Interreg Co-funded by the European Union

Alpine Space

PlanToConnect

Project of local ecological network Salzburg

Mapping report identifying the GBI elements, barriers, connectivity measures in pilot areas

Version 1.2

Activity 2.3 Case Studies 2nd step: To design a GBI network for connectivity across administrative boundaries or transnational cross-border areas in pilot sites

Reference in AF: D.2.3.1

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GLOSSARY

Habitats

- **Core habitat (*Kernlebensraum*):** Year-round habitats with a minimum size of 5,000 hectares
- **Habitat Island (*Insellebensraum*):** habitats between 2,000 and 5,000 hectares in size (forest). These habitats may or may not be year-round habitats.
- **Stepping stone habitat (*Trittsteinlebensraum*):** Definition of habitats with a size of 2 to 2,000 hectares. They are not suitable as year-round habitats.

Habitat Network (*Lebensraumvernetzung*): Structural connection, especially between core habitats and in the form of corridors (*concept of Leitner et al. 2014 / 2018)*

Green space and migration corridors (*Grünraum- und Wanderkorridore*): semi-natural open spaces in which the passage of the area is guaranteed (in particular free of barriers for wild animals from hare size)

Tabelle 1 Types of Green Space and Migration Corridors

Corridor type	Local	Regional	Interregional
Minimum width	~ 150 m	~ 300 m	500 - 1000 m
General function	Reaching different habitats	Seasonal change	Genetic exchange

Connectivity (structural and functional): Connectivity comprises two components, structural and functional connectivity. It expresses how landscapes are configurated, allowing species to move. Structural connectivity, equal to habitat continuity, is measured by analysing landscape structure, independent of any attributes of organisms. […]. Functional connectivity is the response of the organism to the landscape elements other than its habitats (i.e. the non-habitat matrix). This definition is often used in the context of landscape ecology. A high degree of connectivity is generally linked to low fragmentation.

(EUROPEAN COMMISSION - Technical information on Green Infrastructure (GI), 6.5.2013, Glossary)

GBI – Green and blue infrastructure

"*Green infrastructure (GI) is a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services. It incorporates green spaces (or blue if aquatic ecosystems are concerned) and other physical features in terrestrial (including coastal) and marine areas. On land, GI is present in rural and urban settings*." (EUROPEAN COMMISSION - Green Infrastructure (GI) — Enhancing Europe's Natural Capital, 6.5.2013)

ISEK – Integrated Urban Development Concept (ISEK = *Integriertes Städtebauliches Entwicklungskonzept*)

An integrated urban development concept (ISEK) relates to a specifically defined area (e.g. town or city centre, district, urban quarter or redevelopment area). An ISEK consists of

- a town centre/ city centre declaration that formulates solutions to strengthen the town centre/ city centre that are specifically adapted to the particular municipality.
- short, medium and long-term measures. These are set out in both the form of written texts and planning.
- an implementation plan for the measures, which specifies the time frame and includes a financing plan (ÖROK 2019).

EXECUTIVE SUMMARY

This report identifies regional and interregional key corridors in the Flachgau and Tennengau region. A special focus is placed on the municipality of St. Gilgen. For this focus region, the currently protected open spaces have been depicted and the barriers in the form of settlement development have been contrasted with them.

This report provides an impact assessment of habitat connectivity in the St. Gilgen pilot area, identifying priority corridors, ecological modeling approaches, habitat types, species presence, and key barriers. The findings will inform future technical proposals and restoration measures (D2.5).

1. What Corridors Are the Priority Corridors?

- Interregional Corridor (SACA2 – High Conservation Value)
  - Location: North of St. Gilgen, connecting Flachgau to Upper Austria.
  - Function: Enables large mammal movement and genetic exchange across regional boundaries.
  - Threats: Infrastructure expansion and urban encroachment reducing permeability.
- Regional Corridor (West of St. Gilgen)
  - Location: Links core habitats and protected areas in the western landscape.
  - Function: Supports local-scale biodiversity connectivity, particularly for medium-sized mammals and forest-dwelling species.
  - Threats: Tourism pressure, habitat fragmentation, and agricultural expansion.
- Stepping-Stone Corridors
  - Location: Scattered forest patches, wetlands, and grasslands between urban areas and protected zones.
  - Function: Provide temporary habitats for migratory species and increase functional connectivity.
  - Threats: Lack of formal protection and land-use changes reducing habitat quality.

2. Which Approach Do You Choose to Model the Network?

- Methodological Approach
  The habitat connectivity model is based on:
  - GIS-Based Corridor Mapping: Integration of SAGIS spatial data, CORINE Land Cover (CLC5, 2018), and habitat suitability models.
  - Strategic Alpine Connectivity Areas (SACA) Analysis: Classification of the pilot region's ecological network.

- Landscape Permeability Modeling: Use of LRVA-Index 2022 to assess habitat fragmentation and species movement potential.
- Barrier Analysis and Resistance Mapping: Identification of urban, transportation, and land-use conflicts affecting connectivity.

The modeling approach follows a multi-scale analysis, combining macroscale habitat corridors with local-scale stepping-stone assessments.

REPORT

1 Introduction

The Alpine region, with its unique landscapes and rich biodiversity, faces increasing pressures from human activities and climate change, which disrupt wildlife habitats and ecological processes. Recognizing the urgent need to maintain ecological connectivity within this fragile ecosystem, the project *PlanToConnect* aims to establish and enhance connections between habitats as part of a larger Alpine-wide strategy to preserve the natural corridors that allow species movement, genetic exchange, and ecosystem resilience.

Structural connectivity focuses on maintaining physical linkages between habitat areas, such as forest patches and open landscapes. Functional connectivity, on the other hand, emphasizes the ecological flow that these connections enable, allowing species like red deer to move freely, access food resources, find mating partners, and adjust to seasonal changes. Even though corridors can function in both ways – structural and functional – its main use is depending on the size of the corridor. The focus within the pilot region lies on connecting green infrastructure, although aquatic ecosystems are present in St. Gilgen.

Through an integrated urban development concept (ISEK = *Integriertes Städtebauliches Entwicklungskonzept*) local and regional planning instruments are combined to maintain ecological functions.

In this report, Chapter 2 provides an overview of the Tennengau and Flachgau pilot regions. Chapter 3 outlines the methodological approach in the pilot area, including data usage and working steps. Chapter 4 presents the results of the analysis.

2 Pilot region

The pilot regions Tennengau and Flachgau are located in Salzburg, Austria, and together cover an area of approximately 1,672 km².

According to the biogeographical regions of the Natura 2000 model, Tennengau and Flachgau both lie within the Alpine region, whereas the northern part of Flachgau extends into the Continental region (see Fig.1).

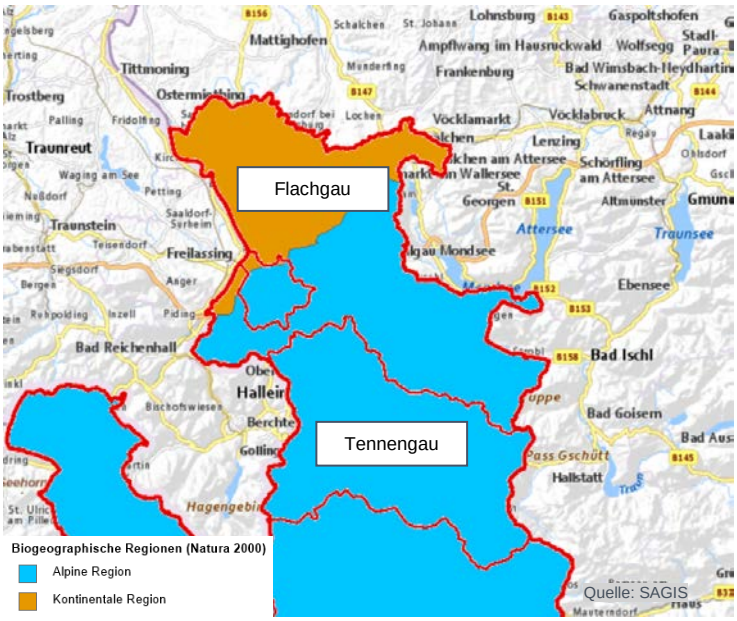


Figure 1 Biogeographical Regions Tennengau and Flachgau

Within this study, the regions work as an overall observation area. The primary focus, however, is on the municipality of St. Gilgen, located in Flachgau at the border to the neighboring federal state of Upper Austria. This focus enables the consideration of ecological connections across municipal boundaries, to neighbouring municipalities, and interregional, to Upper Austria, where different spatial planning regulations apply.

