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COWI

Assistance to the Development of the Mykolaiv Masterplan

Water supply and sanitation

Roadmap - Moving towards the Vision 2050

Final

May 2024

COWI

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List of Abbreviations

CAPEX	Capital expenditures
CBEP	Central body of executive power
CMU	Cabinet of Ministers of Ukraine
CTEA	Classifier of types of economic activity
DMAs	District Metered Areas
DS sludge	Dried Stabilized Sludge
DSIF	Danida Sustainable Infrastructure Finance
EC	European Commission
EIA	Environmental impact assessment
EIB	European Investment Bank
EU	European Union
ICRC	International Committee of the Red Cross
IFI	International financial institution
IMC	Intermunicipal cooperation
LA	Legal acts
LLC	Limited liability company
LTIP	Long-term investment project
MCA	Mykolaiv City Administration
MFA	Ministry of Foreign Affairs
MPN	Most probable number
MTIP	Mid-term investment project
MUC	Municipal utility company
MVK	Mykolaiv Vodokanal (Water Utility)
NGO	Non-Governmental Organisation
NKREKP	National Commission for State Regulations of Energy and Public Utilities
NRW	Non-Revenue Water
OPEX	Operation expenditures
PIP	Priority Investment Program
PPP	Public-private partnership
PS	Pumping station
RO	Reverse osmosis
SCADA	System of Control and Data Acquisition
SDGs	Sustainable Development Goals
SS	Suspend solid
STIP	Short-term investment project
SWOT	Strengths Weaknesses Opportunities Threats
TA SP	Technical Assistance Support Provider
TEM	Transient electromagnetic
UC	Utility Company
UMIP	Ukraine Municipal Infrastructure Programme
WFD	Water Framework Directive
WSPS	Water supply pump station
WSS	Water supply and sanitation
WTP	Water treatment plant
WWTP	Wastewater treatment plant

1 Introduction

This report has been developed within the framework of the project “Mykolaiv - Denmark partnership – Technical support unit” financed by the Danish Ministry of Foreign Affairs (MFA). The project, which has been entrusted COWI, is a framework contract, which, among others, includes assistance to the Mykolaiv City Administration (MCA) in developing the Mykolaiv Masterplan in close cooperation with an Italian company, One Works.

Box 1-1 COWI's contribution to Mykolaiv Masterplan in a nutshell

Mykolaiv Masterplan, which has been requested by the Mayor of Mykolaiv City, has a time horizon till 2050. It provides a compass for actions to be taken by the Mykolaiv City to ensure that it will develop into a thriving city attractive to its citizens and business community.

COWI and One Works have assisted Mykolaiv City Administration in developing the masterplan. In this work, COWI focused on three sectors:

- Water and wastewater
- Energy, including power, district heating and renewable energy sources
- Solid waste management.

COWI established a project organization consisting of a project management team and three sector teams of professionals, each headed by a Discipline Leader. Three sectoral Focal Points were responsible for monitoring cross-cutting activities, ensuring coordination between the parties and maintaining consistency in the deliverables.

To enhance transparency in the development of the Mykolaiv Masterplan, given its significant public interest and exposure, COWI established three sector-specific Sounding Boards inviting all potentially interested parties to take part in these.

It builds upon the results of the work carried out by the water supply and sanitation (WSS) team of COWI, in close cooperation with the MCA and coordinated with the Italian company One Works.

The work resulted in the four reports in addition to the current report, including the Priority Investment Programme, Water, namely:

- Vision 2050
- Existing Situation Report
- Institutional Report
- Asset Management Report
- Future Sustainable Raw Water Source, Note.

The Vision 2050 report outlines the 2050 sector targets for WSS in Mykolaiv City. This vision has been discussed with all relevant stakeholders and approved by the MCA.

The findings outlined in the four other reports (Existing Situation Report, Institutional Report, Asset Management Report and Future Sustainable Raw Water Source, Note) describe and analyse the existing situation within WSS in Mykolaiv and puts forward a few recommendations on asset management and improved water security.

The current report outlines the steps required for the city, its residents, leaders, and industry professionals to meet the 2050 sector targets for WSS, as they are laid down in the 2050 Vision – taking into due account the existing situation. That is, it addresses the question: How to move from existing situation to the Vision 2050?

The principal audience for this report comprises the MCA, given its central role in the realization of the steps suggested in the roadmap. Following COWI's approach to visibility and transparency in supporting the process of rebuilding a better and greener Ukraine, this report, along with all others, has been made public available.

The report includes five chapters in addition to the current introduction:

- **Chapter 2** presenting the essence of the Vision 2050 for the WSS sector in the city.

- **Chapter 3** briefly introducing the main conclusions of the assessment of the existing situation related to the status of the WSS in Mykolaiv, including legal, regulatory and institutional challenges, present situation and condition of the available infrastructure, affordability and cross-cutting issues. Furthermore, it briefly highlights issues connected with insufficient maintenance and, hence, increasing backlog, as well as the affordability of the population to cover expenses through tariffs.

- **Chapter 4** outlining the basis for moving forward towards the targets set by Vision 2050 for the WSS sector. It presents the legal and regulatory basis, the main principles of public engagement and transparency that should be applied, as well as the projected affordability frames and funding opportunities.

- **Chapter 5** giving an overview of the Priority Investment Program (PIP) suggested for the development of the WSS in Mykolaiv City. The PIP is broken down by investment projects and enabling projects, as well as by short-term, mid-term and long-term projects. It also suggests grouping the projects included to the PIP into three Investment Packages, each consisting of a number of projects sharing a common objective and very much interlinked.

- **Chapter 6** providing an Action Plan listing specific activities related to each project and/or package, introducing responsible institutions and individuals on behalf of MCA that will be appointed for implementation of each task.

Three so-called cross-cutting reports have also been prepared, see Box 1-2 below..

Box 1-2 Three cross-cutting reports

Three so-called cross-cutting reports have been prepared by COWI in connection with its contribution to the development of the Mykolaiv Masterplan. They are cross-cutting in the sense that they address issues of relevance for more than one of the three sectors (water, energy and waste). They are:

- Water and District Heating Affordability
- Financing Options for Municipal Infrastructure
- Impacts of Climate Changes.

