

SYMBIOSIS

Knowledge Transfer and Capacity Building Strategy

D2.2

International Coalition for Sustainable Infrastructure (ICSI)

22/06/2026

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CONSORTIUM - LIST OF PARTNERS

Partner no.	Short name	Name	Country
1	UIC	UNION INTERNATIONALE DES CHEMINS DE FER	FRANCE
2	FEHRL	FORUM DES LABORATOIRES NATIONAUX EUROPEENS DE RECHERCHE ROUTIERE FEHRLAISBL	BELGIUM
3	UPM	UNIVERSIDAD POLITECNICA DE MADRID	SPAIN
4	CERTH	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS	GREECE
5	PGE-ENERGETYKA	PGE ENERGETYKA KOLEJOWA SPOLKA AKCYJNA	POLAND
6	MINUARTIA	MINUARTIA ESTUDIS AMBIENTALS SL	SPAIN
7	ITALFERR	ITALFERR SPA	ITALY
8	SLU	SVERIGES LANTBRUKSUNIVERSITET	SWEDEN
9	FFE	FUNDACION DE LOS FERROCARRILES ESPANOLES	SPAIN
10	CENTRALES UPELEC	CENTRALESUPELEC	FRANCE
11	FC.ID	FCIENCIAS.ID - ASSOCIACAO PARA A INVESTIGACAO E DESENVOLVIMENTO DE CIENCIAS	PORTUGAL
12	CIENCIAS ULISBOA	FACULDADE DE CIÊNCIAS DA UNIVERSIDADE DE LISBOA	PORTUGAL
13	SNCF	SOCIETE NATIONALE SNCF	FRANCE
14	SNCF-RESEAU	SNCF RESEAU	FRANCE
15	KONNEKTABLE	KONNEKTABLE TECHNOLOGIES LIMITED	IRELAND
16	H&Z	UNTERNEHMENSBERATUNG AG	GERMANY
17	RPS	OCHRANA DRACOV NA SLOVENSKU ZDRUZENIE	SLOVAKIA
18	IFEU	FEU - INSTITUT FÜR ENERGIE- UND UMWELTFORSCHUNG HEIDELBERG GGMBH	GERMANY
19	UKCEH	UK CENTRE FOR ECOLOGY & HYDROLOGY	UNITED KINGDOM
20	ICSI	INTERNATIONAL COALITION FOR SUSTAINABLE INFRASTRUCTURE	UNITED KINGDOM
21	UNIVLEEDS	UNIVERSITY OF LEEDS	UNITED KINGDOM
22	NETWORK RAIL	NETWORK RAIL INFRASTRUCTURE LIMITED	UNITED KINGDOM



EXECUTIVE SUMMARY

The SYMBIOSIS project seeks to build a community of practice between transport infrastructure, energy distribution and production, and biodiversity, while addressing the role of strategic planning in climate change and building resilient infrastructure.

Task 2.3 - Knowledge Hub and Capacity Management plays a critical role in the development of this community of practice, through developing and delivering training and capacity-building activities to key stakeholders.

This document is the final Knowledge Transfer and Capacity Building Strategy. It aims to provide a strategy for the knowledge transfer and capacity building activities that will take place during the SYMBIOSIS project. It will describe the audience, content, platforms and materials that will be used to build capacity and share knowledge, drawing on the outputs of the SYMBIOSIS project across Work Packages.

The report builds upon the interim strategy delivered in **MS8 - Interim Report - Knowledge Transfer and Capacity Building Strategy** and incorporates insights from a Learning Needs Assessment conducted with project stakeholders. The document first presents the methodological basis and key findings of this assessment, followed by the identification of priority audiences and trainers. It then outlines the planned training formats and activities, including Europe- and Africa-focused capacity-building initiatives, as well as the development of the Knowledge Hub. The report concludes with the next steps for implementing the strategy during the remaining project period.



TABLE OF CONTENTS

Consortium - List of partners.....	2
Executive summary	3
Abbreviation and Acronyms	5
Figures and Tables.....	6
1. INTRODUCTION.....	7
2. KNOWLEDGE TRANSFER AND CAPACITY BUILDING STRATEGY	9
2.1 Learning needs assessment and stakeholder consultation	9
2.1.1 Results from the Learning Needs Assessment	10
2.2 Recipients and trainers for knowledge transfer and capacity building activities	13
2.2.1 Key audiences.....	13
2.2.2 Trainers and Delivery Partners.....	16
2.3 Knowledge transfer and capacity building formats, and associated training materials	16
2.3.1 Isle learning hubs for training and capacity-building	17
2.3.2 Europe-Focused In-Person and Virtual Training Activity	17
2.3.3 Africa-Focused Virtual Training Activity.....	20
2.3.4 Transport infrastructure and biodiversity knowledge and learning hub.....	21
3. NEXT STEPS	23
4. APPENDICES	24
Appendix A - SYMBIOSIS Learning Needs Assessment (LNA) – KII/FGD Questions	24
Appendix B - Detailed results from the Learning Needs Assessment (LNA)	27
Appendix C - The Infrastructure Sustainability Learning (ISLe) Initiative	34



ABBREVIATION AND ACRONYMS

Abbreviation / Acronym	Definition
AB	Advisory Board
CoP	Community of Practice
EU	European Union
EU-BISON	EU-financed “Biodiversity and Infrastructure Synergies and Opportunities for European Transport Networks” project
FGD	Focus Group Discussion
GIS	Geographic Information System
IENE	Infrastructure and Ecology Network Europe
ISLe	Infrastructure Sustainability Learning Initiative
KII	Key informant interviews
LNA	Learning Needs Assessment
MS	Milestone
NPE FR	Nature-Positive Foresight Review
O&M	Operations and Maintenance
SCT	Steering Committee Team
SYMBIOSIS	Systemic Mobilisation for Joint Biodiversity and Infrastructure
TSG	Technical Stakeholder Group
UNEP	United Nations Environment Programme
WP	Work Package



FIGURES AND TABLES

Figure 1: Knowledge generation and transfer mechanisms lead to impact on the ground 9

Figure 2: Survey results, Preferred Learning Formats 11

Figure 3: Survey results, Preferred Training Materials 12

Figure 4: Survey results, Preferred Features of the Knowledge Hub 12

Figure 5: Survey results, Respondents by Stakeholder Group 28

Figure 6: Survey results, Respondents by Sector..... 28

Figure 7: Survey results, Self-Rated Knowledge of Biodiversity in Transport Infrastructure..... 29

Figure 8: Survey results, Priority Areas for Additional Knowledge and Guidance..... 30

Figure 9: Survey results, Barriers Faced in Implementing Biodiversity-Positive Approaches..... 31

Figure 10: Survey results, Desired Outcomes from SYMBIOSIS Training and Capacity-Building 32

Table 1: Proposed Training Topics and Associated SYMBIOSIS Outputs Across Work Packages 19

Table 2. Timeline and action plan for delivering training activities 23



1. INTRODUCTION

SYMBIOSIS will address the urgent need to build the capacity of infrastructure practitioners and decision-makers to implement infrastructure solutions that deliver services in ways that are aligned with biodiversity, climate change mitigation, adaptation and resilience objectives.

The aim of **Task 2.3 - Knowledge Hub and Capacity Management** is to help transport and energy sector actors integrate biodiversity into their plans in alignment with the project outcomes. This report is the key deliverable for subtask **T2.3.1 - Development of a Knowledge Transfer and Capacity Building Strategy**. It outlines the strategy for:

- Identifying the key objectives for knowledge transfer and capacity building for the SYMBIOSIS project
- Identifying recipients and trainers for knowledge transfer and training activities
- Developing options for knowledge transfer and capacity building formats, learning avenues and associated training materials.
- Developing two training and capacity-building activities to be implemented, that will:
 - Strengthen institutional and individual capacity to integrate biodiversity and climate resilience into infrastructure planning.
 - Ensure inclusivity and accessibility of learning opportunities across geographies and stakeholder groups.
- Promoting cross-sectoral collaboration and knowledge exchange.

The report also informs subtasks **T2.3.2 - Development of Knowledge & Learning Hub** and **T2.3.3 - Delivery of Capacity Building and Training**. This three-fold approach ensures a comprehensive and integrated strategy for knowledge transfer, capacity building, and the establishment of a Knowledge & Learning Hub, aligning with the overarching objectives of the SYMBIOSIS project.

This document builds upon the interim strategy report (**MS8**) delivered in M12 and is informed by a further consultation held with Work Packages (WPs) across the SYMBIOSIS project, as well as a Learning Needs Assessment (LNA). The final strategy takes into account feedback from partners across the project to ensure that SYMBIOSIS goals and priorities are adequately addressed.

Partner Contributions to D2.2

Partner	Specific Contribution
ICSI	Led the development of D2.2, including the design and dissemination of the Learning Needs Assessment survey through EU-RAIL channels, and the conduct of stakeholder consultations with Advisory Board (AB) and Technical Stakeholder Group (TSG) members. Participated in Steering Committee Team (SCT) meetings to develop the strategy and identify needs in alignment with WP leaders.
FFE	Facilitated the dissemination of the Learning Needs Assessment across its network.



MINUARTIA	Participated in stakeholder consultation and SCT meetings. Provided input on the IENE Handbook Infrastructure and Ecology and IENE 2026 Training Seminars, informing the training activity planning.
CERTH	Participated in stakeholder consultation, contributing to discussions on the format and approach for knowledge transfer and capacity building. Coordinated with ICSI on how WP4 inputs and content will support the training activities outlined in D2.2.
SLU	Participated in stakeholder consultation and SCT meetings.
RPS	Participated in stakeholder consultation.
FCIENCIAS.ID	No direct contribution to D2.2 was required. Involvement is planned for RP2, particularly during the implementation and expansion phases of the Knowledge Hub and Capacity Building activities.



2. KNOWLEDGE TRANSFER AND CAPACITY BUILDING STRATEGY

Knowledge Transfer: The systematic sharing and application of project results, insights, and innovations with external stakeholders to maximise uptake, replication, and exploitation. It focuses on turning project outputs into actionable knowledge that informs policy, guides investment, improves practice, and creates measurable impact beyond the project lifecycle.

Capacity Building: Activities (such as training) carried out during the project to strengthen the skills, competencies, and understanding of partners and stakeholders directly involved in or engaged by the project. These activities ensure that participants are equipped to apply methods, tools, and solutions effectively and sustain their benefits after the project concludes.

This strategy (**D2.2**) outlines how SYMBIOSIS knowledge transfer and capacity building activities will be designed and delivered to strengthen capacity across key stakeholder groups. The aim is to enable more effective, inclusive, and sustainable infrastructure planning, development, and operation.



Figure 1: Knowledge generation and transfer mechanisms lead to impact on the ground

By integrating project outputs into training activities and a Knowledge and Learning Hub, Task 2.3 directly links knowledge generation and knowledge transfer mechanisms, thereby strengthening capacity building and supporting real impact at the implementation level (see Figure 1: Knowledge generation and transfer mechanisms lead to impact on the ground).

2.1 LEARNING NEEDS ASSESSMENT AND STAKEHOLDER CONSULTATION

A Learning Needs Assessment (LNA) has been undertaken to identify knowledge gaps and learning priorities through direct engagement with experts from the AB and the TSG. The LNA included:

- Survey dissemination among AB members and broader stakeholder groups, including ERJU-communication channels



- Key informant interviews (KIIs) with selected TSG members

Stakeholders for the LNA were identified through existing ICSI networks and those of project partners. Questions used for this LNA can be found in **Appendix A - SYMBIOSIS Learning Needs Assessment (LNA) – KII/FGD questions**. Outcomes from this assessment, together with the internal consultation across WPs, have informed the scope, design, structure and format of the capacity-building activities.

2.1.1 RESULTS FROM THE LEARNING NEEDS ASSESSMENT

The LNA was conducted to inform the design of SYMBIOSIS training activities and the development of the Knowledge Hub by identifying current knowledge levels, priority learning needs, and preferred learning approaches among stakeholders working at the intersection of transport infrastructure and biodiversity. The findings below are based on survey responses and KIIs. *A detailed analysis of the results of the LNA can be found in **Appendix B - Detailed results from the Learning Needs Assessment (LNA)**.*

2.2 RESPONDENT PROFILE

The survey had 12 respondents, and the results provide balanced input across governance, operational, technical, and advocacy perspectives. Rail transport is the most represented sector among respondents, however frequent overlap between sectors highlights the interconnected professional profiles of respondents and reinforces the need for training content that supports integrated biodiversity approaches across transport and energy infrastructure systems. Although the sample size is limited, the results show a balanced representation across stakeholder groups and sectors, providing useful qualitative insights into priority learning needs and preferred training approaches. The findings should therefore be interpreted as indicative rather than statistically representative, supporting the iterative development of training formats and materials. To complement the survey results, KIIs were conducted with five selected TSG members representing a range of professional roles across transport infrastructure and biodiversity, as well as different European contexts. These profiles reflect technical, operational, research, and strategic perspectives relevant to biodiversity integration in infrastructure practice.

2.3 CURRENT KNOWLEDGE AND LEARNING NEEDS

Most survey respondents assess their understanding of biodiversity in transport infrastructure as moderate. However, responses indicate that knowledge levels remain uneven across organisations and roles. While technical specialists demonstrate growing expertise, particularly in areas such as mapping, monitoring, and lifecycle approaches, engineers and decision-makers often have a more limited understanding. Overall, awareness is increasing; however, biodiversity considerations are still frequently introduced late in project processes or treated primarily as a compliance requirement rather than an integral part of infrastructure planning and design.

In line with this, several priority areas are identified for further learning. Biodiversity monitoring and reporting standards emerge as the most requested topic, followed by policy and regulatory frameworks and financing biodiversity-positive infrastructure. Interviewees consistently emphasised the importance of robust biodiversity mapping and data integration, including the use of GIS tools, remote sensing, and standardised habitat assessment methods to support evidence-based decision-making. Lifecycle approaches were



highlighted as critical, ensuring biodiversity considerations are embedded from early planning and design stages through construction, monitoring, and reassessment. Participants also stressed the need for clearer methodologies that translate policy and regulatory frameworks into practical engineering and design processes, particularly within environmental impact assessments and sustainability reporting. Harmonised European standards, minimum requirements, and shared indicators were seen as important for improving consistency across projects and geographies.

2.4 BARRIERS TO IMPLEMENTATION

Survey respondents also identified key barriers to implementing biodiversity-positive approaches. Budget or financial constraints are identified most frequently, followed by competing project priorities such as cost, speed, or performance. Interview insights reiterate that biodiversity is often perceived as a secondary consideration or introduced too late in project cycles. Together, the survey and interview results indicate that overcoming implementation barriers will require not only technical capacity-building, but also institutional change, improved cross-disciplinary collaboration, and stronger alignment between policy objectives and operational practice.

2.5 EXPECTED OUTCOMES OF TRAINING AND PREFERRED LEARNING FORMATS

When sharing the outcomes they expect from SYMBIOSIS training activities, the majority of survey respondents highlighted stronger policies and frameworks for supporting biodiversity integration, emphasising the expectation that training should contribute to broader institutional and strategic change. Insights from the interviews complement these expectations, shining a spotlight on the need for long-term communities of practice, aligned methodologies, and clearer links between policy objectives and operational decision-making. The findings suggest that SYMBIOSIS training and capacity-building activities should aim to foster sustained collaboration, practical learning, and systemic change across the infrastructure sector.

Survey respondents also provided input on preferred learning approaches. Peer-to-peer communities of practice emerge as the most preferred format, followed by webinars focused on case studies see Figure 2: Survey results, Preferred Learning Formats. These preferences indicate a strong interest in virtual, collaborative, experience-based approaches that support dialogue, knowledge exchange, and practical application rather than individual or passive learning formats. Interview results highlight a strong preference for smaller, practitioner-focused sessions that enable direct exchange between peers working in diverse roles or sectors.

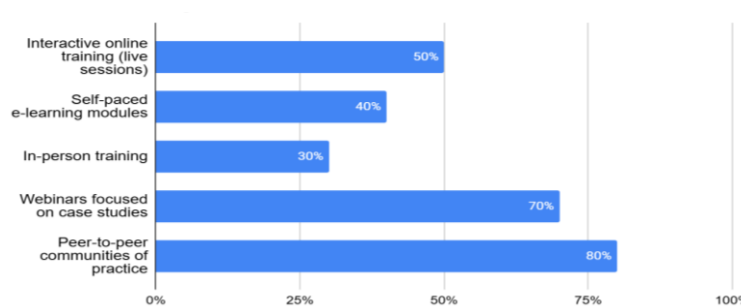


Figure 2: Survey results, Preferred Learning Formats



2.6 PREFERRED TRAINING MATERIALS AND KNOWLEDGE HUB FEATURES

Respondents expressed a clear preference for practical training resources. Case studies of successful biodiversity integration, practical toolkits and checklists, and technical standards and data protocols are each selected by the majority of respondents, followed by policy and guidance documents (see *Figure 3: Survey results, Preferred Training Materials*). Overall, the results suggest a clear preference for practical, implementation-oriented resources that support real-world application. Interviewees emphasised the need for methodologies that can be directly integrated into engineering and design workflows, including guidance on mapping approaches, environmental impact assessment processes, and lifecycle management.

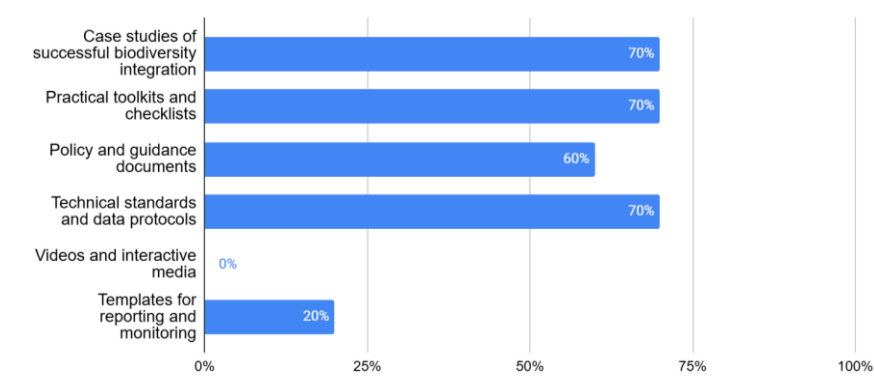


Figure 3: Survey results, Preferred Training Materials

Survey respondents also identified the most useful features for the SYMBIOSIS Knowledge Hub (see *Figure 4: Survey results, Preferred Features of the Knowledge Hub*). Online tools for biodiversity assessment and carbon calculation emerge as the most requested feature, followed by a centralised library of resources and publications. Interviewees highlighted the importance of usability, relevance to real-world practice, and regularly updated content to ensure continued engagement with the platform. They emphasised the need for searchable resource libraries, practical tools linked to decision-making processes, and opportunities for peer exchange within focused professional communities.

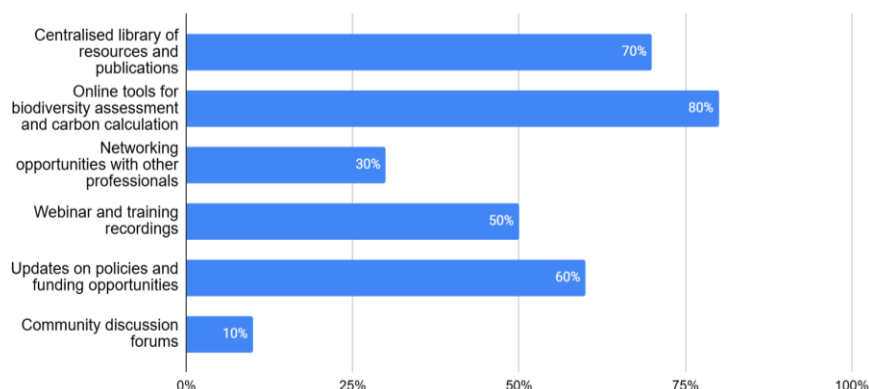


Figure 4: Survey results, Preferred Features of the Knowledge Hub



2.2 RECIPIENTS AND TRAINERS FOR KNOWLEDGE TRANSFER AND CAPACITY BUILDING ACTIVITIES

2.2.1 KEY AUDIENCES

ICSI has held a consultation with WP2 members, SYMBIOSIS Steering Committee Team (SCT) members, TSG members and other project partners to prioritise key audiences and needs.

The selection of priority audiences is intentional and evidence-based. These groups sit at the critical interfaces where biodiversity, climate resilience, regulation, finance, and delivery decisions are made, yet they remain underserved by practical, implementation-oriented capacity building. All capacity building activities will be tailored to specific audiences.

Key audiences for both the SYMBIOSIS training activities and the Knowledge Hub consist primarily of infrastructure practitioners, including engineers, planners, environmental specialists, and asset managers who are directly involved in project planning, design, and operations. It is key to reach mixed professional groups, combining technical specialists with policymakers and regulatory stakeholders to support earlier integration of biodiversity considerations into infrastructure processes. At the same time, the international dimension of the training is critical for facilitating the exchange of good practices across geographies, enabling professionals working towards similar objectives, such as ecologists and environmental managers within infrastructure owner-operator organisations, to learn from each other's experiences and approaches.

List of key audiences:

- Linear infrastructure practitioners with no prior ecology training, e.g. Engineers, planners, consultants and asset managers
- Policymakers and regulators
- Environmental specialists and ecologists within infrastructure owner/operator organisations

LINEAR INFRASTRUCTURE PROFESSIONALS WITH NO PRIOR ECOLOGY TRAINING

This group, which includes engineers, planners, consultants, and asset managers, plays a decisive role in translating policy intent into tangible, long-term outcomes on the ground. Collectively, they shape decisions across the full infrastructure lifecycle – from early planning and design, through construction and operations & maintenance (O&M), to decommissioning. **While environmental and ecological expertise is often consulted, it is not typically embedded within their core professional training or decision-making frameworks.**

This audience is prioritised because they:

- Make day-to-day technical, commercial, and operational decisions that directly determine ecological impacts, risks, and opportunities



- Frequently cite uncertainty, lack of clear guidance, and perceived delivery, liability, and performance risks as reasons for conservative, grey-only design and maintenance approaches
- Operate under time, cost, and performance pressures that can marginalise ecological considerations unless these are embedded into standard tools, processes, and incentives
- Act as key multipliers, influencing multiple projects, clients, portfolios, and geographies over time

Asset managers within the transport and energy sectors are a particularly critical subgroup within this audience. Although they are responsible for long-term asset performance, maintenance strategies, and value optimisation, biodiversity considerations are rarely integrated into asset management frameworks, performance metrics, monitoring systems, or capital reinvestment planning. This creates a structural gap between short-term project-level mitigation and long-term nature-positive outcomes. The EU-BISON project and the Nature-positive Foresight Review (NPE FR) both highlight the need for stronger lifecycle-based approaches that explicitly link biodiversity outcomes with resilience, risk management, and long-term value creation.

Targeted training for this combined audience will enable:

- Systematic integration of biodiversity and climate resilience into mainstream planning, design, construction, and asset management practices (rather than treating them as specialist add-ons)
- Improved understanding of how nature-positive interventions can reduce long-term operational risk, enhance system resilience, and optimise whole-life value
- Stronger connections between monitoring, reporting, and strategic reinvestment decisions, embedding biodiversity into asset performance management

These groups shape how policy intent is operationalised across project development, delivery, and long-term asset management. Targeting them through a coherent training programme addresses the current knowledge and practice gap between ecological ambition and infrastructure delivery, reducing fragmentation between policy and practice and increasing the likelihood that biodiversity-positive approaches are embedded systemically rather than applied on a project-by-project basis.

POLICYMAKERS AND REGULATORS

Policymakers are a priority audience because regulatory frameworks, procurement rules, and strategic planning instruments strongly influence whether biodiversity and climate resilience objectives are translated into practice or remain aspirational. Policymakers are therefore key to enabling the integration of biodiversity into infrastructure development and must be equipped with the knowledge and skills to do so.

Evidence from the EU-BISON project highlights that while high-level biodiversity ambitions are increasingly reflected in EU policy, there remains a gap in operational guidance, cross-sector coherence, and practical understanding of how infrastructure decisions affect biodiversity outcomes. Similarly, the NPE FR identifies



limited institutional capacity and weak integration of ecological considerations into economic and infrastructure decision-making as a key barrier to implementation.

The training will therefore support policymakers to:

- Understand how biodiversity and climate resilience considerations can be operationalised across the infrastructure lifecycle
- Align regulatory and planning frameworks with emerging best practice and EU-level objectives
- Engage more effectively with technical stakeholders by strengthening shared language, metrics, and expectations

ENVIRONMENTAL SPECIALISTS AND ECOLOGISTS WITHIN INFRASTRUCTURE OWNER/OPERATOR ORGANISATIONS

Environmental specialists, infrastructure ecologists and biodiversity managers working within infrastructure owner/operator organisations represent a distinct and strategically important audience for SYMBIOSIS training activities. Unlike external consultants or policy actors, these professionals operate at the interface between ecological expertise and operational delivery, translating corporate sustainability commitments and regulatory requirements into day-to-day project and asset decisions.

While these practitioners often possess strong ecological or environmental backgrounds, they frequently work in organisational environments where they may be one of only a few specialists embedded within predominantly engineering- or operations-focused teams. As a result, opportunities for peer exchange, professional benchmarking, and cross-sector learning are limited. Training activities, therefore, serve not only as knowledge transfer mechanisms but also as a vehicle for a Community of Practice (CoP), enabling participants to connect with peers facing similar institutional constraints, governance structures, and implementation challenges across different countries and infrastructure sectors.

This audience is prioritised because they:

- Act as internal change agents, advocating for biodiversity integration within planning, operations, maintenance, and investment processes
- Bridge technical engineering teams, management structures, and external ecological expertise, helping translate scientific guidance into practical implementation
- Often work in isolation within their organisations, with limited structured opportunities to exchange lessons learned, methodologies, and monitoring approaches with similar professionals elsewhere
- Play a critical role in scaling nature-positive practices from pilot projects to organisational standards and long-term asset strategies



2.2.2 TRAINERS AND DELIVERY PARTNERS

As part of the consultation process, ICSI has coordinated with WP leaders, AB members, and the TSG to identify appropriate trainers aligned with the agreed training topics and the learning needs identified through the LNA.

SYMBIOSIS WORK PACKAGE EXPERTS

Training will be led by WP3, WP4 and WP5 experts and task leaders, who will deliver sessions based on the knowledge, tools, methodologies, and case studies developed within the SYMBIOSIS project. This ensures that capacity-building activities directly translate project outputs into practical guidance for infrastructure practitioners and support the uptake of SYMBIOSIS results beyond the consortium.

TECHNICAL STAKEHOLDER GROUP MEMBERS

TSG members will contribute as guest experts, practitioner speakers, and peer-learning facilitators, bringing real-world implementation experience from infrastructure planning, biodiversity integration, and sustainability practice across different geographic and sectoral contexts. Their involvement strengthens the link between project outputs and real-world application, ensuring that training content reflects the operational realities faced by infrastructure owners, operators, and practitioners.

EXTERNAL CONTRIBUTORS

Technical contributions from selected external partners (e.g., infrastructure owner-operators) will complement the internal expertise of the consortium, bringing diverse perspectives, scientific credibility, and strong practical relevance. External contributors will be engaged where specialised knowledge is required, including areas such as biodiversity finance and other technical topics that extend beyond the core scope of the project.

2.3 KNOWLEDGE TRANSFER AND CAPACITY BUILDING FORMATS, AND ASSOCIATED TRAINING MATERIALS

As defined in the Grant Agreement, the geographic focus of the knowledge transfer and capacity building activities will be Europe and Africa. Working closely with WP leaders as well as AB & TSG members, the strategy is to identify opportunities within each WP for training, capacity building and knowledge transfer activities using knowledge created by the SYMBIOSIS project. Ensuring that resources remain accessible and adaptable across sectors, while linking training activities with the Knowledge Hub, will support ongoing peer exchange and facilitate practical application. This document outlines the objectives for the training activities, identifies target audiences, key topics and delivery formats, and specifies expected outputs and timelines for delivery.

A variety of formats, learning avenues and materials will be deployed to address different needs and contexts. For training activities, virtual CoPs will be established for ongoing exchange and cooperative learning. Interactive trainings, including ‘Ask an Expert’ sessions, will allow practitioners to seek specialist advice on specific areas of expertise through knowledge exchange and focused Q&A sessions. Training effectiveness will be assessed through pre- and post-training surveys evaluating participants’ knowledge of key topics. The web-based learning and knowledge hub will function as a repository for practitioners to access expertise and gain the information they need to integrate biodiversity considerations into infrastructure projects.



2.3.1 ISLE LEARNING HUBS FOR TRAINING AND CAPACITY-BUILDING

Based on the results of the LNA, ICSI will deliver the training and capacity-building activities through the [Infrastructure Sustainability Learning \(ISLe\)](#) initiative's capacity-building model, which directly responds to the identified stakeholder needs for peer learning, practical exchange, and sustained collaboration. ISLe is based on peer-to-peer learning exchange through virtual communities of practice, providing a rapid, inexpensive, and effective means of equipping practitioners with tools, access to expertise, and a community of peers facing similar challenges and opportunities (see **Appendix C - The Infrastructure Sustainability Learning (ISLe) Initiative**).

This approach enables SYMBIOSIS to translate project knowledge into applied learning environments and to foster long-term CoPs beyond individual training events. ISLe employs a case-based virtual learning model that can be applied to help disseminate SYMBIOSIS' knowledge products and resources, along with international best practices, to infrastructure and biodiversity stakeholders.

The Nicholas Institute for Energy, Environment & Sustainability at Duke University and the UN Environment Programme (UNEP) are core partners of ISLe. While UNEP will play a supporting role, Duke University will be subcontracted by ICSI to support the design and delivery of the ISLe training activities. Duke's experience in developing and delivering capacity-building curricula, coupled with its extensive international network of experts and practitioners, will provide significant value to the SYMBIOSIS project.

2.3.2 EUROPE-FOCUSED IN-PERSON AND VIRTUAL TRAINING ACTIVITY

The purpose of this training is to provide European rail, road, and energy infrastructure stakeholders with hands-on, implementation-focused training on integrating biodiversity and climate resilience across policy, planning, design, and asset management, using SYMBIOSIS-aligned tools, outputs, and best practices. The training is designed to directly address capacity gaps identified by EU-BISON and related EU initiatives, and to leverage the momentum and stakeholder presence of the 2026 IENE conference.

The training responds directly to the LNA, which highlighted strong demand for practical, case-study-based learning, peer-to-peer exchange, and interdisciplinary training environments that bring engineers, ecologists, planners, and decision-makers together. Priority topics identified through the LNA, including biodiversity monitoring and reporting, lifecycle approaches, policy implementation, and financing considerations, will be embedded within the training curriculum. Content of the training will be finalised in collaboration with WP3, WP4 and WP5 experts by Month 21 (May 2026).

FORMAT & ACTIVITIES

In close coordination with ICSI, UIC will submit an application to conduct a hybrid (in-person and virtual) training activity at the IENE conference in Month 25 of the project (September 2026). This conference will be held in Bristol, UK and has been identified as a promising opportunity to deliver in-person training to ecology experts working in the transport and energy infrastructure space. The hybrid nature of the event will allow for the inclusion of a broader audience and will include a recording of the session for further dissemination. The inclusion of an in-person component responds to LNA findings that smaller, practitioner-focused exchanges



and real project discussions are particularly valued for building trust, shared understanding, and cross-sector collaboration.

Disclaimer: As of the submission of D2.2, it has not yet been confirmed whether the training activity will take place at the 2026 IENE conference. No updates have been received to date. In case the application is not accepted, the Europe-focused introductory training activity will be delivered as an online webinar instead.

The IENE training will serve as an introductory session within a broader, phased training approach, leading into a more detailed virtual training series. Building on this initial activity, a virtual training will be conducted in Year 3 using the ISLe capacity-building model. The training curriculum will include topics that traverse each of the technical WPs, ensuring that expert input can be delivered from each WP. This format aligns with LNA preferences for communities of practice, case-based webinars, and interactive sessions that enable ongoing dialogue rather than one-off training delivery. A typical ISLe session includes:

- A technical expert presentation
- A practitioner case presentation
- Facilitated problem-solving discussion

Delivering the training virtually through the ISLe model will allow for greater geographical reach among the identified key audiences and will increase financial accessibility among attendees and trainers who wish to participate. It will also allow for the recording of the training sessions, which can then be shared in the Knowledge and Learning Hub, further amplifying the reach and impact of the training.

TOPICS

In consultation with WP and task leaders, and in alignment with the LNA, ICSI has identified topics central to the SYMBIOSIS project and critical for upskilling practitioners on integrating biodiversity considerations throughout the infrastructure lifecycle.

Key considerations for the SYMBIOSIS training activity, based on the LNA and WP consultations:

- Prioritising biodiversity monitoring and reporting, policy frameworks, lifecycle approaches, and biodiversity mapping and data integration, and financing mechanisms as core training topics.
- Disclaimer: To fully address this consideration within training activities, the involvement of external experts will be required to provide specialised input on detailed financing mechanisms, which falls outside the core scope of the WP3, WP4 and WP5 activities. These contributions will form a smaller component of the overall training programme and are expected to be delivered pro-bono by ICSI partners, without requiring additional budget allocation. ICSI will harness its established partnerships with organisations such as WWF, UNEP and Conservation International to engage and invite expert contributors at the appropriate stages of the project. In addition, due to the limited nature of their contribution, the activities planned are not dependent on these external partners to deliver high-quality training. The consortium already has strong in-house expertise, complemented by a broad network of specialists through the TSG



and AB. The external partners identified by ICSI would therefore provide additional value and perspectives, but would not constitute a prerequisite for the successful delivery of the training programme.

- Addressing organisational challenges, including budget constraints and competing project priorities, and engineering-driven decision-making environments within training content.
- Disclaimer: Coverage of organisational and budgeting challenges extends beyond the core technical scope of WP3, WP4 and WP5. While these topics are not a primary focus of the work packages, project partners are encouraged to contribute relevant expertise to support their inclusion in the training programme. Such contributions are expected to form a smaller component of the overall training programme.

Table 1 *Table 1: Proposed Training Topics and Associated SYMBIOSIS Outputs Across Work Packages* identifies key results from the LNA and demonstrates how these are addressed by the proposed key topic areas for the training activities and associated outputs from the WPs.

Table 1: Proposed Training Topics and Associated SYMBIOSIS Outputs Across Work Packages

Need identified through LNA	Key Training Topics	Associated Output and WP
Biodiversity mapping and data integration Financing biodiversity-positive infrastructure	Quantifying and mapping biodiversity values, and Impact on biodiversity by different rail stakeholders	Operational toolkit (WP3), Assessment Framework (WP5)
Lifecycle approaches	Assessment of carbon emissions, mitigation impacts on biodiversity within the infrastructure lifecycle	Biodiversity-CO2 calculator (WP3)
Prioritising biodiversity monitoring and reporting Technical standards and data protocols Harmonised European standards, minimum requirements, and shared indicators	Biodiversity monitoring and reporting, including standards for data storage, analysis, interoperability and reporting	Framework for biodiversity monitoring and reporting, Case studies (WP4)
Need for biodiversity monitoring guidance	Integrating guidance within rail and energy sectors	Foundational framework (WP5)



Methodologies that translate policy and regulatory frameworks into practical engineering and design processes Policy and guidance documents		
Case studies of successful biodiversity integration, practical toolkits and checklists	Mainstreaming biodiversity and resiliency in strategic planning and decision-making	Guidelines for the design and management of ecological assets (WP3), Dashboard, Recommendations (WP5)

ICSI will work closely with WP leaders and SCT members to confirm the exact scope of topics to be included in the training, and to involve external experts where relevant.

2.3.3 AFRICA-FOCUSED VIRTUAL TRAINING ACTIVITY

The Africa-focused training will aim to strengthen technical and institutional capacity among African transport and energy practitioners to integrate biodiversity and climate resilience using tools, outputs, and best practices as identified in SYMBIOSIS. The focus on peer-to-peer learning and applied case studies responds to identified needs for context-specific guidance and institutional capacity building.

FORMAT & ACTIVITIES

The training will be delivered in Months 30-32 of the SYMBIOSIS project as a virtual series of learning sessions using the ISLe model (as above - see Appendix C for more details). The proposed schedule is one session every two weeks in Feb-April 2027, with the training curriculum including direct input on topics from each of the technical WPs. These frequent, interactive sessions will create a strong foundation for learning and for the development of a CoP. In addition to the typical ISLe session structure (as outlined above), other aspects considered for inclusion are:

- Live case clinics where participants bring project challenges.
- ‘Ask an Expert’ sessions to facilitate knowledge exchange.
- Formation of an African CoP linked to the global ISLe network.



TOPICS

The training will leverage findings, tools and knowledge from the SYMBIOSIS project, whilst concerted effort will be made to ensure that learnings are transferable from a European to an African context and that the training is relevant and applicable to a diverse African audience. Project partners will utilise African networks and partnerships to reach target audiences and to validate that the training content is valuable and appropriate for these audiences.

2.3.4 TRANSPORT INFRASTRUCTURE AND BIODIVERSITY KNOWLEDGE AND LEARNING HUB

The Transport Infrastructure and Biodiversity Knowledge and Learning Hub (**D2.4**) will be delivered in Month 36 of the project. This will allow for the full learnings from the SYMBIOSIS project to be included. ICSI is developing the concept for the Knowledge and Learning Hub in close collaboration with the WP2 leader (FEHRL) and partners, and the SYMBIOSIS SCT members to be implemented as part of WP2 activities.

This Knowledge and Learning Hub and supporting network will provide European transport infrastructure practitioners with access to curated resources, tools, international best practices, and global initiatives and communities of practice. It will serve as a stand-alone resource, as well as complementary to the training activities.

Findings from the LNA, including stakeholder preferences for practical tools, case-study-based resources, and accessible knowledge repositories, will directly inform the design, structure, and prioritisation of content within the hub.

Key considerations for the SYMBIOSIS Knowledge Hub based on the LNA and WP consultations:

- Prioritising practical, user-oriented tools that support biodiversity assessment, mapping, monitoring, and carbon-related analysis, enabling evidence-based decision-making in infrastructure contexts.
- Developing a searchable, well-structured, centralised library that combines case studies, technical guidance, policy resources, and methodologies tailored to different professional audiences.
- Ensuring regular updates on policies, regulatory developments, funding opportunities, and emerging practices to maintain relevance and encourage repeated engagement.
- Integrating webinar recordings, training materials, and learning resources to support continuous professional development beyond individual training events.
- Embedding CoPs and peer-learning environments as a core feature, enabling practitioners to exchange experiences, discuss real operational challenges, and build long-term professional networks that extend beyond the project lifecycle.

In addition, the EU-BISON project's [Strategic Research Agenda](#) will serve as a guiding framework, emphasising the integration of biodiversity into rail research and underpinning the development of the Knowledge and Learning Hub.



In addition to the LNA and WP consultations, ICSI has conducted a review of existing knowledge hubs and web-based resources (e.g. the Handbook for Action developed by the EU-BISON project), to inform the final design and glean best practices. ICSI will develop a mock-up of the proposed approach and present options to SYMBIOSIS partners for review and input. ICSI will work closely with UIC and FEHRL to coordinate the web development of the hub.

ICSI will undertake the curation of resources for the Knowledge and Learning Hub in consultation with project partners on an ongoing basis. In addition to relevant SYMBIOSIS outputs, existing materials developed under the EU-BISON, EU-SOURCE and EU-FORESEE programmes will be included in the Hub and incorporated into training activities where relevant. These include:

- EU-BISON [Biodiversity and Infrastructure: A Handbook for Action](#)
- EU-BISON [Handbook Guidelines portal](#)
- EU-BISON [Handbook Glossary](#)
- EU-BISON [Strategic Research & Deployment Agenda](#)
- EU-BISON [Policy Briefs](#)
- EU-BISON [E-learning platform](#)
- EU-SOURCE
- EU-FORESEE

This approach ensures that both EU-BISON and SYMBIOSIS findings and outputs are incorporated into capacity-building activities, building on the existing knowledge base and providing practitioners with a robust foundation for learning.

To ensure the longevity of the hub following completion of the project, ICSI, together with the SCT members, is exploring opportunities to partner with external collaborators to host the SYMBIOSIS content on an independent platform (such as IENE or WWF-GRID) that will increase the lifespan of SYMBIOSIS content and expand its reach. This will allow learnings from the project to be widely disseminated and available for a broad audience, long after project completion. The hosting and dissemination of materials will be undertaken in accordance with the SYMBIOSIS dissemination and exploitation strategy, ensuring appropriate consideration of intellectual property rights, data protection requirements, and partner consent where relevant. Discussions are underway, and ICSI is optimistic that this solution will prolong and deepen the lasting impact of the project.



3. NEXT STEPS

In close collaboration with WP leaders, project partners, and the SCT, ICSI will design the training activities and Knowledge Hub in accordance with this strategy and the timeline of activities presented in *Table 2*. *Timeline and action plan for delivering training activities*. Timings and responsibilities for identified tasks will be confirmed with WP leaders on an ongoing basis.

Table 2. Timeline and action plan for delivering training activities

T2.3 Subtask	Action	Indicative Timeline
Europe-focused training activity - IENE	Submit 2026 IENE conference application	March 2026
	Confirm training topics	April 2026
	Develop training concept note	July 2026
	Confirm trainers/presenters	July 2026
Europe-focused training activity - online	Develop training strategy based on the stakeholder input at IENE	September - October 2026
	Deliver training	November 2026 - January 2027
Africa-focused training activity - online	Develop training strategy	September 2026 - February 2027
	Deliver training	February - April 2027
Knowledge Hub	Confirm hosting platform (e.g. IENE or WWF-GRID)	April 2026
	Develop structure and content	March - December 2026
	Draft version	March 2027
	Final version	August 2027



4. APPENDICES

APPENDIX A - SYMBIOSIS LEARNING NEEDS ASSESSMENT (LNA) – KII/FGD QUESTIONS

These questions are designed to help the SYMBIOSIS project understand the current knowledge, skills gaps, and preferences of stakeholders involved in transport infrastructure and biodiversity. Responses will inform the design of training, capacity-building activities, and the future Knowledge Hub. These questions were disseminated through an online survey as well as in targeted KIIs.

Section 1: Respondent Profile

1. Which stakeholder group best describes your role?
 - Policymaker / Government regulator
 - Investor / Financial institution
 - Planner / Project Manager
 - Engineer / Designer / Contractor
 - Ecologist / Biodiversity Specialist
 - Infrastructure owner or operator
 - Civil society / NGO
 - Rail passenger / General public
 - Other (please specify)
2. Which sector(s) do you primarily work in? (Select all that apply)
 - Rail transport
 - Road transport
 - Energy infrastructure
 - Other linear infrastructure (e.g., pipelines, power lines)
 - Other (please specify)

Section 2: Knowledge and Skills Gaps

3. How would you rate your current knowledge of integrating biodiversity considerations into transport infrastructure projects?
 - Very low
 - Low
 - Moderate
 - High
 - Very high
4. Which areas do you most need additional knowledge or guidance on? (Select up to three)



- Quantifying and mapping biodiversity values (e.g., GIS tools)
 - Assessing carbon emissions and biodiversity impacts across the infrastructure lifecycle
 - Biodiversity monitoring and reporting standards
 - Integrating biodiversity considerations into planning and procurement processes
 - Stakeholder engagement and communication strategies
 - Policy and regulatory frameworks for biodiversity integration
 - Financing biodiversity-positive infrastructure
 - Other (please specify)
5. Which barriers do you face in implementing biodiversity-positive approaches? (Select up to two)
- Lack of technical knowledge or skills
 - Limited access to tools and data
 - Insufficient policies or regulatory guidance
 - Budget or financial constraints
 - Lack of stakeholder buy-in or support
 - Competing project priorities (e.g., cost, speed, performance)
 - Other (please specify)

Section 3: Training Preferences

6. Which learning format would be most useful to you?
- Interactive online training (live sessions)
 - Self-paced e-learning modules
 - In-person workshops
 - Webinars focused on case studies
 - Peer-to-peer communities of practice
 - Other (please specify)
7. What type of training materials would you find most valuable?
- Case studies of successful biodiversity integration
 - Practical toolkits and checklists
 - Policy and guidance documents
 - Technical standards and data protocols
 - Videos and interactive media
 - Templates for reporting and monitoring
 - Other (please specify)

Section 4: SYMBIOSIS Knowledge Hub and Networking

8. Which features would you find most useful in a Transport Infrastructure & Biodiversity Knowledge Hub?
- Centralised library of resources and publications



- Online tools for biodiversity assessment and carbon calculation
 - Networking opportunities with other professionals
 - Webinar and training recordings
 - Updates on policies and funding opportunities
 - Community discussion forums
9. Would you be interested in participating in SYMBIOSIS' pilot training events in Europe or Africa?
- Yes, Europe
 - Yes, Africa
 - Yes, both
 - No, not at this time

Section 5: Final Feedback

10. What outcomes would you like to see from SYMBIOSIS training and capacity-building activities? (Select up to two)

- Stronger policies and frameworks supporting biodiversity integration
- More accessible tools and resources for practitioners
- Improved collaboration across sectors and disciplines
- Increased funding and investment in biodiversity-positive infrastructure
- Other (please specify)



APPENDIX B - DETAILED RESULTS FROM THE LEARNING NEEDS ASSESSMENT (LNA)

The LNA had two components:

1. Online survey - Quantitative
2. Key informant interview - Qualitative

The online LNA survey was designed to support Task 2.3 in assessing the current knowledge levels, skills gaps, and learning preferences of stakeholders involved in transport infrastructure and biodiversity. The results inform the design of training activities, capacity-building initiatives, and the development of the SYMBIOSIS Knowledge Hub. Respondents were primarily drawn from the SYMBIOSIS AB and key experts identified through project partner networks. A total of 12 responses were received.

The survey respondents represent a mix of technical, policy, and operational profiles (*see Figure 5: Survey results, Respondents by Stakeholder Group*). Engineers, designers, and contractors account for the largest share (33%), while policymakers/government regulators represent 17% and infrastructure owners/operators, and civil society/NGO representatives each represent 20%. Researchers make up a smaller proportion (8%). The questionnaire results provide balanced input across governance, operational, technical, and advocacy perspectives. Across sectors, respondents could select multiple options, reflecting the multidisciplinary nature of their work (*see Figure 6: Survey results, Respondents by Sector*). Rail transport is the most represented sector (60%), followed by other infrastructure sectors (40%), which include sustainability, research, or cross-cutting infrastructure activities. Road transport accounts for 20% of responses, while energy infrastructure represents 10%. The overlap between sectors highlights the interconnected professional profiles of respondents and reinforces the need for training content that supports integrated biodiversity approaches across transport and energy infrastructure systems.

Although the sample size is limited, the survey results show a balanced representation across stakeholder groups and sectors, providing useful qualitative insights into priority learning needs and preferred training approaches. The findings should therefore be interpreted as indicative rather than statistically representative, supporting the iterative development of training formats and materials.

To complement the survey results, 5 key informant interviews were conducted with selected TSG members representing a range of professional roles across transport infrastructure and biodiversity, as well as different European contexts. Profiles included a landscape connectivity and mitigation practitioner working at regional scale in Southeast Europe; an environmental and biodiversity specialist embedded within a rail infrastructure owner/operator organisation in Ireland; a biodiversity strategy manager responsible for integrating nature considerations across a national rail estate in the United Kingdom; a sustainability and design methodology expert from a large engineering company supporting railway planning and infrastructure design across Italy and wider European and international markets; and an interdisciplinary transport infrastructure researcher based at a French technical university, focusing on biodiversity integration, infrastructure rights-of-way, and nature-positive engineering approaches across road, rail, and energy systems. These profiles reflect technical, operational, research, and strategic perspectives relevant to biodiversity integration in infrastructure practice.

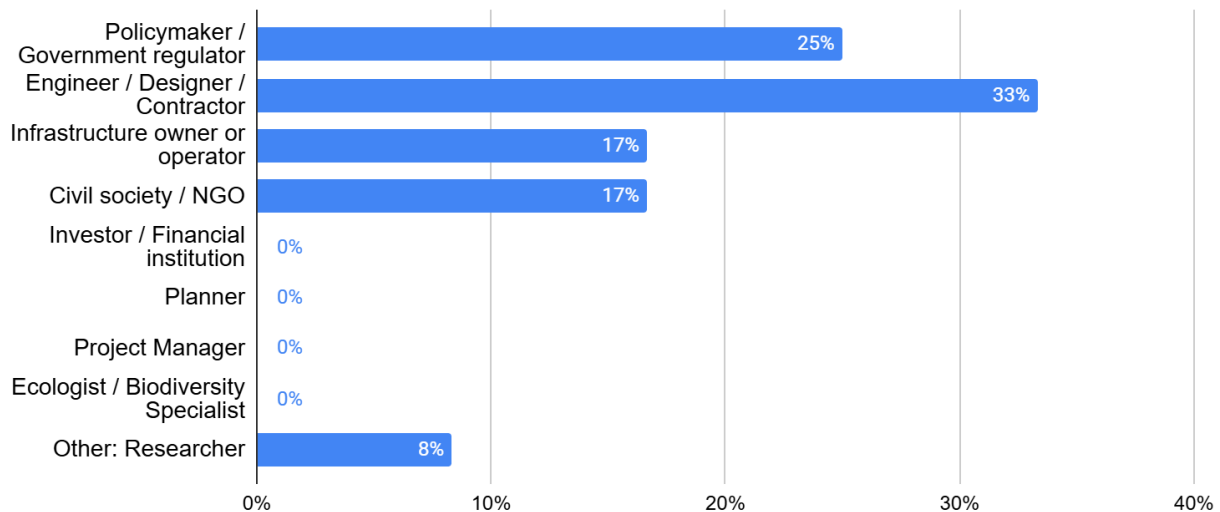


Figure 5: Survey results, Respondents by Stakeholder Group

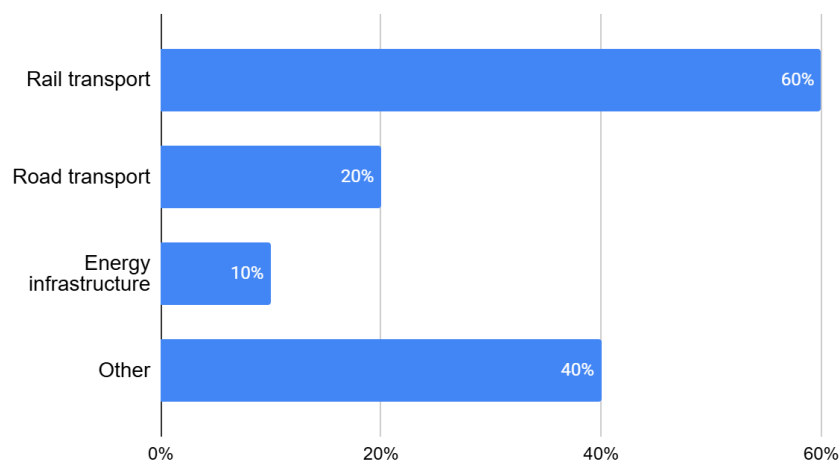


Figure 6: Survey results, Respondents by Sector

In terms of self-rated knowledge (see *Figure 7: Survey results, Self-Rated Knowledge of Biodiversity in Transport Infrastructure*), most survey respondents assess their understanding of biodiversity in transport infrastructure as moderate (50%), Low, high, and very high knowledge levels are each reported by 16.7% of respondents, while no respondents report very low familiarity. This suggests that participants generally have an existing foundation in biodiversity topics.

Aligned with these results, interviewees were asked about the current level of knowledge and experience among their professional peers regarding biodiversity integration in transport infrastructure projects. Responses indicate that knowledge levels remain uneven across organisations and roles. While technical specialists demonstrate growing expertise, particularly in areas such as mapping, monitoring, and lifecycle



approaches, engineers and decision-makers often have a more limited understanding. Overall, awareness is increasing; however, biodiversity considerations are still frequently introduced late in project processes or treated primarily as a compliance requirement rather than an integral part of infrastructure planning and design.

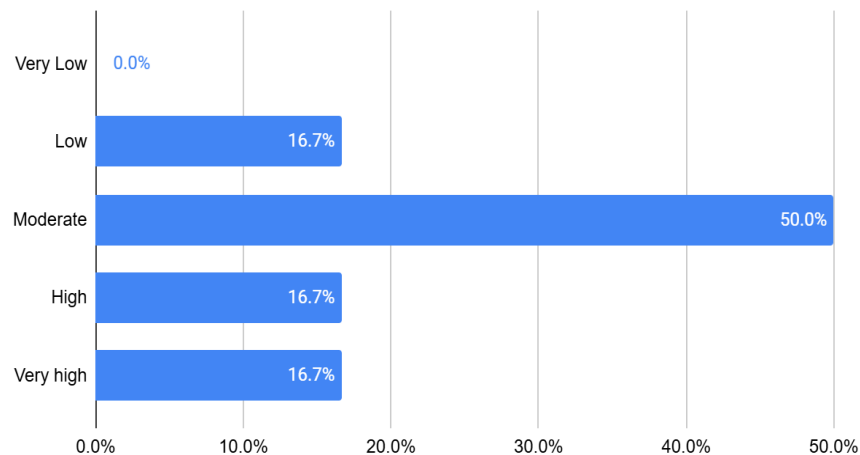


Figure 7: Survey results, Self-Rated Knowledge of Biodiversity in Transport Infrastructure

When identifying priority areas for additional knowledge and guidance, survey respondents could select multiple options (see *Figure 8: Survey results, Priority Areas for Additional Knowledge and Guidance*). Biodiversity monitoring and reporting standards emerge as the most requested topic (60%), followed by policy and regulatory frameworks and financing biodiversity-positive infrastructure (50% each). Quantifying biodiversity values and assessing lifecycle carbon and biodiversity impacts are both highlighted by 40% of respondents, while integrating biodiversity into planning and procurement processes receives 20%. Stakeholder engagement and communication strategies are selected less frequently (10%).

Insights from the interviews reinforce these findings and provide additional depth on the types of knowledge and guidance required. Interviewees consistently emphasised the importance of robust biodiversity mapping and data integration, including the use of GIS tools, remote sensing, and standardised habitat assessment methods to support evidence-based decision-making. Lifecycle approaches were highlighted as critical, ensuring biodiversity considerations are embedded from early planning and design stages through construction, monitoring, and reassessment. Participants also stressed the need for clearer methodologies that translate policy and regulatory frameworks into practical engineering and design processes, particularly within environmental impact assessments and sustainability reporting. Harmonised European standards, minimum requirements, and shared indicators were seen as important for improving consistency across projects and geographies. In addition, interviewees noted that stronger institutional backing, clearer regulatory interpretation, and practical technical guidance are needed to build knowledge in these areas. Peer learning, interdisciplinary collaboration, and accessible tools were identified as key enablers to support practitioners in applying biodiversity principles effectively within infrastructure planning and delivery.

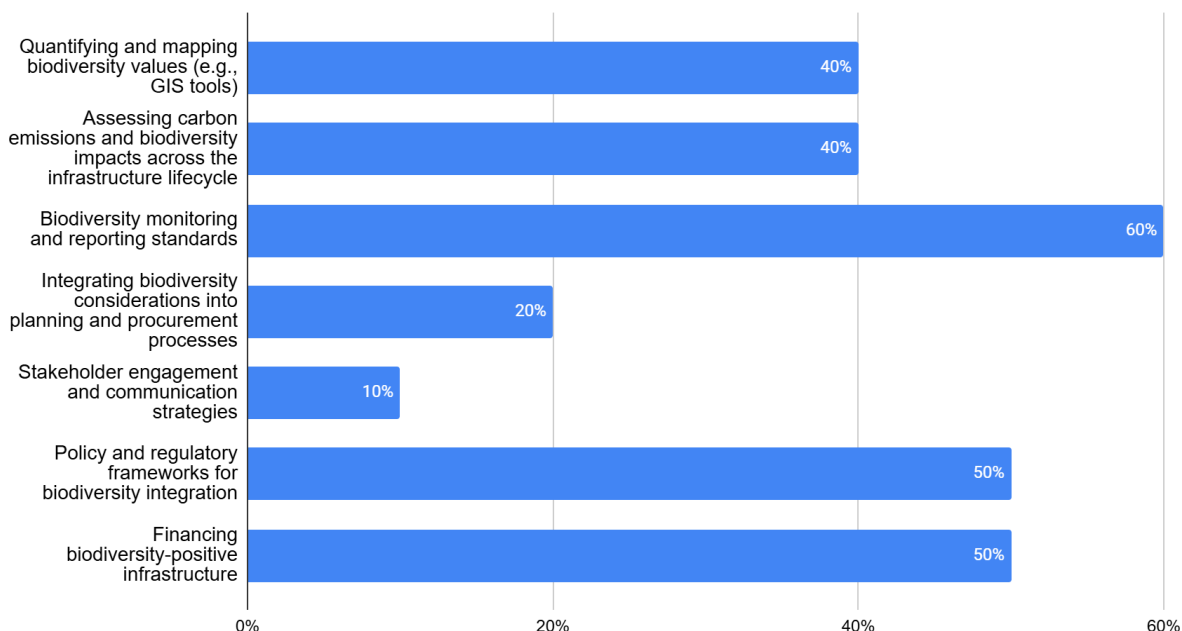


Figure 8: Survey results, Priority Areas for Additional Knowledge and Guidance

Survey respondents could select multiple barriers faced in implementing biodiversity-positive approaches (see Figure 9: Survey results, Barriers Faced in Implementing Biodiversity-Positive Approaches). Budget or financial constraints are identified most frequently (60%), followed by competing project priorities such as cost, speed, or performance (40%). Lack of stakeholder buy-in or support is also highlighted (30%), while lack of technical knowledge, limited access to tools and data, and insufficient policy or regulatory guidance are each noted by 20% of respondents.

Insights from the interviews complement these findings by highlighting additional structural and cultural barriers. Interviewees frequently referred to strong engineering-driven decision-making environments, where biodiversity is often perceived as a secondary consideration or introduced too late in project cycles. Limited availability and accessibility of reliable biodiversity data, siloed organisational structures, and inconsistent interpretation of regulatory requirements across countries were also identified as significant challenges. Several participants noted that political pressure to deliver infrastructure quickly can reduce opportunities for early biodiversity integration, while market-driven priorities and safety requirements often favour conventional engineering solutions over nature-based approaches. Together, the survey and interview results indicate that overcoming implementation barriers will require not only technical capacity-building, but also institutional change, improved cross-disciplinary collaboration, and stronger alignment between policy objectives and operational practice.

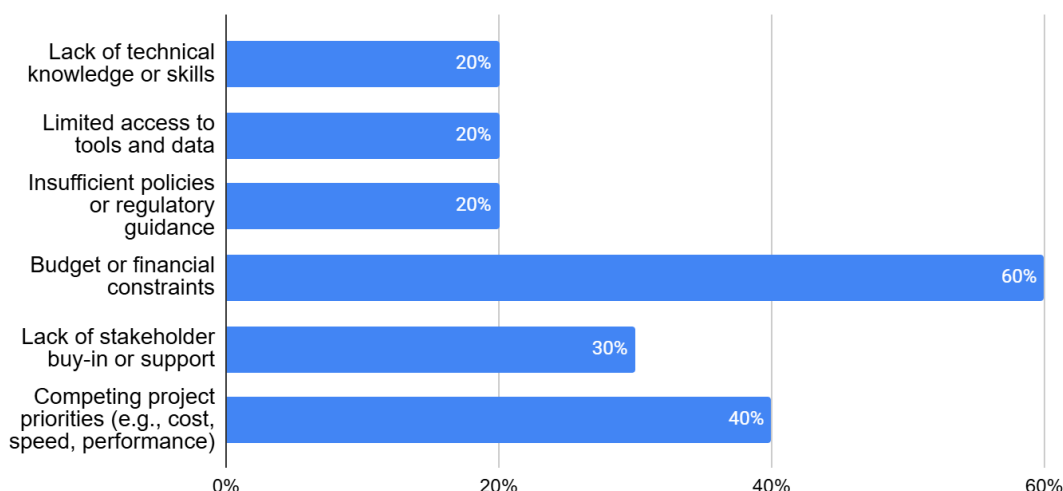


Figure 9: Survey results, Barriers Faced in Implementing Biodiversity-Positive Approaches

Building on the contextual assessment, survey respondents and interviewees were asked to provide input on the most effective approaches for delivering the planned training activities and shaping the SYMBIOSIS Knowledge Hub and their desired outcomes.

Survey respondents also identified the key outcomes they would like to see from SYMBIOSIS training and capacity-building activities, with multiple options selected (see *Figure 10: Survey results, Desired Outcomes from SYMBIOSIS Training and Capacity-Building*). Stronger policies and frameworks supporting biodiversity integration are prioritised by 60% of respondents, highlighting the expectation that training should contribute to broader institutional and strategic change. In addition, more accessible tools and resources for practitioners, improved collaboration across sectors and disciplines, and increased funding and investment in biodiversity-positive infrastructure are each selected by 50% of respondents.

Insights from the interviews complement these expectations, emphasising the need for long-term communities of practice, harmonised methodologies, and clearer links between policy objectives and operational decision-making. Interviewees highlighted the importance of building interdisciplinary understanding between engineers, ecologists, planners, and decision-makers, as well as supporting cultural change within infrastructure organisations to integrate biodiversity earlier in project processes.

Together, the survey and interview findings suggest that SYMBIOSIS training and capacity-building activities should aim to foster sustained collaboration, practical learning, and systemic change across the infrastructure sector.

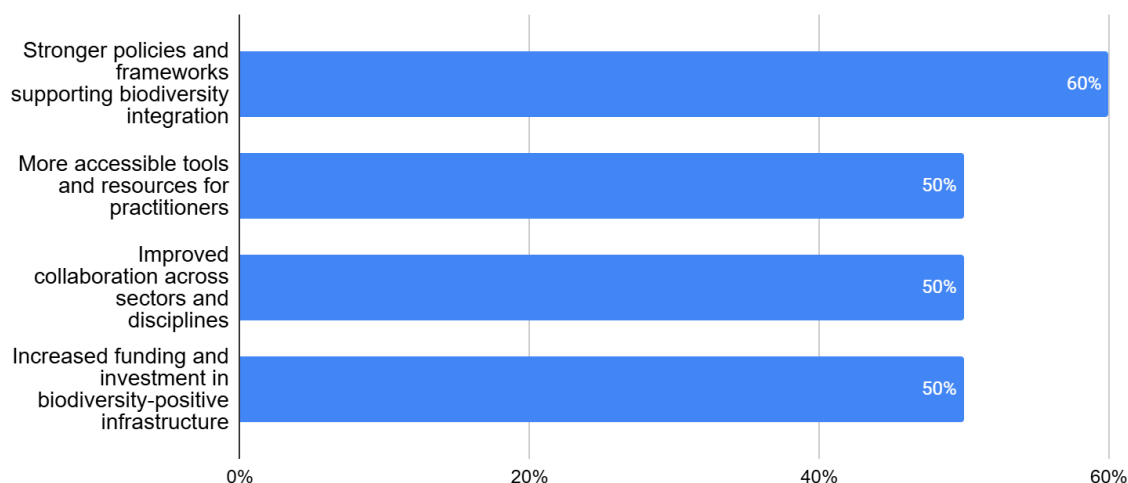


Figure 10: Survey results, Desired Outcomes from SYMBIOSIS Training and Capacity-Building

When asked about preferred learning formats, survey respondents could also select multiple options (see *Figure 2: Survey results, Preferred Learning Formats*). Peer-to-peer communities of practice emerge as the most preferred format (80%), followed by webinars focused on case studies (70%). Interactive online training sessions are selected by 50% of respondents, while self-paced e-learning modules receive 40% and in-person training 30%. These preferences indicate a strong interest in virtual, collaborative, experience-based learning approaches that support dialogue, knowledge exchange, and practical application rather than individual or passive learning formats.

Interview results highlight a strong preference for smaller, practitioner-focused sessions that enable direct exchange between peers working in diverse roles or sectors. Participants emphasised the value of case-based learning and mixed-discipline training environments that bring engineers, ecologists, planners, and decision-makers together to build shared understanding. Several interviewees noted that large conference-style sessions are less effective than targeted workshops or technical exchanges, and stressed the importance of practical examples, real project experiences, and ongoing communities of practice that extend beyond single training events.

Survey respondents could select multiple options when identifying preferred training materials (see *Figure 3: Survey results, Preferred Training Materials*). Case studies of successful biodiversity integration, practical toolkits and checklists, and technical standards and data protocols are each selected by 70% of respondents, followed by policy and guidance documents (60%). Templates for reporting and monitoring receive lower interest (20%), while videos and interactive media are not selected. Overall, the results suggest a clear preference for practical, implementation-oriented resources that support real-world application.

Insights from the interviews further expand on these findings, highlighting the importance of real-world case studies that demonstrate both successful outcomes and lessons learned from challenges or failures. Interviewees emphasised the need for methodologies that can be directly integrated into engineering and design workflows, including guidance on mapping approaches, environmental impact assessment processes,



and lifecycle management. Visual examples, management-process narratives, and adaptable templates were also identified as particularly useful for bridging the gap between policy objectives and operational practice, reinforcing the need for training materials that are practical, infrastructure-specific, and aligned with day-to-day professional needs.

Survey respondents were also asked to identify preferred features of the SYMBIOSIS Knowledge Hub, with multiple selections allowed (see *Figure 4: Survey results, Preferred Features of the Knowledge Hub*). Online tools for biodiversity assessment and carbon calculation emerge as the most requested feature (80%), followed by a centralised library of resources and publications (70%). Updates on policies and funding opportunities are selected by 60%, while webinar and training recordings receive moderate interest (50%). Networking opportunities are identified by 30% of respondents, and community discussion forums by 10%.

Interviewees highlighted the importance of usability, relevance to real-world practice, and regularly updated content to ensure continued engagement with the platform. They emphasised the need for searchable resource libraries, practical tools linked to decision-making processes, and opportunities for peer exchange within focused professional communities. Several participants suggested integrating visualisation tools, shared methodologies, and problem-solving spaces where practitioners can discuss real operational challenges. In contrast to the survey results, the interviews reinforce the need for a Knowledge Hub that functions not only as a repository of information, but as a practical, user-oriented platform that supports collaboration, learning, and the application of biodiversity knowledge in infrastructure contexts.



APPENDIX C - THE INFRASTRUCTURE SUSTAINABILITY LEARNING (ISLe) INITIATIVE

As infrastructure spending ramps up across the globe, one of the greatest barriers to building in a sustainable and resilient way is a lack of capacity among local government officials, engineers, developers, and financiers. To address this challenge, the ISLe Initiative was established. The founding partners - the Nicholas Institute for Policy and Energy at Duke University, the UN Environment Programme, and ICSI - are creating virtual communities of practice for sustainable infrastructure practitioners to learn from experts and from one another.

The ISLe Initiative delivers change through establishing and convening learning networks. Stakeholders from across multiple disciplines are engaged through Learning Hubs, which use the case-based and problem-solving learning approaches developed by [Project ECHO](#) - a virtual capacity-building model that connects specialists with practitioners for case-based learning and training in addressing complex challenges. Within an ISLe network, participants explore issues related to their own area of work in collaboration with other practitioners and sustainable infrastructure experts.

A typical meeting comprises:

- A brief technical presentation from an expert
- A more extensive case study presentation from another expert
- A discussion involving participants and experts on the challenges, solutions, and learnings from the case presented.