According to the Strategic Alpine Connectivity Areas (SACA) model, most of St. Gilgen is classified as Category 2, meaning if functions as an ecological intervention area. Category 2 zones form critical links between SACA1 areas (ecological conservation areas). Connectivity currently works to a degree but still requires enhancements, making improvement or restoration measures necessary. Mount Schafberg marks the border with Upper Austria; its SACA1 designation indicates an ecological conservation area where connectivity is already functioning relatively well.

However, the center of St. Gilgen corresponds to Category 3, signifying a major barrier between SACA1 areas and necessitating substantial connectivity restoration efforts.

Please describe your pilot region (maybe copy from D2.1.2) and answer following questions:

- *What corridor have you selected?*

- **Interregional corridor:** Running through the northern part of St. Gilgen, this corridor is classified as a SACA2 area, indicating its role as an ecological intervention zone. It connects critical habitat areas both within and beyond the municipality.

- **Regional Corridor:** Located west of St. Gilgen, this corridor ensures connectivity to neighboring ecological networks. Both corridors are crucial for maintaining habitat linkages across administrative and regional boundaries. A particular focus is placed on the land strip between the Fuschlsee and Wolfgangsee, traversed by the B158 road. This strip is a key linkage but faces threats from infrastructure development and urban sprawl.

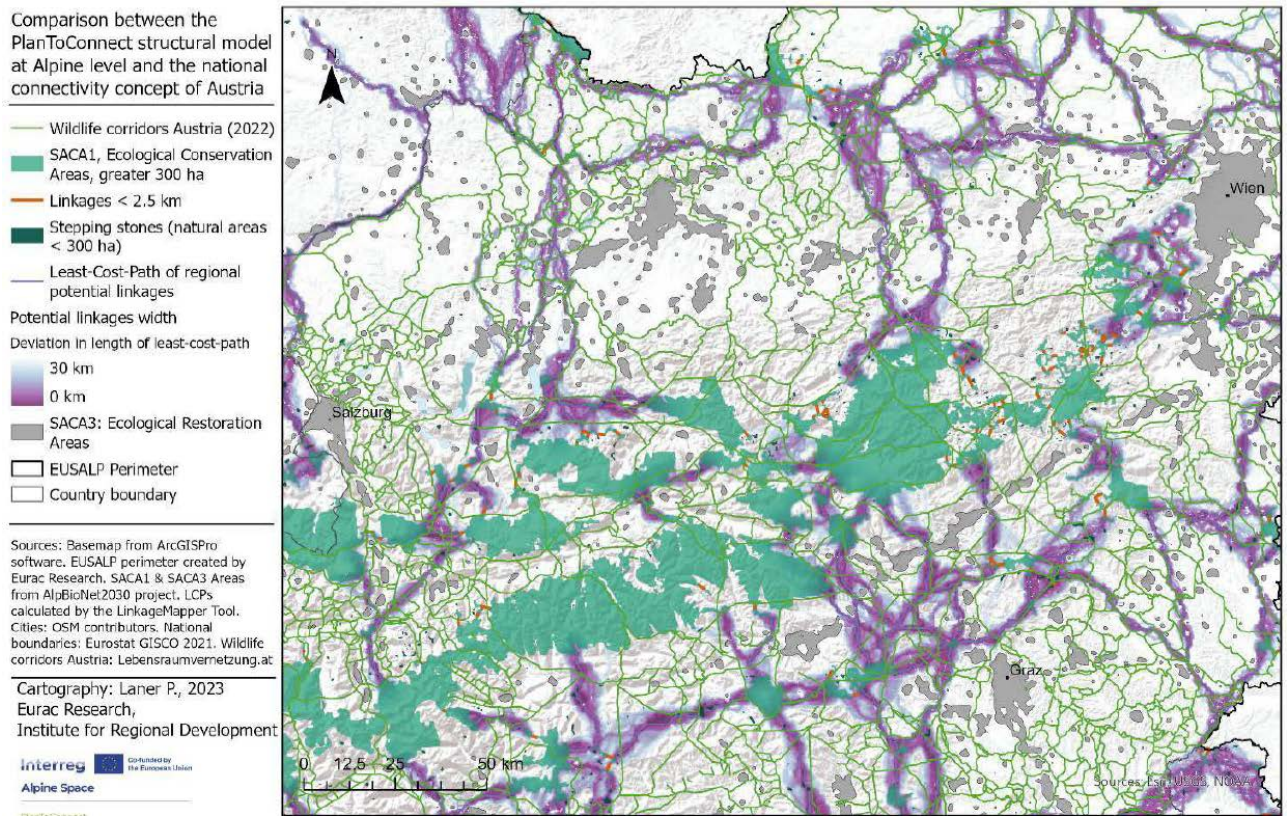


Figure 2 Comparison between the PlanToConnect structural model at Alpine level and the national connectivity concept of Austria

Which are the main barriers in the pilot region that resulted from the macro-regional model (D1.1.1)?

- Urban Development:

The center of St. Gilgen is classified as a Category-3 area (SACA3), indicating it acts as a significant barrier between ecological conservation areas (SACA1). While the northern interregional corridor remains functional, urban development in the center poses challenges for connectivity improvements.

- Transportation Infrastructure:

Highways and major roads are significant barriers. In particular, crossings without green bridges or underpasses increase fragmentation and hinder wildlife movement.

- Gaps in Corridor Connectivity:

The interregional corridor running through the northern part of the municipality is functional but could benefit from enhanced measures to strengthen connections to regional corridors in the west. Urban barriers in the center of St. Gilgen reduce permeability, but the corridor itself is not completely interrupted.

- Topographical Challenges:

Areas with steep slopes and significant elevation differences (>2,500 m) act as natural barriers, further limiting connectivity for certain wildlife species.

The link to an alps-wide structural connectivity should be illustrated by the SACA – Strategic Alpine Connectivity Areas (cat. 2 mainly) – the description should precise whether the pilot region is situated in a SACA area and in which of the 3 types

- **Interregional Corridor:** Running through the northern part of St. Gilgen, classified as **SACA2**, acting as an ecological intervention zone. It connects important habitats both within and beyond the municipality.
- **Regional Corridor:** Located west of St. Gilgen, ensuring connectivity to adjacent ecological networks.

Both corridors are crucial for sustaining habitat linkages across administrative boundaries. **Particular attention** is given to the **land strip between Fuschlsee and Wolfgangsee** (traversed by the **B158**), a key linkage threatened by infrastructure development and urban sprawl.

Which are the main barriers in the pilot region that resulted from the macro-regional model (D1.1.1)?

- **Urban Development**

  The center of St. Gilgen is classified as **SACA3**, forming a significant barrier between conservation areas (SACA1).

- **Transportation Infrastructure**

  Major roads and highways, especially where no wildlife underpasses or green bridges exist, fragment habitats and hinder movement.

- **Gaps in Corridor Connectivity**

  The northern interregional corridor is functional but would benefit from enhancements connecting it to the western regional corridor.

- **Topographical Challenges**

  Steep slopes and high elevations (>2,500 m) serve as natural barriers for certain species.

The link to an alps-wide structural connectivity should be illustrated by the SACA – Strategic Alpine Connectivity Areas (cat. 2 mainly) – the description should precise whether the pilot region is situated in a SACA area and in which of the 3 types

The SACA model (Strategic Alpine Connectivity Areas) categorizes land into three types:

- SACA1 = Ecological conservation areas (high connectivity)
- SACA2 = Ecological intervention areas (connectivity works partly but needs improvement)
- SACA3 = Areas representing significant barriers or requiring restoration

In St. Gilgen:

- Much of the area is SACA2 (ecological intervention).
- Parts of the Schafberg are SACA1 (conservation).
- The municipal center is SACA3 (barrier).