2 Vision for Water Supply and Sanitation

The Vision report appears to be a strategic document detailing the City of Mykolaiv long-term goals for water supply and wastewater up to the year 2050. It outlines the initial sharing of the vision with key stakeholders, such as the Mykolaiv City Administration (MCA) and Mykolaiv Vodokanal (MVK) and emphasizes the importance of their roles in the vision's realization. The document has undergone a collaborative refinement process with the relevant partners, such as One Works and incorporating feedback from the Sounding Board on Water's first session. Vision for WSS aims at providing a detailed framework for the initiatives critical to achieving the city's objectives in this sector. This framework supports the strategic direction and principles that are expected to guide Mykolaiv's advancements in water-related services.

Box 2-1 Vision-2050 in a nutshell

In the year 2050, Mykolaiv Vodokanal (MVK), responsible for the provision of water services to population of Mykolaiv City, as well as industries, institutions and other consumers in the city, envisions a sustainable, resilient, and ecologically balanced community where water resources are managed with excellence, in alignment with the United Nations Sustainable Development Goals (SDGs), and in accordance with the European Commission (EC) directives. As a beacon of responsible water management, MVK is dedicated to achieving environmental neutrality, fostering a green transition, and embodying energy efficiency. Through innovation, strategic management, and community collaboration, MVK aspires to ensure clean water access, reduce environmental impact, and inspires positive change on a global scale.

The table below present the 11 main principles of the Vision-2050 for the WSS in Mykolaiv.

Table 2-1 Main principles of the Vision-2050, Water

Eleven outlined principles below are the core beliefs and values that will steer MVK's approach to water supply and wastewater services in Mykolaiv up to 2050. They serve as the foundation for making decisions and actions in the area of improving the services to water and wastewater.	
Holistic SDG Integration	*MVK commits to integrating the United Nations SDGs into every facet of its operations, ensuring that the efforts contribute to the achievement of these global goals.*
Compliance with EC Directives	*MVK adheres unwaveringly to the directives set forth by the European Commission.* *Company's policies, practices, and innovations will be in full alignment with EC guidelines.*
Environmental Neutrality and Beyond	*MVK is to achieve a state of environmental neutrality for its services.* *MVK will minimize its carbon footprint, reduce waste, and adopt sustainable practices across the board.* *MVK strives to leave a positive impact on the environment through restoration and conservation efforts.*
Energy-Friendly Infrastructure	*MVK is dedicated to transforming company's infrastructure into energy-friendly assets.*
Active Leakage Control and Asset Management	*MVK commits to efficient water management extends to active leakage control.* *MVK will implement comprehensive strategies to minimize Non-Revenue Water (NRW), enhance distribution network efficiency, and optimize asset management.* *MVK will conserve water resources and improve operational effectiveness.*

District Metered Areas for Comprehensive Monitoring	*MVK will establish District Metered Areas (DMAs) throughout the city to ensure responsible water consumption.* *These areas will enable precise monitoring of water distribution* *It will enable MVK to identify and address inefficiencies, reduce wastage, promote water-saving behaviours among consumers. and contribute to the above-mentioned decrease of NRW.*
Community-Centric Approach	*MVK's success relies on the involvement of the citizens of Mykolaiv. MVK will actively engage and educate residents about water conservation, sustainable practices, and the significance of our collective efforts.* *MVK aims to build a sustainable water-conscious culture.*
Continuous Innovation and Learning	*MVK will continuously seek out cutting-edge technologies, methodologies, and solutions.* *Through ongoing learning and adaptation, MVK will remain at the forefront of sustainable water management practices and lead by example.*
Transparency and Accountability	*MVK's operations will be characterized by transparency and accountability. MVK pledges to communicate on progress, challenges, and achievements openly.* *MVK ensure that actions align with the vision.*
Sustainable Financing	*It is important that MVK ensures the availability of the finances. Sustainable finances are important as for capital investments to be made as well as for the operational expenditure and maintenance in short- and long-term run.*
Resilience in the Face of Change	*As MVK navigates a dynamic world, MVK commits to building resilience into the strategies. Whether in the face of climate change, technological advancements, or evolving community needs, MVK will adapt and fortify its approach to ensure the longevity and efficiency of the company's initiatives.*

3 Summary of existing situation

To achieve the goals outlined in the Vision-2050 the City of Mykolaiv along with MVK is to implement a comprehensive plan to transform the city's water supply and wastewater systems by 2050. The current baseline highlights several challenges, including regulatory and legal hurdles, institutional inefficiencies, and outdated municipal WSS infrastructure. To achieve the ambitious goals for 2050, the city aims to implement key initiatives that will overhaul the water supply and wastewater sectors. These initiatives are designed to align with strategic principles that support sustainable development and improved quality of life for Mykolaiv's residents. The success of Vision-2050 will depend on the effective execution of these initiatives, addressing the existing shortcomings, and adapting to emerging environmental and technological advancements.

The following chapters highlight the main findings upon execution of the project, overview of the legal and regulatory framework of the water supply and wastewater in Ukraine and in the City of Mykolaiv along with the description of the technical situation in the water and wastewater sector.

Additionally, the chapter describes the sector's economy, which is currently subsidized by the city budget and relies on the tariff system. The achievement of the targets set for 2050 will therefore only be viable if the suggested service level of municipal services remains affordable for the population.

3.1 Legal and regulatory overlook

Ukraine's legislation governing water supply and sanitation is primarily based on the Water Code of Ukraine, along with additional laws and regulations. In December 2022, Ukraine introduced the Water Strategy to 2050, which outlines the fundamental principles of the state's policies concerning water usage, resource protection, and sustainability. This strategy is designed to promote the harmonious and integrated utilization of water resources, enhance water security, and mitigate risks through sustainable water management practices.

The pre-war state of Ukraine's water supply and sanitation indicated the need to improve state regulation of this area. The main problems of the water supply and sanitation of Ukraine were defined as institutional, management (organizational), financial and economic, technical, environmental, legal regulation, and security problems. The war made these problems more complicated and showed a lack of vision and a systematic approach to solving them, and also "exposed" the issues of safe and sustainable water supply and sanitation and safety of critical infrastructure.

The table below presents a SWOT analysis of the normative and regulatory spheres of the water supply and sanitation system of Ukraine in general and the city of Mykolaiv in particular.

