

# **SERBIA ACCELERATING INNOVATION AND GROWTH ENTREPRENEURSHIP (SAIGE) PROJECT**

## **Program PROMIS**

### **ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)**

***Exploring the Avian Microbial Frontier: Metagenomic Surveillance of  
Infectious Diseases and Antimicrobial Resistance in Wild Birds (MetAvian)***

**DRAFT DOCUMENT**

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## ABBREVIATIONS AND ACRONYMS

AMR	Antimicrobial resistance
DNA	Deoxyribonucleic acid
ESMP	Environmental Social Management Plan
EtBr	Ethidium bromide
FVM	Faculty of Veterinary Medicine
INCVP	Institute for Nature Conservation of Vojvodina Province
No/Nos	Number/Numbers
PI	Principal Investigator
PIU	Project Implementation Unit
PPE	Personal protective equipment
RNA	Ribonucleic acid
RS	Republic of Serbia
SAIGE	Serbia Accelerating Innovation and Growth Entrepreneurship Project
SF	Science Fund
SOPs	Standard Operating Procedures
SRO	Scientific and Research Organization
SVINS	Scientific Veterinary Institute Novi Sad
UNSFA	Faculty of Agriculture; University of Novi Sad
WP	Work Package

## EXECUTIVE SUMMARY

The purpose of the Environmental and Social Management Plan is to highlight and mitigate the potential negative environmental and social risks and impacts during the preparation and implementation of the MetAvian research project. This ESMP is therefore prepared to set out specific mitigation, monitoring, and institutional measures to be taken during implementation to eliminate adverse environmental and social impacts, offset them or reduce them to acceptable levels.

The relevant Ethical approval necessary for the execution of the project have been obtained.

All necessary project specific stakeholder consents and permits for sampling will be provided during the implementation of the project (requests have been submitted at the moment of writing this document).

Leading SRO of the project, Scientific Veterinary Institute Novi Sad (SVINS), is the leading research and scientific veterinary institution in the Republic of Serbia. SVINS has taken part of the SAIGE project that aims to enhance Serbia's growth and competitiveness by improving relevance and quality of scientific research. These statues will inevitably lead to strengthening existing and building new capacities both in the scientific and administrative section.

The project will focus on the comprehensive collection of wild bird samples (swabs from live birds and carcasses of wild birds found dead) and essential epidemiological and environmental data within the Vojvodina province of the Republic of Serbia. The strategy is meticulously designed to ensure representation across diverse geographic locations and avian species and seasonal differences. To achieve this, a strategic sampling approach will encompass various bird species and populations across different seasons (summer, spring, and autumn). This approach aims to capture a wide spectrum of pathogens and characterize antimicrobial resistance genes while accounting for potential variations in prevalence and migration patterns. The sample collection has already received ethical approval from the Ministry of agriculture, forestry and water management, Veterinary Directorate (no. 323-07-12206/2023-05). Relevant permission for collection of carcasses will be acquired at the beginning of the project implementation (request has already been submitted). For the collection of swabs from wild birds the coordinating Institution (SVINS) relies on the previously established cooperation with the Institute for Nature Conservation of Vojvodina Province (INCVP) with which a contract of cooperation has been signed (Contract on collaboration on activities for monitoring the cause of death and the presence of infectious pathogens in strictly protected and protected wild animals, no. 03 028/3980). The INCVP field team each year collects wild bird samples for the National annual infectious diseases monitoring plans (for avian influenza and West Nile virus - Rulebook listed below in the Legal Framework section). The samples for the MetAvian project proposal will in part be acquired through the above mentioned annual monitoring plans and activities, while the rest of the samples will be gathered from wild birds which the INCVP team helps recuperate in their facilities which are properly equipped for these types of activities. The INCVP field team consists of ornithologists and biologists who have been trained in working and handling wild birds and adhere to rules set by the law (appropriate law listed below in the Legal Framework section). INCVP has established contract of cooperation with field veterinarians in the province of Vojvodina who will be responsible for swab collection from wild birds. SVINS will supply the INCVP field team with swabs and other necessary equipment. All listed permits, approvals and agreements are available upon request.

Concerns and potential adverse effects related to infectious and chemical waste as well as the disposal of animal tissues during the project have been tackled within the mitigation plan. Detailed occupational safety measures for the project team and laboratory biosafety protocols, encompassing the handling of infectious materials and chemicals, have been outlined. This ESMP document encapsulates a concise project overview, providing relevant background information essential for assessment. It includes details about the sampling process and sample transportation, the accompanying legal framework for project realization, identification of sensitive receptors, potential impacts, and impact assessment. The pivotal components of this document are the plans for mitigation and monitoring. Following a comprehensive analysis of the surrounding environment where the project will take place and its potential impacts, no sensitive receptors have been identified. The project team firmly believes that through additional information, clarifications, proposed mitigation actions, and monitoring, both environmental and social risks will be diminished. As previously mentioned, there exist specific environmental risks associated with activities outside SROs (collecting samples from wild birds) and within participating SROs laboratories. Social risks linked to sampling have been identified, yet all raised concerns can be effectively addressed through mitigation measures. Therefore, this ESMP is crafted to delineate precise mitigation, monitoring, and institutional steps to be implemented during execution. The aim is to eradicate adverse environmental and social impacts, offsetting them or reducing them to acceptable levels.

