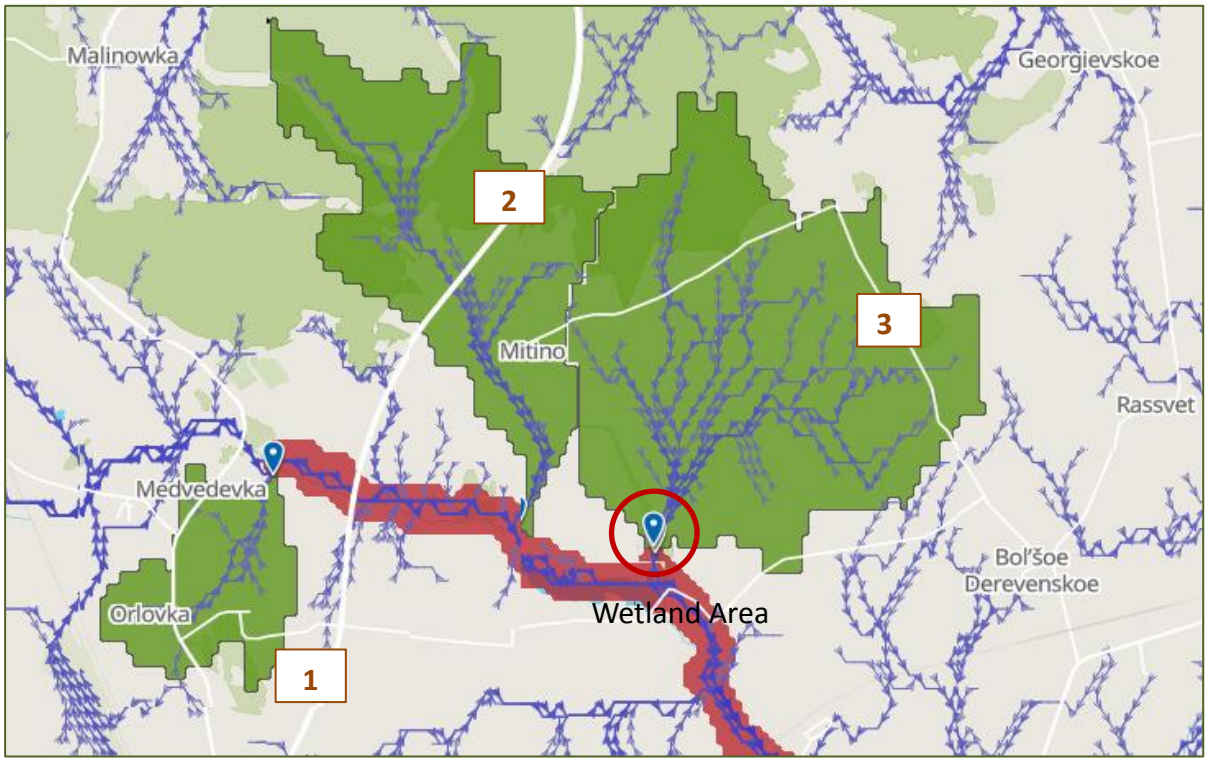
We analyzed the use and construction of wetlands in Denmark. (example: Minivådområde-ordningen 2019 Etablering af åbne minivådområder og minivådområder med filtermatrice).

Based on the results of the land survey, we came to the following decision: it is advisable to place an open-type wetland with an open drain in the selected area.

XII. SITE SELECTION AND DESIGN OF THE WETLAND

The total drainage canals catchment area is 1030 ha, of which 490 ha is agricultural land**.**

The water catchment of drainage channels in CA



On the map, the theoretically optimal place of wetland is shown

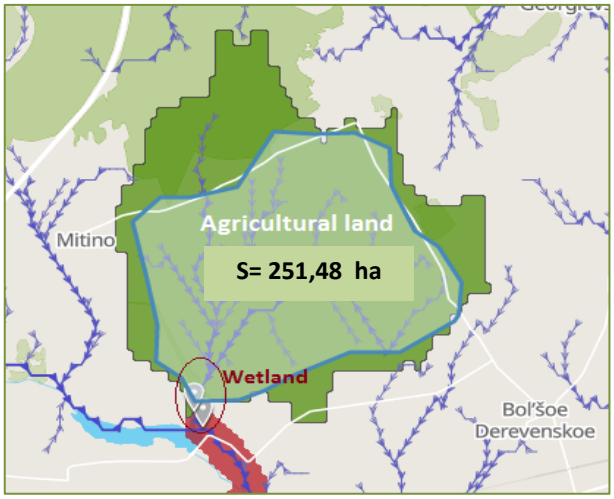
- Catchment drain channel 1 only includes wastewater from settlements.
- Catchment drain channel 2 includes agricultural land. But the territory does not have the road infrastructure.
- Catchment drain channel 3 includes agricultural land. The territory has a road infrastructure.

XIII. SELECTION OF WETLAND LOCATION

DRAINAGE CHANNEL 3 (МПОО-11-6а)

(point 3 on the map)

- Channel catchment area: 431 ha
- Flow rate: 1,07m3 / s
- The Length to the pond: 3,5 km
- Agricultural land about 251,48 ra
- **The size of the catchment area in SCALCO (SRTM) - 580 ha**
- **The size of the catchment is according to FGBU "Kaliningradmeliovodkhoz"**

