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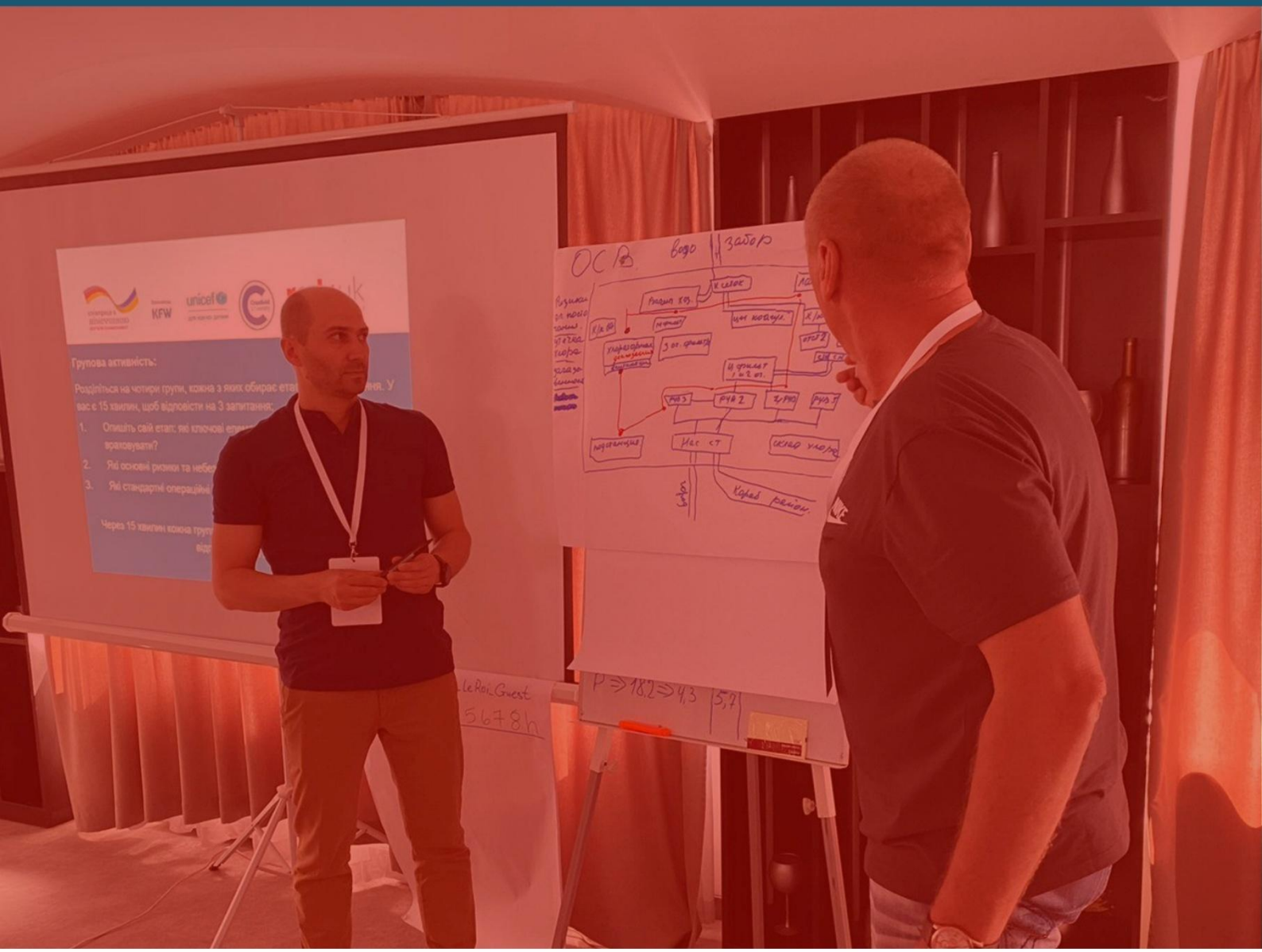
LEARNING AUDIT & NEEDS ASSESSMENT

UKRAINE WATER UTILITIES (VODOKANAL) CAPACITY STRENGTHENING

30th June, 2025



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UNICEF Vodokanal Capacity Strengthening Project

Contents

Introduction

Background and Understanding of the project

The Ukrainian vodokanals have the majority of the responsibility to supply safe drinking water and sewage services across the country. Even before the escalation of the conflict the vodokanals faced severe challenges of aging infrastructure and high water losses. These have been compounded by increased energy costs, increased fuel consumption, tariff deficits and more, as well as conflict damage for those utilities operating in conflict regions. UNICEF Ukraine is working with the Ukrainian vodokanals to support them towards an eventual recovery path and potential integration of Ukraine into the European Union.

The aim of this project is to develop a capacity strengthening programme to strengthen the workforce among WASH service providers in Ukraine, equipping them with the necessary competence and skills for improved and more efficient WASH services. The training will focus on transmitting the essential knowledge and skills to improve the quality and efficiency of WASH service delivery in the immediate term, whilst considering the longer term aim of EU integration.

Accordingly, this project:

1. Undertook a scoping exercise to identify the most urgent training requirements by target audience (Vodokanal management, engineers and operators), and identify a plan and methodology for implementation of the capacity development programme.
2. Developed relevant training modules to address the main training needs.
3. At the time of publishing report, commenced trainings across 15-20 vodokanals in Ukraine with the target of approximately 750 vodokanal personnel.
4. Will ultimately, provide actionable recommendations to scale-up capacity enhancement initiatives to reach additional staff and vodokanals.

Situation Analysis

Even before the escalation of the conflict in February 2022, approximately 10 million people in Ukraine lacked access to centralised piped water supply, and 20 million people lacked access to centralised wastewater collection and treatment facilities (GoU, 2021). The water and sanitation facilities are overall old and decaying, and both drinking water supply and wastewater treatment depend on this heavily degraded infrastructure. By 2021, around 40% of existing networks were in critical condition and almost 35% of sewage treatment facilities needed upgrades (GoU 2021).

The scale of this vulnerability has been significantly exacerbated with the war, as expected. As per the Rapid Damage and Needs Assessment, between February 2022 and December 2023, the estimated physical damage for the water supply and sanitation sector stands at US$4 billion. Most of the damage has been observed in larger physical infrastructure like wastewater treatment plants, water supply and wastewater collection networks, and drinking water treatment plants and facilities. Losses have been estimated at approximately US$11.6 billion, more than 40% of which are from lost revenues, with the next biggest losses incurred due to increased

energy costs, and then increased fuel consumption, increased prices of materials and equipment, tariff deficits, etc.

The majority of the responsibility to supply safe drinking water supply falls on Ukrainian vodokanals (water utilities). According to the National Vodokanal Association, as of December 2023, the estimated number of utilities providing water supply and sewage services in Ukraine is approximately 2,550 utilities. The size of water supply and sewage systems (pipelines, pumping stations, treatment plants, etc.) is on an average 2.5 times larger than the existing needs (Vodokanal Association 2023). The average non-revenue water among the largest utilities is 41.1% (data from the National Tariff Regulator). The vodokanals are facing significant challenges, compounded with the losses due to lost revenues, increased energy costs, increased fuel consumption, increased prices of materials and equipment, tariff deficits, etc. Also given the pre-existing vulnerabilities and deteriorating infrastructure, there is an urgent need to strengthen the capacity in vodokanals for more efficient working to counteract the damages and losses, as well as modernise them and capacitate their key staff towards an eventual recovery path and integration of Ukraine into the European Union. The provision of WASH services needs a workforce that is well trained and equipped to deliver quality WASH services.

Most vodokanals are owned and operated by local governments or municipal authorities. This means they are accountable to their respective city or town councils, and it is those city or town councils that determine the tariff structure for water and sewerage services. Funding for the vodokanals comes from these consumer tariffs, local budget allocations, and sometimes state subsidies. As a result, the larger more urban vodokanals, such as in Kyiv, are relatively well funded and resourced compared with smaller, rural vodokanals that can struggle to fund the most basic of operations. The funding and resourcing of vodokanals is further impacted by whether they are located in areas of active conflict, in de-occupied zones, or are further west and remote from conflict areas. Consequently, this wide diversity in vodokanals impacts upon the capacity strengthening needs and the prioritisation of vodokanal staff to receive support from this project.

Project Methodology

This scoping study takes a mixed methods research approach to develop a rich and nuanced understanding of vodokanals' learning needs, taking into account the perspectives of varied stakeholders.

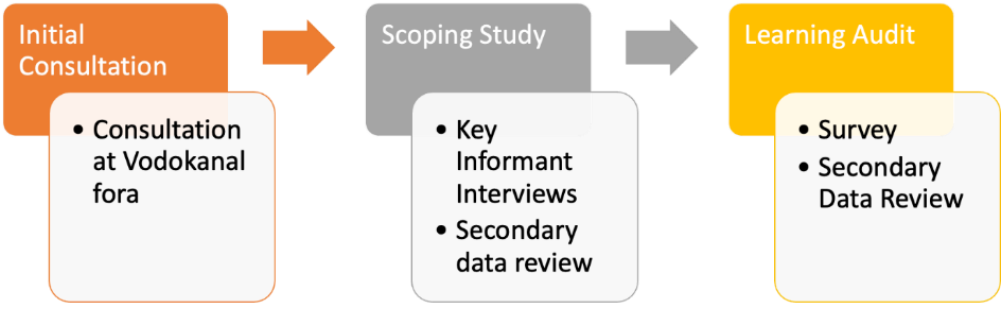


Figure 1 Scoping study stages and methods

This study builds on the findings of the initial consultation undertaken by UNICEF and employs a sequential mixed design which includes the following stages and methods:

The exploratory sequential design gathered qualitative data through key informant interviews during the scoping phase, followed by quantitative and qualitative data through surveys in the learning audit phase. This approach was selected to enable broad exploration of the key challenges and learning priorities of WASH actors in Ukraine followed by validation and prioritisation of training topics through triangulation of the results from each phase and data collection method. Further details on the research methods employed in each phase can be found in the corresponding sections of the report below.

Learning Audit Summary

The Learning Audit was conducted using a combination of desk research, UNICEF consultations with vodokanals, a learning needs assessment survey, and Key Informant Interviews. Detailed description of the key informant interviews can be found below.

Findings from the initial consultation, KIIs and learning needs assessment survey were analysed and compared to identify the priority training topics for each learner group. Further analysis was undertaken to identify topics which do not need to be included in this training program i.e. where there is already training provision in Ukraine through another training provider, these topics were not included in this training programme, but existing trainings from other providers will be signposted for learners. The results of this analysis enabled the consultants to identify the topics that will form the core content of each module to be designed in the learning programme phase of work.

Results of Learning Audit for Operators

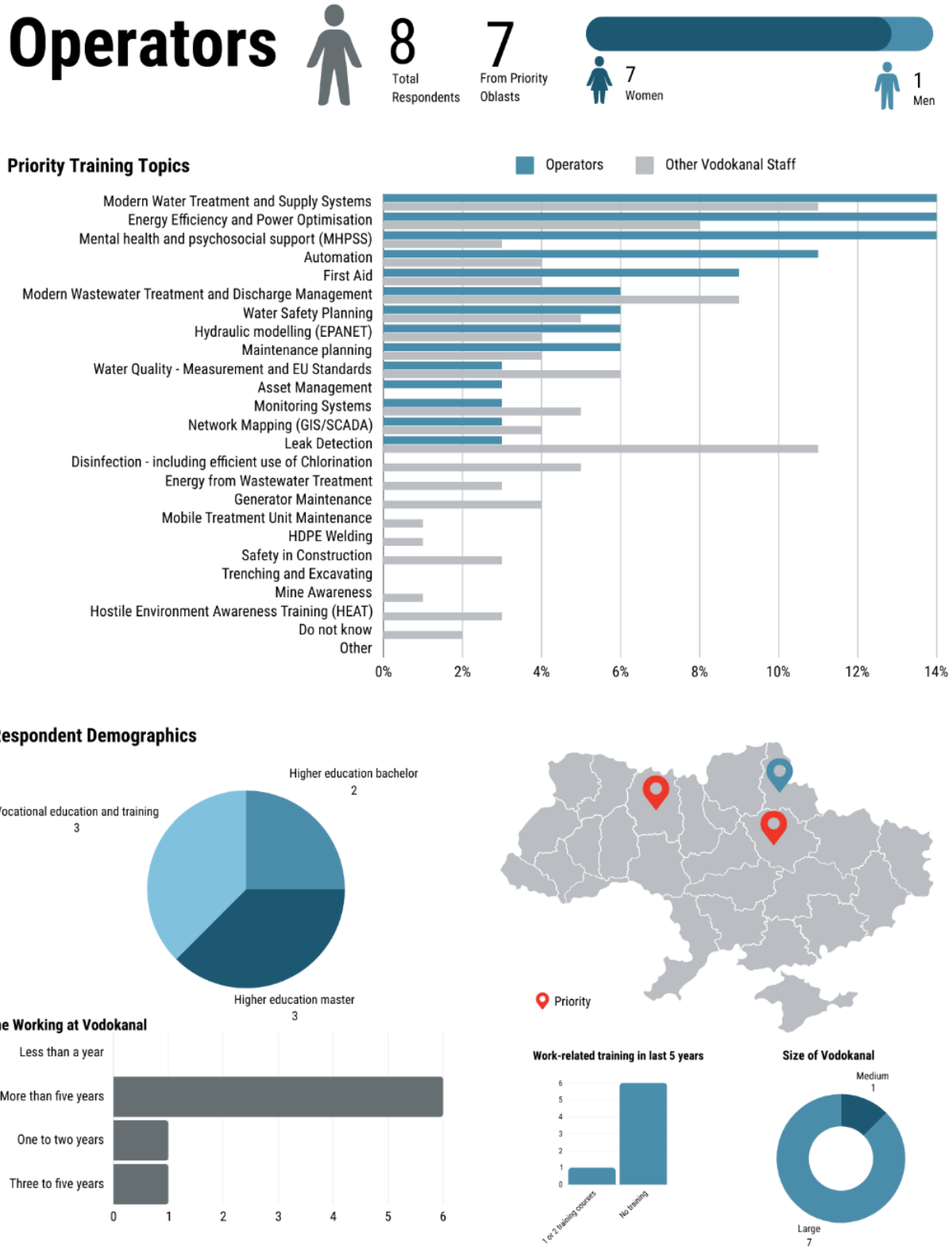


Figure 2 Results of Learning audit for Operators

Summary overview of Operators training

Target learner group:

Staff in operator roles at Vodokanals in Ukraine including Drinking Water Treatment Plant (DWTP) operators, Wastewater Treatment Plant (WWTP) operators, construction and repair crews, safety personnel, dispatcher.