## LEGAL AND ADMINISTRATIVE FRAMEWORK

### LEGAL FRAMEWORK

#### Relevant laws of the Republic of Serbia

All laboratory work, sampling procedures, field work, and waste management will be in concordance with the relevant laws and/or management strategies of the Republic of Serbia, including specific rulebooks:

1. Law on nature protection ("Official Gazette of RS", nos. 36/2009, 88/2010, 91/2010, 14/2016, 95/2018 and 71/2021),
2. Law on environmental protection ("Official Gazette of RS" No. 135/04, 36/09, 72/09, 43/11, 14/16, 76/18 and 95/18),
3. Decree on placing under control the use and circulation of wild flora and fauna ("Official Gazette of RS", Nos. 31/2005, 45/2005, 22/2007, 38/2008, 9/2009, 69/2011 and 95/2018),
4. Law on Science and Research ("Official Gazette of RS" No. 49/19),
5. Law on Occupational Health and Safety ("Official Gazette of RS", 35/2023),
6. Law on Fire Protection ("Official Gazette of RS", Nos. 111/2009, 20/2015, 87/2018 and 87/2018),
7. Rulebook on preventive measures for safe and healthy work to prevent the occurrence and spread of infectious disease epidemics ("Official Gazette of RS", No. 94/2020),
8. Rulebook on preventative measures for safe and healthy work when exposed to biological hazards ("Official Gazette of RS", 96/2010 and 115/2020),
9. Rulebook on personal protective equipment ("Official Gazette of RS", No. 23/2020),
10. Rulebook on preventive measures for safe and healthy work at the workplace ("Official Gazette of RS", Nos. 21/2009 and 1/2019),

11. Rulebook on preventive measures for safe and healthy work when exposed to chemical substances ("Official Gazette of RS", Nos. 106/2009, 117/2017, 107/2021),
12. Rulebook on the provision of signs for safety or health at work ("Official Gazette of RS", Nos. 95/2010 and 108/2017),
13. Rulebook on the provision of first aid, the type of means and equipment that must be provided at the workplace, the method and deadlines for training employees to provide first aid ("Official Gazette of RS", No.109/2016),
14. Rulebook on preventive measures for safe and healthy work when exposed to carcinogens or mutagens, ("Official Gazette of RS", Nos. 96/2011 and 117/2017),
15. Rulebook on the provision of signs for safety and health at work ("Official Gazette of RS", Nos. 95/2010 and 108/2017),
16. Rulebook on preventive measures for safe and healthy work when using work equipment ("Official Gazette of RS", Nos. 23/2009, 123/2012, 102/2015 and 101/2018),
17. Rulebook on the procedure for inspecting and checking work equipment and testing working environment conditions ("Official Gazette of RS", Nos. 94/2006, 108/2006, 114/2014 and 102/2015),
18. Rulebook on records in the field of safety and health at work ("Official Gazette of RS", Nos. 62/2007 and 102/2015),
19. Guidelines for Good Laboratory Practice ("Official Gazette of RS", 28/08),
20. Rulebook on the manner and procedure of risk assessment at the workplace and in the working environment, ("Official Gazette of RS", Nos. 72/2006, 84/2006, 30/2010 and 102/2015),
21. Rulebook on determining the Program of Animal Health Protection Measures ("Official Gazette of RS", no. 23/2023 and 27/2023),
22. Law on animal welfare ("Official Gazette of RS", no. 41/2009).

Waste will be managed in accordance with:

1. Waste Management Program in the Republic of Serbia for the period 2022 – 2031,
  2. Law on waste management ("Official Gazette of RS", 36/09, 88/10, 14/16 and 95/2018),
  3. Law on noise protection ("Official Gazette of RS", 36/09, 88/10 and 96/2021),
  4. Law on Packaging and Packaging Waste ("Official Gazette of RS", No. 36/2009 and 95/2018),
  5. Law on Veterinary Medicine ("Official Gazette of the RS", No. 91/05, 30/10, 93/12 and 17/19).
- Additionally, project specific SOPs and procedures already established at SVINS and FVM will integrate the principles of The Law on Veterinary Medicine ("Official Gazette of the RS", No. 91/05, 30/10, 93/12 and 17/19-other law) with regard to materials presumed infectious of animal origin with zoonotic potential. In addition, other relevant rulebooks are:
1. Rulebook on the manner of storage, packaging and marking of hazardous waste ("Official Gazette of RS", Nos. 92/2010 and 77/2021),
  2. Rulebook on categories, testing and classification of waste ("Official Gazette of RS", No. 56/10 and 93/2019),
  3. Rulebook on the form of daily records and annual report on waste with instructions for its completion ("Official Gazette of RS", Nos. 95/10 and 88/2015),
  4. Rulebook on the form of the document on the movement of hazardous waste, the form of prior notification of the method of its delivery and instructions for filling it in ("Official Gazette of RS", Nos. 114/2013 and 17/2017),
  5. Rulebook on the document form on the movement of waste and instructions for its completion ("Official Gazette of RS", No. 72/2009),

6. Rulebook on the method and procedure of pharmaceutical waste management ("Official Gazette of RS", No. 49/2019),
7. Rulebook on medical waste management ("Official Gazette of RS", No. 48/2019),
8. Regulative on using company cars ("Official Gazette of RSS", No. 49/2014 and 15/2015). In addition to observing the relevant laws and rulebooks, the lead and participant SROs implementing the project will abide by the rules of best fieldwork and laboratory work practice and the internal relevant rulebooks that regulate the matter. The Project will also follow all institutional acts, rulebooks and procedures.

### Relevant Institutions

The Ministry of Environmental Protection of the Republic of Serbia (specifically the Institute for Nature Conservation of Serbia) is responsible for proposing legislature concerning environmental protection and environmental policy and monitors implementation. The Ministry of Science, Technological development and Innovation proposes laws on Science and Research, including funding policy. The Ministry of Health of the Republic of Serbia is responsible for policy and proposing legislature on regulating medical waste. The Veterinary Directorate of the Ministry of Agriculture, Forestry and Water Management proposes policy and legislature on prevention of epidemics, managing animal waste (including carcasses) and animal welfare and monitors implementation. The Ministry of Labor, Veterans and Social Policy proposes legislature on worker's rights and safety in the workplace and monitors implementation. The other relevant institutions for this project are: Institute for Nature Conservation of Vojvodina Province. The roles of SROs in the context of the ESMP are provided in the table with mitigation measures planned.