1. An **overview map** of the region, showing the pilot site in the Alpine context (e.g., Alpine Convention boundaries).

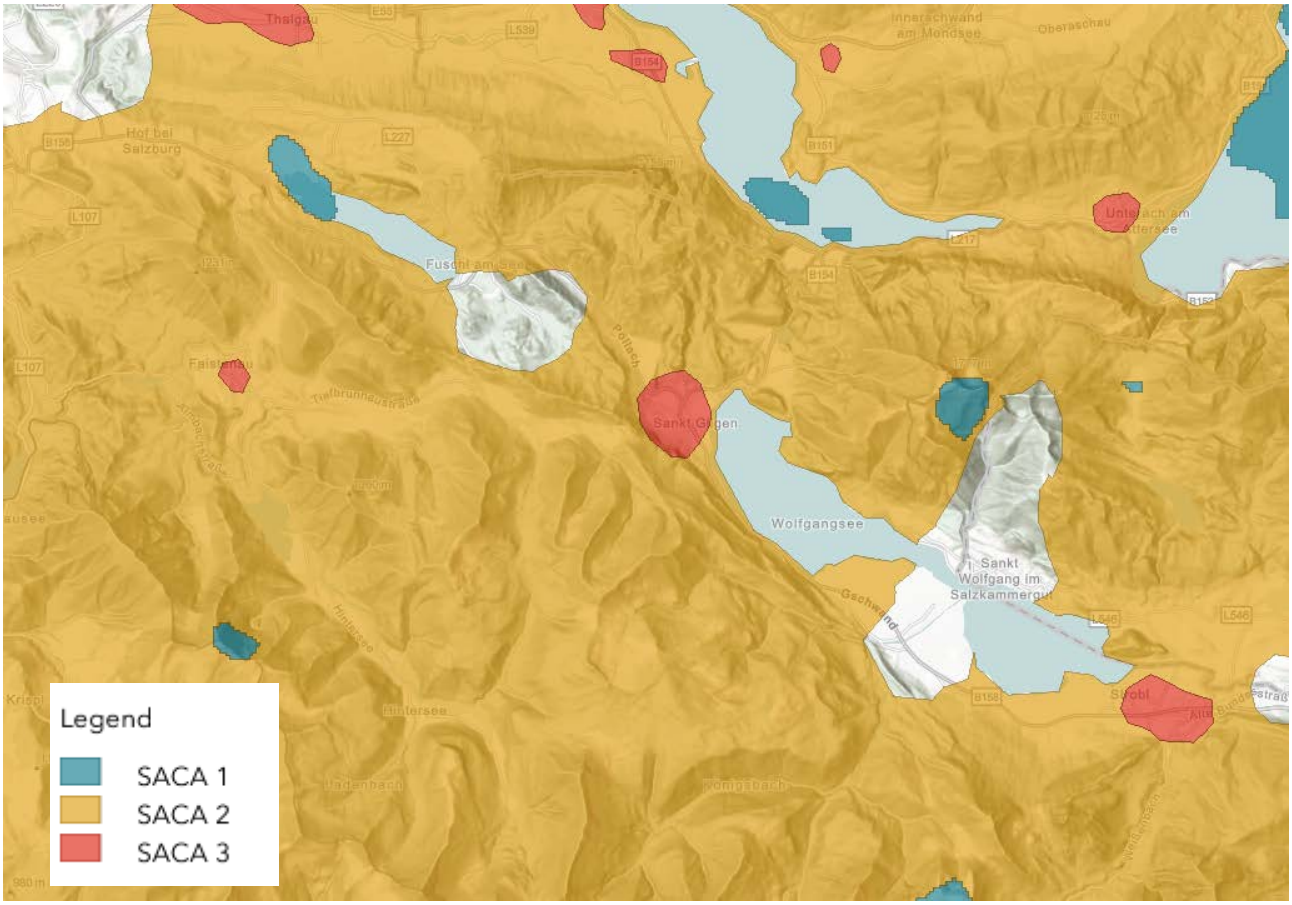


Figure 3 A **SACA-based** map (SACA1–3) to illustrate macro-regional connectivity

3 Methodical approach in the pilot area

3.1 Methodical approach

This network design integrates multi-scale data, comparing the Alpine-Wide Structural Connectivity Model from PlanToConnect with regional studies like Lebensraumvernetzung Salzburg. Discrepancies due to differing scales and methodologies are resolved by overlaying local, regional, and macro-regional corridors to identify consistent patterns and gaps.

3.2 Data used

The following key sources were used as a baseline for the Activity 2.3 “Network Design”:

Firstly, the study *Lebensraumvernetzung zur Sicherung der Biodiversität in Österreich* by Leitner et al. from 2018 forms an important basis at national level. This builds on the interdisciplinary project *Lebensraumvernetzung Salzburg* from 2014 which was conducted at regional level. The aim of this project was to secure the green spaces in Salzburg in order to preserve the habitat of large-scale migratory, forest-bound animal species such as the red deer. Therefore, the Department of Spatial Planning and Nature Conservation of Salzburg worked together with *Salzburger Jägerschaft* (Salzburg Hunters' Association) and *Regionalverband Pinzgau* (Regional Association of Pinzgau). This joint project was carried out by *Büro für Wildökologie und Forstwirtschaft*, also under the direction of DI Leitner.

For the visualisation of the studies a map of the green space and migration corridors in Austria was created (See Fig. 2). For the case study region, this enables interregional habitat networking and transnational integration. The geodata for Salzburg is available via the Salzburg Geographical Information System *SAGIS.*

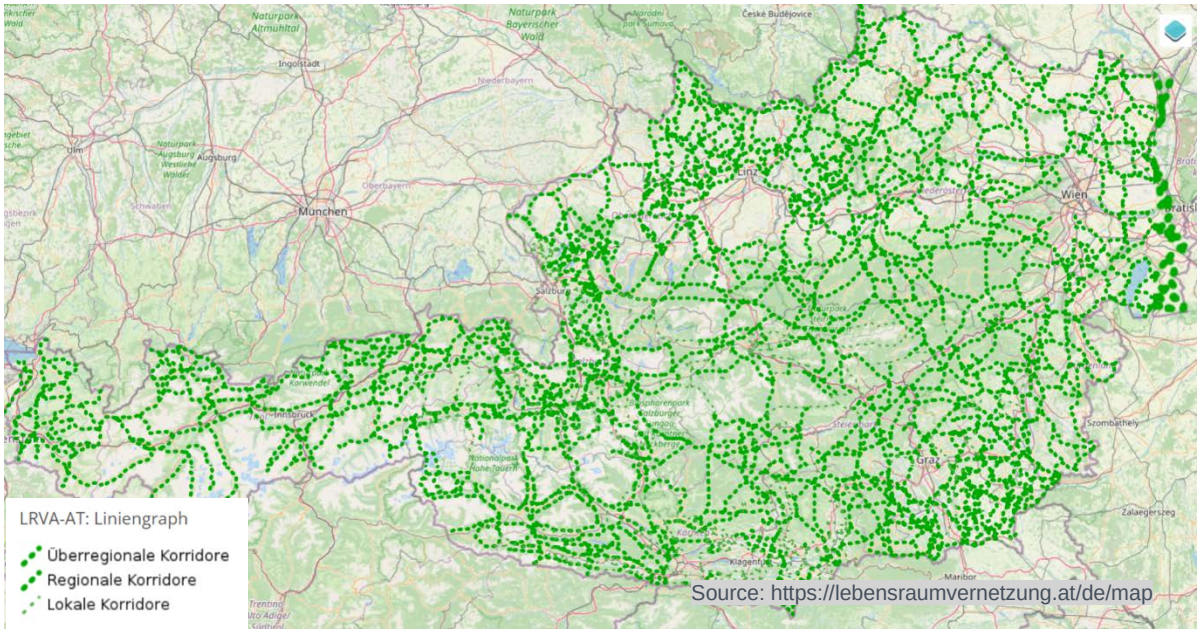


Figure 4 Lebensraumvernetzung Austria

The development programme of Salzburg (*Salzburger Landesentwicklungsprogramm*) also sets out a fundamental 'requirement' for habitat networking. In Chapter *4.3 Freiraumentwicklung*, this programme ensures the preservation of green space and corridors. An example map is included here at state level, but 'only' corridors of interregional importance or core habitats are shown here (see Fig. 3). Chapter 6.6 of the development programme stipulates "the protection of local corridors should be ensured by the municipalities as part of their planning" (LEP 2022).