Table 3-1 SWOT analysis of the normative and regulatory sphere, WSS

STRENGHTS	WEAKNESSES
Foundation of livelihood and balanced development of the region The basis of local economic development Monopoly position on the market Stability of demand for services Availability of a resource saving program Availability of a system of providing subsidies to citizens A developed network of enterprise services Improving the security dimension of the economy and the environment Promotion of internal reforms • Development of scientific potential Formation of qualified personnel Creation of jobs Implementation of direct and indirect state/local support The political will of local authorities to provide the population with drinking water The political will of local authorities to improve the technological level of the drainage system	Limited investment and shortage of financial resources necessary for development, Vulnerability of the energy supply system in war conditions (risks of water supply interruption) Difficult implementation of EU standards Insufficient amount of investments, in particular from the private sector The difficulty of achieving strategic goals in the field of water supply and sanitation in Ukraine Non-transparency and high level of corruption Institutional and regulatory issues Limited financial capabilities of budgets and lack of financial resources of communal enterprises for the implementation of resource-saving projects Lack of transparent economic regulation. Politicization of the economic regulator (NKREKP) Using the field of centralized water supply and sanitation as a lever of political and social influence (tariff policy) Limitation of models of management and regulation in the field of water supply and sanitation (model of direct public management - communal ownership). Creation of conditions for the formation of mixed models of regulation based on performance indicators of enterprises (benchmarking) Absence of a legal basis for the management of communal property, the transformation of communal enterprises into joint-stock companies Lack of a base of re-use projects (typical projects) for modernization, construction of water supply and sanitation facilities (which can be taken as a basis for use in investment projects free of charge) Lack of tools and conditions for long-term investment in infrastructure

	Conservative procurement procedures that limit innovation Lack of risk management system
OPPORTUNITIES	**THREATS**
Ensuring guarantees of security of the state, business and citizens, protection of investments and private property Creation of favorable conditions for business activities and a transparent tax system Integration with the EU and development of green generation Creation of tools and conditions for long-term investment in infrastructure Attraction of foreign investments Implementation of water management and water audit in the field of water supply and sanitation Strengthening of social regulation Creation of an institute for the protection of consumer rights Creation of effective mechanisms for pre-trial dispute resolution Introduction of benchmarking (as a systematic way of determining, understanding and developing the best product, service, structures, equipment, processes and practices to improve the real performance indicators of the enterprise) Ukraine's "advantage of backwardness" over developed economies makes it possible to borrow institutes, management methods and production technologies already	Ongoing war and threats connected Environmental and technogenic disasters Immutability of the principles of state regulatory policy Strategic uncertainty of the field's development Carrying out rapid administrative transformations while preserving former inefficient mechanisms of regulation and management Fixation of reforms at the central level (lack of connection with the regions Self-isolation after non-compliance with EU rules or their inadequate implementation Lack of reform of the judicial system Ignoring the provision of low-carbon infrastructure components

working in the world, which will significantly reduce their cost. Training of professional personnel in the field of water supply and sanitation (training, confirmation of qualifications, certification) Introduction of the risk management system Introduction of asset management standards based on the ISO 55000 standard Solving institutional problems of state administration in stimulating enterprises to introduce innovations Creation of a database of reuse projects (typical projects) for modernization, construction of water supply and sanitation facilities (which can be taken as a basis for use in investment projects free of charge)	

3.2 Overall water supply and wastewater situation

The overall water supply situation in Mykolaiv is characterized by the provision of drinking water to a significant portion of the population. Raw water is sourced from the Dnipro River and treated to meet national water supply standards before being distributed to consumers. However, the city faces challenges due to the scarcity and low quality of local groundwater resources. Prior to the onset of military operations in Ukraine, the water supply system in the city of Mykolaiv consisted of a surface water intake from the Dnipro River near Mykilske village in the Kherson region. Additionally, the system included underground water intakes from six artesian wells located within various neighbourhoods of Mykolaiv and the Kherson region. The underground water intakes provided water for both domestic and industrial purposes, as well as for the operational needs of the local utility enterprise MVK without requiring additional purification or disinfection.

Following the initiation of armed aggression by the Russian Federation, the water supply system faced significant changes. On April 12, 2022, the Dnipro-Mykolaiv water main, serving as the sole source of drinking water for the city, was destroyed during hostilities near Kiselyvka village in the Kherson region. Consequently, the entire population of approximately 500,000 residents faced a critical humanitarian crisis due to the absence of a centralized supply of drinking water.

Through the efforts of the city authorities and MVK the centralized water supply was partially restored, providing technical water. This helped alleviate the challenging situation faced by the local population concerning their sanitation needs. However, the supply of drinking water remained limited and relied on imported water, mobile reverse osmosis units, and the support of humanitarian organizations and missions.

Unfortunately, the technical water, which had a high salt content, led to accelerated corrosion of steel pipelines and shut-off valves within the centralized water supply system, as they were not designed for operation under such conditions.

Following the liberation of the right-bank part of the Kherson region from the Russian invaders, the supply of raw water from the Dnipro-Mykolaiv water intake was partially restored, and MVK briefly resumed supplying fresh water to the centralized water supply system. However, on June 6, 2023, the Russian invaders maliciously destroyed the dam of the Kakhovsky reservoir, resulting in a large-scale man-made catastrophe with ongoing consequences that are yet to be fully assessed.

This disaster severely impacted the Dnipro-Mykolaiv water intake plants, leading to the complete cessation of their operation. As an alternative, MVK was compelled to rely on technical water supply from the Inhulets irrigation system (previously used to fill the Zhovtneve Reservoir until 2006) and the Pivdennyi Buh River. However, the quality of the raw water does not meet the standards required for purification to produce drinking water at the existing water treatment plants in Mykolaiv.

With the objective of diversifying the sources of raw water and ensuring a reliable water supply for the City of Mykolaiv in light of the threat posed by the Russian invasion of Ukraine, MVK and the City of Mykolaiv have sought technical assistance from the European Investment Bank (EIB) under the UMIP-2 Project. This assistance aims to develop and implement a sustainable long-term solution.

COWI has developed a Note on future sustainable raw water sources. Draft final was submitted to the Mayor of Mykolaiv 20 October 2023.

The events that unfolded during the war in Mykolaiv revealed several weaknesses in the centralized water supply system, highlighting the need for specific mitigation measures and further development. Based on these observations, the following components have been identified as essential for addressing the needs:

- Further restoration of the damaged water distribution network (including in parallel establishment of the DMAs).

- Restoration of the water intake Dnipro-Mykolaiv and related water mains: Efforts should be focused on restoring the damaged infrastructure of the water intake and associated water mains to reinstate the reliable supply of water from the Dnipro River.

- Rehabilitation of priority elements of existing water treatment plants (WTP): The rehabilitation of key elements within the existing WTP is necessary to improve their functionality and efficiency. This includes repairs and upgrades to treatment processes, equipment, and facilities.

- Reconstruction of the 0th, 1st, and 2nd Stages Water Supply Pumping Stations (WSPS): The reconstruction of these pumping stations is crucial to ensure proper water distribution and pressure management within the system, as well as increase of the energy efficiency.

- Installation of a new disinfection system at the 3rd Stage WSPS: Upgrading the disinfection system at the 3rd Stage WSPS is necessary to enhance the treatment process and ensure the provision of safe and potable water to consumers.

- Final selection of alternative sources of raw water: The identification and selection of reliable alternative sources of raw water should be concluded, considering factors such as availability, quality, and sustainability.

- Construction of new technological water treatment facilities at the existing WTP: The construction of new water treatment facilities within the existing WTP is essential to accommodate the treatment requirements of alternative raw water sources and ensure the production of high-quality drinking water.

- Restoration of the Zhovtneve reservoir: The rehabilitation and restoration of the Zhovtneve reservoir are necessary to utilize it as a water storage facility, enabling the reliable supply of water to the city.

Addressing these components will contribute to the overall improvement and resilience of the water supply system in Mykolaiv, enhancing its capacity to provide safe, reliable, and sustainable water to the population. These needs assessments form the basis for strategic planning and prioritization of investments in the water sector in Mykolaiv.

Wastewater treatment situation

The current facility has been in operation for 44 years, with limited reinvestment except for the aeration system in the Aeration Tanks (ATs). At present, the plant falls short of treating 100% of incoming wastewater to meet mandated effluent standards, and only a portion of the primary sludge undergoes treatment. There is presently no comprehensive concept in place for the treatment and disposal of sludge.

The presence of brackish water and high concentrations of chlorine in incoming wastewater significantly hinder the biological treatment process. These factors diminish the microbial population in the activated sludge, leading to a notable decrease in its volume.

- The proposed three-phase approach aims to:
- Upgrade the plant to a state-of-the-art, energy-efficient facility
- Structurally rehabilitate it for another minimum 15 years of operation
- Handle projected 2030 waste loads
- Comply with current Ukrainian effluent standards
- Maximize energy and thermal power recovery from sludge
- Minimize CO2 emissions
- Ensure sludge disposal in full accordance with Ukrainian legislation.

Due to time constraints necessitating urgent rehabilitation of the Aeration Tanks, the decision has been made to refurbish the existing plant exclusively for the Korabelnyi district. A new, modern plant will be constructed at a lower elevation closer to the city centre, in line with the 2006 Feasibility Study, to serve the remainder of the city.

These phases have been designed with consideration for available funding, with the first phase being financed by the existing EIB loan. Additionally, this initial phase will yield the most significant environmental benefits.

The WWTP in the city of Mykolaiv has been identified by the Black Sea Commission as a significant environmental concern within the Black Sea catchment area. The direct discharge into the Pivdennyi Buh estuary has wide-ranging impacts on the Black Sea ecosystem. In response, the European Commission initiated a feasibility study in 2005 to develop a project for implementing mitigation measures in line with EU Directive standards for urban wastewater. This led to the creation of the "Development of Water Supply and Wastewater System in the City of Mykolaiv" project in 2006, currently being executed with funding from the EIB's loan, E5P grant, and EPTATF grant.

The proposed project components are designed to meet the specified effluent concentrations after each rehabilitation phase. Compliance with these standards is assessed through 24-hour composite daily samples and annual average results. The achievable effluent standards are compared to EU discharge standards (Council Directive 91/271/EEC).

Currently, MVK is actively engaged in the execution of the rehabilitation contract for the existing WWTP facilities as part of the "Development of the Water Supply and Wastewater System in the City of Mykolaiv" project. This initiative is funded by an EIB loan and an E5P grant. The pivotal aspect of this project is the phased restoration of the aforementioned aging facilities.

The envisioned wastewater system development plan encompasses the following elements:

- Comprehensive overhaul of existing wastewater pumping stations, integrating SCADA and other automation systems extensively
- Further refurbishment of the existing WWTP
- A substantial program for rehabilitating damaged sewage collectors, employing advanced sanitation technology with GRP-liners and installation of new plastic or cast-iron pipes
- Construction of a new state-of-the-art WWTP, originally planned under the DSIF program which existed before the full-scale invasion.

3.3 Maintenance

Insufficient maintenance of infrastructure constitutes a major problem - not only in WSS, but in all municipal infrastructure sectors, not only in Mykolaiv, but in the whole of Ukraine, not only since the full-scale invasion of Russia, but all the time since the dissolution of the Soviet Union (and even before then). It is an issue which has to be resolved as part of the rebuilding of Ukraine.

When companies like water utilities lack financial resources, maintenance and repair are often the first to suffer. This underfinancing leads to infrastructure deterioration, losses, such as water losses, and decreased service quality. In this regard it is worth emphasizing the main difference between WSS systems and heating systems in this regard. The main difference lies in the fact that the WSS systems operates a larger number and more powerful pumps requiring regular maintenance. Furthermore, heating systems utilize specially purified water with reduced oxygen content in a closed loop which is only partially refreshed to compensate for losses. This contrasts with water supply systems where water is continuously renewed, often without special deoxygenation, accelerating corrosion and wear, and increasing maintenance costs. We estimate that WSS system maintenance costs are about 10-20% higher than those for heating systems.

Below we provide our estimates of the proper maintenance costs of the WSS system in Mykolaiv City. More precise figures will be determined during feasibility studies for investment preparation.

Our initial estimates of the proper maintenance costs are:

1. For prevailing system where repair and maintenance works were previously inadequate and lead to significant system degradation, it's expected that maintenance costs will be in the range of **12-15% of total operating costs** for several years.

2. For newly installed equipment and especially networks, the initial years typically require lower maintenance due to the condition of the equipment. Our estimated maintenance costs for these first years (2-3 years) are about **1,5% of the total investment cost**. However, as the system ages and components start to wear, maintenance costs are likely to rise, possibly to **2,5-4,5% of total investment** in subsequent years (4-7 years after investment).

3. For systems that have undergone rehabilitation it is difficult making an estimate due to varying degrees of refurbishment. However, a general estimation might place maintenance costs in the range of **5-8% of the total investment**. This figure takes into account that the rehabilitated systems, again especially networks, has been significantly improved, reducing maintenance needs compared to its state prior to rehabilitation. But still, it will require more maintenance than a brand-new system.

When estimating the maintenance costs of WSS systems, it is important to take into account that sewage and water treatment systems have their specifics. Firstly, more funds are spent on the regular maintenance of the sewage networks due to the need for cleanings. Older sewage systems often rely on outdated pumps requiring much more frequent maintenance compared to the ones in water systems. The disposal or reclamation of sludge presents a significant challenge, especially for older systems.

Considering this, sewage and wastewater treatment operations can cost about twice as much as those for water supply systems. This does not account for the additional 30-50% cost for sludge field reclamation in older systems.

Two Key Points for Consideration:

- While cities typically have only a few wastewater treatment plants (1 to 5), there are significantly more boiler plants, albeit smaller size. It is important to take this into account when scaling-up and estimating total maintenance costs both for water and district heating.

- In Mykolaiv, the WSS networks have been almost entirely destroyed by salty water during the war, making their maintenance costs nearly equivalent to the cost of complete replacement. This is estimated to be around 10-12% of total operating costs annually, limited by the availability of pipes on the market and the feasibility of completing such extensive work over the summer.

3.4 Affordability

To investigate the potential impact of current and forecasted tariffs on households, an affordability analysis for WSS has been conducted. Affordability was defined as a share of monthly household expenditure, which is spent on utility bills. This indicates the actual financial ability of households to

pay for utility services. The threshold level for water/wastewater was set at 5% of household income/expenditure.

Average household with all similar characteristics, except income levels, have been investigated. 10 household income groups have been considered, from lowest till highest income decile. Levels of income into the future have been forecasted using wage increase index, and they were compared to utility bill, based on forecasted tariffs. Tariff rates have been forecasted to increase using average compounded growth rate from 2018 to 2023. In calculating the average household bill, the rate for of consumption for water and discharge of wastewater, forecasted tariffs, and VAT rate of 20% have been used.

The results of analysis for WSS services suggest no significant problem with increased tariffs for households. Only in first income decile (poorest families) in the period 2030-2032 the average bill for WSS services exceeded threshold of 5% of income. This means that increased tariffs are not going to pose any significant problems for households. And for the poorest families application of direct household assistance can be recommended. The required demand for municipal funds for this purpose will be limited, given that only the first decile and two years need subsidizing.

For more information about the affordability analysis carried out, see the cross-cutting report, titled “Water and District Heating Affordability”.

4 Basis for moving forward

This chapter outlines the basis or key elements for moving forward towards the targets set by Vision 2050 for the WSS sector, highlighting Ukraine’s EU candidate member status. .

Ukraine's signing of the Association Agreement with the EU and its EU candidate member status have made the EU's water legislation a crucial factor in harmonizing Ukraine's legal framework. The foundation of EU water legislation is the Water Framework Directive (WFD) 2000/60/EC, which is designed to eventually replace other related directives. The WFD is complemented by a list of interconnected directives aimed at ensuring water quality and management.

The implementation of European Directives in Ukraine began on November 1, 2014, and is ongoing in accordance with the Association Agreement between Ukraine and the European Union and its member states. Specifically, in the field of environmental protection (Chapter 6, "Environment," of Section V, "Economic and Sectoral Cooperation," of the Agreement), there is provision for sectoral cooperation. This means that Ukraine, in the realm of environmental protection, aligns its practices with EU legislation across eight sectors. In total, this alignment is regulated by 29 sources of law, including EU Directives and Regulations, which establish general rules and standards that must be incorporated into national legislation.

Ukraine's integration of European Directives, particularly in the environmental sector, is a significant step towards harmonizing its practices with EU standards. The water supply and sanitation (WSS) sector is critical for public health and environmental sustainability, is undergoing reforms to improve its financial and regulatory frameworks. The World Bank has outlined the challenges and recommended reforms for sustainable development in Ukraine's WSS sector, emphasizing the need for inclusive and resilient services. The UN's assessment of damages and needs in Ukraine's WSS sector highlights the urgent reconstruction required due to extensive damages suffered since the start of the Russian invasion in 2022, with an estimated US$3.3 billion needed for ambitious reconstruction goals. These efforts align with Ukraine's commitment to the Association Agreement with the EU, which includes the adoption of EU Directives and Regulations into national legislation. The proposed measures aim to enhance the investment climate, streamline tariff regulations, and ensure effective state investment policies, which are essential for the sector's modernization and alignment with European standards.

The water supply and sanitation sector in Ukraine currently requires improvements in its financial and economic regulatory mechanisms. This involves the necessity to establish conditions for effective state investment policy. This includes enhancing the investment climate, offering competitive conditions for conducting business, reducing or simplifying taxes, providing incentives, creating a database of investment projects, ensuring the rule of law, and more.

Table 4-1 overleaf provides an overview of measures to be taken to intensify investment activities in the WSS sector.

Table 4-1 The structure of the necessary changes in the legislation of water supply and sanitation

The direction of improvement	The essence
	Consistency of the city development strategy (plan) with the planning of sustainable development of the water supply and sanitation infrastructure; Approval and "digitization" of the city's water supply and sanitation development strategy with specific deadlines and measures calculations; Improvement of the procedure for providing subventions (subsidies) from the regional development fund.
Activation of investment activities	Simplification of the procedure for justifying investment activity; Implementation of medium and long-term planning of investment activities; Implementation of planning of financial security of investment activity; Establishment of the maximum rate of the investment component of the tariff for water supply and sanitation services, which will be directed to the renewal of the fixed assets of the enterprise. *At the same time, the investment component must be of targeted use and protected (it cannot be reduced and redirected to other purposes);* Rejection of control of the tariff structure, transition to control of the total value of the cost price (moderate deregulation); Provision of direct and indirect (tax benefits, etc.) state support; Creation of appropriate conditions for attracting private investments (creation of a base of analog projects; provision of effective conflict resolution mechanisms; creation of a base of investment projects; etc.).

5 Priority Investment Program

This chapter provides an overview of the Priority Investment Program (PIP) suggested for the development of the WSS in Mykolaiv City. The PIP is broken down by investment projects and enabling projects, as well as by short-term, mid-term and long-term projects. It also suggests grouping the projects included to the PIP into three Investment Packages (Ips), each consisting of a number of projects sharing a common objective and very much interlinked.

Reference is made to 6Annex 1, which provides the PIP in extenso.

When preparing the draft PIP, COWI has been in contact with representatives of various IFIs and donors, including EBRD, EIB, NEFCO, ICRC and Swedfund.

Table 5-1 below lists all short-, mid- and long-term investment and enabling projects that have been included to the PIP for Water. Furthermore, it puts forward a timeline.

Table 5-1 PIP, Water, timeline

No	TERM	PROJECT NAME	COST (EUR)	YEAR
		INVESTMENT PROJECTS		
1	STIP	Construction of new microfilters' unit at the site of preliminary water treatment of water-intake plant «Dnipro-Mykolaiv»	6 million	
2	STIP	Installation of rotating screens at the site of zero-stage PS of water intake p	4 million	
3	STIP	Mykolaiv Non-Revenue water I	6.2 million	
4	STIP	Mykolaiv NRW-2	7.2 million	
5	STIP	Establishment of the DMAs for water supply network in the City of Mykolaiv	39 million	
6	STIP	Replacement of pumping and control equipment to improve energy efficiency, Integration of SCADA system at water supply PSs	N/A	
7	STIP	Construction of solar power stations for water supply	3.6 million	
8	STIP	Rehabilitation of Zhovtneve Reservoir	52 million	
9	STIP	Construction of the new water treatment facilities at existing WTP	134.3 million	
10	STIP	Rehabilitation of Wastewater Pumping Station (WWPS) of ME "Mykolaivvodokanal" with metering units of WWPS No.11A, Mykolaiv City, Heroiv Ukrainy Str., 11/2	2.5 million	
11	STIP	Installation of Nano-bubbles generators at the existing WWTP	1 million	
12	STIP	Installation of S: Selection unit at the existing WWTP	2 million	
13	MTIP	Construction of the new water intake and transmission main (51 km mark on Pivdenyy Buh)	128.87 million	
14	MTIP	Rehabilitation of WWPS of ME "Mykolaivvodokanal"	N/A	
15	MTIP	Construction of the sludge processing facilities	N/A	
16	LTIP	Construction of a new WWTP including modernization of the sewage collecti	80 million	
17	LTIP	Wind power generation facilities	N/A	
		ENABLING PROJECTS		
1	STEP	Twining arrangement between MVK and Danish utility	N/A	
2	MTEP	Skills' upgrading within WSS	N/A	
3	MTEP	Implementation of the EU Water Acquis at municipal level (MTEP 4)	N/A	

YEAR: 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050

Table 5-2 Investment packages (IPs), Overview

No	Title	Objective	Investment projects included	CAPEX, Total, EUR
1	Nova Odesa Water Supply Complex	To ensure sustainable source of raw water. To improve the raw water quality to drinking water standards. To collect and preserve raw water for further use.	MTIP 13, STIP 8, STIP 9	316 Mln. EUR
2	Establishment of DMAs within water supply network	To optimize operations, improve energy efficiency and lower the share of NRW.	STIP 5 STIP 3 and 4	39 Mln. EUR 13.4 Mln EUR
3	New Wastewater Treatment Plant	Entire new wastewater treatment plant, Modernized sewage collection infrastructure (including sewage collectors and respective wastewater pumping stations).	LTIP 16	80 Mln EUR

Table 5-2 overleaf presents three IPs, specifying their objectives and referring to the number of projects from the PIP WSS that target each specific objective. Each IP besides investment projects includes also enabling projects that will have to be carried out to ensure effect of the investments. Three enabling projects on WSS are highly relevant for three IPs.

Table 5-2 Investment packages (IPs), Overview

No	Title	Objective	Investment projects included	CAPEX, Total, EUR
1	Nova Odesa Water Supply Complex	To ensure sustainable source of raw water. To improve the raw water quality to drinking water standards. To collect and preserve raw water for further use.	MTIP 13, STIP 8, STIP 9	316 Mln. EUR
2	Establishment of DMAs within water supply network	To optimize operations, improve energy efficiency and lower the share of NRW.	STIP 5 STIP 3 and 4	39 Mln. EUR 13.4 Mln EUR
3	New Wastewater Treatment Plant	Entire new wastewater treatment plant, Modernized sewage collection infrastructure (including sewage collectors and respective wastewater pumping stations).	LTIP 16	80 Mln EUR

6 Action Plan

This chapter provides an Action Plan regarding WSS. It lists specific activities related to each project and/or investment package, introducing responsible institutions and individuals on behalf of MCA that will be appointed for implementation of each task. The Action Plan shall ensure the proper implementation of the PIP. **Error! Reference source not found.** below includes the Action Plan.

The Action Plan has been developed in close cooperation with the Housing and Municipal Service Department of MCA. The Action Plan may be translated into a database to be uploaded to the Mykolaiv City Council website. If so, potential investors may have easy access to it. This will facilitate the coordination of efforts among the MCA and various IFIs and donors active in Mykolaiv City.

Table 6-1 Action Plan, WSS

Nr.	Project Title	Expected duration	Estimated CAPEX/EUR	Beneficiary	Key tasks (from PIP)	Status	IFI/Organization potentially interested in the project	Responsible authority	Contact person
1	Construction of new microfilters' unit at the site of preliminary water treatment of water-intake plant «Dnipro-Mykolaiv»	12 months	6.000.000	MVK	• The existing design documentation should be fully reviewed. • BoQs to be reviewed. • Tendering documentation should be developed. • Tender procedure to be carried. • Construction of a new building • Installation of 12 microfiltration units	• The existing design should be fully reviewed due to the entire demolition of the building of microfiltration unit. • Due to the serious price increase on the world market the BoQs have to be also reviewed.	• EBRD	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy +380663369424
2	Installation of rotating screens at the site of zero-stage PS of water intake plant «Dnipro-Mykolaiv»	2 months after supply of equipment	4.000.000	MVK	• BoQs to be reviewed. • Tendering documentation should be developed. • Tender procedure to be carried. • The construction of a new building should be done. • Installation of rotating screens to be executed.	Design documents passed state expertise and ready.	• EBRD	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com

Nr.	Project Title	Expected duration	Estimated CAPEX/EUR	Beneficiary	Key tasks (from PIP)	Status	IFI/Organization potentially interested in the project	Responsible authority	Contact person
3	Mykolaiv Non-Revenue water I	12 months + 2 months after supply of equipment	6.200.000	MVK	• Development of the related Feasibility Study and Design documents. • Tendering documentation should be developed. • Tender procedure to be carried. • PIU consultant to be chosen. • Executing a tender. • Replacement of pumping equipment, pipes. • Installation of master water meters in multistoried buildings.	Design documents passed state expertise and ready.	• DSIF • NEFCO	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com
4	Mykolaiv NRW - 2	12 - 15 months	7.500.000	MVK	• Development of the related Feasibility Study and Design documents. • Tendering documentation should be developed. • Tender procedure to be carried. • PIU consultant to be chosen.	Design documents passed state expertise and ready.	• MFA Denmark • NEFCO	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com
5	Establishment of the DMAs for water supply network in the City of Mykolaiv	36 months	39.000.000	MVK	• Hydraulic modelling. • Identification of the DMAs • Development of the related Feasibility Study and Design documents. • Conduct a comprehensive network survey incl. a combination of GIS-based site data collection and surveying available records in MVK to develop a complete database with all parameter of the entire distribution network. • Procure hydraulic modelling software for MVK.	• Pilot project design documents (2023) Source: MVK, ongoing contract • DMAs concept (Feasibility study 2006) Source: TACIS, 2006 • Recommendation on DMAs and hydraulic modelling (Feasibility study) Source: ICRC/GFA, 2023	• ICRC (part of the project started) • EIB • NEFCO	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com

Nr.	Project Title	Expected duration	Estimated CAPEX/EUR	Beneficiary	Key tasks (from PIP)	Status	IFI/Organization potentially interested in the project	Responsible authority	Contact person
					• Develop a complete and calibrated hydraulic model (pre-condition for DMA design). • Design an estimated 70 DMAs for the entire network. • Elaborate BoQs and specifications for DMA implementation (considering SCADA). • Elaborate BoQs and specifications for pipe replacement and network upgrading (considering SCADA). • Elaborate a sequenced pipe replacement implementation plan, incl. bankable investment packages (incl. BPS rehabilitation and design of house connections). • Determine priority areas for most urgent implementation.				
6	Replacement of pumping and control equipment to improve energy efficiency, Integration of SCADA system at water supply PSs	10 - 12 months	-	MVK	• Detailed pumping station efficiency assessment. (It will be mandatory to organize the collection of objective characteristics of energy consumption and corresponding water supply volumes for each pumping station). • Selection of pumping characteristics and appropriate automatic control stations with frequency converters: • Verification of correctness of selection of pumping	• Pilot project design documents (2023) Source: MVK, ongoing contract • Recommendation on upgrade of the pumping station and integration of SCADA system (Feasibility study) Source: ICRC/GFA, 2023	• ICRC • EIB	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com

Nr.	Project Title	Expected duration	Estimated CAPEX/EUR	Beneficiary	Key tasks (from PIP)	Status	IFI/Organization potentially interested in the project	Responsible authority	Contact person
					equipment characteristics and assessment of predicted efficiency of their operation in different consumption modes should be done through creation of hydraulic models of their operation. • Automatic control stations should be selected based on the required capacity and with functions that take into account their subsequent use in SCADA and possibly DMA systems. • Procurement and installation of necessary equipment • Assess needs define main tasks. • Develop detailed system design – hardware, software, network architecture and data flow. • Identify and install necessary data collection devices. • Procure appropriate SCADA software. • Integrate SCADA with other existing systems. • Conduct comprehensive system testing to validate SCADA functionality. • Prepare system manuals, operation procedures and maintenance instructions. • Train operators.				

Nr.	Project Title	Expected duration	Estimated CAPEX/EUR	Beneficiary	Key tasks (from PIP)	Status	IFI/Organization potentially interested in the project	Responsible authority	Contact person
7	Construction of solar power stations for water supply	6 months	3.500.000	MVK	• Development of the design documentation. • Tender documentation development. • Tender procedure. • Tender, procurement, delivery of the solar panels. • Construction of three (+) solar power generation stations at the water supply facilities of Mykolaivvodokanal (WTP, 3rd Stage water pumping station, water-intake). • Equipment supply and installation works.	• The project documents are not ready yet.	• EIB • NEFCO	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com
8	Rehabilitation of Zhovtneve Reservoir	24 months	5.200.000	MVK	• According to the outcomes of the related Feasibility Study. • Preparation of the project design documentation. • Preparation of Tender Documents • Procurement of a Contractor. • Construction works.	• Feasibility Study and Pre-design documents by EGIS are ready.	• EIB • DSIF	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com
9	Construction of the new water treatment facilities at existing WTP	36 months	134.300.000	MVK	• Design documentation should be prepared. • Tendering documentation should be developed. • Tender procedure to be carried. • The construction of a new facilities should be done. • Installation of new water treatment equipment to be executed. • Geodesic, geologic	• Preliminary design is ready • Design documentation should be developed	• EIB • DSIF	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com

Nr.	Project Title	Expected duration	Estimated CAPEX/EUR	Beneficiary	Key tasks (from PIP)	Status	IFI/Organization potentially interested in the project	Responsible authority	Contact person
10	Rehabilitation of Wastewater Pumping Station (WWPS) of ME “Mykolaivvodokanal” with metering units of WWPS No.11A, Mykolaiv City, Heroiv Ukrainy Str., 11/2.	8.5 months	2.500.000	MVK	• Tender procedure. • Tender and constructs to be signed for the construction works. • Construction works.	• Design documents are ready. • BoQs 2021 should be updated.	• EIB	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com
11	Installation of Nano-bubbles generators at the existing WWTP	8 months	1.000.000	MVK	• Development of the respective Feasibility Study. • Development of the design documentation. • Development of the tender documentation. • Procurement procedures. • Procurement, delivery and installation of the technological equipment.	• Technical specification on equipment is ready. Source: Danish company Techras Nano		ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com
12	Installation of S: Selection unit at the existing WWTP	12 months	2.000.000	MVK	• Development of the respective Feasibility Study. • Development of the design documentation. • Development of the tender documentation. • Procurement procedures. • Procurement, delivery and installation of the technological equipment.	• The technology is already applied at WWTP in Copenhagen. • Technical specification on equipment is ready. Source: Danish company TECHRAS Miljø		ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com
13	Construction of the new water intake and transmission main (51 km mark on Pivdenyy Buh)	24 months	128.870.000	MVK	• Development of the respective Feasibility Study. • Development of the design documentation. • Development of the tender documentation. • Tender and procurement procedures. • Obtaining necessary	• Feasibility Study by EGIS, 2023 • High on agenda at Mykolaiv City and central government	• EIB • DSIF	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com

Nr.	Project Title	Expected duration	Estimated CAPEX/EUR	Beneficiary	Key tasks (from PIP)	Status	IFI/Organization potentially interested in the project	Responsible authority	Contact person
					permits. • Land allocation issues. • Connection to the electrical grid. • Tendering and constructs with the contractor. • Procurement of a Contractor. • Construction works and Supervision activities.				
14	Rehabilitation of WWPS of ME “Mykolaivvodokanal”	N/A	-	MVK	• Development of the respective Feasibility Study. • Development of the design documentation. • Development of the tender documentation. • Procurement procedures. • Procurement, delivery and installation of the technological equipment.	N/A	TBC	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com
15	Construction of the sludge processing facilities	24 months	-	MVK	• Development of the respective Feasibility Study. • Development of the design documentation. • Development of the tender documentation. • Tender and procurement procedures. • Procurement, delivery and installation of the technological equipment. • Construction	N/A		ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com

Nr.	Project Title	Expected duration	Estimated CAPEX/EUR	Beneficiary	Key tasks (from PIP)	Status	IFI/Organization potentially interested in the project	Responsible authority	Contact person
16	Construction of a new WWTP including modernization of the sewage collection infrastructure	36 months	80.000.000	MVK	• Development of the respective Feasibility Study. • Development of the design documentation. • Development of the tender documentation. • Tender and procurement procedures. • Procurement, delivery and installation of the technological equipment.	• Concept document is ready. Source: MVK. Concept developed by Posch and Partners, 2017	• DSIF	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com
17	Wind power generation facilities	N/A	-	MVK	• Development of the respective Feasibility Study. • Development of the design documentation. • Development of the tender documentation. • Tender and procurement procedures. • Obtaining necessary permits. • Land allocation issues. • Connection to the electrical grid. • Tendering and constructs with the contractor. • Procurement of a Contractor. • Construction works and Supervision activities. • Mention envisaged key tasks to be carried out to produce the outputs.	• Should be developed	TBC	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com

Nr.	Project Title	Expected duration	Estimated CAPEX/EUR	Beneficiary	Key tasks (from PIP)	Status	IFI/Organization potentially interested in the project	Responsible authority	Contact person
18	Twining arrangement between MVK and Danish utility	84 months	N/A	MVK	• Study tours to Danish utilities • Internship at Danish utilities for MVK staff • On the job training • Introduction to new technology • Training of trainers • Establishment of good practices • Hotline between MVK and Danish utility	N/A	TBC	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com
19	Skills' upgrading within WSS	84 months	N/A	MVK	• Identify areas for capacity building • Identify relevant institutions • Develop Curriculum • Conduct the education	Initiated	• VCS Denmark	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com
20	Implementation of the EU Water Acquis at municipal level (MTEP 4)	108 months	N/A	Department of Housing and Municipal Services within Mykolaiv City Administration	• Development of Guide on EU Water Acquis • Deep dive into the key directives within the EU Water Acquis focusing on service levels and legal and regulatory framework • Development and execution of training programme (preferably, modular training programme) • Development of guide on data collection, processing and reporting, including templates, and ad-hoc assistance implementing this guide	N/A	To be identified	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com

Nr.	Project Title	Expected duration	Estimated CAPEX/EUR	Beneficiary	Key tasks (from PIP)	Status	IFI/Organization potentially interested in the project	Responsible authority	Contact person
21	Replacement of the pipes	2022-2025	N/A	MVK	Maintenance of the infrastructure	Ongoing activity	TBC	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com
22	Replacement of the valves and fittings	2022-2025	N/A	MVK	Maintenance of the infrastructure	Ongoing activity	TBC	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilitites	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com
23	Replacement of quartz sand in the speedy filters at 3rd Stage Treatment Facilities of the WTP	2023-2024	N/A	MVK	Maintenance of the infrastructure	Ongoing activity	TBC	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com
27	Water tests on the pilot model of WTP	March – December 2024	N/A	MVK	Maintenance of the infrastructure	Ongoing activity	TBC	ME "Mykolaivvodokanal" MCA, Head of the dep-t for utilities	Victor Pisotsky vpisotskiy@vodokanal.mk.ua Dmytro Bezdolnyy kpkbmk@gmail.com

Nr.	Project Title	Expected duration	Estimated CAPEX/EUR	Beneficiary	Key tasks (from PIP)	Status	IFI/Organization potentially interested in the project	Responsible authority	Contact person
26	Modernization of water treatment systems	2024-2025	100,000	ME "DYZ "Pilot"	Installation of innovative mechanisms, additional equipment for uninterrupted operation of water purification systems	Ongoing activity	TBC	ME "DYZ "Pilot" MCA, Head of the dep-t for utilities	Iryna Krysina krysinairen@gmail.com Dmytro tel.: kpkbmk@gmail.com

Annex 1 Priority Investment Programme (PIP)

This annex is provided in a separate file.