## PROJECT DESCRIPTION

Project Proposal Title: Exploring the Avian Microbial Frontier: Metagenomic Surveillance of Infectious Diseases and Antimicrobial Resistance in Wild Birds

Acronym: **MetAvian**

Sub-program: Biotechnology

Lead SRO and address:

Scientific Veterinary Institute "Novi Sad" (SVINS), Rumenački put 20, Novi Sad, Serbia - 2 participants, PI, 1 WP leader

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Partner SROs:

Faculty of Agriculture, University of Novi Sad (UNSFA)

Faculty of Veterinary Medicine, University of Belgrade (FVM)

The "MetAvian" project is a multifaceted initiative designed to delve into the realm of avian microbial diversity and its implications for both animal and human health. By employing cutting-edge techniques in metagenomics and bioinformatics, the project seeks to unravel the complex microbial

communities residing within diverse wild bird populations. The core objective is to conduct comprehensive shotgun metagenomic sequencing on samples obtained from wild birds—fecal matter, cloacal and pharyngeal swabs from live birds and tissues from wild birds found dead. Through meticulous bioinformatics analysis the project aims to identify and characterize these microbial communities which will shed light on the vast array of microorganisms present and their potential implications for public and animal health. By analysing genetic sequences obtained from metagenomic data, the project aims to pinpoint potential zoonotic and animal pathogens. This exploration into the genetic makeup of these microorganisms will aid in understanding the risks posed to both human and animal health. An integral aspect involves delving into antimicrobial resistance (AMR) within wild bird populations. Through dedicated antibiotic resistance metagenomic sequencing the project seeks to identify antibiotic resistance genes. This analysis will uncover the prevalence and diversity of these genes, elucidating the role of wild birds as carriers and reservoirs of antibiotic resistance and its potential transmission to other species. Understanding the impact of environmental factors on disease transmission dynamics is crucial. Collecting environmental data alongside animal samples allows for the assessment of correlations between environmental parameters and disease prevalence. Statistical analyses will illuminate the intricate relationships between environmental factors, animal behaviour, disease dynamics, and the spread of AMR. Recognizing the interconnectedness of ecosystems, the project aims to unravel the impact of infectious diseases on biodiversity loss. The insights gained will pave the way for targeted conservation strategies, safeguarding vulnerable bird species and their habitats, thereby preserving biodiversity. The culmination of the project's findings will lead to comprehensive reports outlining evidence-based recommendations. These will not only enhance surveillance and management of infectious diseases in wild bird populations but also contribute to the broader understanding of antibiotic resistance ecology. The project aims to provide actionable strategies for mitigating the spread of antibiotic resistance and reducing the risk of infections in both wild bird populations and the broader ecosystem. The project is not just about research; it's a platform for capacity building and knowledge exchange. Involving young scientists provides hands-on experience in various facets of research, from sample collection to advanced bioinformatics analysis. This empowers them to contribute meaningfully to the field, fostering their skills and expertise for future endeavours in infectious disease ecology and biodiversity conservation. The MetAvian project isn't solely about findings; it's about strengthening research capabilities. By handling vast genomic data and utilizing advanced bioinformatics tools, the laboratory gains invaluable experience. This project's outcomes pave the way for future metagenomics protocols advancements, infrastructure enhancements and the acquisition of new laboratory equipment. The project's impact extends beyond the laboratory. It aims to inform evidence-based policies, bolster disease surveillance, and fortify the scientific community's ability to address emerging challenges in wildlife health and conservation. Ultimately, it aims to contribute to an improved understanding of infectious diseases and their implications for both wildlife and human populations. In summary, the MetAvian project is a holistic endeavour that not only probes the microbial frontier in wild birds but also nurtures the next generation of scientists, strengthens research capabilities and aims to safeguard biodiversity while enhancing the understanding of infectious diseases and antibiotic resistance in the ecosystem. The MetAvian work plan showcases the recognized, diverse expertise of the specifically chosen partners aimed at maximizing the project's collective impact. MetAvian's research endeavours are structured across four interrelated work packages (WP1 to WP4), fostering active collaboration and interaction among them. The MetAvian project activities will be carried out at SVINS, FVM and UNSFA which are public accredited research and education institutions (Accreditation Act numbers: 660-01-00009/4, 660-01-00002/36 and 612-00-00070/9/2019-03, respectively) with documented procedures for the protection of worker rights, worker safety, and environmental protection. Safety rules and



regulations are publicly available at <https://vet.bg.ac.rs/sr/dokumenta/zashtita-bezbednost-i-zdravlie-na-radui-radnoi-okolini> and internal documents. SVINS documentations, procedures and SOPs for safety rules and regulations and waste management are available upon request. The research activities predicted by the project do not deviate from the regular working activities of the SROs, and as such are not expected to bear any substantial or high additional risks to worker health and safety or the environment. However, certain low risk actions have been identified, and the Mitigation and Monitoring tables given below outline how those risks will be managed during the course of the Project.

## ASSESSMENT OF THE POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS OF SPECIFIC TASKS WITHIN THE PROJECT

### *Potential impact on sampling sites*

The realization of this project will not directly impact air, water or soil quality in any way. Fieldwork will require the use of a field vehicle (SVINS), for total of three months (collection of samples will be performed in three seasons – spring, autumn and summer during the first 12 months of the project implementation). The whole project will last for two years. The total number of samplings will be 50 – which is the number of samples we plan to analyse in the later phases of the project. The bird species cannot be known upfront as we do not know which species our partners will collect. The field vehicle is equipped with samples transportation equipment and cold storage. Field activities will be realized in the INCVP facilities used for regular health checks and recuperation of injured/sick wild birds. Wild birds are brought in these facilities from the whole province of Vojvodina which has terrestrial ecosystems of diverse habitats (rich in water) which attract various species of wild birds and is interspersed and fragmented by agricultural plots and pastures. This layout facilitates complex interactions between people, domestic and wild terrestrial and aquatic fauna at a macro and microscopic level, which will be examined through this project. As interactions between native and bred wildlife with domestic animals and humans are possible under these conditions, as well as contact between wildlife and human food and/or animal feed, transmission dynamics which allow exchange of parasite species are created. Specifically, the opportunity for circulating species of microorganisms to transition into the domestic cycle is provided, which raises public health concerns. Handling and sampling swabs from wild birds will be performed by INCVP team consisting of ornithologists and veterinarians trained and experienced in performing these activities. The veterinarians possess appropriate licenses through which they are allowed to handle and work with animals. The sampling will be done manually, without any mechanical devices or machines, using a regular swab. The procedure does not produce any noise, heat, waste or emissions. Sampling will be done with minimal handling time, using gentle techniques and swiftly to reduce stress. None of project work regarding sampling will be disruptive for the local ecosystems or protected habitats of the wild birds. Birds will not be captured, swabs will be taken only for birds which are hurt/diseased and are taken to the shelter to recuperate, as described in the mitigation plan table. No wild birds will be trapped or otherwise disturbed for the needs of this project. Wild bird carcasses are brought by veterinarians in our Institute as part of the National surveillance plan for Avian influenza and we plan on using only these carcasses, not collect carcasses on our own. We plan on sampling only carcasses for which there are signs of infectious disease. Sampling of wild bird carcasses will be performed by the SVINS field team which have been trained and have experience in sampling biological samples. All samples will be transported to the SVINS and FVM laboratory.