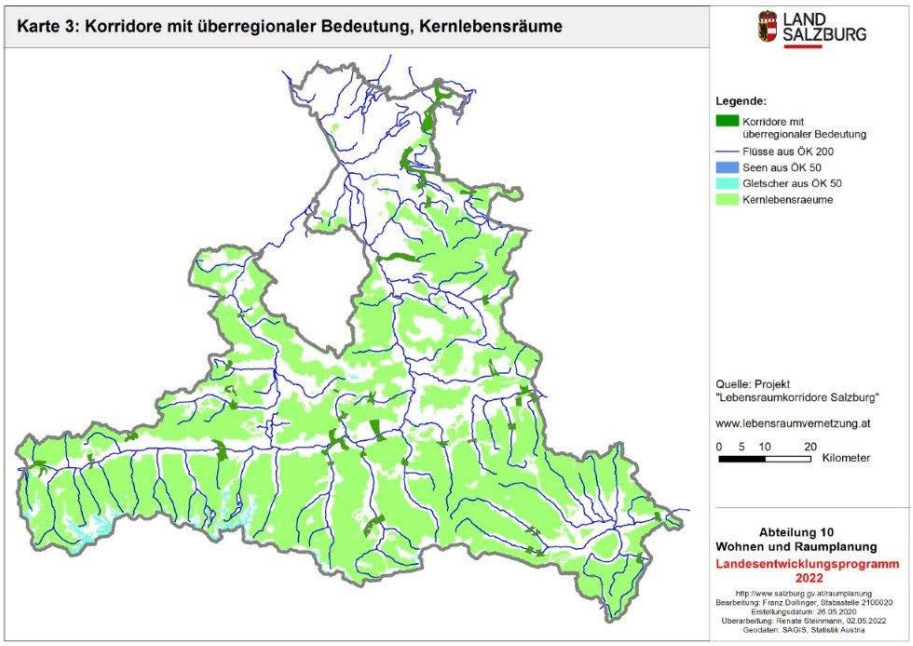


Figure 5 Corridors of Interregional Importance & Core Habitats, Salzburg

3.3 Working steps

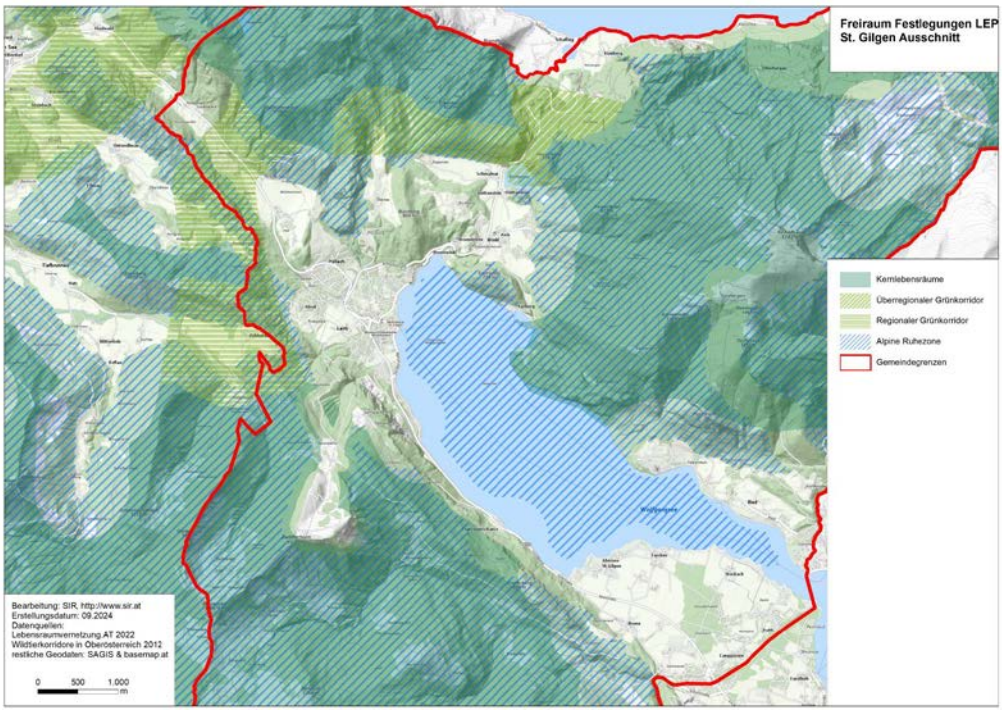
For the implementation of the network design, the *Alpine Wide Structural Connectivity Model* created within the PlanToConnect project at transalpine level was firstly compared with the corridors from *Lebensraumvernetzung Salzburg*. In this approach, the *Alpine Wide Structural Connectivity Model* was layered as a macro-model of structural corridors with the local/regional green space and migration corridors according to the concept *Lebensraumvernetzung zur Sicherung der Biodiversität in Österreich*. This was done to find out whether the generated macro-regional corridors from the *Alpine Wide Structural Connectivity Model* are practicable in the pilot region and to identify where areas of overlap exist between the two models and where they do not.

This has shown that the *Alpine Wide Structural Connectivity Model* in the study region differs or is partly less detailed. This is due to the different scales and the different analysis methodology. Especially in the immediate case study area (= municipal area of St. Gilgen and surrounding neighbouring municipalities), no corridor is shown according to the *Alpine Wide Structural Connectivity Model*.

Therefore, the two studies *Lebensraumvernetzung Salzburg* and *Lebensraumvernetzung zur Sicherung der Biodiversität in Österreich* were compared with each other in the next step. In this way, the Salzburg network could be expanded with the interregional corridors.

Further working steps are listed in the table below:

Table 2 General Working steps

Working Step	Description
1	Compilation of the protected areas within the corridor
	In a first step, existing preservation of open spaces was included in the mapping. Figure 4 shows the spatial planning area zoning (using the example of Alpine Ruhezonen) in the focus region of St. Gilgen. Figure 5 shows sectoral planning area classifications, in particular through nature conservation, which can contribute to securing habitat connectivity. The overlapping of these areas is shown in Figure 6. This serves in particular to identify strategic priority planning areas that are currently unsecured or weakly secured.  Figure 6 Open space regulations (Alpine Ruhezone) St. Gilgen