Course content and Duration:

Table 1 Operators Course Content

	Topic	Duration (Minutes)
1.0	Introduction	15
1.1	Water standards and measurement	60
1.2	Coagulation and Flocculation	60
Break		15
1.3	Clarification	60
Lunch		60
1.4	Filtration	60
Break		15
1.5	Adsorption	60
1.6	Disinfection	60
1.7	Closing and Reflections	15
2.0	Introduction	15
2.1	Preliminary and primary treatment	60
2.2	Secondary biological processes I	60
Break		15
2.3	Secondary biological processes II	60
Lunch		60
2.4	Tertiary treatment	60
Break		15
2.5	Sludge treatment	60
2.6	Novel contaminants	60
2.7	Conclusion	15

Overview of respondents:

There were a total of eight responses to this survey, with seven female and one male respondent. Seven of the respondents are located the priority oblasts of Poltavska and Zhytomyrska.

One respondent works in water treatment, three work in both water and wastewater treatment, and four state that they work in 'other'.

Respondents described their roles as operator (1 response), 'The operator providing the information makes calculations' (4 responses), and 'consultation of subscribers' (1 response).

Six of the respondents have worked at the vodokanal for more than five years, one respondent has three to five years experience, and one has one to two years of experience.

The majority of respondents (seven) work for a large vodokanal (covering more than 100,000 inhabitants), and one works in a medium sized vodokanal (covering between 40,000 to 100,000 inhabitants).

The highest level of education completed by respondents ranged from vocational education and training (three) to higher education, with two respondents completing a bachelor's degree and three completing a master's degree.

Existing capacities:

The LNA survey asked respondents to describe the existing leadership, management and planning and technical capacities in their vodokanal. For the purposes of the survey, the following definitions were provided:

Leadership: Effective leadership establishes and communicates a long-term vision for the organisation and embodies a commitment to cultivating the organisation's culture, helping to ingrain methods to achieve the utility's vision into the organisation's day-to-day operations.

Management and Planning: Establishing Standard Operating Procedures, sharing knowledge and best practice, measurement of service performance (e.g. water supply, water quality, wastewater discharge quality) and planning operation and maintenance to meet goals for service delivery.

Technical: General knowledge of water/wastewater treatment, and knowledge and skill in the operation, maintenance and repair of applicable machines, equipment and tools.

Respondents answered the question 'How would you rate the current capacity (knowledge and skills) in your Vodokanal in the following areas?' as follows:

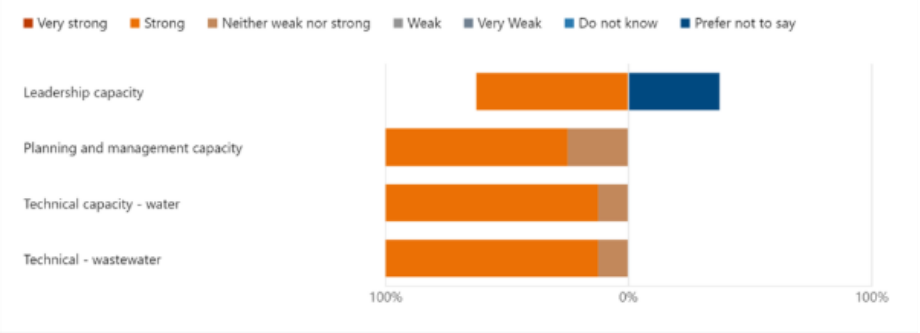


Figure 3 Operator responses to the question 'How would you rate the current capacity (knowledge and skills) in your Vodokanal in the following areas?'

When asked to explain the reasons for the ratings given, operator responses included *'Because we have good specialists in these areas' 'We have good specialists in every field'* and one stated their vodokanal 'Has long experience and qualified employees'.

These responses regarding technical capacity differ from the responses from senior managers and engineers, in that operators rate technical wastewater and water capacities equally whereas the senior managers and engineers perceive weaker technical capacities in wastewater as compared to water. However, operator rating of technical capacities do align to the findings of the KIIs conducted during the scoping study, in which a number of KIs described vodokanals as having a good level of technical capacity to maintain and operate existing systems.

Training history:

When asked 'What training courses or materials are you aware of that are relevant for your work?' there only one person responded stating that they were not aware of any training.

When asked 'How much training have you received for your work in the past 5 years?', six respondents stated they have not attended any training and one respondent stated they had attended one or two trainings during that period. This contrasts with responses from senior managers and engineers – as outlined later in this report; in both of those groups, the majority of respondents had received training in the past 5 years. These findings are consistent with the findings from the KIIs, which noted that many operators will receive on the job training or mentoring rather than attend formal training.

Priority topics:

When asked to identify their priority training needs, operators were provided with a list of possible training topics, developed through the scoping study. They could select up to five training topics to prioritise, including the option to select 'other' which allowed them to propose additional training topics not included in the list provided. All of the survey respondents selected between 3-5 topics each indicating an appetite for training amongst the respondents in this target learner group. Responses are shown in figure 4.

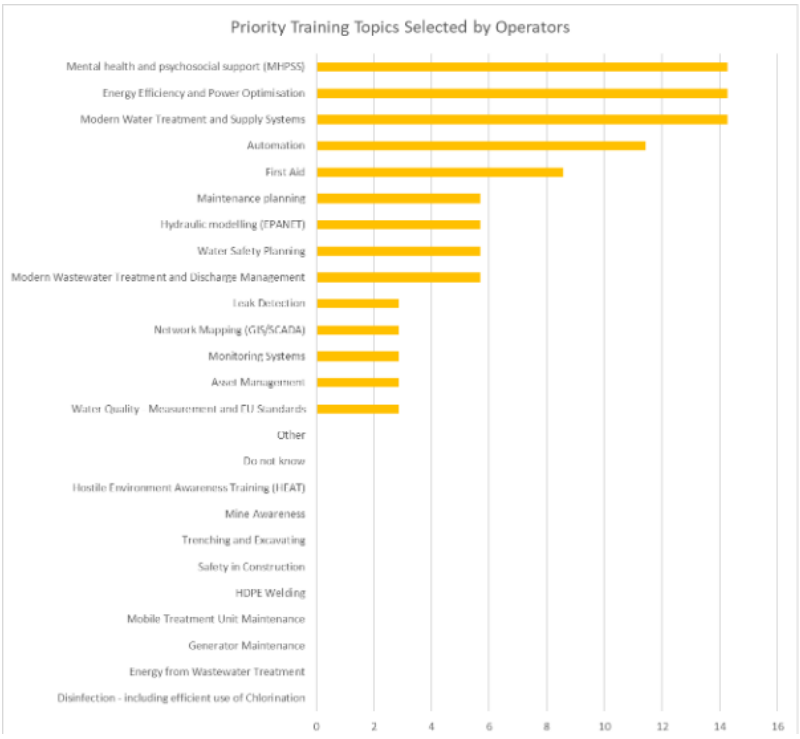


*Figure 4 Precentage of responses to survey question 'In the immediate term, what training topics are the highest priority for **operators** at your vodokanal?'*

Respondents to the senior managers survey and engineers survey were also asked the same question 'In the immediate term, what training topics are the highest priority for **operators** at your vodokanal?' to enable the consultants to triangulate responses and gain a broader understanding of perceptions within vodokanals regarding priority training topics for operators.

Respondents to the senior managers' and engineers' surveys prioritised training topics for the operators in their vodokanals as follows:

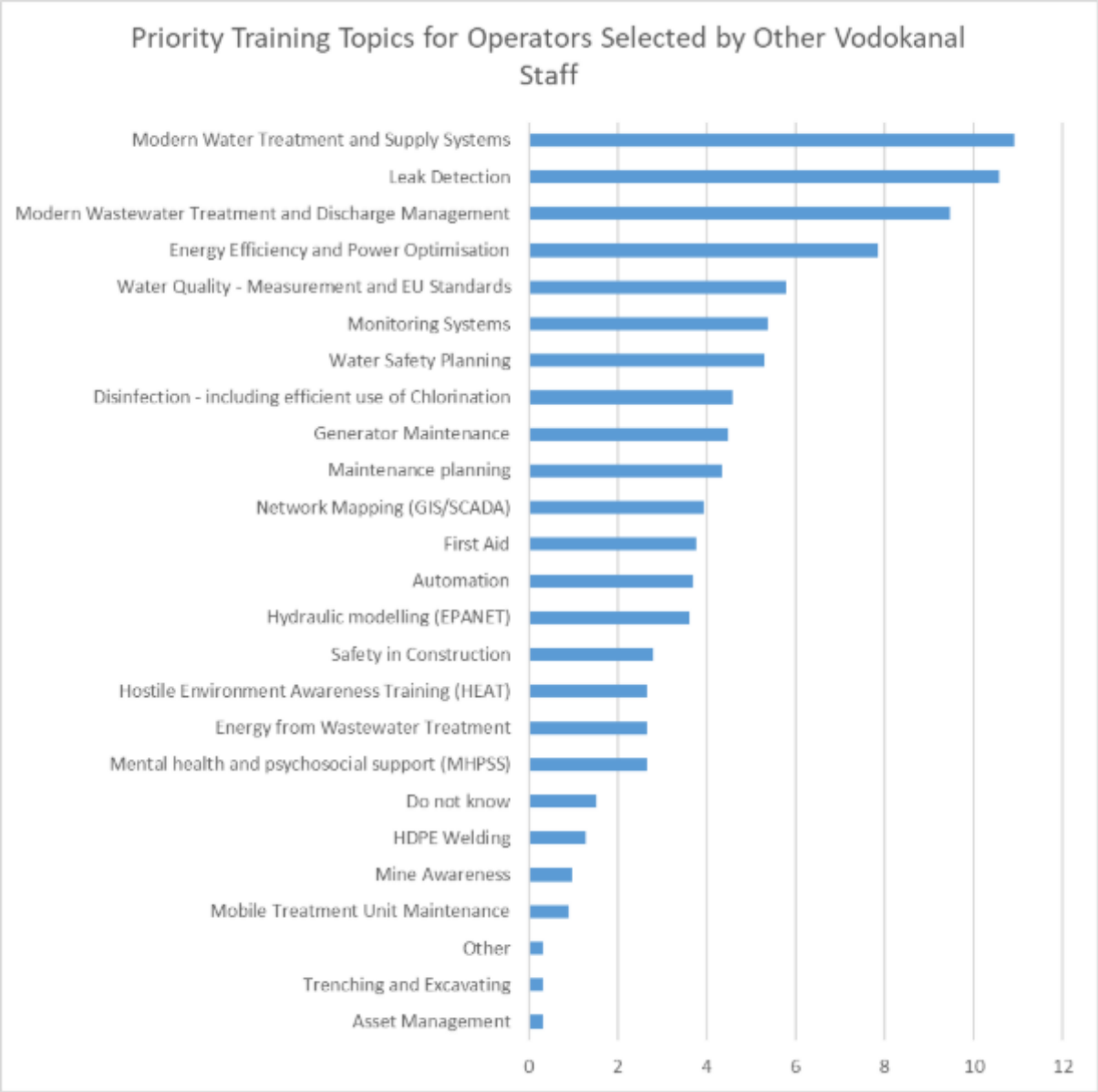


Figure 5 Priority training topics for Operators based on Senior Managers and Engineers' responses

The prioritisation of training topics for operators as per figures 4 and 5 above were compared to identify which topics were rated as the:

Highest priority, defined as a top 5 ranking by both groups of respondents

High priority, defined as a top 5 ranking by one group and a top 10 ranking by the other group

Priority, defined as a top 5 ranking by one group but not a top 10 ranking by the other group

Lower priority, defined as a top 10 ranking by either group

The following priority training topics for operators were identified:

Priority Level	Training Topics
Highest priority	Modern Water Treatment and Supply Systems Energy Efficiency and Power Optimisation
High priority	Modern Wastewater Treatment and Discharge Management Water Quality - Measurement and EU Standards Leak Detection
Priority	Automation First Aid Mental health and psychosocial support (MHPSS)
Lower priority	Water Safety Planning Hydraulic modelling (EPANET) Maintenance planning Monitoring Systems Disinfection - including efficient use of Chlorination Generator Maintenance

Figure 6 Priority training topics for Operators based on survey responses from operators, engineers and senior managers.

Comparison with findings from the Scoping Study and Initial Consultation:

The initial consultation by UNICEF identified the following priority topics for the Operator Module:

- HDPE pipe welding;
- leak detection;
- Safety in construction;
- Mine awareness

Neither of the two topics identified as the highest priority training topics for operators through the learning audit, were also identified as priority topics by UNICEF through the initial consultation. However, both of these topics were identified as short term priorities in the scoping study.

Of the three high priority topics identified through the learning audit, namely Modern Wastewater Treatment and Discharge, Water Quality Measurement and EU Standards, and Leak Detection, only the latter was also identified as a priority topic in the initial consultation. However all three topics were identified as short term priorities through the scoping study.

Further priority training topics for operators identified through UNICEF's initial consultation were: HDPE pipe welding, Safety in Construction and Mine awareness. None of these topics were

ranked as a priority through the learning audit. However, both HDPE pipe welding and Mine awareness were identified as short term priorities through the scoping study.

The differing priority training topics identified through the initial consultation, scoping study and learning audit are listed in the table below.

Table 2 Priority training topics identified through the initial consultation, scoping study and learning audit

Training Topics	**Learning Audit**	**Initial Consultation**	**Scoping Study**
Modern Water Treatment and Supply Systems	Highest Priority	No	Short term priority
Energy Efficiency and Power Optimisation	Highest Priority	No	Short and long term priority
Modern Wastewater Treatment and Discharge Management	High	No	Short term priority
Water Quality - Measurement and EU Standards	High	No	Short term priority
Leak Detection	High	Yes	Short and long term priority
HDPE pipe welding	No	Yes	Short term priority
Safety in Construction	No	Yes	No
Mine awareness	No	Yes	Short term priority
Automation	Priority	No	Short term sensitisation, long term priority
First Aid	Priority	No	Short term priority
Mental health and psychosocial support (MHPSS)	Priority	No	Short term priority
Water Safety Planning	Lower	No	Short and long term priority

Hydraulic modelling (EPANET)	Lower	No	Short and long term priority
Maintenance planning	Lower	No	Short and long term priority
Monitoring Systems	Lower	No	Short term priority
Disinfection - including efficient use of Chlorination	Lower	No	Short term priority
Generator Maintenance	Lower	No	No

Recommendations – training topics for operators:

This triangulation of the findings from the three phases of the study indicates differing perspectives on prioritisation of training topics for operators and only one topic was consistently prioritised by stakeholders throughout the study, namely leak detection. However, leak detection must necessarily be addressed by applying and learning to use appropriate leak detection technology alongside a comprehensive knowledge of the supply network in hydraulic terms. This is beyond the scope of this project.

The highest priorities for training identified in both the scoping study and the LNA were for Modern Water Treatment and Supply Systems and Energy Efficiency and Power Optimisation. As the role of the engineer has a more material impact on Energy Efficiency and Power Optimisation this topic would not be of significant value to the operators. The high priority of training in Wastewater Treatment and Discharge Management, together with Water Quality Standards and Measurement would indicate that training in these topics would benefit the operators whilst complementing the topics that have been prioritised for the engineers in M2. Furthermore, as most operators either work within water or wastewater, these modules could be offered separately to have greater impact as two one-day trainings.

The proposed length of training for operators is 16 hours. This study recommends that the following topics form the core content of the training module for operators:

- Water Treatment and Supply Systems, including Water Quality Standards & Measurement (1 day)
- Wastewater Treatment and Discharge Management, Including discharge water quality standards & measurement (1 day)

Other topics identified as a priority, such as automation and first aid, are either beyond the scope of this project as they require investment in infrastructure or are already being offered by other partners.

Training preferences – operators:

Operators indicate slight preference for remote (online) facilitated training over in person training. Responses to the question 'How would you prefer to access training? Were as follows:

Figure 7 Operators 'How would you prefer to access training?'

However, when asked whether their internet connection is sufficient to attend online facilitated training, 75% of respondents indicated that their internet connection was not sufficient, or sometimes not sufficient to attend online facilitated training. Furthermore, when asked 'Do you have any additional comments on your barriers to participate in a learning programme or how we could make the learning accessible to you and your team?, four respondents stated internet access would be a barrier to participation. This must be taken into account during training design, either with in-person training prioritised for operators, or with provisions being made to enable operators to access suitable internet connections to attend training if it is facilitated remotely.

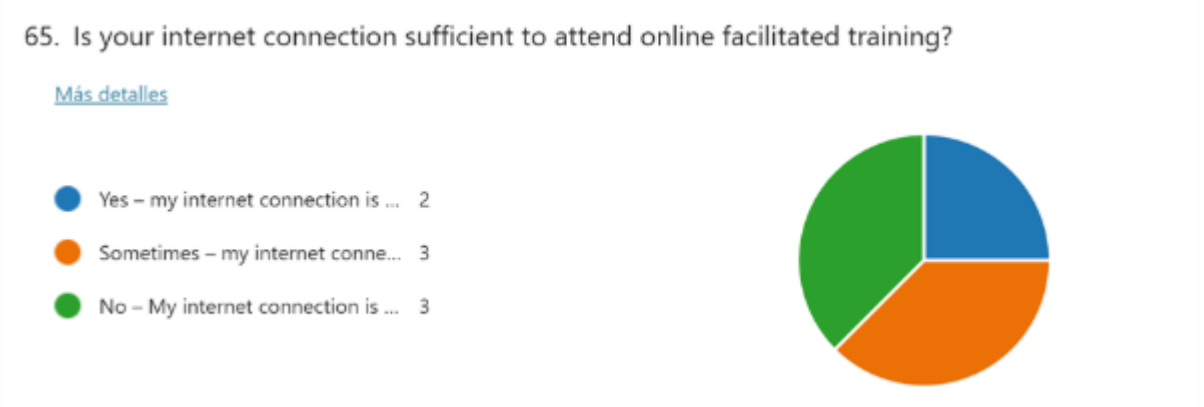


Figure 8 Operators 'Is your internet connection sufficient to attend online facilitated training?'

The majority (seven out of eight) of respondents indicated that they are available to attend training for more than 3 days. The duration of operator training as proposed by the UNICEF initial consultation is 2 days, meaning that operator availability for training is more than sufficient for the proposed training.

Regarding scheduling of training, only one respondent indicated they are available to participate in training in both the morning and afternoon. Most respondents (seven out of eight) indicated that they are either available for training only in the morning (four respondents) or only in the afternoon (three respondents) rather than all day. The scheduling of training will need to reflect learner availability, and offer training sessions in both the morning and afternoon to enable learners to attend.

Results of Learning Audit for Engineers

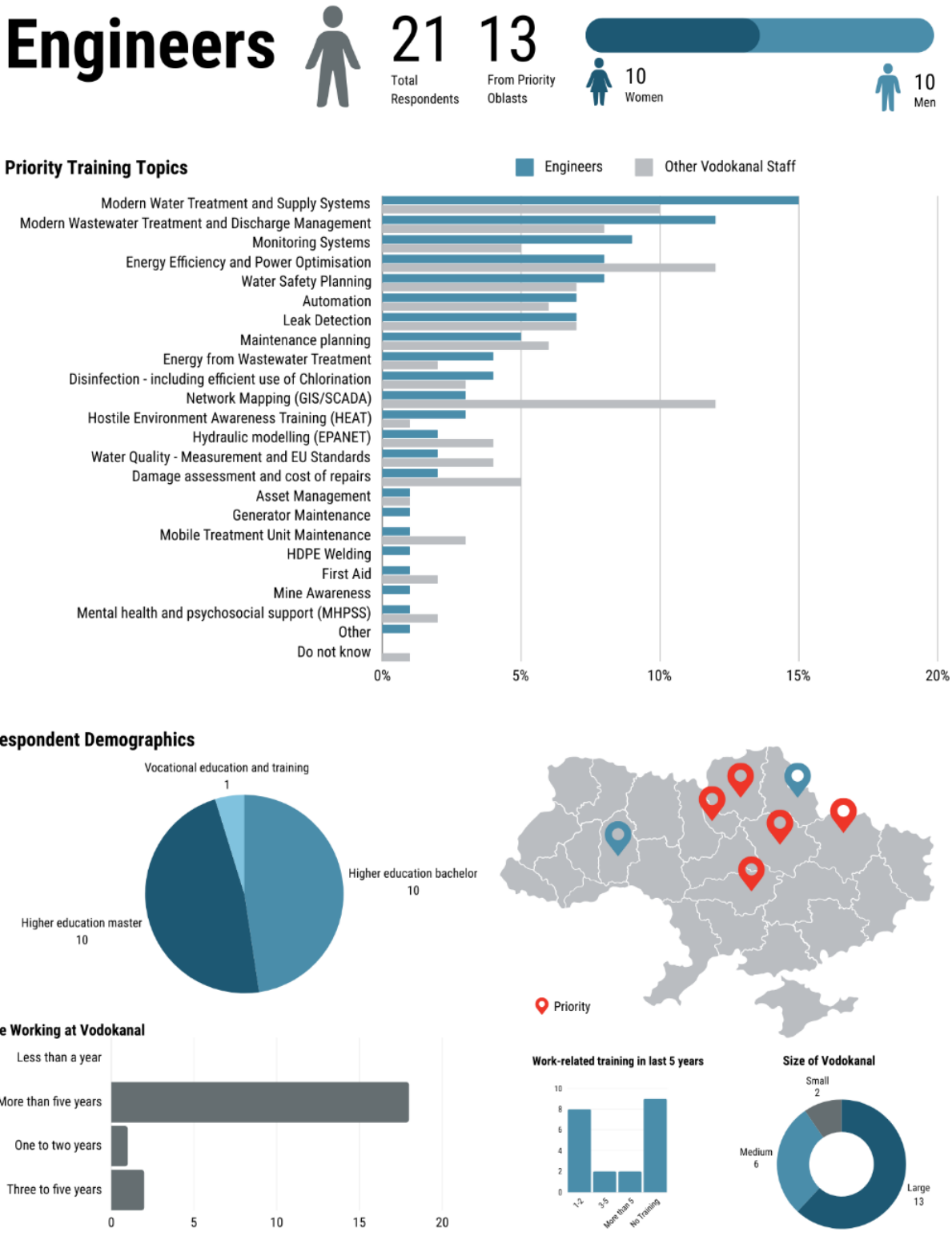


Figure 9 Results of Learning audit for Engineers

Summary overview of Engineers training:

Target learner group:

Staff in engineering or technical roles at Vodokanals in Ukraine including senior engineers, engineers, technicians and laboratory personnel.

Course content and Duration:

Table 3 Course Content for Engineers

	Topic	Duration (Minutes)
3.0	Intro	10
3.1	EU standards for water treatment	90
Break		15
3.2	Water Safety Planning	90
Lunch		60
3.3	Preliminary and primary treatment	60
3.4	Secondary biological processes	60
Break		15
3.5	Tertiary treatment	55
	Closing of Day 1	10

	Intro to day 2	10
4.1	Disinfection	90
Break		30
4.2	Coag, floc & Clar	90
Lunch		60
4.3	Filtration	60
4.4	Adsorption	45
Break		15
4.5	Energy Efficiency & Power Optimization	95
	Q&A and closing remarks	10

Overview of respondents:

There were a total of twenty-one responses to this survey, with ten female and ten male respondents and one person not answering this question. 17 of the respondents are located the priority oblasts of Zaporizka, Poltavska, Kyivska, Kharkivska and Chernihivska.

Four respondents work in water treatment only, 14 work in both water and wastewater treatment, and three state that they work in 'other' including accounting and sales.

Respondents roles include Engineer, Chief Engineer, Deputy Chief Engineer, Head of Department including Head of Laboratory and Head of Production and Technical Departments.

Eighteen respondents have worked at the vodokanal for more than five years, while two have worked at the vodokanal for three to five years and one respondent has worked at the vodokanal for less than two years.

Thirteen respondents work for a large vodokanal (covering more than 100,000 inhabitants, six work for medium sized vodokanals (covering between 40,000 and 100,000 inhabitants) and the remaining two work for small vodokanals (covering less than 40,000 inhabitants).

Ten of the respondents hold a master's degree, and a further ten hold a bachelor's degree. One completed vocational education and training.

Existing capacities:

The LNA survey asked respondents to describe the existing leadership, management and planning and technical capacities in their vodokanal. For the purposes of the survey, the following definitions were provided:

Leadership: Effective leadership establishes and communicates a long-term vision for the organisation and embodies a commitment to cultivating the organisation's culture, helping to ingrain methods to achieve the utility's vision into the organisation's day-to-day operations.

Management and Planning: Establishing Standard Operating Procedures, sharing knowledge and best practice, measurement of service performance (e.g. water supply, water quality, wastewater discharge quality) and planning operation and maintenance to meet goals for service delivery.

Technical: General knowledge of water/wastewater treatment, and knowledge and skill in the operation, maintenance and repair of applicable machines, equipment and tools.

Respondents answered the question 'How would you rate the current capacity (knowledge and skills) in your Vodokanal in the following areas?' as follows:

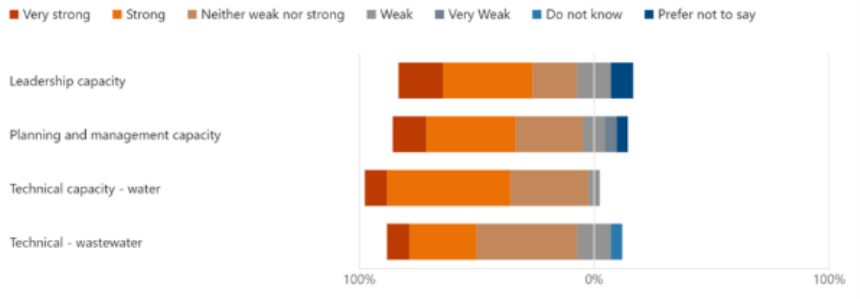


Figure 10 Engineer responses to the question 'How would you rate the current capacity (knowledge and skills) in your Vodokanal in the following areas?'

These responses indicate differing leadership, planning and management and technical capacities across vodokanals, and underscore the findings of the scoping study, which noted that vodokanals are not one homogenous group, and that factors such as size, proximity to the contact line, and access to resources and funding will impact each vodokanal's capacities to effectively provide water and wastewater services.

With regard to technical capacities, responses indicate a significant difference between technical capacities in water, with 61.9% of respondents rating this as strong or very strong as compared with technical capacities in wastewater, with only 38.1% of respondents rating this as strong or very strong. It is noted that responses from operators do not reflect these differences in water and wastewater capacities, with operators rating these equally (see below in in the LNA summary of results – operators 'existing capacities').

When asked to explain the reasons for the ratings given, engineer responses reflect the wide range of ratings given across all capacity areas and include: '*strive for improvement and development*', *'There is room to grow'* and *'The company has great potential but needs to implement a quality management system'* and *'The 70% depreciation of the company's fixed assets makes it impossible to effectively plan, organise and execute work processes at the enterprise'* and

'For 20 years, there has been no training to improve the level of knowledge, there is no strategy for the development of the enterprise, there is an urgent need to update the networks and facilities of the WCS'. A senior management respondent made a similar statement regarding professional development opportunities for technical staff: *'The vast majority of engineering and technical staff are limited in their ability to share the experience and best practices of other water utilities, participate in seminars, conferences, exhibitions of the latest equipment and technologies…'*

These responses provide some insight into the differing contexts and challenges faced by vodokanals in Ukraine and highlight technical staffs' limited access to capacity strengthening. These findings echo the range of responses gathered through KIIs in the scoping study.

Training history:

When asked 'How much training have you received for your work in the past 5 years?, nine respondents stated they had not received any training, eight stated they had attended one or two training courses, two stated they had attend between three to five courses and the remaining two respondents stated they had attended more than five trainings. This reflects a lower level of access to training than reported by senior managers.