All sampling procedures and field work will be in concordance with the relevant laws and/or specific rulebooks. Field work will be conducted outside protected natural areas, to ensure that no protected flora or fauna will be disturbed by the project team. No sample collection will occur near private homes, residential areas, children's playgrounds and homes for the elderly. A company car will be used for transport; the car will not be driven through any natural terrain; natural terrain will be accessed exclusively on foot by the project team. No analytical methods, *equipment which generates noise* or aerosols will be used while in the field. All analytical methods will be conducted inside the laboratory using existing and project specific occupational health and safety, biosafety and hazardous chemical safety training SOPs and proper PPE.

### ***Potential biohazard impact on the environment and human health***

All laboratory work (including biosafety measures) will be in concordance with the relevant laws and/or management strategies of the Republic of Serbia, including specific rulebooks. For handling of biological materials there are measures, SOPs, PPE, knowledge on biosafety and training, which all help in preventing and most importantly avoiding infection. Not all biological materials handled in this project are truly infectious but will be treated as such, thus potential risks have been identified and mitigated, as stated in this document. In addition, SROs performing laboratory work have Rulebooks and Risk assessment acts related to our field of work, which will be adhered to. Collected swabs and carcasses will be safely packed on the sampling site and transferred to the laboratory in the plastic tubes and bags respectively, tightly sealed with caps, packed in the zip bags to prevent accidental spillage of potentially infectious material and transmission to another location. All samples will be safely stored in the laboratory in freezers. The processing of the samples will be done in biosafety cabinets so there is minimal risk of biohazard in the case of accident during the laboratory work both for the environment and the laboratory personnel. The carcasses will not be necropsied rather swabs will be taken from body orifices so there is little to no risk for this activity. While potential pathogenic microorganisms can be found in the samples collected for this project, the danger of infection is minimal since all personnel included are already trained, proper PPE and protection will be provided. All team members are employees of accredited SROs obligated to follow national Law on Occupational Health and Safety and other legal documents concordant with occupational safety, including the training of the project team. General work in laboratories is in accordance with legal requirements listed above under subtitle of Legal and Institution Framework. Throughout the various stages of project execution and activities (such as laboratory and pilot work), researchers will be acquainted with precautionary measures outlined in the Safety Data Sheets of chemicals and will be provided with personal protective equipment. Scenarios involving pathogenic microorganisms spreading beyond the laboratory is not an issue, as the researches have had extensive training and experience, and the laboratory are equipped with appropriate equipment in accordance with established SOPs, procedures and rulebooks. Thus, spreading of these microorganisms beyond the laboratory is not an issue, and is not related to this project. Also, all precautions to prevent infection while processing samples in the lab have been taken and proper PPE (including regular cleaning and disinfection of the laboratory workspace) will be provided and worn by the team members. Work in the laboratory with infectious and potentially infectious material - will be handled in accordance with laws listed in the Legal Framework section. Mitigation measures will include containment of the spread within the lab. This involves securing the area and ensuring that no personnel or materials leave the space without proper decontamination and prompt notification of relevant authorities, including public health officials and emergency response teams. The next step would be to identify and monitor individuals who were in the lab or who might have come into contact with the pathogen. This includes lab personnel, visitors, and anyone else who

might have been exposed, followed by quarantine of those who were exposed to prevent further spread. Provide medical care and surveillance for those exposed. This might include prophylactic treatment, vaccines (if available), or other medical interventions to prevent infection or manage symptoms. Communicate with the public and stakeholders transparently about the incident, the risks involved, and the measures being taken to address the situation. Provide guidelines and information to the public to prevent panic and to educate them on self-protection measures. Decontaminate the lab and any potentially contaminated areas thoroughly. This might involve specialized cleaning agents and procedures depending on the pathogen. Dispose of contaminated materials safely and securely. Conduct a thorough investigation to understand how the breach occurred. This includes tracing the source, identifying the route of exposure, and assessing any lapses in safety protocols. After managing the immediate crisis, review and revise lab safety protocols to prevent similar incidents in the future. Enhance training for lab personnel on safety procedures and emergency response.

### ***Potential impact of generated waste***

During the implementation of the project following types of waste will be generated – solid non-biological waste, solid potentially infectious waste, liquid hazardous waste, liquid potentially infective and infective waste. Solid non-biological waste (plastic consumables, packaging and paper) will be disposed of according to the waste management plans at each SRO participating in laboratory work. Potentially infectious solid waste (plastic tips, tubes, columns) will be physically inactivated (autoclaving/freezing) prior to discarding in labelled biohazard bags in accordance with the waste management plans and contracts with medical waste removal companies at each SRO. Liquid potentially infective or infective waste (buffers, saline) will be collected in plastic flasks/bottles and chemically inactivated for at least 24h using sodium hypochlorite at a final concentration of 10%, after which the solution can be safely discarded in the laboratory drains. Liquid waste with potentially hazardous chemicals will be stored in glass bottles until pickup and disposal by the waste management company. Medical waste and consumables used for manipulation of medical waste will be collected in special biohazard cans, inactivated for at least 24h using sodium hypochlorite at a final concentration of 10% and disposal according to SROs plan for medical waste and pickup by the medical waste managed company contracted by SROs operating with such material (SVINS, FVM). Solutions containing ethidium bromide (electrophoresis buffer) will be filtered using activated charcoal filters to remove EtBr prior to discarding in the laboratory drain. Agarose gels will be exposed to UV light for several days prior to discarding in hazardous waste bags and pickup by the said hazardous chemical waste contractor.