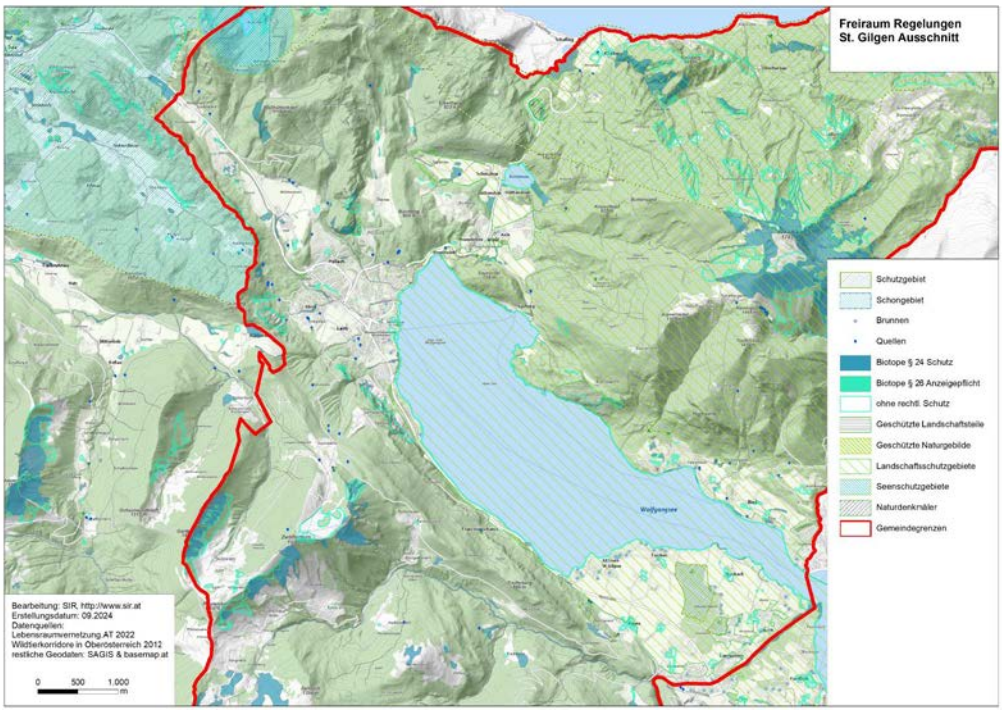


Figure 7 Open space regulations (nature conservation) St. Gilgen

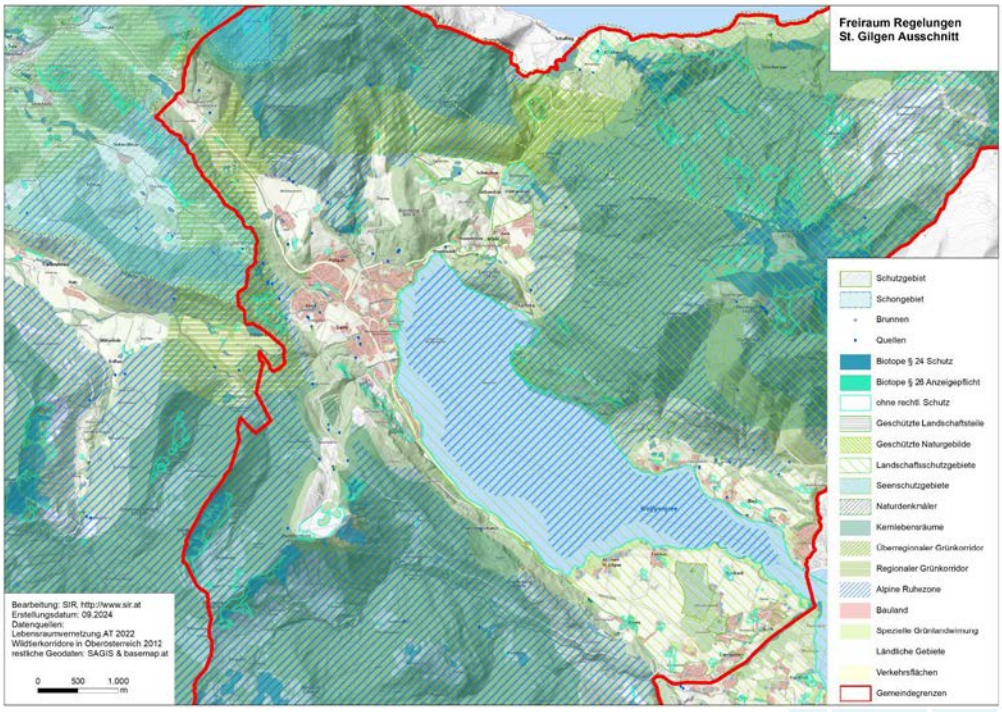


Figure 8 Open space regulations (Overlay) St. Gilgen

Working Step	Description
2	Compilation and analysis of GBI elements within the corridor (connectivity evaluation)
	In a second step, all GBI elements (based on the categories of CORINE Land Cover 5 ha CLC5 (2018) within the corridor are listed and summarised according to the main categories: **Forested Core and Island Habitats (CLC: 311, 312, 313 – Forests)** This category includes large, unfragmented forest areas (core habitats) as well as smaller, isolated forest patches (island habitats). These forests play a crucial role in biodiversity conservation and ecological connectivity. Key examples in the corridor: Schafberg, Zwölferhorn, and forested areas near Wolfgangsee and Fuschlsee Corresponding CORINE classes: 311 – Broad-leaved forest 312 – Coniferous forest 313 – Mixed forest **Grasslands and Stepping Stone Habitats (CLC: 231, 321, 322 – Grasslands & Pastures)** Grassland areas serve as stepping-stone habitats, allowing species movement between larger core habitats. These areas include natural meadows, alpine pastures, and sparsely vegetated landscapes, which provide habitat continuity for pollinators, herbivores, and ground-nesting birds. Corresponding CORINE classes: 231 – Pastures 321 – Natural grasslands 322 – Moors and heathland **Semi-Natural and Agricultural Transition Zones (CLC: 242, 243 – Mixed Land Use Patterns)** These areas function as regional and local connectivity corridors, maintaining permeability between settlements and natural areas. They include agricultural lands with significant semi-natural vegetation, which supports species movement at multiple scales. Subcategories: Interregional corridors: Connecting Flachgau with Upper Austria Regional corridors: Linking western St. Gilgen to protected areas Local corridors: Ensuring small-scale connectivity between settlement edges and core habitats Corresponding CORINE classes: 242 – Complex cultivation patterns 243 – Land with a mix of agriculture and natural vegetation

Working Step	Description
	Water Bodies and Wetlands (CLC: 512, 411 – Blue Infrastructure) Aquatic ecosystems serve as critical biodiversity hotspots, supporting ecological connectivity along riverbanks, lakeshores, and wetland zones. These areas provide essential ecosystem services, including water purification, habitat for amphibians, and flood regulation. Key water bodies in the corridor: Wolfgangsee, Fuschlsee, and Eibensee wetlands Corresponding CORINE classes: 512 – Water bodies (lakes, reservoirs, rivers) 411 – Inland wetlands
3	Definition / refinement of objectives for ecological connectivity
	The objectives of the St. Gilgen case study within the PlanToConnect project are based on the scientific framework of the Habitat Connectivity Salzburg Study (Leitner et al. 2014) and its integration into local and regional planning processes. **1. Preservation and Protection of Green Space and Migration Corridors** Safeguarding interregional, regional, and local corridors from urbanization and fragmentation. Integrating corridors into local planning frameworks (e.g., through Spatial Development Concepts – REK). Maintaining landscape permeability for wildlife species (minimum hare size), in line with the Habitat Connectivity Salzburg concept. **2.Enhancing Ecological Permeability and Reducing Barriers** Mitigating built and infrastructural barriers along key corridors, particularly along the B158 between Fuschlsee and Wolfgangsee. Ensuring compatibility with agricultural and forestry use, as long as habitat connectivity is not significantly impaired. Promoting green bridges, wildlife crossings, and underpasses to counteract fragmentation effects. **3. Strengthening Protection Status and Integration into Planning Instruments** Aligning existing protected areas (e.g., landscape conservation areas, Alpine quiet zones) with habitat corridors to identify insufficiently protected zones. Integrating habitat connectivity into local spatial planning (REK, zoning plans) and forest development planning (WEP). Developing a strategic planning approach for long-term ecological connectivity. **4. Considering Climate Adaptation and Multi-functionality** Increasing resilience of habitat corridors through sustainable land management, especially in wetlands and alpine landscapes.

Working Step	Description
	Identifying areas with multifunctional potential, e.g., for agriculture, recreation, or climate protection measures. Incorporating ISEK processes for targeted land-use management and urban development planning.
4	Compilation and analysis of regional and local data
	The analysis of regional and local data in the St. Gilgen pilot area is based on multiple geospatial datasets and planning instruments, ensuring an integrated approach to ecological connectivity and land use conflicts. The data compilation focuses on habitat connectivity, land use patterns, and planning constraints to support conservation strategies. Key Data Sources for St Gilgen **1. Data Sources and Methodology** The data sources used for the analysis include: Habitat Connectivity Models: Based on the Habitat Connectivity Salzburg Study (Leitner et al., 2014) and the Austrian Habitat Connectivity Network (2018). GIS-Based Mapping Tools: Integration of datasets from SAGIS (Salzburg Geographical Information System) and the Strategic Alpine Connectivity Areas (SACA) model. Spatial Planning Instruments: Analysis of regional and local zoning plans (Flächenwidmungsplan - FWP), spatial development concepts (Raumentwicklungskonzept - REK), and nature conservation designations. Land Cover and Use Data: Based on CORINE Land Cover and regional land-use classifications to assess habitat structure and fragmentation. **2. Key Findings from Regional and Local Data** Identification of Core Habitats and Corridors The northwestern interregional corridor (classified as SACA2) plays a critical role in species movement, linking habitats across administrative boundaries. Regional corridors west of St. Gilgen are important for local-scale habitat connectivity, but face challenges due to urban development. Barrier Analysis The B158 road significantly disrupts east-west ecological connectivity, posing risks for wildlife migration and genetic exchange. Urban expansion in St. Gilgen's center (SACA3) reduces permeability between protected habitats and semi-natural landscapes. Zoning and Protection Status