Responses to the question, 'What training courses or materials are you aware of that are relevant for your work?' included training on a range of topics as follows:

- Internal trainings (two respondents)
- ICEF trainings, online trainings organised by the Ukrvodokanalekologiya Association, Incident Command System (I-100, I-200), VEI trainings
- 'EU Policy and Law on Environmental Management and Integration of Environmental Policy in the Field of Water Use. Environmental Impact Assessment' course, 2019

- The Law of Ukraine On Wastewater Disposal and Treatment, the Procedure for Developing Volumes of Surface Wastewater that Flows Unorganised to the Centralised Water Supply System
- Meteorology and sanitary station
- (State Ecological Academy of Postgraduate Education, Advanced Training)
- Seminar on tender procurement
- An estimator's course

'For 3 years, I took part in 1. online seminars on water supply and sewerage, organised by Ukrvodokanalekologiya; 2. online seminars from WaterNet, 3. Advanced training courses Accreditation of testing and calibration laboratories. Requirements for controlling the technical characteristics of testing equipment, organised by Ukrmetrteststandard SE'

Priority topics:

When asked to identify their priority training needs, engineers were provided with a list of possible training topics, developed through the scoping study. They could select up to five training topics to prioritise, including the option to select 'other' which allowed them to propose additional training topics not included in the list provided. 19 of the 21 survey respondents selected between 3-5 topics each, and two respondents selected two topics each, indicating an appetite for training amongst the respondents in this target learner group. Responses are shown in figure 11 below:

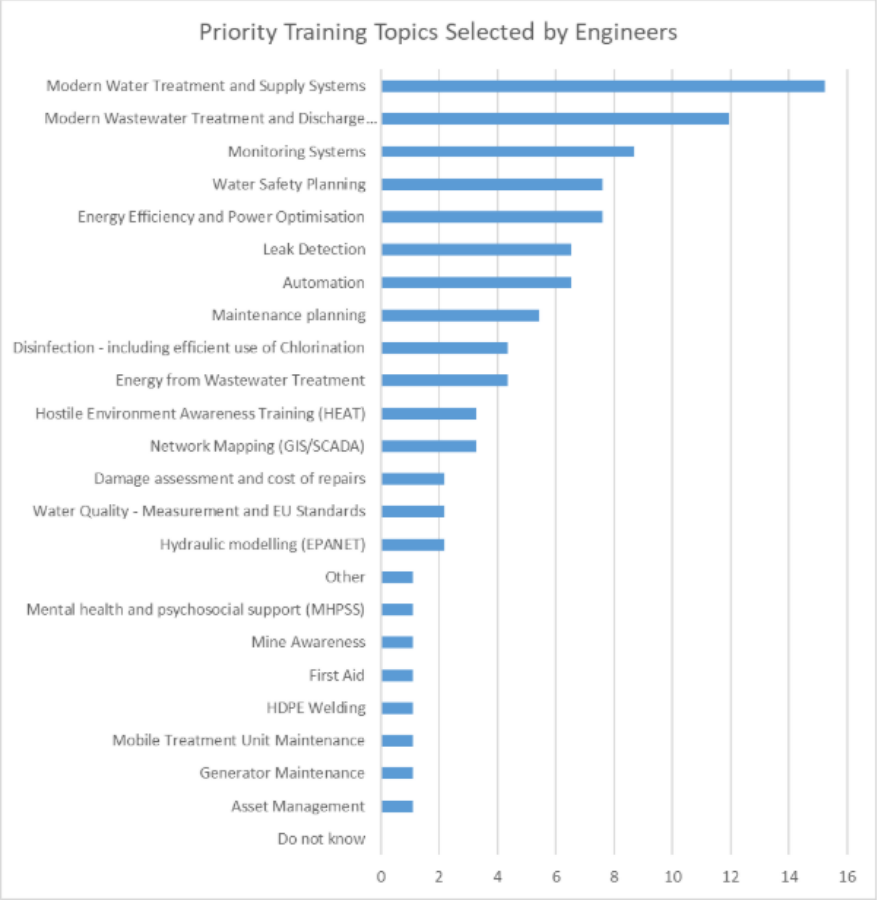


Figure 11 Percentage of responses to survey question 'In the immediate term, what training topics are the highest priority for engineers at your vodokanal?'

Respondents to the senior managers survey and operator survey were also asked the same question 'In the immediate term, what training topics are the highest priority for **engineers** at your vodokanal?' to enable the consultants to triangulate responses and gain a broader understanding of perceptions within vodokanals regarding priority training topics for engineers.

Respondents to the senior managers' and operators' surveys prioritised training topics for the engineers in their vodokanals as follows:

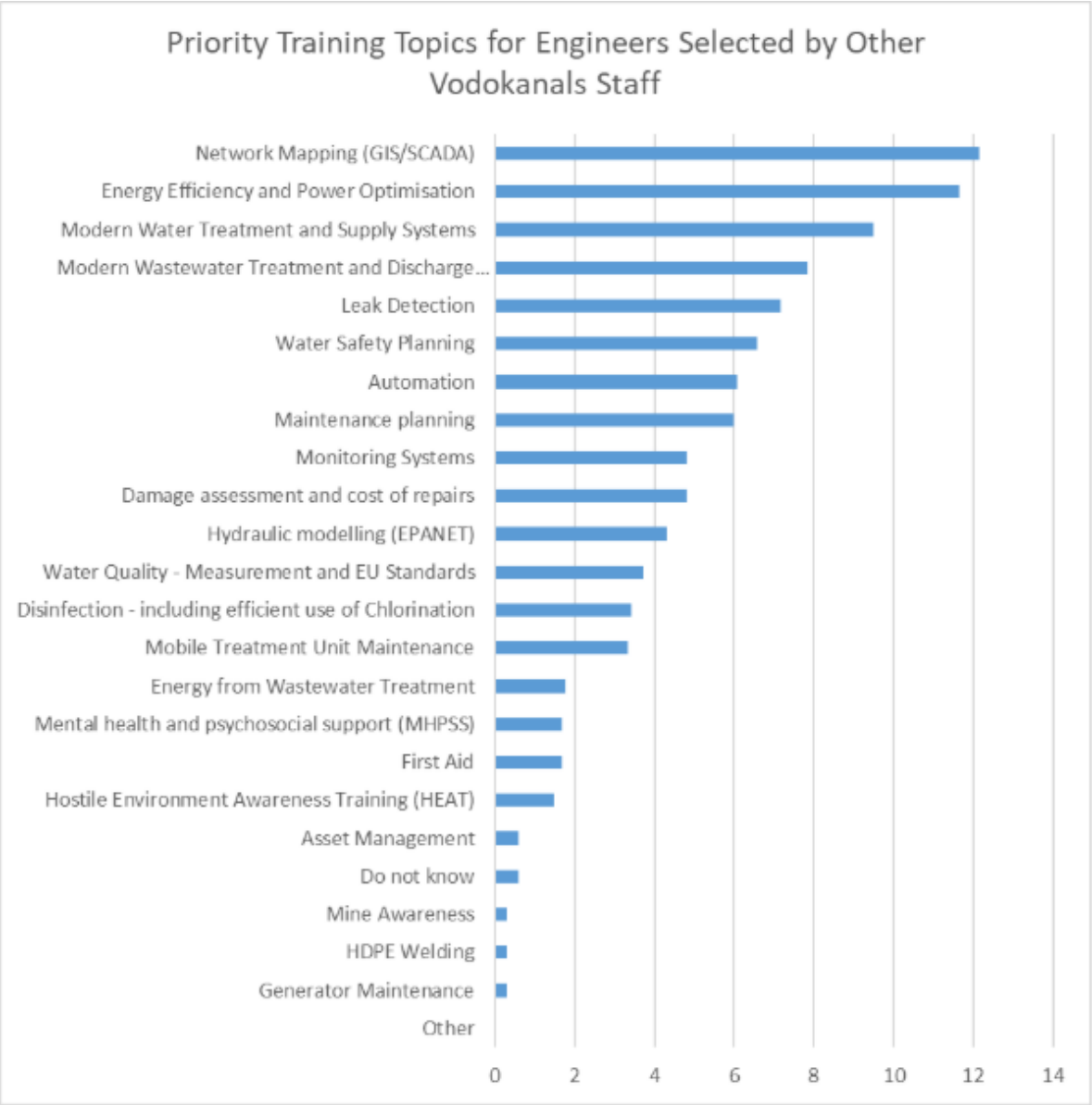


Figure 12 Priority training topics for engineers based on senior managers' and operators' responses

The prioritisation of training topics for engineers as per figures above were compared to identify which topics were rated as the:

Highest priority, defined as a top 5 ranking by both groups of respondents

High priority, defined as a top 5 ranking by one group and a top 10 ranking by the other group

Priority, defined as a top 5 ranking by one group but not a top 10 ranking by the other group

Lower priority, defined as a top 10 ranking by either group

The following priority training topics for engineers were identified:

Table 4 Priority training topics for engineers based on survey responses from operators, engineers and senior managers.

Priority Level	Training Topics
Highest Priority	**Modern Water Treatment and Supply Systems** **Modern Wastewater Treatment and Discharge Management** **Energy Efficiency and Power Optimisation**
High Priority	Monitoring Systems Water Safety Planning Leak Detection
Priority	Network Mapping (GIS/SCADA)
Lower Priority	Automation Maintenance planning Energy from Wastewater Treatment Disinfection - including efficient use of Chlorination Damage assessment and cost of repairs

Comparison with findings from the Scoping Study and Initial Consultation:

The initial consultation by UNICEF identified the following priority topics for the Engineer Module: State of the art water supply; State of the art wastewater treatment; Water quality; Energy efficiency

The three topics identified as the highest priority training topics for engineers through the learning audit were also identified as priority topics by UNICEF through the initial consultation. These are Modern Water Treatment and Supply Systems, Modern Wastewater Treatment and Discharge Management, and Energy Efficiency and Power Optimisation. The scoping study also identified these topics as priorities in the short term.

The fourth topic identified in the initial consultation, water quality, was not rated as a priority by engineers or other vodokanal staff; it was not ranked in the top ten priority topics by either group.

However other high priority training topics for engineers were identified through the learning audit survey, namely Monitoring Systems, Water Safety Planning and Leak Detection. The

scoping study also identified Monitoring Systems as a priority topic in the short term and Water Safety Planning and Leak Detection as priority topics in the short and long term.

Priority Training Topics for Engineers:

The priority training topics identified through the initial consultation, scoping study and learning audit are listed in the table below.

Table 5 Priority Training Topics for Engineers Identified in Each Phase of the Study

Training Topics	Learning Audit	Initial Consultation	Scoping Study
Modern Water Treatment and Supply Systems	Highest Priority	Yes	Short term
Modern Wastewater Treatment and Discharge Management	Highest Priority	Yes	Short term
Energy Efficiency and Power Optimisation	Highest Priority	Yes	Short and long term
Water quality	No	Yes	Short term
Monitoring Systems	High	No	Short term
Water Safety Planning	High	No	Short and long term
Leak Detection	High	No	Short and long term
Network Mapping (GIS/SCADA)	Priority	No	Short and long term
Automation	Lower	No	Short term sensitisation, long term training
Maintenance planning	Lower	No	Short and long term
Energy from Wastewater Treatment	Lower	No	Short term sensitisation,

			long term training
Disinfection - including efficient use of Chlorination	Lower	No	Short term
Damage assessment and cost of repairs	Lower	No	No

This triangulation of the findings from the three phases of the study indicates three training topics for engineers which were consistently prioritised by stakeholders throughout the study:

- Modern Water Treatment and Supply Systems
- Modern Wastewater Treatment and Discharge Management
- Energy Efficiency and Power Optimisation

This study recommends that these three topics form the core content of the training module for engineers. However, as the proposed duration of the training is only 8 hours it may be necessary to provide a greater emphasis on one of these topics in order to cover the necessary detail within the subject.

Modern Water Treatment will necessarily include an overview of water quality (EU standards), the use of chlorine in disinfection and an introduction to water safety planning. Supply systems require network mapping and hydraulic modelling which are topics that are already being addressed by some partners within the WASH sector in Ukraine, including USAID, VIE, ICRC and SDC. A brief introduction to these topics could be provided as integral to supply systems and subsequently a sensitisation to understanding Energy Efficiency and Power Optimisation within the supply system. These topics altogether would take a full day to cover, and even so very much in introductory format. With flexibility on length of training it would allow some coverage of Modern Wastewater Treatment and Discharge Management, including water discharge quality standards, and an overview of how energy can be garnered from wastewater treatment. It should be noted that one partner, VEI, has been providing training in hydraulic modelling and has expressed an interest in RedR supporting the wider dissemination of this training.

Training preferences – engineers:

Engineers indicate a preference for facilitated training rather than self-paced learning, with only 2 respondents selecting the latter. Respondents indicated a slight preference for remote (online) facilitated training (9 respondents), over attending training in-person (7 respondents).

Responses to the question 'How would you prefer to access training? Were as follows:

Figure 13 Engineers 'How would you prefer to access training?'

One respondent highlighted further considerations with regard to attending facilitated training, noting that air raids or emergencies at work may impact engineers' ability to attend. This is true whether they attend in-person or online.

Despite the slight preference for online facilitated training over in-person training amongst engineers, 57% indicated that their internet connection is sometimes not sufficient to participate in online training and 5% stated their internet connection is not sufficient to attend online facilitated training. Only 38% of respondents indicated that their internet connection is reliably sufficient to participate in online training.

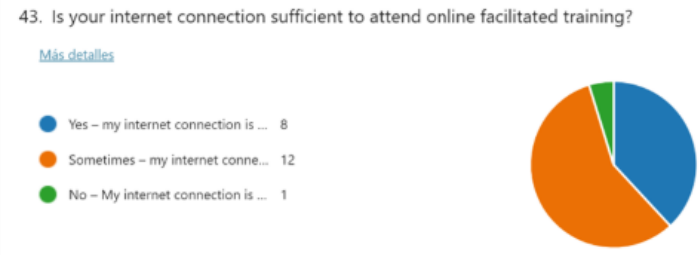


Figure 14 Engineers 'Is your internet connection sufficient to attend online facilitated training?'

Based on these preferences and constraints, this study recommends provision of in-person training for engineers where possible. In cases where it is not possible to convene learners in-person due to security concerns or travel restrictions, online facilitated should be considered as an alternative.

Eleven of the twenty-one respondents indicated they are available for a full day of training or more, which is sufficient for the proposed duration of 8 hours training. However, ten respondents indicated less than 8 hours availability for training. This may impact on attendance rates.

57% of respondents are available in the morning and the afternoon for training. However, 24% of respondents stated they would prefer to attend training in the afternoon and the remaining 19% prefer the morning.

Results of Learning Audit for Senior Management

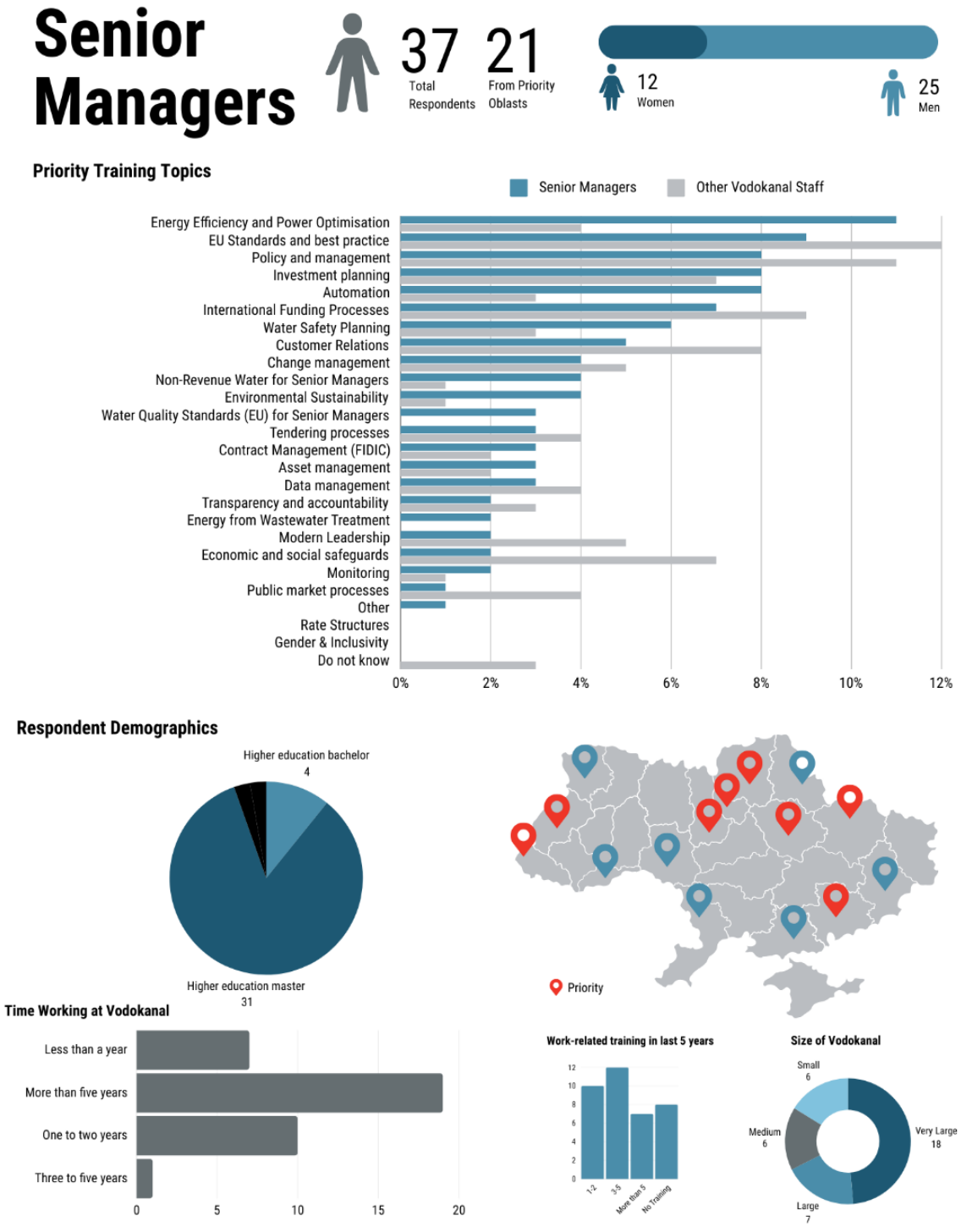


Figure 15 Results of Learning audit for Senior Managers

Summary overview of Senior Managers training:

Target learner group:

Senior Management staff at Vodokanals in Ukraine including Directors, Deputy Directors, Director of Finance, strategic development, and other management positions not directly related to technological water production/wastewater treatment including tendering processes, etc.

Duration:

1-day of training

Core content and timings:

	Intro	15
5.1	EU Standards & Best Practices in Environmental Sustainability, Gender & Inclusion	90
Break		15
5.2	Policy, Asset Management, Strategic Planning	90
Lunch		60
5.3	Performance and Funding Processes	90
Break		15
5.4	Energy Efficiency & Power Optimization	90
	Q&A and Closing remarks	10

Overview of respondents:

There were a total of thirty-seven responses to this survey, with twelve female and twenty-five male respondent. 21 of the respondents are located the priority oblasts of Chernihivska, Kharkivska, Kirovohradska, Kyivska, Poltavska, Zakarpatska, Zaporizka and Zhytomyrska.

Respondents roles include Director, Deputy Director, Head of Department, Manager and Chief Engineer. Respondents work across range of departments and functions including strategic planning, business planning and development, operations management, attracting investment and donor relations, capital investment, legal, finance and accounting, procurement, communications and public relations, and quality assurance.

51% of respondents have worked at the vodokanal for more than five years, while 46% have worked at the vodokanal for less than two years.

Respondents work in vodokanals ranging in size from very large (covering more than 500,000 inhabitants), to very small (covering less than 1000 inhabitants). 49% of respondents work for a large vodokanal (covering more than 100,000 inhabitants) and the other respondents were spread quite evenly across very large vodokanals (16%) medium sized vodokanals (19%) and very small vodokanals(16%).

The majority of respondents (84%) hold a master's degree, while 11% hold a bachelor's degree. Of the remaining respondents, one holds a PhD and the other completed upper secondary education.

Existing capacities

The LNA survey asked respondents to describe the existing leadership, management and planning and technical capacities in their vodokanal. For the purposes of the survey, the following definitions were provided:

- **Leadership:** Effective leadership establishes and communicates a long-term vision for the organization and embodies a commitment to cultivating the organization's culture, helping to ingrain methods to achieve the utility's vision into the organization's day-to-day operations.
- **Management and Planning:** Establishing Standard Operating Procedures, sharing knowledge and best practice, measurement of service performance (e.g. water supply, water quality, wastewater discharge quality) and planning operation and maintenance to meet goals for service delivery.
- **Technical:** General knowledge of water/wastewater treatment, and knowledge and skill in the operation, maintenance and repair of applicable machines, equipment and tools.

Respondents answered the question 'How would you rate the current capacity (knowledge and skills) in your Vodokanal in the following areas?' as follows:

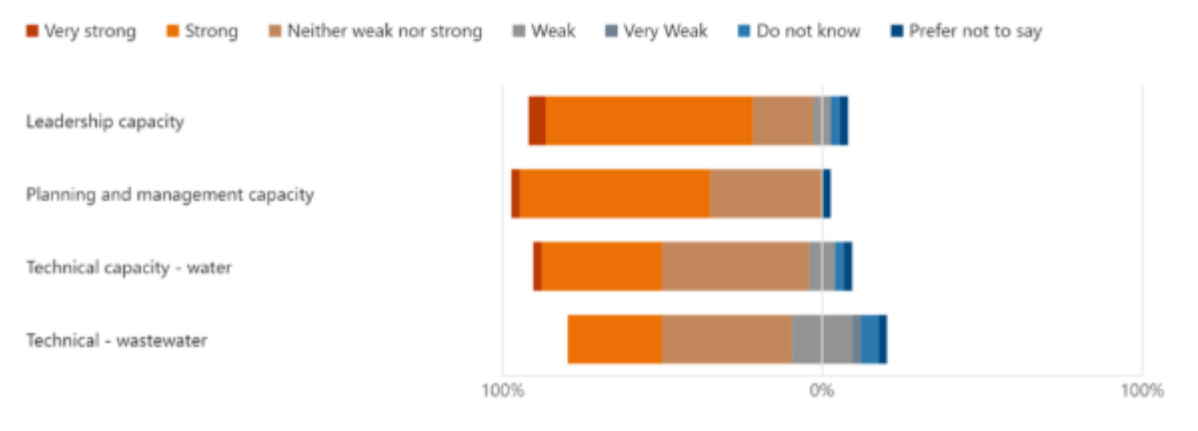


Figure 16 Senior Management responses to the question 'How would you rate the current capacity (knowledge and skills) in your Vodokanal in the following areas?'

These responses indicate strong or very strong leadership capacity in 70.3% of vodokanals and strong or very strong planning and management capacity in 62.2% vodokanals. Engineers' responses to the same question indicate somewhat lower perception of capacities in leadership with 57.1% of respondents rating this as strong or very strong. Similarly, for planning and management capacity only 52.4% of engineers rated this as strong or very strong (see below in in the LNA summary of results – engineers 'existing capacities').

In contrast to the perception of strong leadership, planning and management capacities, only 40.5% of senior management respondents indicate their vodokanal has strong or very strong technical capacity in water and this decreases further to 29.7% of respondents indicating strong technical capacity in wastewater, with no respondents identifying very strong technical capacity

in wastewater. These responses highlight low technical capacity in wastewater and the responses from engineers also indicated significantly lower levels of technical wastewater capacity as compared with technical water capacity (see below in in the LNA summary of results – engineers 'existing capacities').

When asked to explain the reasons for the ratings given, senior manager responses included:

> *'The management of the enterprise is at a fairly high level, which is confirmed by the results of a micro-assessment conducted by UNICEF, which analysed management processes and identified a low level of risk. In terms of water supply, the level is not high, as the company's networks require significant reconstruction. In terms of wastewater, it is weak, as most of the company's treatment facilities are outdated and in need of urgent reconstruction.'*
>
> *'Leadership capabilities need modification and new specific knowledge to meet the challenges of wartime work. For a truly high level of management and planning, we need new effective software and sharing of best practices. Technical needs include training employees in new technologies, improving facilities, and utilizing modern equipment for repairs and reconstructions.'*
>
> *'Management's priorities in work are incorrect'*

A number of respondents highlighted external factors including the impact of hostilities, and political and economic factors, particularly in relation to tariffs. For example:

> *'Inadequate tariff policy, political pressure to set reasonable tariffs, long-term shortage of funds, deteriorated networks, and high receivables. Consumer dishonesty.'*

These responses provide some insight into the differing contexts and challenges faced by vodokanals in Ukraine and indicate differing perspectives on internal capacities within vodokanals. This echoes the range of responses gathered through KIIs in the scoping study.

Training history:

In response to the question, 'What training courses or materials are you aware of that are relevant for your work?' 25 senior managers gave no response and two stated 'no information available' or 'do not know'. One person stated their company was unable to fund training. Further responses included training on a range of topics as follows:

- Training and seminars by the Ukrvodokanalekologiya Association (two respondents)
- Hydraulic design of water supply and sewerage networks
- Topics for enterprise R&D: 1) new industrial methods of water and wastewater treatment; 2) automation and dispatching of production processes; 3) non-revenue water.
- Study of international financial reporting standards, MS Excel: Business analysis and forecasting

> *'In 2017-2024 I participated in national programs on water supply and water management organized by the Bavarian Ministry of Environment, Ministry of Economy of Ukraine, Deutsche Gesellschaft fur Internationale Zusa mmenarbeit (GIZ) and Engagement Global / Service Agency Communities in One World (EG/SKEW) in cooperation with Nimet Water Partnership (GWP) and Nimet Association of Municipal Authorities (VKU).'* Waternet.ua, CRDFGLOBAL

When asked 'How much training have you received for your work in the past 5 years?, eight respondents stated they had not received any training, ten stated they had attended one or two training courses, twelve stated they had attended between three to five courses and remaining seven respondents stated they had attended more than five trainings.

Priority topics:

When asked to identify their priority training needs, senior managers were provided with a list of possible training topics, developed through the scoping study. They could select up to five training topics to prioritise, including the option to select 'other' which allowed them to propose additional training topics not included in the list provided. 36 of the 37 survey respondents selected between 4-5 topics each, and one respondent selected two topics, indicating a strong appetite for training amongst the respondents in this target learner group. Responses are shown in figure below:

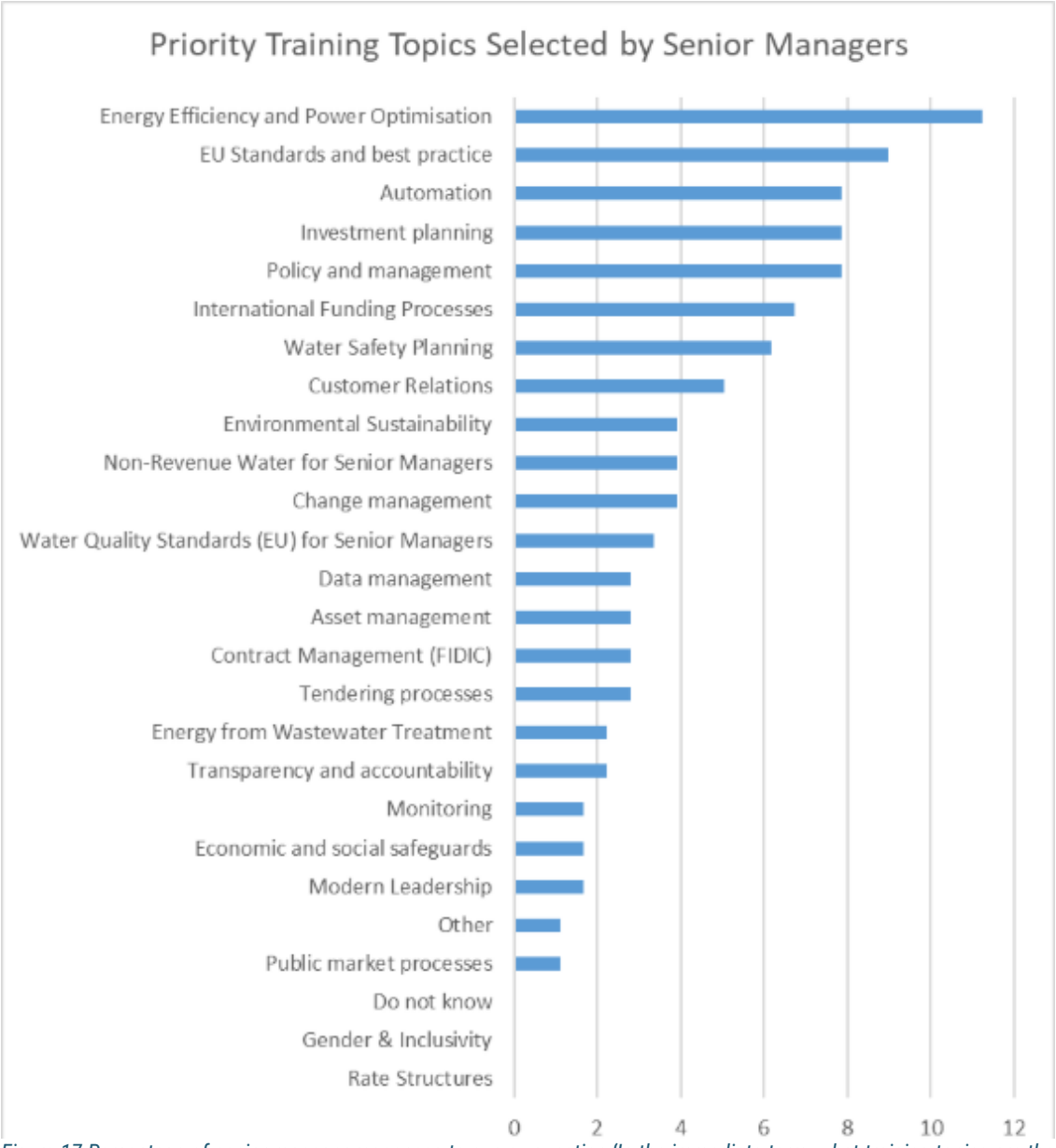


Figure 17 Percentage of senior manager responses to survey question 'In the immediate term, what training topics are the highest priority for senior managers at your vodokanal?'

Respondents to the engineer survey and operator survey were also asked the same question 'In the immediate term, what training topics are the highest priority for **senior managers** at your vodokanal?' to enable the consultants to triangulate responses and gain a broader understanding of perceptions within vodokanals regarding priority training topics for senior managers.

Respondents to the engineer and operator surveys prioritised training topics for the senior managers in their vodokanals as follows:

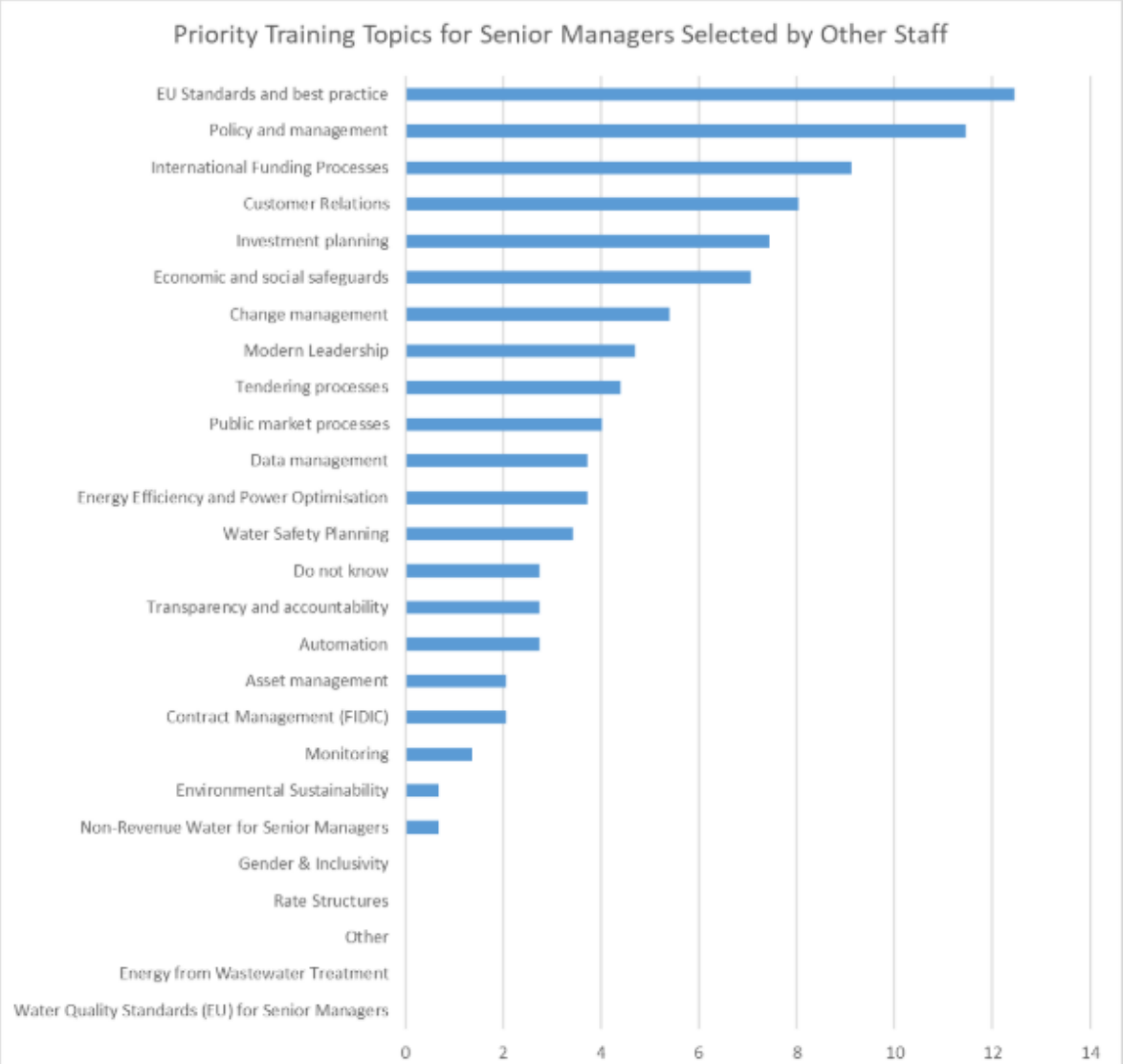


Figure 18 Priority training topics for senior managers based on engineers' and operators' responses

The prioritisation of training topics for senior managers as per figures X and Y above were compared to identify which topics were rated as the:

Highest priority, defined as a top 5 ranking by both groups of respondents

High priority, defined as a top 5 ranking by one group and a top 10 ranking by the other group

Priority, defined as a top 5 ranking by one group but not a top 10 ranking by the other group

Lower priority, defined as a top 10 ranking by either group

The following priority training topics for senior managers were identified:

Table 6 Priority training topics for senior managers based on survey responses from operators, engineers and senior managers.

Priority Level	Training Topics
Highest Priority	EU Standards and Best Practice Policy and Management Investment Planning
High Priority	International Funding Processes Customer Relations
Priority	Energy Efficiency and Power Optimisation Automation
Lower Priority	Water Safety Planning Environmental Sustainability Non-Revenue Water for Senior Managers Change Management Economic and Social Safeguards Modern Leadership Tendering Processes Public Market Processes

Comparison with findings from the Scoping Study and Initial Consultation:

The initial consultation by UNICEF identified the following priority topics for the Upper Management Module:

- **Policy and Management** (including risk-informed tendering processes, public market processes, transparency and accountability, etc.);
- **EU Integration, standards and best practices**;
- Water Safety planning;
- Environmental Sustainability

Of the three topics identified as the highest priority training topics for senior managers through the learning audit, two were also identified as priority topics by UNICEF through the initial consultation. These are Policy and Management and EU Integration, Standards and Best Practices. The scoping study also identified these topics as priorities in the short term.

The other highest priority topic identified through the learning audit, namely Investment Planning, was not identified as a priority topic in the initial consultation but was identified for sensitisation in the short term, and as a training priority in the long term through the scoping study.

Two further topics identified as high priority through the learning audit, namely International Funding Processes and Customer Relations were not identified as priority topics through the initial consultation. However, through the scoping study, International Funding Processes was identified as a priority topic in the short term, and Customer Relations was identified as a topic for sensitisation in the short term, and as a training priority in the long term.

Further priority training topics for senior managers identified through UNICEF's initial consultation were: Water Safety Planning, Environmental Sustainability, Risk-informed Tendering Processes, Public Market Processes, and Transparency and Accountability, which were all rated as lower priority in the learning audit except for Transparency and Accountability, which was not ranked as a priority through the learning audit.

The priority training topics identified through the initial consultation, scoping study and learning audit are listed in the table below.

Table 7 Priority training topics identified through the initial consultation, scoping study and learning audit

Training Topics	Learning Audit	Initial Consultation	Scoping Study
EU Standards and Best Practice	Highest Priority	Yes	Short term priority
Policy and Management	Highest Priority	Yes	Short term sensitisation, long term priority
Investment Planning	Highest Priority	No	Short term sensitisation, long term priority
Transparency and Accountability	No	Yes	Short term sensitisation, long term priority
International Funding Processes	High	No	Short term priority
Customer Relations	High	No	Short term sensitisation, long term priority

Energy Efficiency and Power Optimisation	Priority	No	Short term and long term priority
Automation	Priority	No	Short term sensitisation, long term priority
Water Safety Planning	Lower	Yes	Short term and long term priority
Environmental Sustainability	Lower	Yes	Lower
Non-Revenue Water for Senior Managers	Lower	No	Short term sensitisation, long term priority
Change Management	Lower	No	Short term sensitisation, long term priority
Economic and Social Safeguards	Lower	No	Lower
Modern Leadership	Lower	No	Short term sensitisation, long term priority
Tendering Processes	Lower	Yes	Lower
Public Market Processes	Lower	Yes	Lower

This triangulation of the findings from the three phases of the study indicates 2 training topics for senior managers which were consistently prioritised by stakeholders throughout the study:

- EU Standards and Best Practice
- Policy and Management

This study recommends that these topics form the core content of the training module for senior managers. The topic of Policy and Management is potentially very broad however in this context it can be seen to overlap with that of EU Standards and Best Practice. In view of the long-term

aim for Ukraine to integrate into the EU the vodokanals will be required to meet certain standards of management and governance. The course module can provide an introduction to asset management and strategic planning, together with transparency and accountability, all of which are essential for the vodokanals to embrace in order to satisfy funding requirements from international donors.

It must be stressed that the proposed duration of the training is four hours and that the topics covered will provide only a sensitisation on these subjects, to build awareness and develop senior manager's knowledge of them.

In addition, the topic of Energy Efficiency and Power Optimisation was raised as a priority by the senior managers and has also been raised by UNICEF staff working with the vodokanals. Whilst this subject deviates from those topics recommended above it is recognised that some understanding of the topic is required by the senior managers in order for them to direct operational policy accordingly and to allow the engineers to make the necessary changes to distribution systems to achieve improvements in energy efficiency. Accordingly, a short session on Energy Efficiency and Power Optimisation will be included, if possible, within the timeframe available.

Training preferences – senior managers:

Senior managers indicate a preference for facilitated training rather than self-paced learning, with only 10.8% of respondents selecting the latter. The most preferred option is to attend training in person (35% of respondents), followed by the option of remote training facilitated online (27% of respondents). 21.6% of respondents indicated they would prefer blended training combining in-person training with some self-paced learning.

Responses to the question 'How would you prefer to access training? Were as follows:

Figure 19 Senior Managers 'How would you prefer to access training? '

Two respondents highlighted further considerations with regard to in-person training; ongoing hostilities may affect the feasibility of holding in-person training, or learners' ability to travel to training.

62% of respondents indicated that their internet connection is sufficient to participate in online training, whereas the remaining 38% indicated that their internet connection is sometimes sufficient to participate in online training.

Based on these preferences and constraints, this study recommends provision of in-person training for senior managers where possible. In cases where it is not possible to convene learners in-person due to security concerns or travel restrictions, online facilitated should be considered as an alternative.

The majority (76%) of senior managers indicate that they are available for half a day or more of training. This is sufficient for the proposed duration of 4 hours training. However, the remaining respondents indicated they are only available for up to two hours.

Figure 20 Senior Managers availability to attend facilitated training

The majority of respondents (57%) are available in the morning and the afternoon for training. However, 27% of respondents stated they would prefer to attend training in the afternoon and the remaining 16% prefer the morning. These preferences should be taken into account when scheduling training for senior managers.

Figure 21 Senior Managers preferred time of day for attending training

Annex 1: UNICEF Consultations

UNICEF consultation process

In anticipation of the capacity needs of vodokanals, UNICEF conducted brief training needs assessments along with a prioritization exercise with approximately 100 vodokanals through two national forums (in September and December 2023). The following most immediate training needs were identified:

1. Policy and management (including risk-informed tendering processes, public market processes, transparency and accountability, etc.);
2. Water supply, including water quality monitoring;
3. Efficiency and sustainability;
4. Wastewater treatment;
5. Assessment of levels of damages and cost of repairs;
6. Training on the use of HDPE pipes; and
7. Economic and social safeguards.

In addition, UNICEF Ukraine identified three principal target groups for capacity building:

1. Senior managers, including vodokanal directors, deputy directors, directors of finance, strategic development, and other management positions not directly related to technological water production/wastewater treatment (including tendering processes, etc.)
2. Engineers, technicians, and laboratory personnel
3. Drinking Water Treatment Plant (DWTP) Operators, Wastewater Treatment Plant (WWTP) operators, construction and repair crews, and safety personnel

An initial proposition by UNICEF Ukraine is that the following training will be developed:

1. Upper Management Module (M1)
    - Course duration: Approximately 4h in total
    - Course modality: Offline
    - Course topics: Policy and management (including risk-informed tendering processes, public market processes, transparency and accountability, etc.); EU Integration, standards and best practices; Water Safety planning; Environmental Sustainability
2. Engineering and technical module (M2)
    - Course duration: 8h
    - Course modality: Offline
    - Course topics: State of the art water supply; State of the art wastewater treatment; Water quality; Energy efficiency

3. Operator Module (M3)
    - Course duration: 16h
    - Course modality: Offline
    - Course topics: HDPE pipe welding; leak detection; Safety in construction; Mine awareness

Finally, the anticipated Vodokanals to be considered as priority are those located in:

- Lviv Oblast: Lvivska, Novorozdilska, Sambirska
- Zakarpattia Oblast: Uzhhorodska
- Zhytomyr Oblast: Zhytomyrska, Korostenska, Novohrad-Volynska, Olevska
- Kyiv Oblast: Irpinska, Buchanska, Velykodymerska
- Chernihiv Oblast: Cherhihivska, Nizhynska
- Kirovohrad Oblast: Kropyvnytskyi, Oleksandriiska
- Poltava Oblast: Poltavska
- Kharkiv Oblast: Balakliiska
- Zaporizhzhia Oblast: Zaporizka

Annex 2: Desk Research

Desk Review

The desk review process was initiated by UNICEF Ukraine sharing of available documentation via Google Drive. These documents were reviewed to inform the project design and scoping exercise. Overall findings are summarised here, and there is further discussion of findings in the relevant sections of the report below:

A range of capacity building initiatives with international partners are in progress, some providing short term training in specific topics such as VEI's hydraulic modelling and HDPE welding modules, and others are longer term development projects typically working with a specific vodokanal, for example EBRD's Mikolayiv Emergency Water Project which is providing full reconstruction of the water treatment plant whilst supporting the local staff to learn the processes involved in procurement, tendering, etc. A full list of these initiatives is provided in Annex 5.

A master plan for training and professional development in the water sector of Ukraine was developed approximately 5 years ago by the Vodokanal Association with the support of a range of German organisations including Technische Universitat Dresden and German Water Partnership. The plan included a review of existing training and education available to those working in the water and wastewater industry.

Vocational training is the responsibility of local governments and is provided for professions such as pump operators, fitters or electricians, with some training provided directly by equipment manufacturers.

Engineering and technical specialists will typically attend university depending on the engineering field. As a rule, engineers at water and wastewater companies have a civil engineering qualification in which they may have covered some aspects of water supply and wastewater treatment.

The main universities that provide courses in water supply and sewerage include the following:

- Kyiv National University of Construction and Architecture;
- Lviv Polytechnic National University;
- National University of Water and Environmental Engineering;
- Yuri Kondratyuk Poltava National University;
- Odesa State Academy of Civil Engineering and Architecture;
- O.M. Beketov Kharkiv National University of Urban Economy.

However, there is a lack of students enrolling for these courses. A career as a water and sanitation engineer is often regarded as having low prestige and salaries can be low.

The Vodokanal Specialist Training Masterplan proposed development of a standardised curriculum for technical staff working in the water and wastewater industry ensuring continuous professional development and cooperating with universities for specialist subjects. Funding for the plan had not been identified and the Masterplan program has not been implemented.

Annex 3: Learner Survey

Following the review of existing information, and in agreement with UNICEF Ukraine, a targeted learning needs assessment (LNA) survey was conducted by RedR seeking responses from the three target learner groups identified through the initial consultation and scoping study phases. The LNA survey aimed to gather target learner perspectives to inform selection and prioritisation of training topics. In addition, it refined the learner profile and assessed preferences around days/times to schedule trainings, duration, reliability of internet connection, language preference, etc.

Learning Audit Methodology

The learning audit was conducted through a survey of target learners. A branching survey was developed to gather data from the three target learner groups as defined in the scoping study:

Senior management, for example vodokanal directors, deputy directors, director of finance, strategic development, and other management positions not directly related to technological water production/wastewater treatment (including tendering processes, etc.)

Engineers and technical roles, for example senior engineer, engineer, technician, laboratory personnel

Operators, for example Drinking Water Treatment Plant (DWTP) operators, Wastewater Treatment Plant (WWTP) operators, construction and repair crews, safety personnel, dispatcher

The survey questions for each target learner group are listed in Annex 6

The LNA survey was created using Microsoft office forms. It was circulated to target learners through the following channels:

- Email;
- Messengers such as WhatsApp, Viber;
- UNICEF shared the link for LNA survey during the Vodokanal representatives general meeting.

The emails were sent and two days later, the RedR team called to the vodokanal representative to fill out the survey and share it with colleagues especially with operators.

The survey was originally scheduled to run from 23rd to 30th September 2024. However, as UNICEF representatives were scheduled to participate in the Vodokanal general meeting from 1st -2nd October 2024, the survey period was extended to 7th October 2024 to allow UNICEF to promote the survey and encourage target learners attending the forum to complete the survey and share it with their colleagues. Additionally, RedR UK provided an interim report to UNICEF on 30th September 2024, outlining the number of total responses to date, and providing a breakdown of responses per Oblast and target learner group, to enable UNICEF to tailor their messaging at the forum to encourage responses from underrepresented oblasts and target learner groups.

Limitations

The response rate to the survey was initially low, and overall responses rate from operators was low throughout the survey period, mirroring the low level of engagement with operators observed in the previous phase of the study.

Summary of Survey Responses

A total of 70 responses were received during the survey period from 23rd September to 7th October 2024.

Respondents had the option to select Ukrainian or English language for the survey. 67 responded in Ukrainian and three (3) responded in English. 36 respondents were male and 29 were female (5 respondents preferred not to say). Two (2) respondents identified themselves as having a disability.

Of the 70 responses received, 69 were from the target learner group as per the table below:

Employed by a vodokanal as staff	68
Employed to work as a contractor for a vodokanal	0
Working for the vodokanals association	1
None of the above	1

Respondents selecting 'None of the above' are not target learners for this program. Therefore the survey did not request any further information from them.

The number of responses per target learner group are shown in the table below:

Senior management. For example, Vodokanal directors, deputy directors, director of finance, strategic development, and other management positions not directly related to technological water production/wastewater treatment including tendering processes, etc.	37
Engineering or technical role. For example senior engineer, engineer, technician, laboratory personnel.	21
Operator. For example Drinking Water Treatment Plant (DWTP) operators, Wastewater Treatment Plant (WWTP) operators, construction and repair crews, safety personnel, dispatcher.	8
None of the above	3

Respondents are located across 17 oblasts. There were 41 responses from the following priority oblasts identified by UNICEF for this project:

- Chernihiv Oblast: Cherhihivska, Nizhynska
- Kharkiv Oblast: Balakliiska
- Kirovohrad Oblast: Kropyvnytskyi, Oleksandriiska

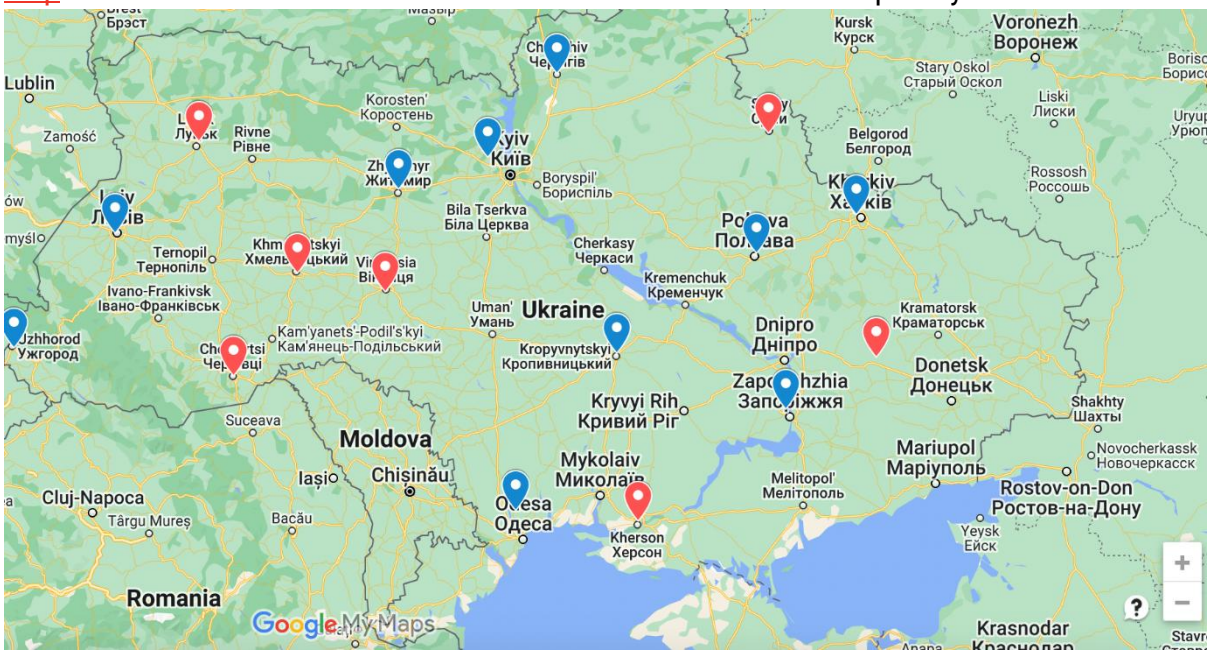
- Kyiv Oblast: Irpinska, Buchanska, Velykodymerska
- Lviv Oblast: Lvivska, Novorozdilska, Sambirska
- Poltava Oblast: Poltavska
- Zakarpattia Oblast: Uzhhorodska
- Zaporizhzhia Oblast: Zaporizka
- Zhytomyr Oblast: Zhytomyrska, Korostenska, Novohrad-Volynska, Olevska

The number of responses per oblast can be seen in the table below:

	Senior Management survey	**Engineer survey**	**Operator survey**	**Total number of responses by oblast**
Avtonomna Respublika Krym	0	0	0	0
Cherkaska oblast	0	0	0	0
Chernihivska	**1**	**2**	**0**	**3**
Chernivetska	1	0	0	1
Dnipropetrovska	0	0	0	0
Donetska	2	0	0	2
Ivano-Frankivska	0	0	0	0
Kharkivska	**3**	**2**	**0**	**5**
Khersonska	3	0	0	3
Khmelnytska	0	1	0	1
Kirovohradska	**2**	**1**	**0**	**3**
Kyivska	**1**	**1**	**0**	**2**
Luhanska	0	0	0	0
Lvivska	**1**	**0**	**0**	**1**
Misto Kyiv	0	0	0	0
Misto Sevastopol	0	0	0	0
Mykolaivska	0	0	0	0
Odeska	3	0	0	3
Poltavska	**3**	**7**	**6**	**16**

Rivnenska	0	0	0	0
Sumska	5	2	1	8
Ternopilska	0	0	0	0
Vinnytska	1	0	0	1
Volynska	1	0	0	1
Zakarpatska	**3**	**0**	**0**	**3**
Zaporizka	**6**	**0**	**0**	**6**
Zhytomyrska	**1**	**0**	**1**	**2**
Total	**37**	**16**	**8**	**61**

Map blue marked UNICEF priority oblasts.



The respondents work for vodokanals that range in size as follows:

Medium sized vodokanals (covering between 40,000 and 100,000 inhabitants),	14
Large sized vodokanals (covering more than 100,000 inhabitants),	38
Very large sized vodokanals (covering more than 500,000 inhabitants)	6
Other	8

The full results and analysis of the LNA survey are presented in Annex 7. A summary of the results is provided in the following section together with the recommendation for the content of the training modules M1, M2 and M3.

Annex 4: Key Informant Interviews

Methodology: Key Informant Interviews

Three target groups for capacity development have previously been identified by UNICEF. For the purposes of this study and the development of the vodokanal capacity strengthening programme, the roles included in each category were identified as follows:

1. Senior management, including vodokanal directors, deputy directors, directors of finance and strategic development, and other management positions not directly related to technological water production/wastewater treatment
2. Engineers, including technicians and laboratory personnel
3. Operators, including Drinking Water Treatment Plant (DWTP) operators, Wastewater Treatment Plant (WWTP) operators, construction and repair crews and safety personnel

Key Informant interviews (KIIs) were carried out remotely online using a semi-structured approach with up to 17 questions, in both English and Ukrainian. A maximum of 50 Key Informants (KIs) was targeted by agreement with UNICEF. The initial list of KIs was provided by UNICEF Ukraine. Further KIs were identified through a snowballing approach and considering the additional relevance and insight those KIs can provide. A range of KIs to provide representation of vodokanal management, engineers and operators in both water and wastewater, as well as actors from other organisations that work alongside or with the vodokanal staff, was targeted. However, it should be noted that there were significant challenges to identifying and contacting plant operators and no KIIs of operators were attained.

The purpose of the KIIs was to:

1. Identify the current leadership, planning, management and technical capacities in the provision of water and wastewater services
2. Identify the immediate needs for improvement in leadership, planning, management and technical capacities in the provision of water and wastewater services
3. Identify strategic needs for vodokanals to be brought in line with EU requirements
4. Prioritise training between leadership, planning, management and technical capability to meet both immediate and strategic needs

5. Identify what training material already exists in Ukraine for leadership, planning, management and technical support of vodokanals and identify where gaps exist
6. Identify existing training modules that could be adapted to fill these gaps
7. Prioritise which training modules to develop/modify

Key Informant Interview Analysis and Conclusions

KIIs were carried out with a total of 33 KIs. Table 1 below shows the breakdown of the Key Informants.

Table 1 Breakdown of Key Informants

KEY INFORMANT TYPE	No. Of KIs	No. Of KIIs
Vodokanal Senior Management	14	10
Vodokanal Engineer	7	7
Vodokanal Operators	0	0
Government	1	1
WaSH Cluster	2	2
Other consultants and contractors	1	1
Humanitarian stakeholders	7	7
Donors	1	1
TOTAL	33	29

Data from the KIIs is analysed by the consultants to consider both the short- and long-term capacity development requirements and to prioritise between the need for development of leadership, planning, management and technical capability to meet both immediate and strategic needs of vodokanals. OpenAI was used to bring together the range of responses from the KIs and support the analysis in identifying the key topics that were being raised by the KIs. Data from the Ukrainian and international partner KIs was considered separately to highlight the specific priorities and concerns of those two distinct KI groups.

A full narrative analysis of the Ukrainian and international partner KIIs is provided in Annex 4. Key themes emerging from these KIIs are summarised as follows:

- **Leadership capacity** is generally regarded as strong and dedicated in large vodokanals, although often weaker in small vodokanals where funding and resources are scarcer. However, leadership style is typically hierarchical and does not encourage input from junior staff.
- **Management and planning capacity** is likewise stronger in the larger, better funded vodokanals and is impacted by the strength of the relationship with the local council. There is little planning carried out in any context, from maintenance planning to investment planning. There are significant challenges to meet EU standards in terms of management structures.
- **Technical capacity** is strong with regards to the operation and daily maintenance of the existing infrastructure for water and wastewater treatment. However, there is a lack of understanding of water and wastewater chemistry or treatment beyond the operation of the infrastructure itself and little knowledge of new water and wastewater treatment processes. Larger repairs or reconstruction of destroyed infrastructure is carried out by contractors with specific skill sets, often supported by international partners both in terms of funding and technical specialists.
- **Existing training** for operators is inconsistent and not standardised. It is typically provided 'on the job' by more experienced operators and does not include the fundamentals of water or wastewater treatment processes. Engineers mostly have good further education but vodokanals in conflict areas are struggling to recruit and retain adequately trained staff. The need for a standardised approach to training technical staff working in the vodokanals was indicated.
- **Resistance vs appetite to change:** whilst many vodokanal staff recognise and have an appetite for updating the aging and outdated infrastructure there remains a resistance to make changes to long established approaches to water supply, such as the over-sized pumps and supply network.
- **Water and wastewater quality standards** are rarely met and not always recognised by those with responsibility, and measurement and monitoring are inadequate.