### ***Project team PPE requirements***

During the realization of this project, several activities may impact the safety of the project team: field work, working with potentially infectious materials and/or hazardous waste. For field work and sample collection dedicated team members will be outfitted with special personal protective equipment which will consist of: field shoes, latex gloves, protective safety work wear, repellent application, portable first aid kits. All field work will be covered by official SRO policy/guideline documents and leave permits as well as SOPs. Laboratory work protective clothe and equipment consist of: lab coats, latex gloves, eye protection (goggles), and masks.

### ***Potential socio-economic impact***

The project does not have any negative socio-economic impact (except the potential biohazard explained in the paragraph above titled: *Potential biohazard impact on the environment and human health*; on the contrary, a significant positive potential impact is projected and expected. The results generated with this project are expected to contribute to disease prevention and control by identifying infectious diseases and understanding antimicrobial resistance in wild birds which can contribute to preventing disease outbreaks in both avian populations and potentially in humans. This surveillance can inform public health strategies, leading to better disease control measures and guidelines. By studying the microbial composition wild bird populations, the project can contribute to understanding ecosystem health. Preserving and protecting these birds not only maintains biodiversity but also supports ecosystems that are vital for agriculture, pest control, and overall environmental stability. Moreover, evidence-based findings can influence policymaking, potentially leading to the implementation of regulations or guidelines aimed at mitigating the spread of infectious diseases and antimicrobial resistance in both wildlife and domestic animals. This can have far-reaching societal impacts. The broader scientific community, as well as other beneficiaries such as companies that produce diagnostic tests or antimicrobial agents, will indirectly be impacted by the results of this project, i.e., with new information useful for the establishment of novel research or development of new products.

### **SUMMARY OF ENVIRONMENTAL AND SOCIAL IMPACT**

The scientific community at large will benefit from this project from the results and findings, which will cover existing knowledge gaps and provide data for future studies. The local scientific communities at the participating SROs will additionally benefit from the project acquired equipment which will facilitate fast and uniform sample processing, thus raising the quality of the data. In addition, the equipment is an investment into raising the capacity of the SVINS institution. The methodology applied in various tasks of this project is diverse and aims to transfer knowledge and skills of the senior team members to the team's trainees (PhD students) as part of building their scientific capacity. Specifically, bioinformatics analysis is a fundamental part of performing metagenomic studies and the project team will gain valuable experience in performing these analyses. The project management strategy has been designed to emphasize working strictly according to SOPs and the maintenance of records and documents, including monitoring plans for every task. This management strategy's emphasis is on enabling the project team to work safely and comfortably with potentially infectious and/or hazardous materials, standardization to ensure reproducibility and quality of the data, traceability to help identify potential omissions and help with troubleshooting and continuous monitoring to ensure timely revisions/updates and avoid errors during implementation of the project. As the management strategy will affect the entire project team, it will provide a framework for future collaborations. Review of the impact on the environment that are predicted for the duration of the project is listed below. Review of the impact on the environment that is predicted for the duration of the project is shown in Table 1.

**Table 1:** Review of the impact on the social and environmental surrounding.

Item	Impact
Population	Low
Sampling	The consequential impact is moderate and related to sampling and environment. Appropriate mitigation and monitoring measures

	during the project implementation are planned.
Social	Low, mitigation measures explained above, in the Potential biohazard impact on the environment and human health section
Geology and soil	Low
Climatic characteristics	Low
Seismology	Low
Air quality	Low (The project team will travel to the facility for sample collection. The routes will be planned to accomplish as many tasks as possible within one trip and only one vehicle will be used to transport the project team and samples. As the facilities are localized in peri-urban areas where vehicles are common, the additional emissions by one car are considered negligible
Working in the laboratory including Life and Fire Safety	Low/Moderate, well controlled and managed, explained in more detail in the Potential biohazard impact on the environment and human health section
Waste	Low/Moderate, well controlled and managed
Water resources	Low
Soil	Low
Flora and Fauna	Low/Moderate, well controlled and managed
Noise	Low
Cultural heritage	Low

## I MITIGATION PLAN

Phase	Issue	Mitigating measures	Cost of Mitigation (If Substantial)	Responsibility*	Observation and comments (to be filled out during monitoring)
Project preparation	Permits and agreements for sampling and contract for waste disposal	<p>Established Contract on collaboration on activities for monitoring the cause of death and the presence of infectious pathogens in strictly protected and protected wild animals, no. 03 028/3980 with Institute for Nature Conservation of Vojvodina Province; Acquired Decision on the approval of the implementation of experiments on animals for this project has been acquired from the Ministry of agriculture, forestry and water management, Veterinary Directorate (2023); Permit for collecting samples of strictly protected and protected species of birds for scientific and research purposes, granted by the Ministry of environmental protection of Republic of Serbia will be acquired before the beginning of the Project (a request has already been submitted). The reason for acquiring this permit at the beginning of the project execution is that is issued yearly (until the end of the calendar year) so it is of no use to us to acquire it in December 2023 – we would have to acquire a new one in January 2024.</p> <p>Handling of wild birds will be performed by ornithologists and biologists trained in performing these activities at facilities designed for routine health check-up and recuperating sick or injured wild birds. Sampling of wild bird swab will be performed by trained veterinarians with which INCVP has established cooperation and agreements. Sampling be performed with minimal handling using gentle and swift techniques. All activities involving any contact with the wild birds are in accordance with Serbian laws and rulebooks regulating these kinds of tasks. Sample transportation will be performed by the SVINS field team who have experience and possess vehicles specifically equipped for safe transportation of samples and have established procedures (Procedure for transportation, reception, handling, protection, storage, storage and disposal of samples for testing, no. 024). Both laboratories have established routes for waste disposal since lab work and activity is performed daily, outside of this project proposal.</p>	N/A	SVINS, FVM	SF/PIU
Project	Potential	As per the Risk Assessment Act 15, every workplace must adhere to written	N/A	SVINS,	SF/PIU