Working Step	Description
	While some corridors are protected through zoning instruments (e.g., Alpine quiet zones, Natura 2000 sites), other critical areas remain unprotected, particularly near Fuschlsee and Wolfgangsee. The existing spatial planning frameworks (REK, FWP) provide a basis for integration, but stronger ecological planning tools are needed. **3. Implications for Ecological Connectivity** High-priority areas for intervention include: Enhancing underpasses and green bridges along the B158 corridor. Strengthening protection measures for unzoned ecological corridors. Integrating ecological connectivity measures into local planning frameworks (REK, FWP, ISEK). Regional planning gaps: Some priority corridors are not yet formally recognized in zoning plans, leading to potential conflicts with urban and infrastructure expansion. Land-use conflicts (agriculture, tourism, renewable energy) need to be addressed through multifunctional land management approaches.
5	Barrier Analysis (based on D 1.2.1 and 1.3.1)
	The barrier analysis for St. Gilgen evaluates the key obstacles and disruptions to ecological connectivity within the designated corridors. These barriers are identified based on spatial data, connectivity models, and planning assessments and categorized according to structural and functional connectivity constraints. **1. Identified Barriers in the St. Gilgen Corridor** Urban Development (SACA3 - High Impact Areas) The central area of St. Gilgen acts as a significant ecological barrier, disrupting the continuity of habitat networks. Expansion of residential and tourism infrastructure increases land fragmentation and reduces permeability. Transportation Infrastructure The B158 road running between Fuschlsee and Wolfgangsee poses a critical fragmentation risk. Lack of wildlife crossings (e.g., underpasses, green bridges) further reduces species movement. Land Use Conflicts

Working Step	Description
	Competing land uses, including agriculture, tourism, and renewable energy projects, affect habitat quality and restrict migration corridors. Potential expansion zones for urbanization (documented in the spatial zoning plan – REK/FWP) could further fragment connectivity networks. Topographical Constraints Steep mountain slopes (e.g., Schafberg, Zwölferhorn) create natural barriers for species requiring low-elevation migration routes. Limited connectivity corridors at lower elevations amplify the impact of human-made barriers. **2. GIS-Based Barrier Mapping and Connectivity Assessment** The barrier analysis utilizes: GIS Data from SAGIS (Salzburg Geographical Information System) to map barriers. Connectivity Indices (LRVA-Index, Landscape Structure 2022) to quantify fragmentation effects. Overlay analysis of land-use planning instruments (REK, FWP, Alpine Quiet Zones, Natura 2000 sites) to assess policy conflicts. Key findings: Interregional connectivity is hindered due to barrier effects from urbanization and infrastructure. Core corridors remain functional, but require additional ecological enhancements to sustain biodiversity. **3. Proposed Mitigation Strategies** Restoration of Connectivity Elements Installation of green bridges and wildlife crossings along B158 to facilitate movement. Ecological compensation measures in areas affected by urbanization. Zoning and Planning Adjustments Stronger integration of habitat corridors in local and regional planning to prevent fragmentation. Enhanced ecological zoning protections in high-risk areas identified in the spatial development framework. Multi-Use Land Management Approaches Incentivizing agricultural practices that support biodiversity without compromising connectivity. Adaptive land-use strategies that balance renewable energy infrastructure with ecological conservation.

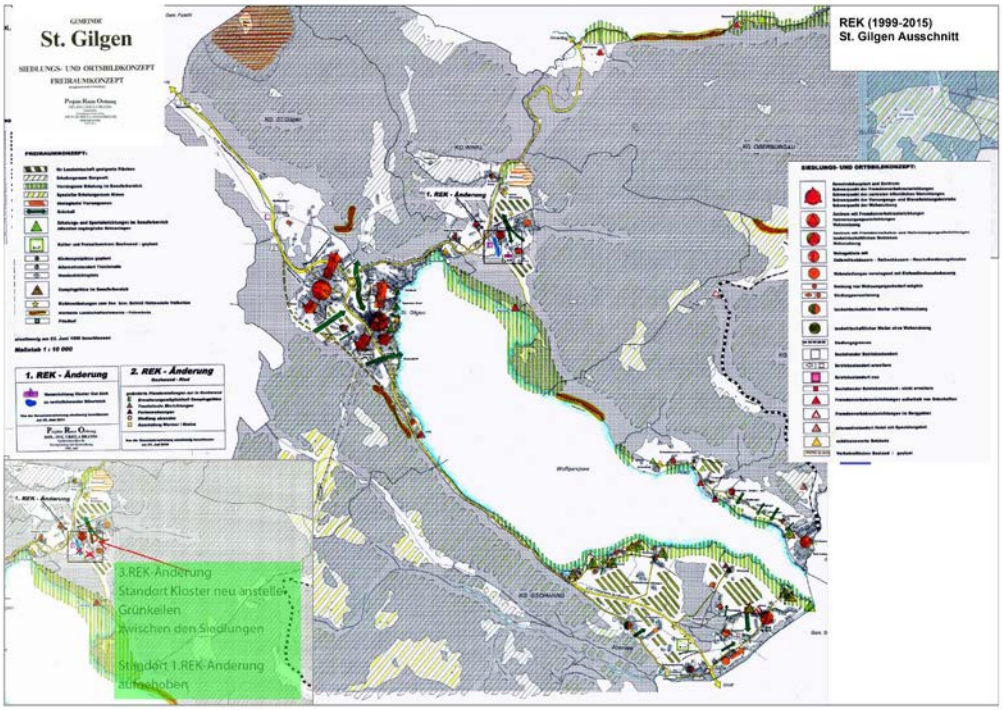


Figure 9 Spatial development concept (Raumentwicklungskonzept) St. Gilgen

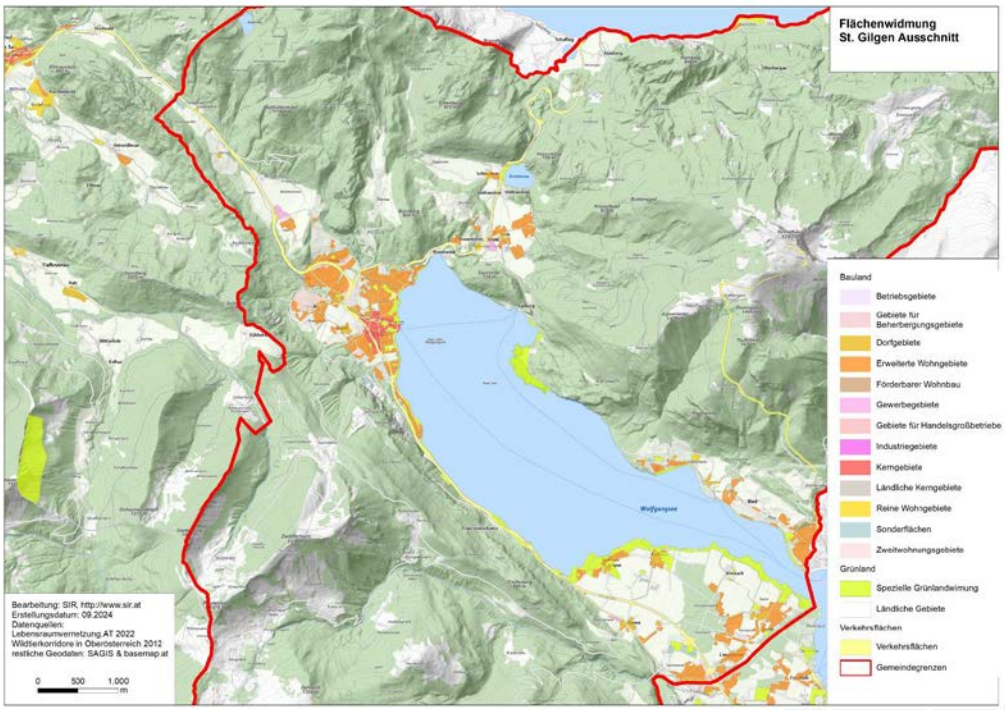


Figure 10 Area zoning plan (Flächenwidmungsplan) St. Gilgen

Working Step	Description
6	Distance analysis of areas of high nature conservation value
	The distance analysis aims to evaluate the spatial distribution and connectivity of high-value conservation areas within the St. Gilgen study area. This analysis assesses the proximity of ecologically significant habitats and corridors, identifying gaps in connectivity and priority zones for intervention. **1. Methodology and Data Sources** The distance analysis is based on: GIS-Based Habitat Mapping: Utilizing datasets from SAGIS and the Austrian Habitat Connectivity Model. Structural and Functional Connectivity Indices: Incorporating landscape permeability assessments from the LRVA-Index (2022). Overlay Analysis: Comparing protected areas, habitat networks, and urban development zones to assess conflicts and opportunities. Key datasets: Core Habitats and Corridors (based on the Habitat Connectivity Salzburg Model, Leitner 2014). Spatial Planning Data (e.g., zoning plans, nature conservation areas, and land-use designations). Distance Thresholds for Connectivity (minimum viable habitat sizes and buffer zones). **2. Key Findings from Distance Analysis** High-Priority Conservation Areas Core Habitats (Kernlebensräume): Large unfragmented forests such as Schafberg and Zwölferhorn serve as ecological anchor points. Island Habitats (Insellebensräume): Mid-sized forested patches act as secondary biodiversity reservoirs. Stepping Stone Habitats (Trittsteinlebensräume): Smaller habitat patches (e.g., wetlands, alpine pastures) function as connectivity enhancers. Distance-Based Connectivity Gaps The land strip between Fuschlsee and Wolfgangsee, bisected by the B158 road, creates a critical disconnection in the corridor network. Gaps between island habitats reduce functional connectivity, especially for species with limited dispersal capabilities. Urban expansion zones in St. Gilgen are encroaching on stepping-stone habitats, further isolating key conservation areas. Protected vs. Unprotected Conservation Areas

Working Step	Description
	Natura 2000 sites and Alpine Quiet Zones provide some level of legal protection, but many priority corridors remain unprotected. Overlap analysis shows that some high-value biodiversity areas lack formal zoning protections, increasing their vulnerability to land-use changes. **3. Strategic Implications for Ecological Connectivity** Corridor Enhancement Strategies Reducing fragmentation between core and stepping-stone habitats to increase permeability. Targeting restoration efforts in critical gaps, such as the land strip between Fuschlsee and Wolfgangsee. Buffering and Conservation Zoning Adjustments Expanding protected area buffers around key biodiversity zones to prevent further fragmentation. Incorporating distance-based connectivity metrics into land-use planning decisions. Wildlife Passage and Barrier Mitigation Implementing green bridges and underpasses at high-risk fragmentation points (e.g., B158 corridor). Enhancing ecological corridors by promoting adaptive land management (e.g., low-impact agriculture, forestry conservation). **4. Summary and Next Steps** The distance analysis reveals key gaps and barriers in habitat connectivity, particularly around urban expansion zones and infrastructure corridors. Restoration efforts should prioritize critical connectivity gaps, especially between Fuschlsee and Wolfgangsee. Conservation zoning adjustments and targeted corridor enhancements are needed to maintain ecological functionality. The findings will inform future connectivity measures in Deliverable D2.5, focusing on mitigation strategies and conservation planning.
7	Identification of priority areas for conservation and restoration
	The identification of priority areas for conservation and restoration within the St. Gilgen study area is based on ecological connectivity assessments, land-use analysis, and conservation planning frameworks. The objective is to preserve critical corridors, enhance habitat quality, and mitigate fragmentation risks. 1. Methodological Approach

Working Step	Description
	The identification process follows a multi-step evaluation based on: GIS-Based Habitat and Corridor Mapping: Integration of SAGIS data, Strategic Alpine Connectivity Areas (SACA), and land-use models. Overlay Analysis with Planning Instruments: Evaluating REK (Spatial Development Plan), FWP (Zoning Plan), and existing nature conservation designations. Functional Connectivity Indices: Using LRVA Connectivity Index (2022) to assess habitat fragmentation and permeability. Risk and Opportunity Assessment: Identifying conflict zones, restoration priorities, and intervention strategies. **2. Priority Conservation Areas in St. Gilgen** Core and Stepping-Stone Habitats Schafberg and Zwölferhorn: Large unfragmented forest areas, serving as biodiversity hotspots. Wetlands and Riparian Zones: Eibensee, Fuschlsee, and Wolfgangsee, which provide critical aquatic ecosystems. Key Ecological Corridors Interregional corridor (north of St. Gilgen, classified as SACA2): Crucial for large mammal movement and genetic exchange. Regional corridor (west of St. Gilgen): Ensures connectivity to adjacent ecological networks. Threatened and Unprotected Areas B158 Road Corridor: Acts as a major barrier, disrupting east-west connectivity between Fuschlsee and Wolfgangsee. Unprotected Green Spaces: Several high-value habitats lack formal protection, making them vulnerable to development. **3. Restoration Priorities and Measures** Strengthening Habitat Connectivity Expand buffer zones around core habitats to reduce fragmentation pressure. Restore stepping-stone habitats (e.g., grasslands, wetlands) to enhance ecological permeability. Infrastructure Mitigation Wildlife corridors and underpasses should be implemented along the B158 road to reduce its barrier effect. Integration of ecological planning measures in transportation projects to improve species movement. Zoning and Policy Adjustments Incorporate ecological corridors into municipal zoning plans (REK, FWP) to ensure long-term protection. Restrict urban expansion in priority conservation zones to minimize habitat loss.

Working Step	Description
	4. Summary and Next Steps The St. Gilgen region hosts several high-priority conservation areas, including core forests, wetland ecosystems, and migration corridors. Unprotected and threatened zones should be prioritized for restoration, particularly around urban edges and transportation corridors. Strategic conservation planning should integrate zoning, habitat connectivity measures, and wildlife-friendly infrastructure. These findings will be integrated into Deliverable D2.5, ensuring that priority conservation areas receive targeted interventions for long-term ecological resilience.
8	Recommendations for possible restoration areas Do you think we should also include recommendations for protection (possible instruments/ tools, etc)? The identification of restoration areas in the St. Gilgen pilot study is based on habitat connectivity assessments, land-use conflict evaluations, and biodiversity considerations. The following recommendations focus on enhancing ecological networks, restoring degraded habitats, and mitigating land-use pressures. **1. Prioritized Restoration Areas** Wetland and Riparian Zone Restoration Target Areas: Eibensee, Wolfgangsee, and Fuschlsee wetlands. Action: Hydrological restoration, buffer zone establishment, and invasive species control. Goal: Improve water retention, reduce habitat fragmentation, and increase biodiversity. Forest Corridor Expansion and Connectivity Target Areas: Schafberg and Zwölferhorn forest corridors. Action: Reforestation with native species, expanding buffer areas, and reducing human disturbance. Goal: Enhance functional corridors for large mammals and maintain genetic flow. Stepping-Stone Habitat Rehabilitation Target Areas: Meadow and grassland areas between settlement zones and protected habitats. Action: Restoring natural grasslands, promoting sustainable grazing, and protecting small biotopes. Goal: Increase structural connectivity and support pollinator species and small mammals. Infrastructure Impact Mitigation

Working Step	Description
	Target Areas: B158 road corridor (barrier between Fuschlsee and Wolfgangsee). Action: Wildlife crossings, green bridges, and underpasses to improve connectivity. Goal: Reduce road mortality and facilitate safe wildlife movement. **2. Should We Include Recommendations for Protection Measures?** Yes! Protection measures are essential to complement restoration efforts and ensure long-term habitat security. Spatial Planning Instruments Integration into Zoning Plans (REK, FWP): Ensuring conservation areas are designated in local spatial development plans. Buffer Zones: Establishing mandatory buffer zones around restored and high-value habitats. Legal and Policy Tools Land-Use Restrictions: Limiting urban expansion into ecologically sensitive areas. Municipal Policy Alignment: Strengthening the protection of migration corridors in local governance frameworks. Financial Incentives for Landowners Subsidies for Conservation Management: Supporting farmers and private landowners in maintaining biodiversity-friendly land-use practices. Funding for Long-Term Monitoring: Establishing financial mechanisms to track and maintain habitat improvements. Community Engagement and Awareness Stakeholder Involvement: Collaborating with local authorities, NGOs, and landowners to promote sustainable land-use. Educational Programs: Raising awareness on the importance of ecological connectivity for local communities. **3. Summary and Next Steps** Restoration should focus on wetlands, forest corridors, and stepping-stone habitats. Barrier mitigation (B158 road crossings) is crucial for enhancing species movement. Protection strategies must be integrated into zoning, policy frameworks, and land-use incentives. Long-term monitoring and stakeholder collaboration are essential for success. These recommendations align with the Impact Assessment (A2.4) findings and will be further elaborated in Deliverable D2.5 for planning integration.