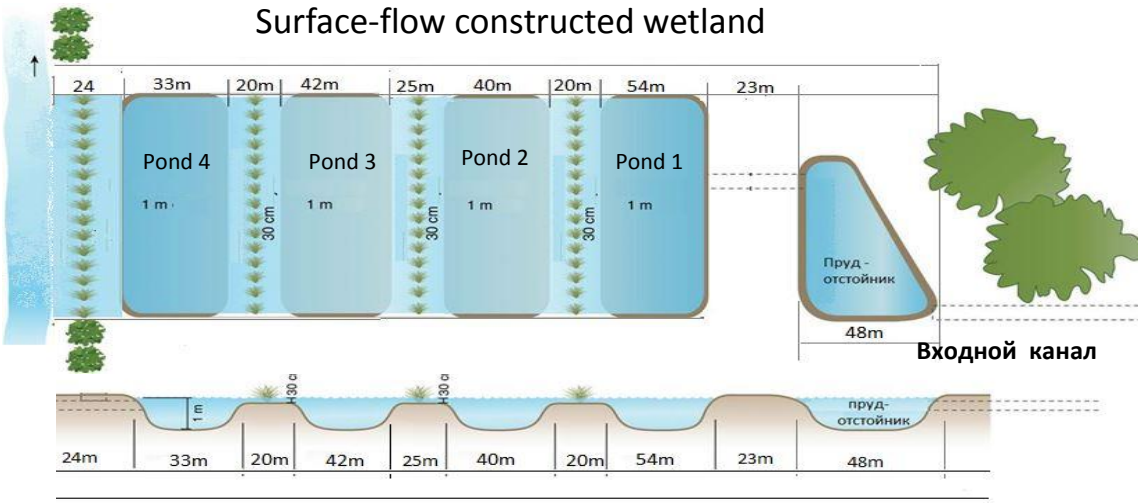


IVX. CHARACTERISTICS OF WETLAND AREAS

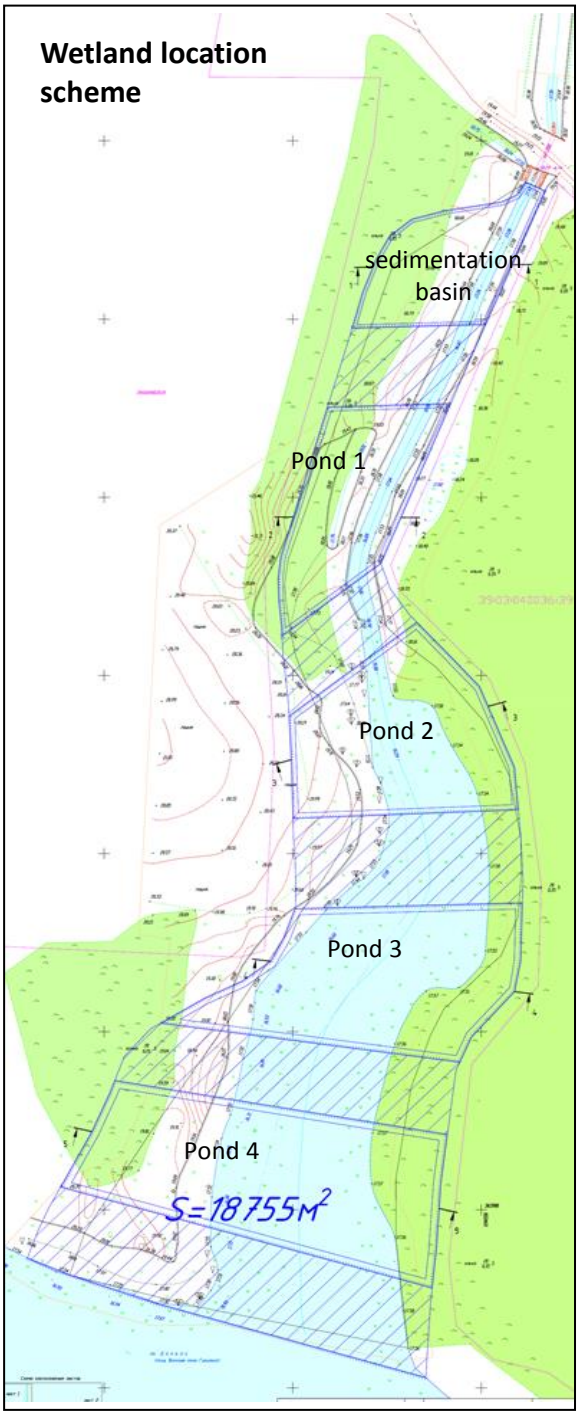
In the course of the Waterdrive project, a land plot with the total area of 1,88 hectares was selected to locate a constructed wetland in the pilot area in the riparian zone of the Guryevka River in the Guryevsk City Municipality.
This area includes:

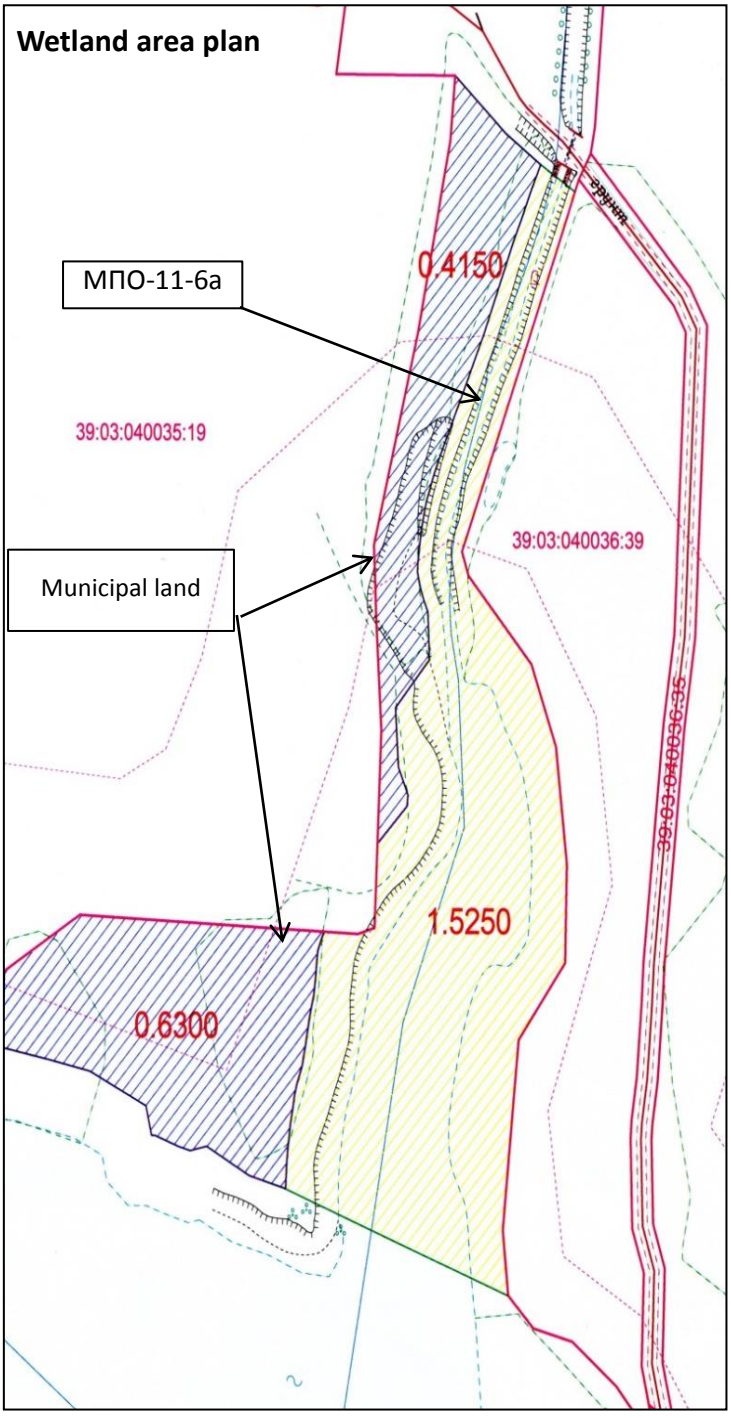
- area of the canal MPOO-11-6a (administered by FGBU Kaliningradmeliovodkhoz" - federal property),
- riparian zone of the Guryevka River with the total area of 1,52 ha (under the Ministry of Natural Resources - federal property)
- land plots (administered by the municipality) adjacent to the river and canal water protection zones, with the area of 0,416 ha and 0,63 ha.

Based on the results of the land survey, we came to the following decision: it is advisable to place an open-type wetland with an open drain in the selected area.