execution	risks associated with working with biological material that contains potentially pathogenic bacteria and/or viruses	regulations. According to this act, the Virology department at SVINS handling samples for viral agents and Department for Microbiology at FVM, handling samples for bacterial agents is classified as a low-risk environment. (SVINS, FVM); Work involving bacteria and viruses will be carefully organized to prevent accidents and minimize any potential harm to employees and the environment, following specific written guidelines (SOPs) (SVINS, FVM). Similarly, activities with viruses and bacteria will be managed to avert accidents and mitigate potential risks to both employees and the environment, in line with written instructions (SOPs) (SVINS, FVM). The handling viruses will be overseen and carried out by individuals who have received proper training in laboratory safety. Certificates verifying their training are accessible. (SVINS, FVM). Researchers in all departments are supplied with personal protective equipment such as masks, gloves, and protective glasses. This equipment is consistently and appropriately utilized following written guidelines (SOPs) (SVINS, FVM). All fire safety measures mandated by law are implemented across our facilities. Specifically marked notification signs, such as "first aid," "evacuation direction," and "exit," are strategically placed, as required for safety. First aid kits are present in facilities where activities related to work with viruses and bacteria are conducted, following guidelines in. There exists an assigned employee responsible for overseeing workplace health, safety, and fire protection, as mandated by the Risk Assessment Act. Notably, safety signs for health and potential risks, movement directions, and designated areas, as well as measures to prevent or mitigate risks, are prominently displayed, in line with the Risk Assessment Act and. Work equipment undergoes inspections and testing as outlined by technical regulations and manufacturer instructions, in accordance with the Risk Assessment Act. These inspections, both regular and extraordinary, are conducted by licensed entities, with detailed records maintained (SVINS, FVM). Appropriate warning signs are placed in each laboratory and access to laboratories is restricted to authorized personnel only.		FVM	
Project execution	Ethics associated with working with animals	<i>Risk of Harm to Animals:</i> Ethical Issue: The primary concern is causing physical or psychological harm to the birds during handling or swabbing. Low Risk: This is considered a low risk because the birds are already being handled for health check-ups, and additional handling for swabs is minimal. Preventive Measures: Trained and experienced personnel handle the birds to	N/A	N/A	SF/PIU



		<p>minimize stress and injury. The use of proper techniques and tools ensures that the swabbing process is as gentle and non-invasive as possible.</p> <p><i>Risk of Stress or Distress:</i>  Ethical Issue: Captive environments and human interaction can cause stress or distress in wild birds.  Low Risk: The risk is low as the birds are in the facility for recuperation, and staff are trained to minimize stress.  Preventive Measures: Minimizing human interaction and duration of handling, and closely monitoring the birds' behaviour to identify signs of stress.</p> <p><i>Risk of Impact on Natural Behaviour:</i>  Ethical Issue: Interaction with humans and captivity might alter the birds' natural behaviours.  Low Risk: Since the birds are in the facility primarily for recuperation, the duration of human interaction is limited, reducing the impact on natural behaviour.  Preventive Measures: Limiting human contact to necessary medical or maintenance procedures.</p> <p><i>Risk of Disease Transmission:</i>  Ethical Issue: Handling and swabbing could potentially introduce new pathogens to the birds or vice versa.  Low Risk: The risk is low because the health of the birds is regularly monitored, and sanitary procedures are strictly followed.  Preventive Measures: Using sterile equipment for each bird, maintaining high hygiene standards, and ensuring that all personnel follow biosecurity protocols.</p> <p><i>Ethical Concerns About Consent:</i>  Ethical Issue: Unlike human subjects, animals cannot give consent for participation in research or data collection.  Low Risk: The risk is evaluated as low because the primary purpose of handling the birds is for their health and recuperation, not research.  Preventive Measures: Ensuring that all procedures are in the best interest of the animals' health and well-being, and that any data collection is secondary to and does not interfere with their care.</p> <p><i>Risk of Long-term Dependency:</i>  Ethical Issue: There is a risk that birds might become dependent on humans during</p>			
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		<p>their recuperation, affecting their ability to survive upon release.</p> <p>Low Risk Assessment: This is generally low as the aim is to release the birds once they are fully recuperated.</p> <p>Preventive Measures: Implementing rehabilitation protocols designed to maintain the birds' wild behaviours and independence, and careful assessment before release to ensure readiness.</p> <p>Note: In separate ethics related screening this project is evaluated to have low risk</p>			
Project execution	Waste management	<p>SROs performing laboratory work have a Waste Management Plan following the guidelines stipulated in the laws and rulebooks listed in the Legal Framework section and all participants involved in the Project are well-acquainted with the procedural norms for handling biological waste. The flow of medical waste generated in the Project's laboratories is precisely outlined, and all staff members are familiar with these procedures, which are thoroughly documented and easily accessible. Researchers engaged in the Project are well-versed in the use of personal protective equipment and the prescribed response plan in case of accidents during medical waste management, as detailed within the Waste Management Plan. SVINS and FVM have a dedicated medical waste treatment facility for the proper disposal and eradication of medical waste, alongside designated areas for short-term waste storage, complying with existing regulations) and in accordance with the Risk Assessment Act. All waste produced is methodically collected, sorted, and categorized according to mandated procedures, temporarily housed in assigned containers, and labelled in accordance with the law, detailed in the Waste Management Plan. Adhering to directives from the Waste Management Plan and Risk Assessment Act, stringent conditions are maintained to store waste without posing risks to human health or the environment, ensuring no intermixing of different waste types or with water. Disposal is entrusted to licensed organizations authorized for waste collection and transportation, contracted by the SRO for specific waste categories. The individual responsible for waste management was appointed in accordance with the guidelines stipulated by the corresponding laws.</p>	N/A	SVINS, FVM	SF/PIU
Project execution	Risks associated with	<p>Laboratories handling samples potentially containing pathogenic microorganisms adhere to the principles of Good Laboratory Practice. Standard operating procedures (SOPs) regulate these planned activities, and all Project participants are</p>	N/A	SVINS, FVM	SF/PIU