4 Results

Resulting from the analysis of the different studies, the following visualisation could be identified (see Fig. 9).

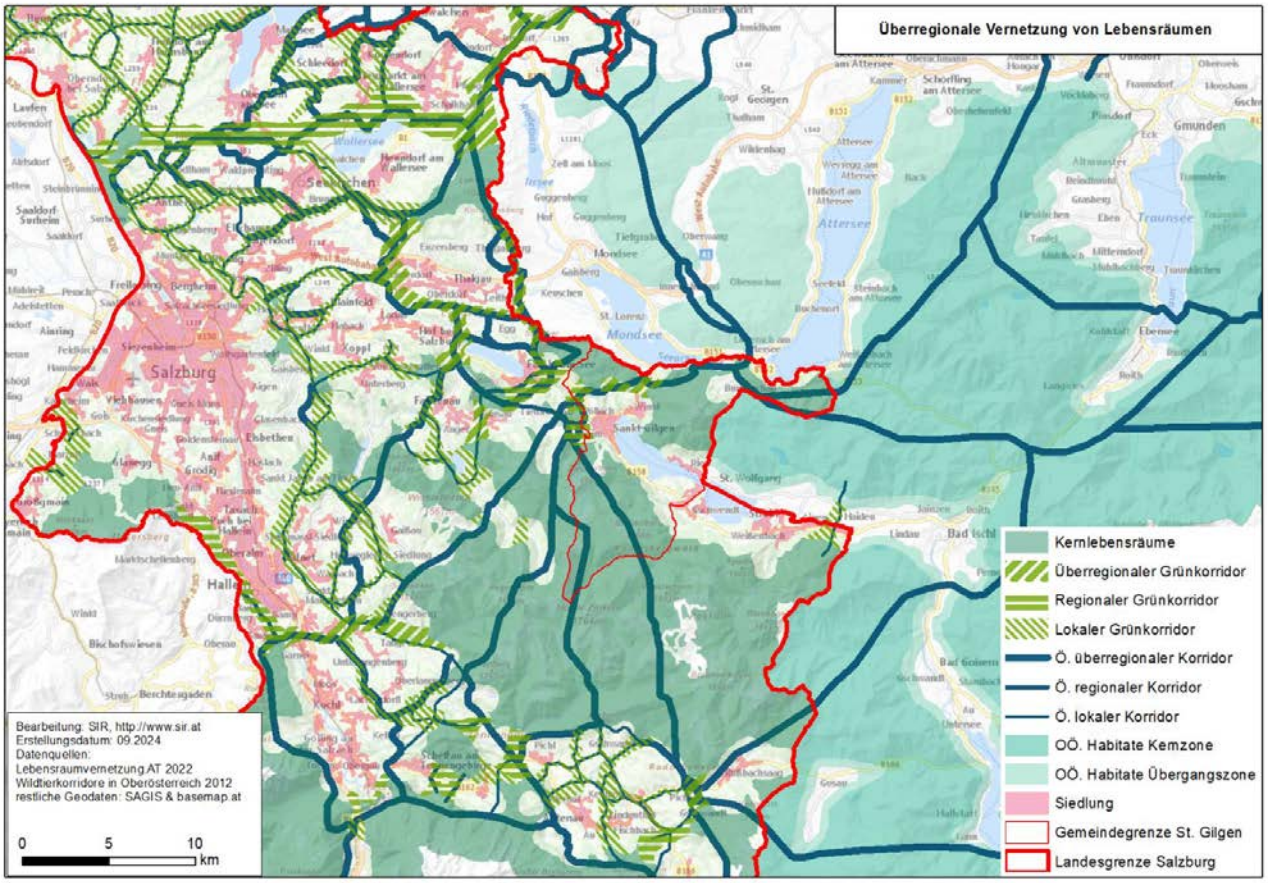


Figure 11 Interregional Habitat Connectivity in the Case Study Area

The habitat connectivity in the Flachgau/Tennengau case study region is now shown, including the interregional corridors across the federal state border that connect to the habitats in Upper Austria. Interregional, regional and local corridors and core habitats were identified as components of the habitat network. The settlement areas that represent important barriers are marked in red.

For the focus municipality of St. Gilgen, it was possible to work out that significant corridors run here. An interregional corridor runs through the north of the municipality. A regional corridor runs to the west of the municipality. These are of particular importance, as there are no other corridors in the region, especially in an east-north-east direction.

5 Recommendations for possible connectivity measures

The following connectivity measures are based on ecological assessments, GIS-based habitat analysis, and land-use impact evaluations from the St. Gilgen case study. These recommendations focus on nature conservation strategies, ensuring habitat connectivity without considering detailed planning measures, which will be covered in Deliverable D2.5.

5.1 Strengthening Habitat Connectivity

Restoration of Degraded Corridors

- Target Areas: Land strip between Fuschlsee and Wolfgangsee, classified as a SACA2 connectivity zone.
- Action: Reintroduce native vegetation, expand buffer zones, and reduce habitat fragmentation in urban-peripheral areas.
- Goal: Restore stepping-stone habitats to increase landscape permeability.

Enhancing Core and Stepping-Stone Habitats

- Target Areas: Schafberg and Zwölferhorn forests, wetlands around Eibensee.
- Action: Protect and expand high-value core habitats and link them with smaller stepping-stone biotopes.
- Goal: Ensure uninterrupted ecological corridors, especially for large mammals and bird migration pathways.

Wildlife-Friendly Agricultural Practices

- Target Areas: Grassland areas and extensively managed farmland adjacent to existing corridors.
- Action: Encourage low-intensity grazing, agroforestry, and hedgerow planting to maintain habitat connectivity.
- Goal: Balance biodiversity conservation with sustainable land use.

5.2 Infrastructure Mitigation for Barrier Reduction

Wildlife Passage Measures Along Major Roads

- Target Areas: B158 corridor between Fuschlsee and Wolfgangsee, identified as a critical ecological barrier.
- Action: Construct green bridges and underpasses to enable safe wildlife movement.
- Goal: Reduce road mortality and increase corridor permeability for species migration.

Adaptation of Land Use Regulations

- Target Areas: Peri-urban expansion zones in St. Gilgen affecting connectivity.
- Action: Implement buffer zones around protected areas and restrict developments that further fragment ecological corridors.
- Goal: Maintain long-term ecological integrity while allowing controlled urban expansion.

Reducing Human Disturbance in Key Corridors

- Target Areas: Sensitive wetlands and riparian zones such as Eibensee and the northern shore of Wolfgangsee.
- Action: Regulate access, establish seasonal protection zones, and minimize light and noise pollution in wildlife-sensitive areas.
- Goal: Preserve functional ecosystems while allowing sustainable recreational use.

5.3 Adaptive Land-Use Management for Climate Resilience

Buffering and Restoration of Wetland Habitats

- Target Areas: Lowland wet meadows and riparian forests along major water bodies.
- Action: Implement hydrological restoration measures, prevent soil erosion, and improve water retention capacity.
- Goal: Increase ecosystem resilience against climate change impacts.

Corridor Management for Climate-Adapted Species Movement

- Target Areas: Higher-elevation transition zones on Zwölferhorn and Schafberg.
- Action: Expand ecological corridors upwards to accommodate species migration due to rising temperatures.
- Goal: Facilitate species adaptation to changing climate conditions.

Integration of Renewable Energy with Ecological Networks

- Target Areas: Potential renewable energy zones within or near ecological corridors.
- Action: Implement biodiversity-sensitive renewable energy planning, ensuring low-impact solar/wind developments do not compromise connectivity.
- Goal: Balance renewable energy expansion with habitat protection.

5.4 Summary and Next Steps

- Enhance connectivity by restoring degraded habitats and reducing fragmentation pressures.
- Mitigate infrastructure barriers through green bridges, underpasses, and adapted zoning policies.
- Adapt conservation measures to ensure resilience against climate change impacts.
- Integrate biodiversity-sensitive land-use planning to prevent further habitat loss.

These measures serve as a baseline for conservation efforts and will be further refined in Deliverable D2.5, focusing on technical and policy-driven planning strategies.

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