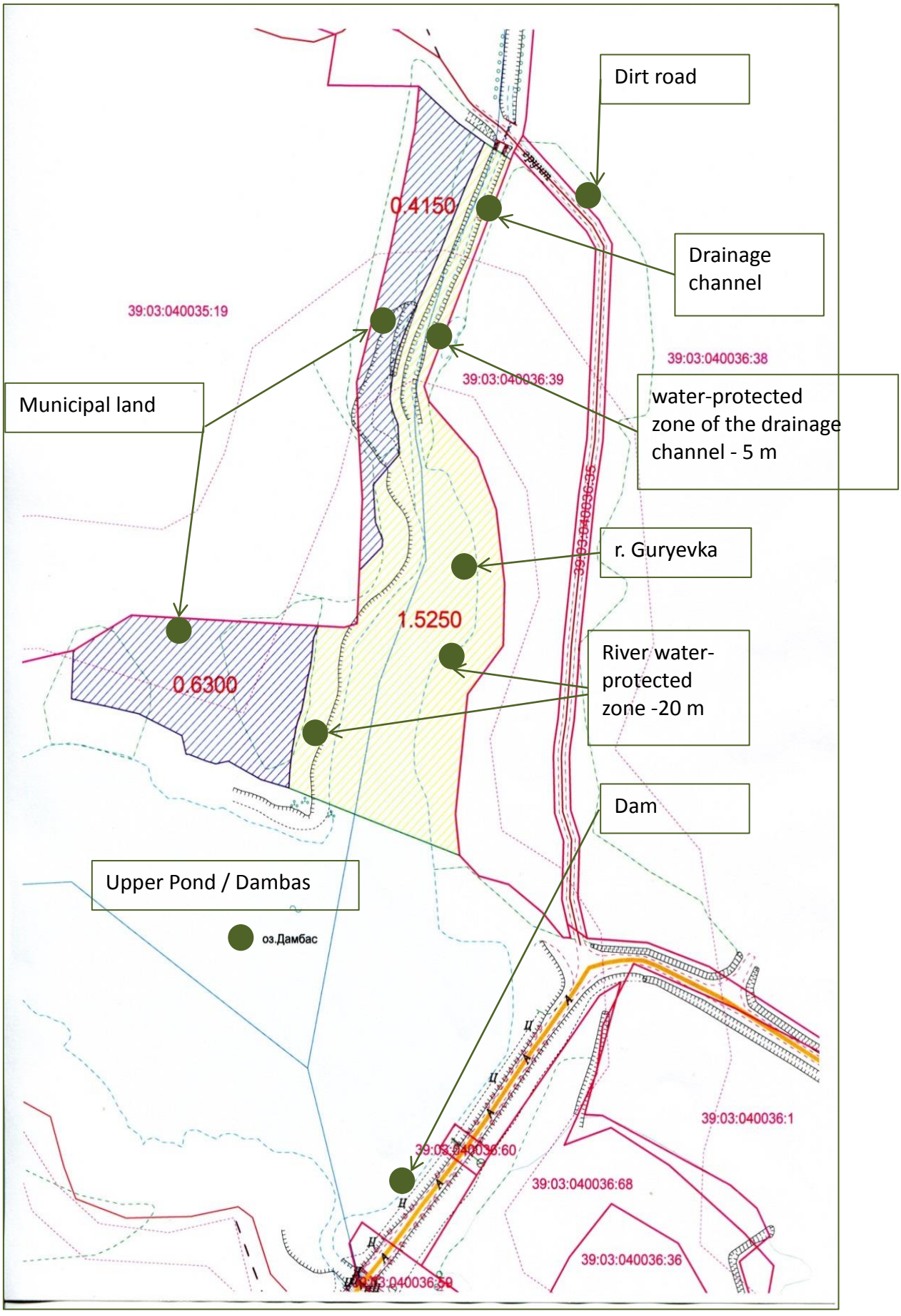


XV. WETLAND LOCATION SCHEME



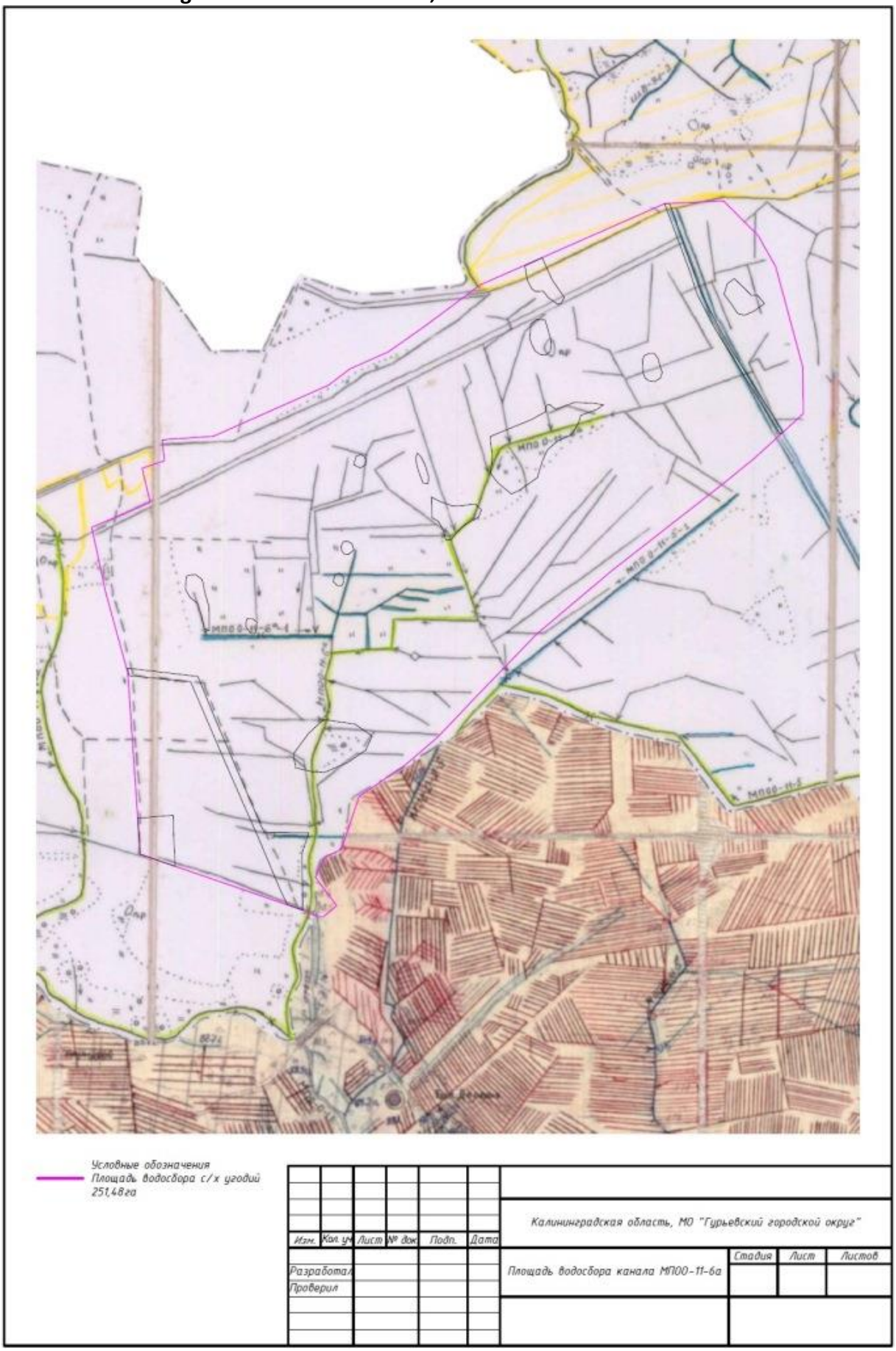


XVI. CASE AREA CADASTRAL PLAN



XVII. AGRICULTURAL LAND IN CASE AREA

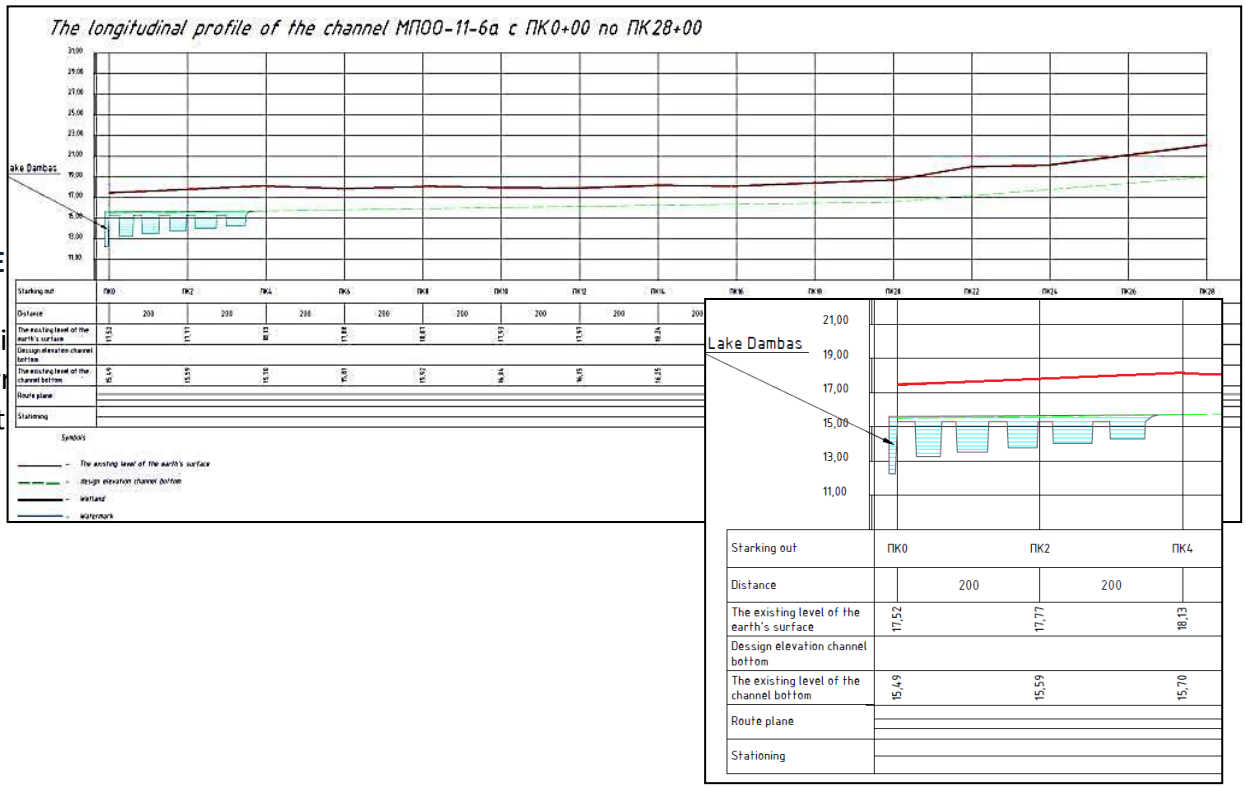
The total area of agricultural lands in CA251,48 ra



The Wetland consists of settling pond (sedimentation basin) and 4 pairs of alternating deep and shallow basins.
In the process of construction of wetland, planned to modify the riverbed Guryevka, at the site of the confluence of the MPO-11-6a drainage channel to the main channel of the river.

And also, the drainage channel bed will be changed (in the area from the country road to the confluence with p. Guryevka). This will entail changes to the technical characteristics of the channel.

Longitudinal profile of drainage channel 3



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XVIII. THE FOLLOWING PERMITS HAVE BEEN OBTAINED FOR CONDUCTING DESIGN WORKS:

The Administration of Guryevsk City District has issued the Permit No 280 of 07.08.2020 for the use of state-owned and municipally-owned land for a period of 5 years.

This Permit has been issued on the basis of the following documents:

1. Maps with borders of the requested land plot;

2. Letters of FGBU Kaliningradmeliovodkhoz by which the institution permits to modify the bed of the federal property canal MPOO-11-6a in its section from point PK+0 to point PK3+56 (at the influx into the Guryevka river) for the construction of a wetland with a surface outflow for biological treatment of water in the specified canal on the following conditions:

- The land plot with the MPOO-11-6a canal shall include a 5 m right-of-way strip on each side of the canal border.
- The land plot specified above shall be formed by Kaliningradmeliovodkhoz on the land of the municipal property with the approval of borders in an established order.

3. Letters from the Ministry of Natural Resources and Environment of the Kaliningrad Region which determine the procedure for obtaining the Decision to use the water body:

a). In accordance with paragraph 7, part 3, article 11 of the Water Code of the Russian Federation No. 74-FZ dated 03.06.2006, the right to use surface water bodies for the works related to changes in the bottom and banks of the surface water bodies is acquired on the basis of a Decision on granting water bodies for use.

b) In order to get such a Decision on the right to use a water body (the Guryevka River, Verkhny Pond area), a package of documents shall be sent to the territorial body of the Federal Water Resources Agency (Kaliningrad Regional Water Resources Department of the Nevsky-Ladozhsky Basin Water Management Board) in accordance with the Rules for Preparation and Decision-Making on Granting a Water Body for Use (Russian Federation Governmental Decree No. 844 dated 30.12.2006). The main documents in this package are:

- Programme for regular monitoring of a water body (this programme was developed under contract No 145 of 07.07.2020 for the provision of services for the development and preparation of a set of documents to obtain a Decision on the right to use the water body (the Guryevka River));
- A copy of the document on approval of design and estimate documentation, which reflects the above technical parameters (Terms of Reference for design development have been prepared).

IXX. IDENTIFIED PROBLEMS

When preparing the Terms of Reference, we encountered the fact that Russian legislation does not contain the concept of “a wetland” and it is rather difficult to identify works related to the construction of a wetland, as in our case we are talking about reducing the level of pollution in the drainage canal passing through agricultural land, and not about treatment of household wastewater (as almost any waste water treatment plant is designed for).

If we use in the ToR the following expression: “Construction of a wetland, which is a natural waste water treatment facility”, then in accordance with the Russian law, for the construction of “a waste water treatment facility” we must obtain a construction permit and undertake a mandatory project impact assessment, which increases the cost and time of the design works.

If we use in the ToR the following expression: “Overhaul of the section of the drainage canal MPOO-11-6a in the catchment area of the Verkhny pond of the Gu According to item 4.1, part 17 of article 51 of the Urban-planning code of the Russian Federation (No 190-FZ of 29.12.2004, edited on 31.07.2020 (put into force with changes and additions on 28.08.2020), obtaining of a building permit is not required in case of overhaul repairs of objects of capital construction;

This is confirmed by the following documents:

- According to item 4.1, part 17 of article 51 of the Urban-planning code of the Russian Federation (No 190-FZ of 29.12.2004, edited on 31.07.2020 (put into force with changes and additions on 28.08.2020), obtaining of a building permit is not required in case of overhaul repairs of objects of capital construction;
- According to item 3, article 49 of the Urban planning code of the Russian Federation No 190-FZ of 29.12.2004, no assessment of design documentation is carried out if a construction permit is not required for construction or reconstruction of a capital construction facility.

XX. CONCLUSIONS: Due to the fact that the case area has different owners, there are problems with obtaining permits, which increases the cost and time of project work. The research period for making informed decisions is very short. In addition, COVID-19 has violated the normal mode of communication with farmers, experts and stakeholders.

XXI. MEETING AND CONFERENCE

1. A start-up conference

October 20-23 2019.
Meeting with project coordinators in Guryevsk, Russia Participants of the meeting: representatives of the Administration of Guryevsk city district, BSAG, SLU, IEEP(PP21), NWRIAEO (PP20), WUP Guryevka Basin, ECAT-Kaliningrad(AO 36), The head of the Municipality "Guryevsk city district; (AO 36), Federal state institution "Kaliningradmeliovodkhoz"(AO 39), Kaliningrad State Technical University "(AO 38).
The main issues discussed at the meeting:

- problems/benefits associated with the selection of the project area
- the solution of the involvement of target groups (local authorities and local rural communities with responsibilities for water- and land management)
- a visit to the pilot project area.

2. Meeting-consultations.

a) Online-meeting with Russian partners report, 8.06.2020

Meeting with Russian partners WP 5.3 was held online on 8.06.2020. Representatives and experts of Denmark, Finland, Russia (St.-Petersburg, Kaliningrad region), 12 persons, participated in the meeting.
The main questions of agenda were: the investment and construction project in Guryevsk, including options for the location and type of wetland in the Guryevsk case area, a program of monitoring and maintenance of wetland, farmers and WUP's involvement, etc.
Participants discussed:

- doubts about the use of channel №3 for wetland (the need to obtain a permit to use the water-object, which requires time and money; increase in the cost of lands works because of construction of the time channel), and also European experts' recommendation;
- monitoring plan for the period until 2020, which should be extended for a longer period;
- difficulties with involving farmers into the project and different reasons for lack of their motivation;
- need to look for experts who could be involved in a wetland design process.

b) E-conference in Guryevsk/online, 22.06.2020

Meeting with representatives of regional ministries of the Kaliningrad region was held offline/online on 22.06.2020. Representatives of Guryevsk District Administration, Ministry of Natural Resources and Environment, The Ministry of Agriculture of the Kaliningrad Region,
The head of the Municipality "Guryevsk city district" (AO37), FGBU «Kaliningradmeliovodkhoz» (AO39), ECAT Kaliningrad (AO36), project team (8 persons) participated in the meeting.

The main questions of agenda were: the project solution for wetland with surface water flow for water quality management in the Guryevka River, including existing restrictions of the selected location of wetland in the Guryevsk case area and feasibility of a project solution.
Participants discussed:

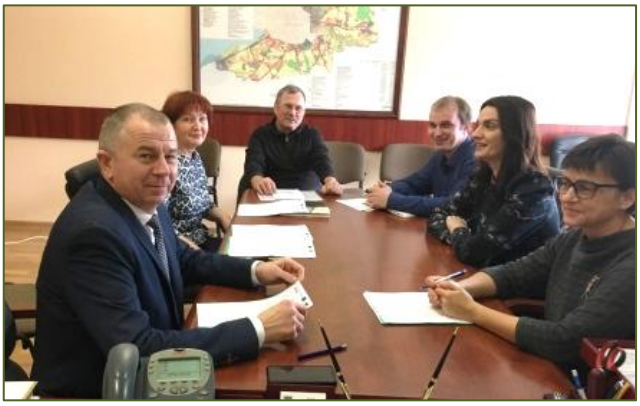
- the results of preliminary researching and discussion on the options for the location of wetland in the Guryevsk case area, the best option (point 3, channel 5) and its characteristics;
- problems have to be solved at first to start designing wetland and continue project working: cadastral registration of 2 free plots of land, an approval from the Ministry of Natural Resources and Environment for using water body, a permission from FGBU «Kaliningradmeliovodkhoz» for changing MPO-11-6a channel bed;
- recommendation of the Ministry of Agriculture of the Kaliningrad Region: ensuring operation of drainage estuaries that go into the MPO-11-6A channel in project, avoiding the rising water level in the channel and excessive vegetation in water bodies during operation of the wetland;
- a mechanism of approval of carrying out the wetland construction works by the Ministry of Natural Resources and Environment.

XXII. FOCUS-GROUPS MEETINGS

3 meetings with focus groups were conducted and 2 individual meetings with landowners on the construction of wetlands and new measures to protect the environment
Dates: 01/15/2020; 30/01/2020; 03/03/2020.
The attendance of the meeting was lower than expected.
Most of the farmers haven't a strong motivation to renovate their fields or local waterbodies.
One of the major bottlenecks is that farmers do not know about the benefits of wetlands and also they need financial support.

1. Working meeting, Guryevsk, 15.01.2020

Participants: PP 22 AO's 13,37,39, MBE "Vodokanal",WUP.
Representatives of Guryevsk administration and the project team (7 persons) participated in the meeting. Defining and division of tasks, preparation of a round table "Water management: approaches and preconditions to wetlands construction in the Guryevka river basin" (30.01.2020) were discussed.



2. Round table "Water management: approaches and preconditions to wetlands construction in the Guryevka river basin", Guryevsk, 30.01.2020.

*Participants: AO's 13,36,37, 38, 39,40 MBE "Vodokanal", The Ministry of Natural Resources and Environment of Kaliningrad Region, School of the Future, Agrofirm "Vodstroy", Guryevsk Department of Agriculture, WUPGuryevka Basin (*17 people).
The round table was held on January 30 in Guryevsk. The aim of the event was to get acquainted with approaches to water management and constructing wetlands in Kaliningrad region and Baltic Sea basin countries, and to discuss opportunities of wetlands construction in the Guryevka river area, prospects of involvement of stakeholders into the process.
There were presented and discussed project-related reports:

- objectives, partners, participants, tools of the project, its implementation progress; description of a case area and possible locations of a wetlands; experience in creating constructed wetlands in the Kaliningrad region (Irina Popova, project coordinator),
- state of biogenic load in the basin of the Guryevka River (based on the research data, 2017-2918), plans of study in the case area (Dmitry Domnin, BIEG),
- characteristics of pollution discharges into the water body near the village Orlovka, analysis of hydrochemical and hydrobiological dynamics of wastewater (Valentina Voronin, MUP Vodokanal),
- approaches to water management and wetlands construction in Denmark (Anna Alimpieva, project manager),

- experience in studying of inland water bodies in the Kaliningrad region, characteristics of the Guryevka river, specificity of pollution and water quality condition in different parts of the river (Sergey Shibaev, Polina Buinyachenko, KGTU),
- History of establishment of the WUP of the Guryevka River, which is one of the target groups of the Waterdrive project (Olga Sheshukova, ECAT),
- Participation of schoolchildren in international and inter-school projects on Guryevka river issues and water management (Tatiana Taletskaya, School of Future).
- The round table participants summed up the results and discussed plans for future work.

3. Focus-group meeting, 3.03.2020 in the CA 22, Guryevsk

Participants: PP22, Agrofirm "Vodstroy", Guryevsk Department of Agriculture, FGBU Kaliningradmeliovodkhoz (AO39).

5 persons – a farmer, expert of the FGBU Kaliningradmeliovodkhoz, a Head of Municipal Agriculture Division, coordinator and manager of the project - participated in the meeting.

Participants discussed a possible location for constructed wetland based on geodesic data and proposal of professionals, considered scheme of the wetland location.

Participants agreed with the location choosing, discussed different questions: ownership of the land plots under constructing wetland, necessity of cadastral registration of free plots of land, technical problems (hanging a channel, soil moving, etc.).

XXIII. FARMERS IN GURYEVSK CASE AREA:

PROSPECTS OF FARMERS' INVOLVEMENT IN THE PROJECT AND FURTHER MEASURES OF WATER MANAGEMENT IN THE CONTEXT OF REGIONAL POLICIES ON LAND RECLAMATION

Within the framework of the Waterdrive project, farmers and agricultural producers are considered as one of the key target groups for constructing a wetland and developing water management measures in general.

At the same time, it is this group that is most difficult to involve in the project.

The other target groups, including regional government agencies (the Ministry of natural resources and ecology, the Ministry of agriculture), municipal authorities and specialized municipal organizations, ecological, scientific research, and educational organizations, are involved in the project to a proportionate extent. Thus, regional and municipal authorities support the project, research organizations and specialized municipal organizations are directly involved in the development of individual project tasks.

The work aimed at involving farmers in the project was made in various formats: informing about the project, its goals and objectives, inviting them to participate in project activities; questionnaires on water resources management and possible environmental solutions, analysis of state policies in the field of agriculture and land reclamation, and measures to support agricultural producers, including questions about water management; personal interviews with farmers to identify objective characteristics of their activities, experience of receiving support from the government in solving water management issues, subjective position to the problem of water quality and greening of agricultural activities, their motivation to support project activities and similar measures in the future.

At the same time, the range of involved farmers was narrowed to agricultural producers who cultivate land close to the location of the future constructed wetland, which will be created as part of the Waterdrive project. There were 5 people, among whom four can be attributed to small farmers (the area of cultivated land from 50 to 200 hectares), and one - to large (the total area of cultivated land is 4.5 thousand hectares, including about 60 hectares in the area of the future wetland). Four small farmers are engaged in vegetable growing (potatoes, cabbage, carrots, beets). A large farmer grows winter wheat and rapeseed, as well as carries out land reclamation works. The last one is also the most active in relation to the project: he took part in a round table and a working meeting to discuss the location of wetland, and expressed readiness to participate in a study visit.

In the process of communication with farmers (questionnaires, interviews, participation in project activities) questions were raised about the specifics of their economic activities, the use of fertilizers, the relevance of hydrotechnical problems (land flooding, soil acidification,

etc.), awareness of government support programs for farmers in the field of land reclamation and experience in participating in them. The relevance of environmental issues in general, understanding the environmental effects of agriculture and readiness to implement eco-friendly measures, as well as the attitude to the creation of a constructed wetland in the case area.

In general, the issues of agricultural ecology and water quality management cannot be considered a priority for farmers in the focus group.

On the one hand, farmers are not aware of their own contribution to environmental degradation, including by referring to their compliance with established standards (for example, on the use of fertilizers in crop production) and supervision by government, as well as to the greater ecological footprint from livestock production than from crop production. Farmers cannot refuse fertilizers because of soil poverty (on the contrary, there is a demand for more efficient fertilizers), while farmers – especially small ones – are not able to give the land a rest and natural restoration of soil fertility. Farmers are not implementing any measures to compensate for the use of fertilizers.

On the other hand, farmers (as well as the majority of Russian citizens, especially the older generation) do not have an objective view of the current quality of the environment (water, air, etc.) and its influence on health, quality of life, and quality of agricultural products. Only the most obvious cases of disasters are perceived as a problem (poor-quality tap water in Guryevsk), however, they are also associated with other factors (condition and obsolescence of water supply system).

Another important factor of the weak orientation of farmers to implement eco-friendly solutions in is their non-necessity and high cost, which is especially relevant for small farmers. At the same time, it is obvious that the implementation of eco-measures in agriculture as an initiative – by one or two farmers in the absence of this kind of measures in the industry as a whole - will not be effective, and it may also weaken the motivation of farmers.

Government policy in the field of agriculture in general and in the field of land reclamation in particular is aimed at increasing agricultural productivity and it doesn't establish environmental objectives. Due to the regional specifics (the region is located in the zone of high humidity, and almost all agricultural land is reclaimed), land reclamation is considered as a priority direction for the development of agriculture in the region, and its improvement is associated with the development of crop production and an increase in agricultural production in general. One of the areas of reclamation policy is the fight against soil acidification, the key cause of which is agricultural activities, including the use of fertilizers. However, this problem is not considered as environmental challenge.

The same applies to the rural development Program, which does not include environmental issues.

Land reclamation issues are also relevant for farmers in the project's focus group. All of them face flooding, soaking of areas of cultivated land. The farmers-vegetable growers, as a

rule, cope with the problem of flooding, waiting for the ground to dry itself and shifting the planting time. A large farmer, the scale of flooding on whose land is significant, is therefore engaged in reclamation work. Two farmers face the problem of soil acidification.

In 2017, work began on the restoration of the reclamation complex of the Kaliningrad region. Federal budget funding for the industry has been increased by 6 times. Since 2019, the region has been actively restoring and developing the land reclamation system. Hydraulic engineering and land reclamation facilities are put in working condition. In 2019, due to the work carried out, the reclamation condition of 7.4 thousand hectares was improved, and the acidity of 6.8 thousand hectares of farmland was reduced.

In addition to direct financing of such works from the regional budget, agricultural producers are subsidized for the restoration and maintenance of land reclamation facilities. The main directions of subsidies are:

- compensation (60%) of expenses related to the implementation of cultural works on land involved in agricultural turnover;
- compensation (90%) of expenses related with the liming of acidic soils on arable land;
- compensation (70%) of expenses of hydro-reclamation activities (construction, reconstruction and technical re-equipment of irrigation and drainage systems, hydraulic structures, etc.).

In 2019, the budget subsidized the repair of 186 km of on-farm reclamation channels, 149 km of closed drainage, and liming of 6.8 thousand hectares for a total amount of 76.3 million rubles. The accomplished work allowed to improve the reclamation condition of 14.2 thousand hectares of agricultural land. In the current year 2020, the regional budget provides 106.8 million rubles for subsidizing the costs of farmers.

Despite the scale, this program has some limitations, and focus group farmers note its imperfection. The procedure for applying for a subsidy and receiving it is complicated and takes about 7-8 months. Subsidies for soil acidification are provided only when using domestic dolomite flour, the quality of which farmers are not sure and prefer to use European flour. The most profitable program is for large areas (200-300 ha), but for some small flooded areas it is not relevant. As a result, small farmers are left without government’s assistance and support. Taking into account the high cost of work, they remain unable to solve the reclamation problems of their territories. The introduction of any new requirements and initiatives, including environmental, in these conditions will have a negative effect.

As a result, farmers of the focus group do not show much interest in the construction of wetland and in the project as a whole. This is due to their lack of ecological awareness, low awareness of wetlands, lack of understanding of the dependence between the creation of such objects and their own activities, well-being and quality of life. It is mindlessly to expect farmers to participate – financially or "territorially" (land allocation) in the creation of wetlands without compensation for their costs and government support, and without a lot of preparatory educational work. This is especially true for small farmers, for whom it is impossible to

withdraw part of a small area of cultivated land from circulation, and they do not actually receive support from the government in other areas of activity.

The only large farmer in the focus group (who also deals with land reclamation) demonstrates the largest potential in terms of involvement in the project. His interest is still educational yet (the farmer is interested in getting experience in constructing and operating wetlands), but in the future he can start implementing it.

XXIV. CONCLUSIONS AND SUGGESTIONS

The key factors of low interest of farmers in the project and constructing wetlands are:

- Low awareness of ecological issues, including current environmental challenges, the influence of agricultural activities on the environment, the pollution of water basin, measures to address environmental and water protection problems, including the constructing of wetlands;
- Low motivation of farmers to implement eco-measures in their own economic activities. In particular, due to the lack of regulatory requirements and a systematic approach to such work, the high cost of their implementation, the lack of appropriate targets in government programs and effective measures to support their implementation (including in the form of subsidies);
- The lack of government incentives eco-friendly measures in rural farming, land reclamation, development of rural territories, both material (subsidization, taxation etc.) and moral (through educational programs and events, moral encouragement, etc.);
- The limitations of existing government support programs, especially for small farmers, which make it difficult to conduct economic activities and move to more innovative ways.

As measures aimed at changing the situation, the following areas are considered promising:

- Promotion of educational programs and events with a focus on climate change, an influence of agriculture on the environment, water management and its possible tools, including wetlands. The target groups of such programs should be farmers, the authorities, the population of rural areas, and schoolchildren. The priority area is raising awareness of farmers and agricultural producers of the Kaliningrad region about environmental challenges which is implemented in an accessible form and in a variety of formats.
- Forming a pool of experts on ecological issues promotion, creation of an information and resource center on water management. For solving this problems, other target groups of the project may be involved: scientific research, ecological and educational organizations, individual experts, the WUP, etc.
- Accelerating research for more eco-friendly solutions in agriculture, taking into account the specifics of the region, dissemination of scientific achievements, modern eco-friendly agricultural technologies, and successful practical experience.
- Development and implementation of incentive measures for farmers by government and municipal agencies in regard to environmental measures (introduction of eco-friendly technologies and measures for environmental damage compensation, etc.), including through support measures from government (subsidies, grants, tax breaks, etc.).

- Development and implementation of a project of Wetland Park with a research and educational center in the Kaliningrad region, Guryevsk case area.

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