	handling pathogen material during laboratory work	well-versed in these documents governing laboratory protocols. As per Project documentation and training materials, qualified personnel work within accredited SRO premises equipped with necessary devices and materials for precise execution of laboratory tests. The designated laboratories for Project tasks boast ample capacity, with clearly defined and labelled areas dedicated to distinct activities. Equipped adequately for planned tasks, these laboratories provide instructions for equipment use both in printed form and visibly posted near the equipment. A documented protocol outlines steps in case of equipment failure or mishandling. Work equipment undergoes inspection and testing by licensed entities, aligning with appropriate laws and rulebooks, with detailed records maintained. Personal protective equipment, in line with the Risk Assessment Act is readily available for all Project participants during laboratory work, used according to prescribed SOPs. Reagents and solutions bear clear identity, expiration dates, and storage requirements, following verification before use, proper labelling upon opening, and meticulous record-keeping. Storage adheres to manufacturer's guidelines and SOP specifications. Chemical disinfectants are utilized in compliance with safety data sheets and written SOP instructions. Risks inherent in laboratory activities are identified and documented within the Risk Assessment Act, with corresponding risk management strategies established. Waste management ensures examination integrity, employing suitable conditions for waste collection, storage, disposal, decontamination, and transport, outlined in the institutional Waste Management Plan and the Risk Assessment Act. Generated laboratory waste during Project activities is disposed of in specially labelled autoclavable bags and undergoes autoclaving, as directed in SOP documents and in accordance with established procedures.			
Project execution	Risks to occupational and community health and safety during the execution of	As per the Risk Assessment Act outlined in the "Official Gazette of RS" 101/05, 91/15, every workplace must adhere to written regulations. According to this act, the Virology department at SVINS handling samples for viral agents and Department for Microbiology at FVM, handling samples for bacterial agents is classified as a low-risk environment. (SVINS, FVM); Work involving bacteria and viruses will be carefully organized to prevent accidents and minimize any potential harm to employees and the environment, following specific written guidelines (SOPs) (SVINS, FVM). Similarly, activities with viruses and bacteria will be managed to avert accidents and	N/A	SVINS, FVM	SF/PIU

research activities.	<p>mitigate potential risks to both employees and the environment, in line with written instructions (SOPs) (SVINS, FVM). The handling viruses will be overseen and carried out by individuals who have received proper training in laboratory safety. Certificates verifying their training are accessible. (SVINS, FVM). Researchers in all departments are supplied with personal protective equipment such as masks, gloves, and protective glasses, in line with the Risk Assessment Act and the Rulebook on Personal Protective Equipment ("Official Gazette of RS", 23/20). This equipment is consistently and appropriately utilized following written guidelines (SOPs) (SVINS, FVM). All fire safety measures mandated by law are implemented across our facilities, adhering to the guidelines in "Official Gazette of RS" 111/09, 20/15, and the Rulebook on Fire Safety. Firefighting equipment, as detailed in the Risk Assessment Act, is available on-site, and comprehensive. Specifically marked notification signs, such as "first aid," "evacuation direction," and "exit," are strategically placed, as required for safety, as per "Official Gazette of RS" 101/05, 91/15, 111/09, and 20/15, aligning with provisions in the Risk Assessment Act (SVINS, FVM). First aid kits are present in facilities where activities related to work with viruses and bacteria are conducted, following guidelines in "Official Gazette of RS" 101/05, 91/2015, 24/05, the Rulebook on Workplace Safety and Health Protection, and the Risk Assessment Act (SVINS, FVM). There exists an assigned employee responsible for overseeing workplace health, safety, and fire protection, as mandated by the Risk Assessment Act, "Official Gazette of RS" 101/05, 91/2015, 24/05, and the Rulebook on Workplace Safety and Health Protection (SVINS, FVM). Notably, safety signs for health and potential risks, movement directions, and designated areas, as well as measures to prevent or mitigate risks, are prominently displayed, in line with the Risk Assessment Act and the "Official Gazette of RS" No. 94/06, 108/06, 114/14, 102/15, and the Rulebook on Workplace Safety and Health Protection (SVINS, FVM). Work equipment undergoes inspections and testing as outlined by technical regulations and manufacturer instructions, in accordance with the Risk Assessment Act, "Official Gazette of RS" No. 94/06, 108/06, 114/14, 102/15, and the Rulebook on Workplace Safety and Health Protection. These inspections, both regular and extraordinary, are conducted by licensed entities, with detailed records maintained (SVINS, FVM). Appropriate warning signs are placed in each laboratory and access to laboratories is restricted to authorized personnel only.</p>			
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Project execution	The risk of not having adequate permits and agreements for sampling can lead to legal and regulatory issues. This may include fines, project delays, or even the suspension of sampling activities	<p>Established Contract on collaboration on activities for monitoring the cause of death and the presence of infectious pathogens in strictly protected and protected wild animals, no. 03 028/3980 with Institute for Nature Conservation of Vojvodina Province; Acquired Decision on the approval of the implementation of experiments on animals for this project has been acquired from the Ministry of agriculture, forestry and water management, Veterinary Directorate (2023); Permit for collecting samples of strictly protected and protected species of birds for scientific and research purposes, granted by the Ministry of environmental protection of Republic of Serbia will be acquired before the beginning of the Project (a request has already been submitted).</p> <p>Handling of wild birds will be performed by ornithologists and biologists trained in performing these activities at facilities designed for routine health check-up and recuperating sick or injured wild birds, – explained in detail in a row above named Ethics associated with working with animals), Regulation on ecological network ("Official Gazette of RS", No. 102/2010), Regulation on protection regimes ("Official Gazette of RS", No. 31/2012), Decree on placing under control the use and circulation of wild flora and fauna ("Official Gazette of RS", Nos. 31/2005, 45/2005, 22/2007, 38/2008, 9/2009, 69/2011 and 95/2018). Sample transportation will be performed by the SVINS field team who have experience and possess vehicles specifically equipped for safe transportation of samples and have established procedures (Procedure for transportation, reception, handling, protection, storage, storage and disposal of samples for testing, no. 024)</p>	N/A	SVINS	SF/PIU
Project execution	Waste management	SROs performing laboratory work have a Waste Management Plan following the guidelines stipulated in the Waste Management Rulebook ("Official Gazette of RS", 36/09, 88/10, 14/16, 95/18), and all participants involved in the Project are well-acquainted with the procedural norms for handling biological waste. The flow of medical waste generated in the Project's laboratories is precisely outlined, and all staff members are familiar with these procedures, which are thoroughly documented and easily accessible. Researchers engaged in the Project are well-versed in the use of personal protective equipment and the prescribed response plan in case of accidents during medical waste management, as detailed within the Waste Management Plan. SVINS and FVM have a dedicated medical waste treatment facility for the proper disposal and eradication of medical waste,	N/A	SVINS, FVM	SF/PIU