Training needs

The following key training needs emerged from the KIIs for **technical staff**, both **operators** and **engineers**:

Water Treatment Processes: international KIs highlighted the need for a basic understanding of water chemistry that underlies the operation of all treatment plants, leading to an introduction to alternative or new technologies for treatment. Intrinsic to this is effective disinfection, with chlorine dosing being the most used method. Ukrainian KIs did not recognise any need for capacity strengthening in this area beyond the need to update the current technology in use.

Drinking Water Quality and Standards: both groups of KIs recognised that there is a lack of knowledge or understanding of target EU and State regulations and standards and although laboratory staff are well trained in water quality testing this has not been extended to field operators.

Water Distribution Networks: the reduction of water losses in the distribution network is recognised by all KIs as fundamental to improving water supply and a focus for capacity strengthening, initially through mapping of the existing networks by hydraulic and GIS modelling. An understanding of basic hydraulics will enable redesign of the networks to reduce pipe and pump sizes and hence reduce power consumption. Some partners are already providing training in this area and this project could support their ongoing work. Although there is strong interest in automation from Ukrainian KIs, training in this would be best provided for the specific automation technology as it is introduced to a facility. Likewise, training in leak detection must coincide with the investment in leak detection technology.

Wastewater Treatment Processes and discharge standards: wastewater treatment appears to be a lower priority with all KIs and their focus is on discharge quality. However, without a basic understanding of wastewater chemistry that underlies the treatment of the existing plant and knowledge of the target EU and State standards this is unlikely to be achieved. Capacity strengthening in this area could include an introduction to generating energy from wastewater but a more in-depth training on that topic would only be relevant if the technology was to be built.

The following key training needs emerged from the KIIs for **senior managers**, which in some instances will include engineers:

Strategic Planning: International KIs highlighted a severe lack of planning by vodokanal staff, whilst recognising that those vodokanals in conflict areas are having to be highly responsive to immediate damage limitation of the infrastructure. All KIs raised the need for capacity strengthening in strategic planning, including asset management, investment planning and maintenance planning. All aspects of strategic planning require longer term learning than the current project can provide, but an introduction to the topic could be covered.

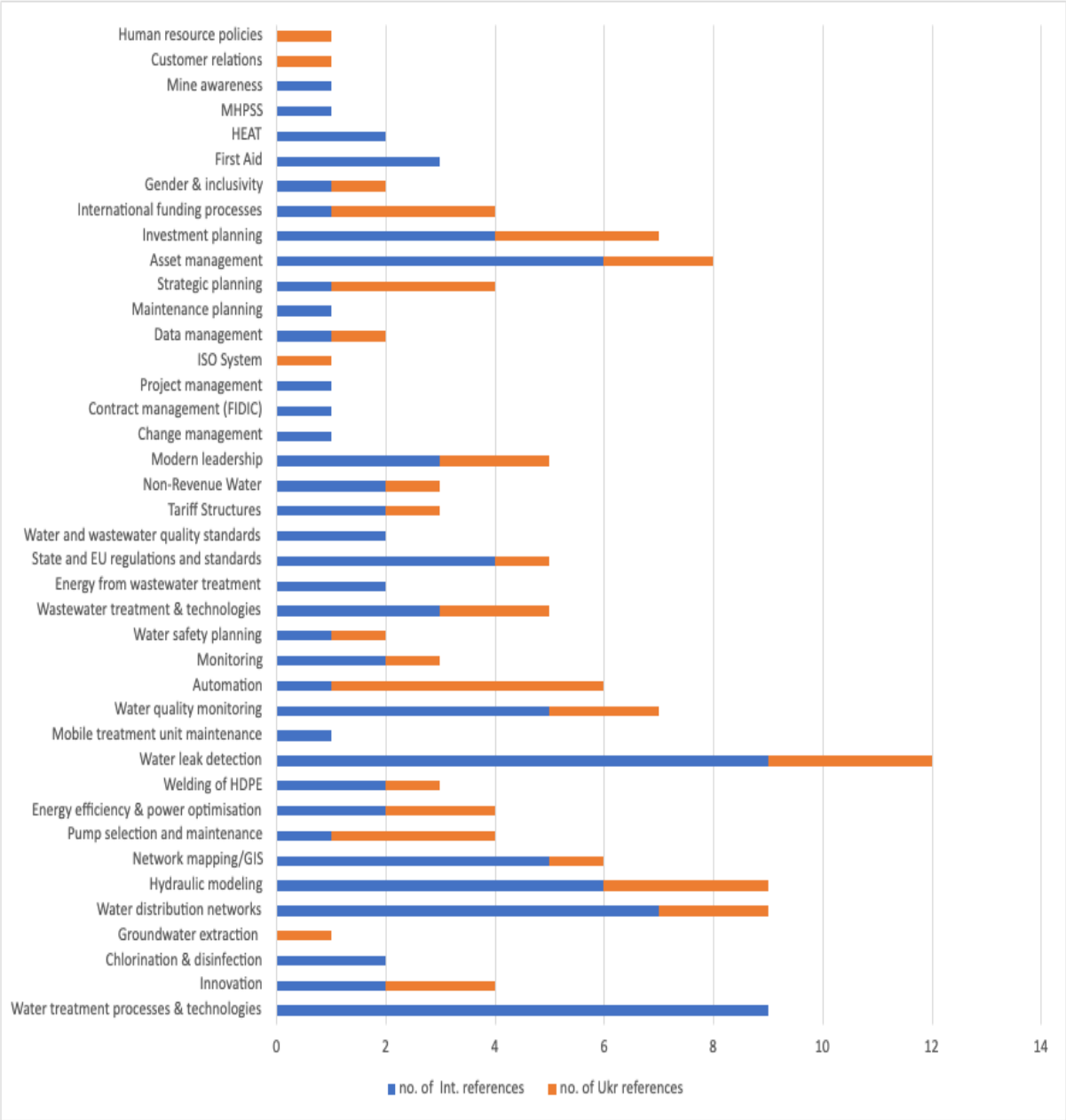
International Funding Process: Ukrainian KIs stressed the need for an understanding of international funding processes to enable the vodokanals to attract and apply for future funds to replace the aging infrastructure. Any modules on this topic must be run together with some understanding of strategic planning which will be an essential element to success in seeking funds.

Organisational Change Management: the need for changes to management approaches and leadership was noted by both Ukrainian and International KIs, particularly with regards to long term integration into the EU. An introduction to these topics, to provide some sensitisation, could be provided in this project, however such a large cultural shift will require a longer-term approach.

A full list of the training themes identified by number of KIIs is given in Table 2.

This shows a clear overlap with topics that were identified in the preliminary UNICEF consultation: (1) Policy and management; (2) Efficiency and sustainability; (3) Water supply and water quality monitoring; (4) Wastewater treatment; and (6) Training on HDPE pipes. However, the themes of (5) Assessment of damage and cost of repairs and (7) Economic and social safeguards, were not raised by any of the KIs.

Table 2: List of all training themes raised in KIIs



Within the key themes emerging from the KIIs it was also clear that the vodokanal organisations are severely impacted by their size and location, most clearly whether they are urban or rural and whether or not they are within conflict or de-occupied zones, and the subsequent funding to which they have access. Equally, their capacity needs are diverse in both the short and long term. This diversity of needs will impact upon prioritisation of those training modules selected for development in this project.

A full list of all training themes that were identified in KIIs is provided in Table 3. An initial indication of whether these themes could be addressed in the short and/or long term with capacity building is provided by colour coding. The subsequent Learning Audit will use this list

of training themes to further gather data on learning needs and prioritisation of which topics to address in this project.

Table 3: Summary of training topics identified from KIIs.

Potential training modules

Potential sensitization or introductory module to topic

THEMES	Short term	Long term
Water treatment processes & technologies		
Innovation		
Chlorination & disinfection		
Groundwater extraction		
Water distribution networks		
Hydraulic modelling		
Network mapping/GIS		
Pump selection and maintenance		
Energy efficiency & power optimisation		
Welding of HDPE		
Water leak detection		
Mobile treatment unit maintenance		
Water quality monitoring		
Automation		
Monitoring		
Water safety planning		
Wastewater treatment & technologies		
Energy from wastewater treatment		
State and EU regulations and standards		
Water and wastewater quality standards		
Tariff Structures		

Non-Revenue Water		
Modern leadership		
Change management		
Contract management (FIDIC)		
Project management		
ISO System		
Data management		
Maintenance planning		
Strategic planning		
Asset management		
Investment planning		
International funding processes		
Gender & inclusivity		
First Aid		
HEAT		
MHPSS		
Mine awareness		
Customer relations		
Human resource policies		

Training prioritisation

Training needs vary by target group (senior management, engineers and operators) and in the short and long term. Prioritisation of the training modules for development must take account of both the topics raised in the KIIs and the scale of the training that will be required for that topic. Some topics, such as automation, will not be relevant unless the infrastructure that the staff are operating is automated. There is a clear distinction between what training can be provided in the short term with the existing infrastructure and what is possible/desirable in the longer term alongside investment. Some topics, such as asset management and modern leadership, are highly specific or require long term capacity building and may not be feasible within the time frame of this project, however the senior management would benefit from receiving introductory modules in the short term.

Two thirds of the KIs stated that priority in the short term should be given to developing the capacity of those working in technical roles in the field, both operators and engineers. For longer term capacity development KIs consistently stated that capacity development was needed at the senior levels in leadership, management and planning to enable the vodokanals to move towards meeting EU requirements in water and wastewater provision.

In parallel to the KIIs a desktop review was carried out to determine the existing training that is available in Ukraine and other potential training available outside of Ukraine that is relevant to the needs of the target groups.

Challenges and Constraints

Wording of topics: as the KIIs are by design open questions, the KIs would refer to training topics using their own wording or understanding. Thus, some topics may be referred to with clarity, such as chlorination, but others would be referred to with differing titles, such as automation and digitisation, or implied, for example the use of innovation which could refer to multiple aspects of both water and wastewater treatment. The consultants have therefore identified and clarified topic titles for the purposes of the LNA survey.

Contacting the target range of KIs was difficult. Senior managers and engineers in the vodokanals were reluctant to include operators in the process as they didn't think operators could contribute anything of value. This underlined the KI statements of hierarchical management structures. Further efforts through the Vodokanal Association were made to contact operators directly through phone interviews which was advised as the preferred way of contact. Of the seven operators contacted, five responded but all stated that they did not have time to be interviewed and preferred to respond instead to the LNA.

KII Questions for KIs not working as Vodokanal staff

1. How would you rate the current technical capacity in the Vodokanals? Why?
2. Can you identify anything that could be done in the short term that would improve the technical capacity for provision of water services?
3. Can you identify anything that could be done in the short term that would improve the technical capacity for provision of wastewater services?
4. How would you rate the current planning and management capacity in the Vodokanals? Why?

5. Can you identify anything that could be done in the short term that would improve the planning and management capacity?
6. How would you rate the current leadership capacity in the Vodokanals? Why?
7. Can you identify anything that could be done in the short term that would improve the leadership capacity?
8. Are there any specific areas in Ukrainian water and/or wastewater services that you are aware of that do not meet EU requirements? For example in drinking water quality or monitoring of wastewater discharge quality?
9. Considering/thinking of the areas of leadership, planning, management and technical capability, which area do you think it is the most important to improve to have the biggest impact on improving the provision of water and wastewater services in Ukraine/this oblast?
10. Are you familiar with any of the training for the staff at the Vodokanals? Can you list any of them?
11. Are then any specific topics that you feel the staff of the Vodokanals aren't trained in and would benefit from?
12. Can you name any existing training modules that you are familiar with, in English or possibly other languages, that would be of value to improving the performance of the Vodokanals if adapted to the Ukrainian context?
13. Of all the training that we have discussed that is needed for senior management, the engineers or the operators, who do you think should be prioritised first?
14. Today our discussion mostly focused on urgent priorities. Thinking longer term, are there any strategic needs that you think should be addressed through this project that would bring the Vodokanals more in line with EU requirements?
15. We are carrying out key informant interviews on a broad range of people involved in vodokanal operation. Is there anyone in particular that you feel we should include in our key informant interviews? (For Vodokanal engineers/leadership request name of field staff who should be included)
16. Is there anything we have not discussed today that you think is important for us to know?

KII Questions for Senior Managers, Engineers and Operators working in Vodokanals

1. How long have you been in your role? What education had you received before you entered this role? What training did you receive to enter the role?
2. You mentioned that you had received XX training for your role. Is there any other training that you haven't yet received that is available to people in your role or similar roles?

3. How would you rate the current leadership capacity in the Vodokanals? Why?
4. Can you identify anything that could be done in the short term that would improve the leadership capacity?
5. How would you rate the current planning and management capacity in the Vodokanals? Why?
6. Can you identify anything that could be done in the short term that would improve the planning and management capacity?
7. How would you rate the current technical capacity in the Vodokanals? Why?
8. Approximately what proportion of the staff in the vodokanal have more than 2 years of experience in their role? What training do they receive to enter the role? (Consider both water and wastewater).
9. In the consultations conducted by UNICEF last year, additional funding and resources were identified as the number one thing that would improve the technical capacity of Vodokanals. Beyond this, what else could be done in the short term that would improve the operation of the **water treatment and supply** ? Which would you focus on first?
10. In the consultations conducted by UNICEF last year, additional funding and resources were identified as the number one thing that would improve the technical capacity of Vodokanals. Beyond this, what else could be done in the short term that would improve the operation of the **wastewater treatment**? Which would you focus on first?
11. Are there any specific areas in Ukrainian water and/or wastewater services that you are aware of that do not meet EU requirements? For example in drinking water quality or monitoring of wastewater discharge quality?
    Where do you get information about technology and innovations in water and wastewater treatment? Do you think it is necessary to be innovating more?
12. Considering/thinking of the areas of leadership, planning, management and technical capability, which area do you think it is the most important to improve to have the biggest impact on improving the provision of water and wastewater services in Ukraine/this oblast?
13. You mentioned that you had received XX training for your role. What training did you NOT receive that you would have liked to receive and would have helped you perform your job better? Is there any training that would benefit your team/colleagues that they have not received?
14. Of all the training that we have discussed that is needed for senior management, the engineers or the operators, who do you think should be prioritised first?
15. Today our discussion mostly focused on urgent priorities. Thinking longer term, are there any strategic needs that you think should be addressed through this project that would bring the Vodokanals more in line with EU requirements?
16. We are carrying out key informant interviews on a broad range of people involved in vodokanal operation. Is there anyone in particular that you feel we should include in

our key informant interviews? (For Vodokanal engineers/leadership request name of field staff who should be included)

17. Is there anything we have not discussed today that you think is important for us to know?