		<p>alongside designated areas for short-term waste storage, complying with regulations outlined in the Environmental Protection Law ("Official Gazette of RS" 135/04, 36/09) and in accordance with the Risk Assessment Act. All waste produced is methodically collected, sorted, and categorized according to mandated procedures, temporarily housed in assigned containers, and labelled in accordance with the Waste Management Law of RS ("Official Gazette of RS", 36/09, 88/10, 14/16, 95/18) as detailed in the Waste Management Plan. Adhering to directives from the Waste Management Plan and Risk Assessment Act, stringent conditions are maintained to store waste without posing risks to human health or the environment, ensuring no intermixing of different waste types or with water. Disposal is entrusted to licensed organizations authorized for waste collection and transportation, contracted by the SRO for specific waste categories, in compliance with the Law ("Official Gazette of RS", 36/09, 88/10, 14/16, 95/18). The individual responsible for waste management was appointed in accordance with the guidelines stipulated by the Law ("Official Gazette of RS", 36/09, 88/10, 14/16, 95/18).</p>			
Project execution	Risk associated with laboratory work	<p>Laboratories handling samples potentially containing pathogenic microorganisms adhere to the principles of Good Laboratory Practice ("Official Gazette of RS" No. 28/08). Standard operating procedures (SOPs) regulate these planned activities, and all Project participants are well-versed in these documents governing laboratory protocols. As per Project documentation and training materials, qualified personnel work within accredited SRO premises equipped with necessary devices and materials for precise execution of laboratory tests. The designated laboratories for Project tasks boast ample capacity, with clearly defined and labelled areas dedicated to distinct activities. Equipped adequately for planned tasks, these laboratories provide instructions for equipment use both in printed form and visibly posted near the equipment. A documented protocol outlines steps in case of equipment failure or mishandling. Work equipment undergoes inspection and testing by licensed entities, aligning with the Rulebook on the procedure for inspecting and checking work equipment ("Official Gazette of RS", No. 94/06, 108/06, 114/14, 102/15), the Rulebook on Workplace Safety and Health Protection, and the Risk Assessment Act, with detailed records maintained. Personal protective equipment, in line with the Risk Assessment Act and the Rulebook on personal protective equipment ("Official Gazette of RS", 23/20), is readily available for all Project participants during</p>	N/A		SF/PIU

		laboratory work, used according to prescribed SOPs. Reagents and solutions bear clear identity, expiration dates, and storage requirements, following verification before use, proper labelling upon opening, and meticulous record-keeping. Storage adheres to manufacturer's guidelines and SOP specifications. Chemical disinfectants are utilized in compliance with safety data sheets and written SOP instructions. Risks inherent in laboratory activities are identified and documented within the Risk Assessment Act, with corresponding risk management strategies established. Waste management ensures examination integrity, employing suitable conditions for waste collection, storage, disposal, decontamination, and transport, outlined in the institutional Waste Management Plan and the Risk Assessment Act. Generated laboratory waste during Project activities is disposed of in specially labelled autoclavable bags and undergoes autoclaving, as directed in SOP documents and in accordance with established procedures.			
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\* Items indicated to be the responsibility of the contractor shall be specified in the bid documents

## II MONITORING PLAN

<b><i>Phase</i></b>	<b><i>What parameter is to be monitored?</i></b>	<b><i>Where is the parameter to be monitored?</i></b>	<b><i>How is the parameter to be monitored/ type of monitoring equipment?</i></b>	<b><i>When is the parameter to be monitored frequency of measurement or continuous?</i></b>	<b><i>Monitoring Cost</i></b>	<b><i>Responsibility</i></b>	<b><i>Monitoring</i></b>
Project preparation	Contracted waste company	SRO laboratories (SVINS, FVM)	On-site visual assessment and checks of dated and signed documentation.	Once, prior to commencing work, and periodically	None	Designated person at SRO should conduct monitoring and notify the PI.	PIU/SF
	Created SOP documents	SRO laboratories	Laboratory/on-site visual assessment and	Once, prior to	None	PI	PIU/SF

	and training manuals.	(SVINS, FVM)	checks of dated and signed documentation.	commencing work			
	Acquired Ethical approval	SVINS	Inspection of documentation	Once, prior to commencing work	None	PI	PIU/SF
	Obtained permits for sampling	SVINS	Inspection of documentation	Once, prior to commencing work	None	PI	PIU/SF
	Signed Contract on collaboration with INCVP	SVINS	Inspection of documentation	Once, prior to commencing work	None	PI	PIU/SF
Project implementation	Working environment and accident prevention	SVINS, FVM	Visual assessment of report of Agreement on the Occupational health and safety management and monitoring	Once a year	None	PI	PIU/SF
	Field work protective equipment available and functional	SVINS field vehicle	On-site visual assessment and checks of equipment	Prior to every field trip	None	PI	PIU/SF

	Infectious waste inactivation and disposal	SVINS, FVM	On-site visual assessment and checks of equipment	continuous (WP 1 and 2)	None	Team members working in the laboratory performs check and informs PI	PIU/SF
	Safety of staff and wild birds in sampling facility	SVINS	Documentation of validate equipment	Three times for three sampling seasons	None	PI	PIU/SF
	Neutralization / deactivation and removal of chemical waste	SVINS, FVM	Invoices on waste pick-up and disposal	continuous (WP 1 and 2)	None	PI	PIU/SF
	Life and fire safety (LFS) procedures in the laboratory	Laboratory of the institution implementing the project.	Visual inspections and checks of the documentation	Periodically during the implementation of the project	None	PI	PIU/SF
Project execution	Sampling, wild bird safety and well-being, permits, agreements	SRO responsible for sampling SVINS	Inspection of documents, permit for sampling and handling wild birds	Once, before the beginning of sampling	No additional cost	WP SVINS leader	SF/PIU



Date:	Prepared by:	Submitted by:	Signature PI:  to be signed
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ESMP reviewed and approved by Environmental and Social Expert:

Date: 29.01.2024.

Name: Andjelka Mihajlov, Prof dr.

Title: ES Consultant 2

Signature: to be signed after Public consultation performed and approved

### III. PUBLIC CONSULTATION DETAILS AND MINUTES OF MEETING FOR THE ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN