REPUBLIC OF TURKEY
MINISTRY OF TRANSPORT
AND INFRASTRUCTURE

AYGM
Altyapı Yatırımları Genel Müdürlüğü

ÇINAR®
ENGINEERING
CONSULTANCY INC.



DİVRİĞİ-KARS-GEORGIA BORDER RAILWAY LINE REHABILITATION AND MODERNIZATION PROJECT

BIODIVERSITY MANAGEMENT PLAN

CNR-ETMIC-BMP-001

(Final)

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Project Location	**Divriği-Erzincan-Erzurum-Kars-Georgia Border**
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Report Submission Date	**December 2024**

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ABBREVIATIONS & ACRONYMS

AYGM	General Directorate of Infrastructure Investments
BMP	Biodiversity Management Plan
CR	Critically Endangered
EN	Endangered
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standard
IUCN	International Union for Conservation of Nature
IVMP	Integrated Vegetation Management Plan
LC	Least Concern
NT	Near Threatened
PIU	Project Implementation Unit
RoW	Right of Way
SEP	Stakeholder Engagement Plan
SSC	Species Survival Commission
VU	Vulnerable
WB	World Bank

APPENDICES

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1 INTRODUCTION

The Biodiversity Management Plan (BMP) for the Project has been developed to clearly delineate actions and methodologies essential for mitigating potential impacts on biodiversity arising from the Project. The BMP encompasses the following key aspects:

- Addresses recognized biodiversity value and potential Project-related impacts.
- Integrates the findings of the Environmental and Social Impact Assessment (ESIA), including pre-construction surveys to address data gaps, and incorporates the requirements of Turkish environmental legislation and international standards.
- Allocates responsibilities for BMP implementation.
- Elaborates on site-specific control measures designed to manage impacts on natural habitats/critic habitats and species of high conservation concern along the Project route.
- Furnishes adequate information to support the development of an Integrated Vegetation Management Plan (IVMP).

The General Directorate of Infrastructure Investments (AYGM) is dedicated to adopting an adaptive management approach during BMP implementation, complying with applicable laws and Project standards, and making necessary updates to the strategies outlined in this document.

1.1 Scope

This BMP encompasses the anticipated construction and operational activities of the Project and is applicable to AYGM staff, contractors, and sub-contractors. It is imperative that contractors guarantee the incorporation of all BMP requirements into their respective management plans. Additional details regarding roles and responsibilities can be found in Chapter 1.3 of this BMP.

1.1.1 Biodiversity Values

Biodiversity values, which are targeted for mitigation measures and management strategies within the framework of this BMP, are outlined in Table 1. Due to the fact that the field surveys were undertaken in winter, limited on-site data, especially in terms of identifying the fauna composition of the area, was collected. Therefore, to address existing data gaps, particularly in terms of fauna species composition, comprehensive pre-construction surveys will be conducted to gather on-site information. The list of biodiversity values presented in Table 1 is subject to revision/update based on survey outcomes, potentially necessitating the development of additional strategies. Pre-construction surveys will led to clarify the lack of presence of fauna species and impact of the project. Distribution areas and mitigation measures if needed will be clarified. Also, the presence and population sustainability of endemic plant species will be monitored.

Table 1. Biodiversity Values of the Study Corridor

Critical Habitat	Natural Habitats	Flora Species of High Conservation Concern	Fauna Species of High Conservation Concern
E1.2 : Perennial calcareous grassland and basic steppes, E1.2B : Serpentine steppes, E1.2E : Irano-Anatolian steppes,	H5.3 : Sparsely- or un-vegetated habitats on mineral substrates not resulting from recent ice activity E1.2E : Irano-Anatolian steppes	*Onosma erzincanica* *Hedysarum yilmazunalii* *Verbascum alyssifolium* *Verbascum tuna-ekimii* *Echinophora chrysantha* *Ferulago longistylis*	*Mesocricetus brandti* *Spermophilus xanthoprymnus* *Ursus arctos* *Streptopelia turtur* *Anthus pratensis* *Haematopus ostralegus* *Vanellus vanellus*

Critical Habitat	Natural Habitats	Flora Species of High Conservation Concern	Fauna Species of High Conservation Concern
E1.B : Serpantin step, G1.1: Riparian and gallery woodland, with dominant Alnus, Betula, Populus, or Salix, G1.7 : Thermophilous deciduous woodland, and H5.3 : Sparsely- or un-vegetated habitats on mineral substrates not resulting from recent ice activity	E1.2B : Serpentine steppes E1.2 : Perennial calcareous grassland and basic steppes G1.7 : Thermophilous deciduous woodland D5.3 : Swamps and marshes dominated by Juncus effusus or other large Juncus spp. G1.1: Riparian and gallery woodland, with dominant Alnus, Betula, Populus, or Salix E4.3 : Acid alpine and subalpine grassland G3.4 : Pinus sylvestris woodland south of the taiga	*Centaurea aucheirana* *Hesperis breviscapa* *Physoptychis haussknechtii* *Campanula yildirimlii* *Tymus spathulifolius* *Achillea sintenisii* *Achillea pseudoaleppica* *Centaurea derderifolia* *Centaurea huber-morathii* *Cousinia sintenisii* *Scorzonera aucherana* *Tanacetum heterotomum* *Isatis sivasica* *Tchihatchewia isatidea* *Campanula munzurensis* *Gypsophila heteropoda subsp. minutiflora* *Gypsophila aucheri* *Silene nerimaniae* *Ebenus macrophylla* *Paronychia arabica subsp. euphratica* *Origanum haussknechtii* *Salvia euphratica ssp. leiocalycina* *Stachys inanis* *Thymus cappadocicus var. cappadocicus* *Glaucium cappadocicus* *Plantago euphratica* *Reseda armena var. scabridula* *Thesium stelleroides* *Gladiolus hamzaoglui* *Allium purpureoviride* *Hyacinthella acutiloba* *Asphodeline tenuior var. puberulenta* *Limoniopsis owerinii* *Beta macrorhiza*	*Clanga clanga* *Gypaetus barbatus* *Neophron percnopterus* *Aythya ferina* *Oxyura leucocephala* *Vipera eriwanensis* *Testudo graeca* *Alburnus escherischi* *Capoeta tinca* *Gobio obtusirostris* *Cryptocephalus paphlagonius* *Eulasia chrysopyga* *Zonitis nigriventris* *Dysmachus safranboluticus* *Tipula guentheri* *Phengaris nausithous* *Phengaris nausithous* *Polyommatus merhaba*

Pre-construction surveys for fauna species will be performed between May and September, to identify and evaluate high concern species prior to completion of detail design. Also, impact on these species will be determined and necessary mitigation measures will be determined, and the BMP will be updated.

Invertebrate surveys should be performed at Divriği Hills Important Nature Area, Esence (Keşiş Mountains) Important Nature Area, and Kop Mountains Important Plant Area in vegetation period (April-August) once.

Amphibian and reptile surveys should be performed at Esence (Keşiş Mountains) Important Nature Area and Kop Mountains Important Plant Area in vegetation period (April-August) once.

Bird surveys should be performed at Ekşisu Reedbeds Wetland of National Importance, Erzurum Marshes Wetland of Local Importance, Çıldır Lake Wetland of National Importance, and Esence (Keşiş Mountains) Important Nature Area in migration and breeding periods for 5 days monthly.

Mammal surveys should be performed at Esence (Keşiş Mountains) Important Nature Area in active period of mammals (April-September) once.

These surveys will be performed in pre-construction phase by the Contractor in supervision of AYGM.

Monitoring and seed collection surveys for flora species should be carried out in May, June, July and August, taking into account the flowering periods of the species. For *Hyacinthella acutiloba* and *Asphodeline tenuior* var. *puberulenta*; and *Allium purpureoviride* May; *Onosma erzincanica, Centaurea aucheirana, Hesperis breviscapa, Physoptychis haussknechtii, Tymus spathulifolius, Achillea sintenisii, Achillea pseudoaleppica, Centaurea derderifolia, Centaurea huber-morathii, Cousinia sintenisii, Scorzonera aucherana, Tanacetum heterotomum, Isatis sivasica, Tchihatchewia isatidea, Campanula munzurensis, Gypsophila heteropoda subsp. Minutiflora, Gypsophila aucheri, Silene nerimaniae, Ebenus macrophylla, Paronychia arabica subsp. Euphratica, Origanum haussknechtii, Salvia euphratica ssp. Leiocalycina, Stachys inanis, Thymus cappadocicus var. cappadocicus, Glaucium cappadocicus, Plantago euphratica, Reseda armena var. scabridula, Thesium stelleroides, Gladiolus hamzaoglui, and Beta macrorhiza* June; *Hedysarum yilmazunalii, Verbascum alyssifolium, Verbascum tuna-ekimii, Ferulago longistylis*, and *Campanula yildirimlii* July; *Echinophora chrysantha* and *Limoniopsis owerinii* August.

These surveys will be conducted by the Contractor in supervision of AYGM.

1.1.2 Potential Impacts on Biodiversity Values

Potential impacts on biodiversity due to planned Project activities include:

- Habitat loss, involving the deprivation of feeding, nesting, and breeding areas, coupled with degradation.
- Animal mortality risks, attributed to collisions, electrocution, wire strikes, and rail entrapment.
- Disturbances from light, noise, and vibrations.
- Pollution of air, soil, and water.
- Soil erosion.
- Alterations to local hydrology.
- Risks of fire hazards.
- The potential introduction of invasive alien species.

1.2 Objective

The main objective of the BMP is to develop strategies to manage impacts on biodiversity, minimizing losses and disturbance to habitats and species, as well as to the ability of wildlife to traverse habitat corridors.

Project construction activities can create negative outcomes on the ecological environment through which the route passes, with some of the areas such as Legally Protected Areas and Internationally Recognized Areas being regarded as highly sensitive and highly valued ecological sites exhibiting a wide range of biodiversity. This BMP therefore:

- Outlines actions and measures necessary for the effective management of biodiversity along the route;

- Covers identified impacts upon biodiversity;
- Details specific control measures to be implemented by AYGM and its contractors (and subcontractors), to achieve this;
- Incorporates the requirements of the ESIA findings, international standards, Türkiye legislation, Lenders requirements and Project-specific environmental permits.

By doing this, AYGM defines the actions and measures necessary for the overall management of biodiversity for both the Project beneficiary and contractors in line with the applicable law and other obligations.

Specific biodiversity management objectives for the Project are outlined in Table 2.

Table 2: Biodiversity Management Objectives

Objective	Target	Performance Indicator
Endemic/Rare Plant Species Protection	Seed Collection and Preservation Proper Soil Management Monitoring with Biologist Supervision	Seeds collected and preserved at the gene bank. Monitoring of these areas and reporting after monitoring periods. Soil erosion should be prevented. Contamination of soil should be prevented.
Critical Habitat Management	No vegetation clearance will be undertaken outside the Project footprint. No Project related activities will be carried out in the critical habitats. Habitat Monitoring Endemic species monitoring	No reported incidents of vegetation clearance outside the Project footprint. No reported project related activities in critical habitats Status of the species identified and reported.
Identify current distribution of triggering fauna Species	Population status of the species will be re-assessed to conclude whether it triggers critical habitat prior to the finalization of detailed design. Species-specific measures will be updated based on pre-construction survey results.	Status of the species identified and reported.
Minimize extent of vegetation clearance in natural habitats	No vegetation clearance will be undertaken outside the Project footprint.	No reported incidents of vegetation clearance outside the Project footprint. Monitoring reports on the integrity natural habitats.
Minimize impacts of habitat fragmentation	Significant locations for wildlife crossings will be identified, and appropriate methods to prevent animal crossings will be implemented.	Wildlife crossings designed and located at areas crucial to animal passage. Different methods implemented so that animals do not enter the RoW.
Minimize injury or mortality of fauna species	Additional pre-construction surveys are conducted to underpin target species and their habitat preferences. On-site speed limits will be enforced and the Project personnel will receive necessary trainings.	Reported incidents on fauna injuries or death due to Project activities. On-site traffic management in place.
Raise awareness among internal and external stakeholders on biodiversity and conservation priorities	Internal capacity will be developed to undertake biodiversity studies, external expert input will be acquired as necessary. Trainings/meetings will be organized to inform internal and external stakeholders within the scope of the Stakeholder Engagement Plan (SEP).	Reports on trainings, information disclosure meetings and attendants. SEP being implemented and updated as necessary.
Develop and implement a Biodiversity Monitoring	Resource allocation and expert input will be provided so that statuses of habitats and species will be monitored throughout all phases of the Project.	Program developed and implemented. Periodical monitoring reports prepared and results evaluated.

Objective	Target	Performance Indicator
and Evaluation Program	Based on monitoring results, habitat and species-specific management strategies will be developed as necessary.	

1.3 Roles and Responsibilities

AYGM holds the responsibility for executing the strategies and mitigation measures outlined in this BMP. Specifically, the Project Implementation Unit (PIU) of AYGM, along with the Environmental and Social Management team within, is tasked with overseeing actions pertaining to biodiversity values and conservation measures as stipulated in the Environmental and Social Impact Assessment (ESIA) and BMP. Contractors and sub-contractors engaged in Project activities during land preparation and construction will appoint their own qualified personnel to manage issues related to biodiversity. Also, during operation phase TCDD will be appoint their own qualified personnel to manage issues related to biodiversity.

The primary responsibilities in the implementation of the BMP include:

- Ensuring compliance with Project standards.
- Executing biodiversity conservation measures and management controls.
- Monitoring the successful implementation of the BMP.
- Identifying adverse impacts on habitats and species and taking additional measures as necessary.

In the execution of biodiversity studies, external experts will be engaged, supplementing the efforts of AYGM and contractor/sub-contractor staff. Biodiversity experts bear the responsibility for conducting additional field surveys, assessing results, implementing necessary measures within the BMP framework, formulating strategies for the implementation of the Biodiversity Monitoring and Evaluation Program, and reporting all findings to AYGM and contractors/sub-contractors.

2 LEGISLATIVE FRAMEWORK

The legislative framework for the Project has been developed to encompass not only Turkish Environmental and Social Legislation but also the Labor Law and Regulations, World Bank Environmental and Social Standards (ESSs), and Environmental Health and Safety Guidelines. A comprehensive overview of the "Institutional and Legislative Framework" is provided within the Environmental and Social Management Plan (ESMP). This section outlines national legislation and international standards related to biodiversity studies, aligning with the institutional and legal framework established for the Project.

2.1 National Legislation

The Environmental Law No. 2872 is geared towards the protection of the natural environment, aligning with sustainable development principles. An expansion of its framework occurred with the enactment of Law 5491 on April 26, 2006, amending the Environmental Law. This amendment introduced essential principles for biodiversity conservation. Article 6 of the Law underscores the significance of protecting biodiversity and outlines penal sanctions for environmental damage, including the destruction of biological diversity, detected through inspections and audits.

Regulations issued under the Environmental Law establish rules for pollution prevention and environmental impact assessment. Turkey's laws and regulations concerning the conservation of habitats and species, along with national strategy documents aimed at implementing statutory biodiversity conservation principles outlined in relevant laws and regulations, are comprehensively detailed in Table 3.

Table 3: National Legislation

Turkish Laws and Regulation	National Strategy Documents
▪ Law on National Parks ▪ Forestry Law ▪ Law for the Protection of Cultural and Natural Assets ▪ Terrestrial Hunting Law ▪ Law on Fisheries ▪ Law for the Protection of Animals ▪ Pasture Law ▪ Regulation on Conservation of Wetlands ▪ Regulation on Fisheries ▪ Regulation on Protection of Wildlife and Wildlife Development Areas	▪ National Biological Diversity Strategy and Action Plan ▪ National Environmental Action Plan ▪ National Plan for In-Situ Conservation of Plant Genetic Diversity ▪ National Agenda 21 Programme ▪ National Wetland Strategy ▪ Turkish National Forestry Programme ▪ National Science and Technology Policies 2003-2023 Strategy Document ▪ Turkish National Action Programme Against Desertification ▪ National Environmental Strategy ▪ National Rural Development Strategy ▪ National Biological Diversity Strategy and Action Plan

The National Biological Diversity Strategy and Action Plan, last updated in 2007, is a response to the obligation to formulate a national strategy to guide the implementation of the Convention on Biological Diversity (CBD). The primary objective of this Strategy is to provide a concise identification and assessment of Turkey's biological diversity, establish a collectively agreed-upon conservation strategy, and propose the necessary actions to achieve the goals of Biodiversity Conservation in Turkey. The Strategy delineates current legal responsibilities related to biological diversity, underscores the significance of international cooperation in policy-making, emphasizes the importance of research conditions for ecosystem management development, and incorporates a definition and assessment of Turkey's biological diversity, along with strategies and priority action plans aligned with the overarching goals.

2.2 International Standards

The World Bank Environmental and Social Standard (ESS) 6

The primary objective of ESS6 on *Biodiversity Conservation and Sustainable Management of Living Natural Resources* is the conservation and protection of biodiversity and living natural resources, aligning with the pursuit of sustainable development. A key emphasis is placed on maintaining the ecological functions of habitats and the biodiversity they sustain. Biodiversity often forms the foundation for ecosystem services, and adverse impacts on biodiversity can consequently affect these services. The World Bank addresses requirements related to ecosystem services in ESS1 on *Assessment and Management of Environmental and Social Risks and Impacts*.

The main objectives outlined in ESS6 are as follows:

- To protect and conserve biodiversity and habitats.
- To apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could potentially impact biodiversity.
- To promote the sustainable management of living natural resources.
- To support the livelihoods of local communities, including Indigenous Peoples, and foster inclusive economic development through the adoption of practices that integrate conservation needs and development priorities.

ESS6 requires that the following are described in the assessment of biodiversity-related risks and impacts:

- Ecosystems affected
- Species affected
- Ecosystems services affected
- Protection status
- Site ownership and control
- Baseline threats
- Potential project-related risks and impacts

Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.

If natural habitats are identified as part of the assessment, the Borrower will seek to avoid adverse impacts on them in accordance with the mitigation hierarchy. Where natural habitats have the potential to be adversely affected by the project, the Borrower will not implement any project-related activities unless:

(a) There are no technically and financially feasible alternatives; and

(b) Appropriate mitigation measures are put in place, in accordance with the mitigation hierarchy, to achieve no net loss and, where feasible, preferably a net gain of biodiversity over the long term. When residual impacts remain despite best efforts to avoid, minimize and mitigate impacts, and where appropriate and supported by relevant stakeholders, mitigation measures may include biodiversity offsets adhering to the principle of "like-for-like or better."

Critical habitat is defined as areas with high biodiversity importance or value, including:

(a) Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches;

(b) Habitat of significant importance to endemic or restricted-range species;

(c) Habitat supporting globally or nationally significant concentrations of migratory or congregatory species;

(d) Highly threatened or unique ecosystems; and

(e) Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).

In areas of critical habitat, the Borrower will not implement any project activities that have potential adverse impacts unless all of the following conditions are met:

(a) No other viable alternatives within the region exist for development of the project in habitats of lesser biodiversity value;

(b) All due process required under international obligations or national law that is a prerequisite to a country granting approval for project activities in or adjacent to a critical habitat has been complied with;

(c) The potential adverse impacts, or likelihood of such, on the habitat will not lead to measurable net reduction or negative change in those biodiversity values for which the critical habitat was designated;

(d) The project is not anticipated to lead to a net reduction in the population of any Critically Endangered, Endangered, or restricted-range species, over a reasonable time period;

(e) The project will not involve significant conversion or significant degradation of critical habitats. In circumstances where the project involves new or renewed forestry or agricultural plantations, it will not convert or degrade any critical habitat;

(f) The project's mitigation strategy will be designed to achieve net gains of those biodiversity values for which the critical habitat was designated; and

(g) A robust and appropriately designed, long-term biodiversity monitoring and evaluation program aimed at assessing the status of the critical habitat is integrated into the Borrower's management program.

In planning and undertaking E&S assessment related to the biodiversity baseline, the Borrower is required to follow relevant GIIP utilizing desktop review, consultation with experts and field-based approaches, as appropriate.

Where identified, risks and impacts on biodiversity or habitats are required to be managed by the Borrower in accordance with the mitigation hierarchy and GIIP. Given ecological systems are highly complex, it is very hard and at times impossible to make reliable estimations on long-term impact associated with project activities. Therefore, in management of risks where there is high levels of uncertainty, it is important to adopt a precautionary approach and implement adaptive management strategies that can respond to monitoring results. In the precautionary principle, the main emphasis is on avoiding actions with potentially harmful (and particularly with irreversible) consequences until there is sufficient information available to properly assess and weigh the likely costs and benefits. Adaptive management involves adjusting actions and approached based on the results of ongoing monitoring.

The Borrower is required to ensure that competent biodiversity expertise is utilized to conduct the E&S assessment and the verification of the effectiveness and feasibility of mitigation measures. Where significant risks and adverse impacts on biodiversity have been identified, the Borrower will develop and implement a project-specific Biodiversity Management Plan (BMP) to address such risks and impacts.

3 MITIGATION MEASURES AND MANAGEMENT CONTROLS

In accordance with the provisions of ESS6, a biodiversity impact assessment has been carried out within the framework of the Environmental and Social Impact Assessment (ESIA), following the mitigation hierarchy. The primary objective of the Project's biodiversity studies is to formulate and implement mitigation measures and actions with the aim of achieving no net loss in natural habitats and species of high conservation concern, while also striving for net gains in critical habitat.

Potential impacts on critical habitats, identified within the scope of the Project's biodiversity features, will be addressed using the mitigation hierarchy. Avoidance will be prioritized as the initial step, while for endemic/rare plant species, identification and monitoring measures will be employed to safeguard the population. Images of locally and regionally endemic species, as well as non-endemic but rare species identified in the project area, are given in Appendix-1. The list of local, regional endemic and rare species is given in Table 4. Also, distribution areas of these species are given in Figure 1.

Table 4. High Conservation Concern Flora Species of the Biodiversity Study Area

Species	Turkish Name	RDB	Coordinates	Survey Location
Onosma erzincanica	Erzincan emzikotu	CR	37S 527389-4388047	Loc 12
			37S 492216-4380433	Loc 3
Hedysarum yilmazunalii	Erzincan batalağı	CR	37S 492216-4380433	Loc 3
Verbascum alyssifolium	Kuduzkuyruk	CR	37S 467915-4371980	Loc 2
Verbascum tuna-ekimii	Ekim sığırkuyruğu	CR	37S 525934-4386912	Loc 11
			37S 532694-4386927	Loc 10
			37S 495420-4381360	Loc 5
Echinophora chrysantha	Yıldız çördüğü	EN	37S 525934-4386912	Loc 11
			37S 492216-4380433	Loc 3
Ferulago longistylis	Dişi kişniş	EN	37S 572872-4384096	Loc 15
			37S 578685-4381964	Loc 17
Centaurea aucheirana	Çeşit tülübaş	EN	37S 492216-4380433	Loc 3
Hesperis breviscapa	Yayla akşamyıldızı	EN	37S 492216-4380433	Loc 3
Physoptychis haussknechtii	Gezertere	EN	37S 492216-4380433	Loc 3
Campanula yildirimlii	Yiğit çıngırağı	EN	37S 456608-4366613	Loc 26
Tymus spathulifolius	Kaşık kekiği	EN	37S 467915-4371980	Loc 2
Achillea sintenisii	Kuruçay perçemi	VU	37S 421801-4365156	Loc 1
			37S 467915-4371980	Loc 2
Achillea pseudoaleppica	Harput perçemi	VU	37S 467915-4371980	Loc 2
			37S 493146-4381037	Loc 4
Centaurea derderifolia	Bağ sarıbaşı	VU	37S 493146-4381037	Loc 4
Centaurea huber-morathii	Ayaklı tülübaş	VU	37S 636074-4422532	Loc 19
Cousinia sintenisii	Bayırkızanı	VU	37S 467915-4371980	Loc 2
			37S 493146-4381037	Loc 4
			37S 532701-4391459	Loc 13
Scorzonera aucherana	Buz tekesakalı	VU	37S 467915-4371980	Loc 2
Tanacetum heterotomum	Soluk pireotu	VU	37S 467915-4371980	Loc 2
			37S 636074-4422532	Loc 19
Isatis sivasica	Sivas çivitotu	VU	37S 467915-4371980	Loc 2

Species	Turkish Name	RDB	Coordinates	Survey Location
Tchihatchewia isatidea	Allıgelin	VU	37S 492216-4380433	Loc 3
Campanula munzurensis	Munzurçanı	VU	37S 512453-4384331	Loc 8
Gypsophila heteropoda subsp. minutiflora	Cüce karşani	VU	37S 467915-4371980	Loc 2
Gypsophila aucheri	Çöven	VU	37S 467915-4371980	Loc 2
			37S 492216-4380433	Loc 3
			37S 493146-4381037	Loc 4
			37 S 521365-4387222	Loc 9
			37 S 532694-4386927	Loc 10
			37 S 525934-4386912	Loc 11
			37 S 577026-4382383	Loc 16
			37 S 578685-4381964	Loc 17
Silene nerimaniae	Sultan nakılı	VU	37S 492216-4380433	Loc 3
Ebenus macrophylla	Ulugeven	VU	37S 467915-4371980	Loc 2
Paronychia arabica subsp. euphratica	Fırat etyaranı	VU	37S 492216-4380433	Loc 3
Origanum haussknechtii	Dağ mercanı	VU	37S 492216-4380433	Loc 3
Salvia euphratica ssp. leiocalycina	Fırat şalbası	VU	37S 493146-4381037	Loc 4
			37 S 495420-4381360	Loc 5
			37 S 505216-4384156	Loc 6
			37 S 509127-4384210	Loc 7
			37 S 512453-4384331	Loc 8
			37S 532701-4391459	Loc 13
Stachys inanis	Bağış çayı	VU	37S 492216-4380433	Loc 3
Thymus cappadocicus var. cappadocicus	Taşkekiği	VU	37S 467915-4371980	Loc 2
Glaucium cappadocicus	Boynuzlu gelincik	VU	37S 467915-4371980	Loc 2
Plantago euphratica	Toklubaşı	VU	37S 467915-4371980	Loc 2
			37S 493146-4381037	Loc 4
			37 S 495420-4381360	Loc 5
Reseda armena var. scabridula	Hasgerdanlık	VU	37S 492216-4380433	Loc 3
Thesium stelleroides	Anagüvelek	VU	37S 467915-4371980	Loc 2
Gladiolus hamzaoglui	İliç kargasoğanı	VU	37S 492216-4380433	Loc 3
Allium purpureoviride	Renkli soğan	VU	37S 492216-4380433	Loc 3
Hyacinthella acutiloba	Sivrisümbül	VU	37S 492216-4380433	Loc 3
Asphodeline tenuior var. puberulenta	Tesbihcik	VU	37S 492216-4380433	Loc 3
Limoniopsis owerinii	Eğin kuduzotu	VU	37S 456608-4366613	Loc 26
Beta macrorhiza	Kızıl pancar	VU	37S 492216-4380433	Loc 3

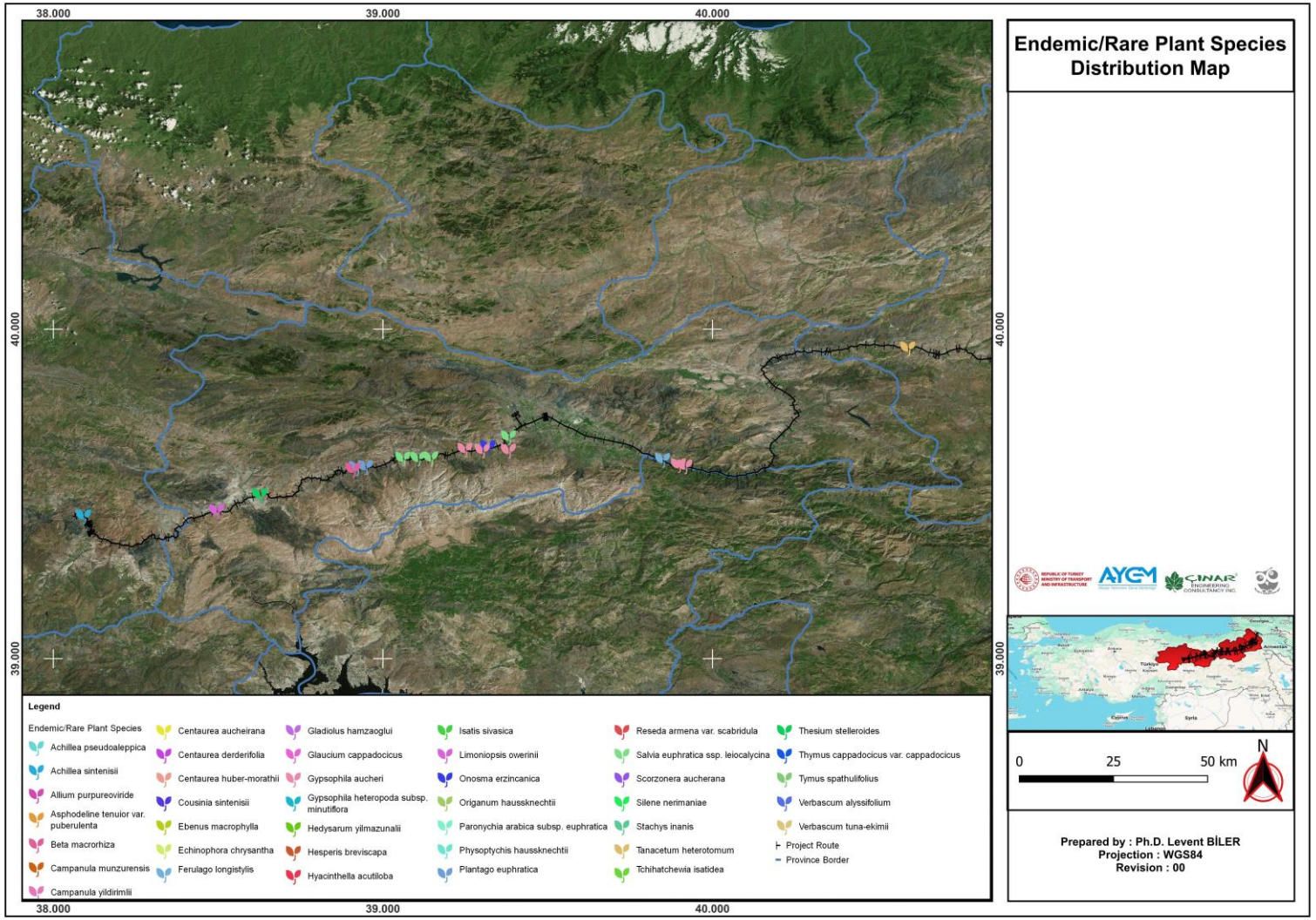


Figure 1. Distribution Area of Endemic/Rare Plant Species

As a result of field surveys conducted on the route, a total of 81 endemic plant species have been identified in the project area, with 38 being regional endemics (such as *Echinophora chrysantha, Ferulago longistylis, Achillea sintenisii, Achillea pseudoaleppica, Centaurea aucherana, Centaurea derderifolia, Centaurea huber-morathii, Cousinia sintenisii, Scorzonera aucherana, Tanacetum heterotomum, Onosma erzincanica, Hesperis breviscapa, Isatis sivasica, Physoptychis haussknechtii, Tchihatchewia isatidea, Campanula yildirimlii, Campanula munzurensis, Gypsophila heteropoda subsp. minutiflora, Gypsophila aucheri, Silene nerimaniae, Ebenus macrophylla, Hedysarum yilmazunalii, Paronychia arabica ssubsp. euphratica, Origanum haussknechtii, Salvia euphratica ssp. leiocalycina, Stachys inanis, Thymus cappadocicus var. cappadocicus, Tymus spathulifolius, Glaucium cappadocicus, Plantago euphratica, Reseda armena var. scabridula, Thesium stelleroides, Verbascum alyssifolium, Verbascum tuna-ekimii, Gladiolus hamzaoglui, Allium purpureoviride, Hyacinthella acutiloba, and Asphodeline tenuior var. puberulenta*), and 43 having a broader distribution. The endemism rate is approximately 19%. Considering that around 70% of the route is agricultural or modified land, the high endemism rate can be attributed to the critical habitats present along the route.

In the project area, the IUCN categories for the local endemic species *Onosma erzincanica, Hedysarum yilmazunalii, Verbascum alyssifolium*, and *Verbascum tuna-ekimii* are classified as 'Critically Endangered, CR.' For the regional endemic species, *Echinophora chrysantha, Ferulago longistylis, Centaurea aucherana, Hesperis breviscapa, Physoptychis haussknechtii, Campanula yildirimlii,* and *Tymus spathulifolius*, they are categorized as 'Endangered, EN.' Additionally, regional endemic species such as *Achillea sintenisii, Achillea pseudoaleppica, Centaurea derderifolia, Centaurea huber-morathii, Cousinia sintenisii, Scorzonera aucherana, Tanacetum heterotomum, Isatis sivasica, Tchihatchewia isatidea, Campanula munzurensis, Gypsophila heteropoda subsp. minutiflora, Gypsophila aucheri, Silene nerimaniae, Ebenus macrophylla, Paronychia arabica ssubsp. euphratica, Origanum haussknechtii, Salvia euphratica ssp. leiocalycina, Stachys inanis, Thymus cappadocicus var. cappadocicus, Glaucium cappadocicus, Plantago euphratica, Reseda armena var. scabridula, Thesium stelleroides, Gladiolus hamzaoglui, Allium purpureoviride, Hyacinthella acutiloba*, and *Asphodeline tenuior* var. *puberulenta* are categorized as 'Vulnerable, VU.' The species *Limoniopsis owerinii* and *Beta macrorhiza*, which are not endemic but have a rare distribution, are also classified as 'Vulnerable, VU' at the national level. The population status of local and regionally distributed endemic or rare species in the project area is provided in Table 5.

Table 5. The populations of local and regional endemic species, as well as non-endemic but rare species along the route, the percentage of their total populations on the route to the total population in Turkey, and threats/suggestions

Species	RDB	Pop. At the Area	Pop. Türkiye ratio	Threats/Recommendations
Onosma erzincanica	CR	20	0.2-0.3	Due to habitat loss, a decline in population is anticipated. Therefore, in July, seeds of populations along the route should be collected and planted in suitable habitats.
Hedysarum yilmazunalii	CR	100	‰0.2-0.3	Due to habitat loss, a decline in the population is expected. Therefore, in August, seeds of populations along the route should be collected and planted in suitable habitats.
Verbascum alyssifolium	CR	20	‰0.2-0.3	Due to habitat loss, a decline in the population is expected. Therefore, in August, seeds of populations along the route should be collected and planted in suitable habitats.
Verbascum tuna-ekimii	CR	50	%0.2-0.3	Due to habitat loss, a decline in the population is expected. Therefore, in August, seeds of populations along the route should be collected and planted in suitable habitats.
Echinophora chrysantha	EN	20	‰0.2-0.3	Due to habitat loss, a decline in the population is expected. Therefore, in September-October, seeds of populations along the route should be collected and planted in suitable habitats.
Ferulago longistylis	EN	100	‰0.2-0.3	Due to habitat loss, a decline in the population is expected. Therefore, in August-September, seeds of populations along the route should be collected and planted in suitable habitats.
Centaurea aucheirana	EN	300	‰0.2-0.3	Due to habitat loss, a decline in the population is expected. Therefore, in July-August, seeds of populations along the route should be collected and planted in suitable habitats.
Hesperis breviscapa	EN	20	%0.1-0.2	Due to habitat loss, a decline in the population is expected. Therefore, in July-August, seeds of populations along the route should be collected and planted in suitable habitats.
Physoptychis haussknechtii	EN	20	%0.2-0.3	Due to habitat loss, a decline in the population is expected. Therefore, in July-August, seeds of populations along the route should be collected and planted in suitable habitats.
Campanula yildirimlii	EN	20	%0.2-0.3	Due to habitat loss, a decline in the population is expected. Therefore, in August-September, seeds of populations along the route should be collected and planted in suitable habitats.
Tymus spathulifolius	EN	200	‰0.2-0.3	Due to habitat loss, a decline in the population is anticipated. Therefore, the seeds of populations along the route should be collected and planted in suitable habitats in July-August.
Achillea sintenisii	VU	50	‰0.2-0.3	Due to habitat loss, a decline in the population is expected. Therefore, in July-August, the seeds of populations along the route should be collected and planted in suitable habitats.
Achillea pseudoaleppica	VU	300	‰0.2-0.3	Due to habitat loss, a decline in the population is expected. Therefore, the seeds of populations along the route should be collected in July-August and planted in suitable habitats.
Centaurea derderifolia	VU	50	‰0.2-0.3	Due to habitat loss, a decline in the population is expected. Therefore, in July-August, the seeds of populations along the route should be collected and planted in suitable habitats.
Centaurea huber-morathii	VU	50	‰0.2-0.3	Due to habitat loss, a decline in the population is expected. Therefore, the seeds of populations along the route should be collected in July-August and planted in suitable habitats.
Cousinia sintenisii	VU	300	‰0.2-0.3	Due to habitat loss, a decline in the population is expected. Therefore, the seeds of populations along the route should be collected in July-August and planted in suitable habitats.
Scorzonera aucherana	VU	50	‰0.2-0.3	Due to habitat loss, a decline in the population is expected. Therefore, the seeds of populations along the route should be collected in July-August and planted in suitable habitats.
Tanacetum heterotomum	VU	100	‰0.2-0.3	Due to habitat loss, a decline in the population is expected. Therefore, in July-August, the seeds of populations along the route should be collected and planted in suitable habitats.
Isatis sivasica	VU	20	‰0.2-0.3	Due to habitat loss, a decline in the population is anticipated. Therefore, in July-August, the seeds of populations along the route should be collected and planted in suitable habitats.
Tchihatchewia isatidea	VU	100	‰0.2-0.3	Due to habitat loss, a decrease in the population is expected. Therefore, in July-August, the seeds of populations along the route should be collected and planted in suitable habitats.

Species	RDB	Pop. At the Area	Pop. Türkiye ratio	Threats/Recommendations
Campanula munzurensis	VU	5	%1-2	Due to habitat loss, a decrease in the population is expected. Therefore, the seeds of populations along the route should be collected in July-August and planted in suitable habitats.
Gypsophila heteropoda subsp. *minutiflora*	VU	300	‰0.2-0.3	Due to habitat loss, a decrease in the population is expected. Therefore, the seeds of populations along the route should be collected in June-July and planted in suitable habitats.
Gypsophila aucheri	VU	500	‰0.2-0.3	Due to habitat loss, a decrease in the population is anticipated. Therefore, the seeds of populations along the route should be collected in July-August and planted in suitable habitats.
Silene nerimaniae	VU	20	%1-2	Due to habitat loss, a decrease in the population is expected. Therefore, the seeds of populations along the route should be collected in July-August and planted in suitable habitats.
Ebenus macrophylla	VU	50	%0.2-0.3	Due to habitat loss, a decrease in the population is expected. Therefore, the seeds of populations along the route should be collected in July-August and planted in suitable habitats.
Paronychia arabica subsp. *euphratica*	VU	50	‰0.2-0.3	Due to habitat loss, a decrease in the population is anticipated. Therefore, it is recommended to collect the seeds of populations along the route in July-August and plant them in suitable habitats.
Origanum haussknechtii	VU	100	‰0.2-0.3	Due to habitat loss, a decline in the population is expected. Therefore, it is advisable to collect the seeds of populations along the route in July-August and plant them in suitable habitats.
Salvia euphratica ssp. *leiocalycina*	VU	500	‰0.2-0.3	Due to habitat loss, a decline in the population is expected. Therefore, it is recommended to collect the seeds of populations along the route in July-August and plant them in suitable habitats.
Stachys inanis	VU	50	‰0.2-0.3	Due to habitat loss, a decline in the population is expected. Therefore, it is recommended to collect the seeds of populations along the route in July-August and plant them in suitable habitats.
Thymus cappadocicus var. *cappadocicus*	VU	300	‰0.2-0.3	Due to habitat loss, a decline in the population is expected. Therefore, it is recommended to collect the seeds of populations along the route in July-August and plant them in suitable habitats.
Glaucium cappadocicus	VU	50	‰0.2-0.3	Due to habitat loss, a decline in the population is anticipated. Therefore, it is recommended to collect the seeds of populations along the route in July-August and plant them in suitable habitats.
Plantago euphratica	VU	20	%0.2-0.3	Due to habitat loss, a decline in the population is anticipated. Therefore, it is recommended to collect the seeds of populations along the route in July-August and plant them in suitable habitats.
Reseda armena var. *scabridula*	VU	10	‰0.2-0.3	Due to habitat loss, a decline in the population is expected to occur. Therefore, it is advisable to collect the seeds of populations along the route in July-August and plant them in suitable habitats.
Thesium stelleroides	VU	20	‰0.2-0.3	Due to habitat loss, a decline in the population is expected to occur. Therefore, it is advisable to collect the seeds of populations along the route in July-August and plant them in suitable habitats.
Gladiolus hamzaoglui	VU	100	%0.2-0.3	Due to habitat loss, a decline in the population is expected to occur. Therefore, it is advisable to collect the bulbs of populations along the route in July-August and plant them in suitable habitats.
Allium purpureoviride	VU	20	%0.2-0.3	Due to habitat loss, a decline in the population is expected to occur. Therefore, it is advisable to collect the bulbs of populations along the route in June-July and plant them in suitable habitats.
Hyacinthella acutiloba	VU	50	‰0.2-0.3	Due to habitat loss, a decline in the population is expected to occur. Therefore, it is advisable to collect the bulbs of populations along the route in May-June and plant them in suitable habitats.
Asphodeline tenuior var. *puberulenta*	VU	50	‰0.2-0.3	Due to habitat loss, a decline in the population is expected to occur. Therefore, it is advisable to collect the rhizomes of populations along the route in May-June and plant them in suitable habitats.
Limoniopsis owerinii	VU	50	‰0.2-0.3	Due to habitat loss, a decline in the population is expected to occur. Therefore, it is advisable to collect the seeds of populations along the route in September-October and plant them in suitable habitats.
Beta macrorhiza	VU	20	‰0.2-0.3	Due to habitat loss, a decline in the population is expected to occur. Therefore, it is advisable to collect the seeds of populations along the route in July-August and plant them in suitable habitats.

The following recommendations are proposed to minimize the impact on critically distributed species (IUCN Threat Categories CR, EN, VU, NT) and ensure the continuity of population of endemic species along the Project route.

Measurable conservation outcomes for biodiversity will be demonstrated in situ (in natural conditions, not in captivity or depository). Therefore, endemic/rare plant species seeds will be collected and given to the Türkiye Gene Bank. These locations, where the endemic species were located, will be monitored. Due to the project is a rehabilitation project a “no net loss” is not expected.

The Project;

- will have no potential adverse impacts, on the habitat or negative change in those biodiversity values for which the critical habitat was designated;
- will comply with all due process required under international obligations or national law;
- will not lead to measurable net reduction or negative change in those biodiversity values for which the critical habitat was designated;
- is not anticipated to lead to a net reduction in the population of any Critically Endangered, Endangered, or restricted-range species, over a reasonable time period;
- will not involve significant conversion or significant degradation of critical habitats;
- will be designed to achieve net gains of those biodiversity values, with its mitigation strategy; and
- will have a robust and appropriately designed, long-term biodiversity monitoring and evaluation program aimed at assessing the status of the critical habitat and it will be integrated into the Borrower’s management program.

The map showing the EUNIS habitats is provided in Appendix 2.

a) Gypsum Habitats between İliç and Kemah:

The gypsum habitats along the route between İliç and Kemah represent the most sensitive and critical habitat of the project. This habitat hosts 16 locally or regionally distributed endemic species, making it a critical area for biodiversity. The soil in this habitat has a distinctive dirty-white appearance and supports numerous endemic species such as *Gypsophila aucheri, Ebenus macrophylla, Achillea pseudoaleppica, Achillea sintenisii, Glaucium cappadocicum, Verbascum alyssifolium, Scorzonera aucherana, Tanacetum heterotomum, Thymus spathulifolius, Thymus cappadocicus, Plantago euphratica, Gypsophila heteropoda, Isatis sivasica*, and *Thesium stelleroides*.

Given the high sensitivity and fragility of this habitat, it is considered the most vulnerable along the route. The proposed activities may lead to habitat loss in some areas, resulting in population decline for critical species. To minimize the impact of these activities and conservation of biodiversity, the following measures are recommended:

1. Seed Collection and Preservation:
   - Collect seeds of critical species during the appropriate period and deposit them in the Türkiye Seed Gene Bank to ensure their preservation.
2. Proper Soil Management:
   - Implement proper soil management practices (tilling, cultivating, growing cover crops, applying compost or manure, etc.) in the gypsum habitats, considering their sensitivity and fragility.
   - Prevent the invasion of invasive species into the areas where gypsum soils are stored.
3. Monitoring with Biologist Supervision:
   - Conduct monitoring of populations belonging to critical species directly affected by the activity.

- Ensure the monitoring is carried out under the supervision of a biologist to safeguard the populations.

These measures aim to mitigate the direct impact on critical species and their habitats, especially in the gypsum habitats between İliç and Kemah, and contribute to the conservation of biodiversity along the route. Due to the project is a rehabilitation project a “no net loss” is not expected.

b) Serpentine Habitats between İliç and Kemah:

The serpentine habitats between İliç and Kemah represent one of the critical habitats within the project area. This habitat is home to local and regional endemic species such as *Echinophora chrysantha, Centaurea aucherana, Onosma erzincanica, Hesperis breviscapa, Tchihatchewia isatidea, Physoptychis haussknechtii, Silene nerimaniae, Beta macrorhiza, Hedysarum yilmazunalii, Paronychia arabica* subsp*. euphratica, Salvia euphratica, Stachys inanis, Verbascum tuna-ekimii, Allium purpureoviride*.

Considering the presence of these local and regional endemic species, this habitat type is one of the most sensitive and fragile along the route. The proposed activities may lead to habitat loss in certain areas, resulting in population decline for critical species. To minimize the impact of these activities and conservation of biodiversity, the following measures are recommended:

1. Seed Collection and Preservation:
   - Collect seeds of critical species during the appropriate period and deposit them in the Türkiye Seed Gene Bank to ensure their preservation.
2. Proper Soil Management:
   - Implement proper soil management practices (tilling, cultivating, growing cover crops, applying compost or manure, etc.) in the serpentine steppes habitats, considering their sensitivity and fragility.
   - Prevent the invasion of invasive species into the areas where gypsum soils are stored.
3. Monitoring with Biologist Supervision:
   - Monitoring of populations belonging to critical species.

These measures aim to mitigate the direct impact on critical species and their habitats, especially in the serpentine habitats between İliç and Kemah, and contribute to the conservation of biodiversity along the route. Due to the project is a rehabilitation project a “no net loss” is not expected.

c) Gypsum Habitats in the Northwest of Aşkale:

The gypsum habitats in the northwest of Aşkale are considered critical habitats within the project corridor. This habitat hosts regionally endemic species such as *Centaurea Huber-morathii, Tanacetum heterotomum, Thymus spathulifolius*, all of which are critically distributed. Therefore, this habitat stands out as one of the most sensitive and fragile habitats along the route. The proposed activities may lead to habitat loss in certain areas, resulting in population decline for critical species. To minimize the impact of these activities and conservation of biodiversity, the following measures are recommended:

1. Seed Collection and Preservation:
   - Collect seeds of critical species during the appropriate period and deposit them in the Türkiye Seed Gene Bank to ensure their preservation.
2. Proper Soil Management:
   - Implement proper soil management practices (tilling, cultivating, growing cover crops, applying compost or manure, etc.) in the gypsum habitats, considering their sensitivity and fragility.

- Prevent the invasion of invasive species into the areas where gypsum soils are stored.

3. Monitoring with Biologist Supervision:
   - Monitoring of populations belonging to critical species.

These measures aim to mitigate the direct impact on critical species and their habitats, especially in the gypsum habitats in the northwest of Aşkale, contributing to the overall conservation efforts along the route. Due to the project is a rehabilitation project a “no net loss” is not expected.

d) Seed Collecting Efforts:

Prior to and/or during the construction phase, it is crucial to conduct seed collecting activities for the 38 regionally endemic (*Echinophora chrysantha, Ferulago longistylis, Achillea sintenisii, Achillea pseudoaleppica, Centaurea aucherana, Centaurea derderifolia, Centaurea huber-morathii, Cousinia sintenisii, Scorzonera aucherana, Tanacetum heterotomum, Onosma erzincanica, Hesperis breviscapa, Isatis sivasica, Physoptychis haussknechtii, Tchihatchewia isatidea, Campanula yildirimlii, Campanula munzurensis, Gypsophila heteropoda* subsp*. minutiflora, Gypsophila aucheri, Silene nerimaniae, Ebenus macrophylla, Hedysarum yilmazunalii, Paronychia arabica* ssubsp*. euphratica, Origanum haussknechtii, Salvia euphratica* ssp*. leiocalycina, Stachys inanis, Thymus cappadocicus* var*. cappadocicus, Tymus spathulifolius, Glaucium cappadocicus, Plantago euphratica, Reseda armena* var*. scabridula, Thesium stelleroides, Verbascum alyssifolium, Verbascum tuna-ekimii, Gladiolus hamzaoglui, Allium purpureoviride, Hyacinthella acutiloba,* and *Asphodeline tenuior* var*. puberulenta)* and 2 rare non-endemic *(Limoniopsis owerinii, Beta macrorhiza*) plant species found within the project area. The seeds should be collected and delivered to the Ankara Seed Gene Bank. The collection periods for seeds of local and regional endemic species are provided in Table 6.

Table 6. Seed Collection Periods for Local and Regional Endemic Plants

Species	Suitable Month(s) for Seed/Tuber Collection	Suitable Month(s) for Seed/Tuber Planting
Onosma erzincanica (seed)	July	October-November
Hedysarum yilmazunalii (seed)	July-August	October-November
Verbascum alyssifolium (seed)	August-September	October-November
Verbascum tuna-ekimii (seed)	August	October-November
Echinophora chrysantha (seed)	August-September	October-November
Ferulago longistylis (seed)	August-September	October-November
Centaurea aucheriana (seed)	July-August	October-November
Hesperis breviscapa (seed)	July-August	October-November
Physoptychis haussknechtii (seed)	July-August	October-November
Campanula yildirimlii (seed)	August-September	October-November
Tymus spathulifolius (seed)	August-September	October-November
Achillea sintenisii (seed)	July-August	October-November
Achillea pseudoaleppica (seed)	July-August	October-November
Centaurea derderifolia (seed)	July-August	October-November
Centaurea huber-morathii (seed)	July-August	October-November
Cousinia sintenisii (seed)	August-September	October-November
Scorzonera aucherana (seed)	August-September	October-November
Tanacetum heterotomum (seed)	August-September	October-November
Isatis sivasica (seed)	June-July	October-November
Tchihatchewia isatidea (seed)	June-July	October-November
Campanula munzurensis (seed)	July-August	October-November
Gypsophila heteropoda subsp. *minutiflora* (seed)	June-July	October-November
Gypsophila aucheri (seed)	July-August	October-November
Silene nerimaniae (seed)	July-August	October-November
Ebenus macrophylla (seed)	June-July	October-November
Paronychia arabica subsp. *euphratica* (seed)	July-August	October-November
Origanum haussknechtii (seed)	July-August	October-November

Species	Suitable Month(s) for Seed/Tuber Collection	Suitable Month(s) for Seed/Tuber Planting
Salvia euphratica ssp. *leiocalycina* (seed)	June-July	October-November
Stachys inanis (seed)	July-August	October-November
Thymus cappadocicus var. *cappadocicus* (seed)	July-August	October-November
Glaucium cappadocicus (seed)	July-August	October-November
Plantago euphratica (seed)	July-August	October-November
Reseda armena var. *scabridula* (seed)	June-July	October-November
Thesium stelleroides (seed)	July-August	October-November
Gladiolus hamzaoglui (bulb)	July-August	October-November
Allium purpureoviride (bulb)	July-August	October-November
Hyacinthella acutiloba (bulb)	May-June	October-November
Asphodeline tenuior var. *puberulenta* (rhizome)	June-July	October-November
Limoniopsis owerinii (seed)	July-August	October-November
Beta macrorhiza (seed)	July-August	October-November

e) Monitoring Activities to be Conducted During Construction and After Completion of Activities:

To ensure the survival of critical endemic plant species (local and regional endemics) along the route and to assess the extent of their impact from the activity, monitoring should be conducted at least twice a year during the construction period and for one year after completion of the construction. This will involve checking whether these plant species continue to thrive and assessing the degree of impact, taking urgent measures if necessary.

Allium purpureoviride, *Hyacinthella acutiloba*, and *Asphodeline tenuior* var. *puberulenta* will be monitored for flowering period in May and for seed collection in May-July. *Onosma erzincanica, Centaurea aucheirana, Hesperis breviscapa, Physoptychis haussknechtii, Tymus spathulifolius, Achillea sintenisii, Achillea pseudoaleppica, Centaurea derderifolia, Centaurea huber-morathii, Cousinia sintenisii, Scorzonera aucherana, Tanacetum heterotomum, Isatis sivasica, Tchihatchewia isatidea, Campanula munzurensis, Gypsophila heteropoda* subsp. *Minutiflora, Gypsophila aucheri, Silene nerimaniae, Ebenus macrophylla, Paronychia arabica* subsp. *Euphratica, Origanum haussknechtii, Salvia euphratica* ssp. *Leiocalycina, Stachys inanis, Thymus cappadocicus* var. *cappadocicus, Glaucium cappadocicus, Plantago euphratica, Reseda armena var. scabridula, Thesium stelleroides, Gladiolus hamzaoglui,* and *Beta macrorhiza* will be monitored for flowering period in June and for seed collection in July-August. *Hedysarum yilmazunalii, Verbascum alyssifolium, Verbascum tuna-ekimii, Ferulago longistylis,* and *Campanula yildirimlii* will be monitored for flowering period in July and for seed collection in August. *Echinophora chrysantha* and *Limoniopsis owerinii* will be monitored for flowering period in August and for seed collection in September-October.

3.1 Critical Habitat

Even though the railway route passes in protected areas, the route itself is modified habitat and the railway line is in operation for more than 60 years. The railway rehabilitation and modernization activities will be conducted within the railway corridor and for facilities where additional area will be required such as new sidings or extension of sidings will not be within these protected areas. If no project activities are conducted in these areas other than the existing railway corridor, it is expected that there will not be an impact on these critical habitats and critical habitat triggering species. Therefore, to ensure effective biodiversity conservation, the following measures and guidelines will be implemented (see Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8, Figure 9, Figure 10, Figure 11, Figure 12, Figure 13, Figure 14, Figure 15, Figure 16, Figure 17, Figure 18, and Figure 19):

Clear Identification of Areas:

- Clearly identify areas to be cleared and those that must not be cleared or damaged.

Temporary Fencing:

- Use temporary fencing to retain critical habitat and exclude construction works from sensitive areas. No Project related activities will be carried out in the critical habitats.

Personnel Training:

- Train Project personnel on the significance of the habitat and species' populations.
- Appoint biodiversity experts to provide necessary information and guidance.

Continuous Habitat Monitoring:

- Monitor critical habitat throughout the construction and operation phases.
- Promptly report and address any Project-related impacts under the supervision of experts.

Careful Process Design:

- Design the entire process meticulously, covering planning, implementation, monitoring, and management.
- Appoint field experts with knowledge of species' biological features and habitat requirements.

Monitoring surveys will be conducted at critical habitats according to endemic/rare species flowering time, which is mentioned in Section 3 (e). These surveys will be conducted by the Contractor in supervision of AYGM.

3.2 Natural Habitats & Flora and Fauna Species of High Conservation Concern

Management controls and measures to avoid and/or minimize impacts on biodiversity include:

Construction Footprint Reduction:

- Reduce the construction footprint in natural habitats, limiting vegetation clearance, especially at creek crossings and within riparian habitats.
- Plan construction in water systems during drier periods to minimize impacts.

Facility Location Planning:

- Place construction facilities (equipment storage, offices, access tracks, etc.) within already cleared areas when possible.

Flora and Fauna Expertise:

- Appoint flora and fauna experts for vegetation clearance in natural habitats.

Breeding and Nesting Period Consideration:

- Plan land clearance considering the breeding and nesting periods of fauna of high conservation concern.

Tree Nest Restrictions:

- Restrict clearing of trees with nests.

Habitat Restoration:

- Restore and rehabilitate natural habitats outside the construction corridor using native plant species upon completion of construction.

Railway Design:

- Design the railway to minimize plant growth in the track area, providing lateral barriers to plant migration.

Fauna Inspections and Relocation:

- Conduct daily inspections to ensure fauna are relocated or leave the site before works commence.
- Facilitate fauna passage around the construction footprint.

Site Speed Limits and Safety Measures:

- Enforce on-site speed limits.
- Securely cover open pits/trenches after daily site works, or use fauna ramps to provide access.

Fauna Relocation Techniques:

- Implement relocation techniques for fauna of high conservation concern under expert supervision before land preparation.

Fauna Crossings:

- Identify areas of higher significance to fauna and construct culverts or crossings where the route bisects important habitats if necessary.
- Use appropriate methods to prevent animal entrance into the Right-of-Way (RoW).
- Regular check and maintaining existing fauna crossing and taking additional measures as necessary.

Fauna Strike Registry:

- Keep a registry for fauna strike and mortality during construction and operation.

Water and Soil Quality Management:

- Minimize impacts on water and soil quality through implementation of related management plans.

Emergency Management:

- Manage emergencies, including natural hazards, fire, and spills, through the implementation of the Emergency Preparedness and Response Plan.

Noise and Vibration Reduction:

- Minimize noise and vibration-related nuisance to animals in line with pollution prevention and construction impacts management plans.

Dust Suppression:

- Implement dust suppression techniques in line with pollution prevention and construction impacts management plans.

Appropriate Lighting:

- Use appropriate lighting in work areas and protective guards for directional lighting.

Personnel Training:

- Train all Project personnel on the significance of biodiversity in the area.
- Prepare protocols for encountering wild animals on the site.
- Banning of all forms of hunting and poaching and reporting any illegal activities to related authorities.

Monitoring and Evaluation Program:

Implement the Biodiversity Monitoring and Evaluation Program provided in Appendix-4 to assess the success of mitigation measures and make necessary interventions and update the Biodiversity Monitoring and Evaluation Program as necessary.

Invasive Alien Species Management:

- Develop and implement an Invasive Alien Species (IAS) Management Procedure to define measures in case of accidental introduction and spread.
- Undertake an IAS survey prior to commencement of site works.
- Inspect all vehicles and equipment entering the work areas are free of invasive alien species.
- Do not allow any animals to be brought to the construction sites.
- Return disturbed topsoil and vegetative material to the original sites.
- Use natural plant species in restoration, continue regular maintenance during operation.
- If avoidance fails, develop eradication and control methods to prevent further spread of IAS.
- Do not use pesticides or fire to control IAS. Follow Project standards while using herbicides.
-

Integrated Vegetation Management Plan (IVMP):

- Develop and implement an IVMP during the operation phase of the Project to ensure habitat and species integrity, fire control, safety, and visibility (see Appendix 3 for Tentative Table of Contents for The Integrated Vegetation Management Plan).
    - Limit the introduction and spread of invasive species,
    - Promote and maintain a healthy native plant community,
    - Implement the IVMP to benefit species associated with conservation efforts,
    - Increase habitat connectivity,
    - Manage the railway RoW as a movement corridor for wildlife,
    - Raise awareness and knowledge on integrated vegetation management, including its benefits, activities and implementation among the Project personnel

This comprehensive set of measures is designed to address potential impacts on biodiversity throughout the various phases of the Project, promoting environmental sustainability and conservation efforts.

The potential critical habitat triggering flora species are given in Table 4. These species meet the Criterion 1 and Criterion 2. Most of the species are regional endemic species and others are distribution restricted species. Therefore, all flora species are triggering critical habitat. The distribution of these species includes only the known areas. Also, the habitats, which were determined evaluated according to the Criterion 4. Due to the Critical Habitat Triggering species E1.2 : Perennial calcareous grassland and basic steppes, E1.2B : Serpentine steppes, E1.2E : Irano-Anatolian steppes, E1.B : Serpantin step, G1.1: Riparian and gallery woodland, with dominant Alnus, Betula, Populus, or Salix, G1.7 : Thermophilous deciduous woodland, and H5.3 : Sparsely- or un-vegetated habitats on mineral substrates not resulting from recent ice activity habitat types meets the Criterion 4. The critical habitats are represented below. Almost all species were distributed only in Türkiye. *Salvia euphratica* ssp. *leiocalycina* has population also in New Zealand. *Limoniopsis owerinii* has population also in Russia. *Beta macrorhiza* has population also in Greece, Bulgaria, Geogia, and Russia. Therefore, the global populations of the triggering species were evaluated according to the global population sizes and precautions given in the BMP should be implemented. Due to the distribution sensitivity of these species, Criterion 1 and Criterion 2 were triggered. BMP has been prepared to define the necessary mitigation measures to avoid indirect impacts on the identified critical habitat and triggering species. Due to the Project is a modernization project, critical habitats are defined outside the railway route. For the conservation of the regional endemic and distribution restricted species, no activities will be performed in critical habitats.

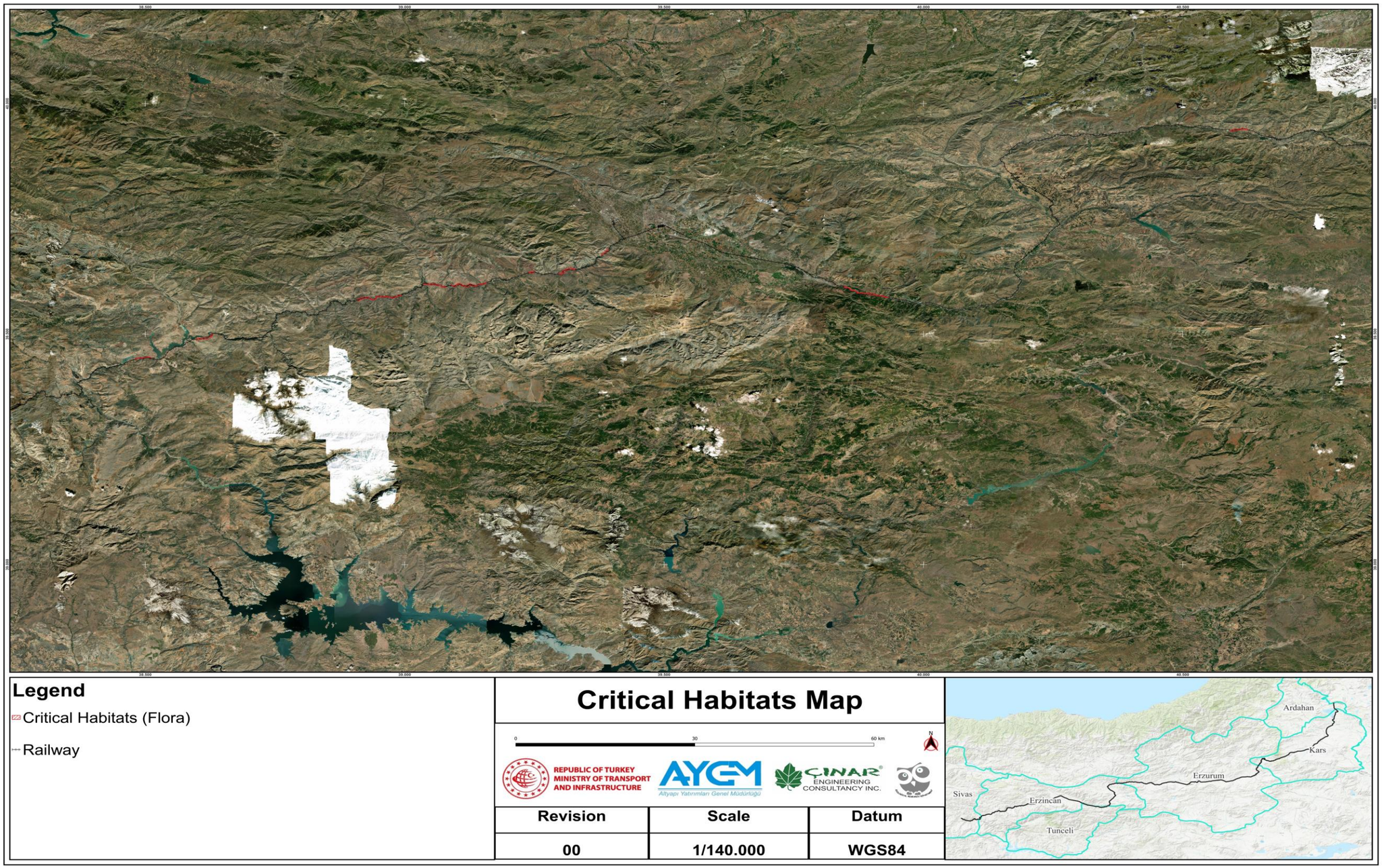


Figure 2.Critical Habitat for Flora Species

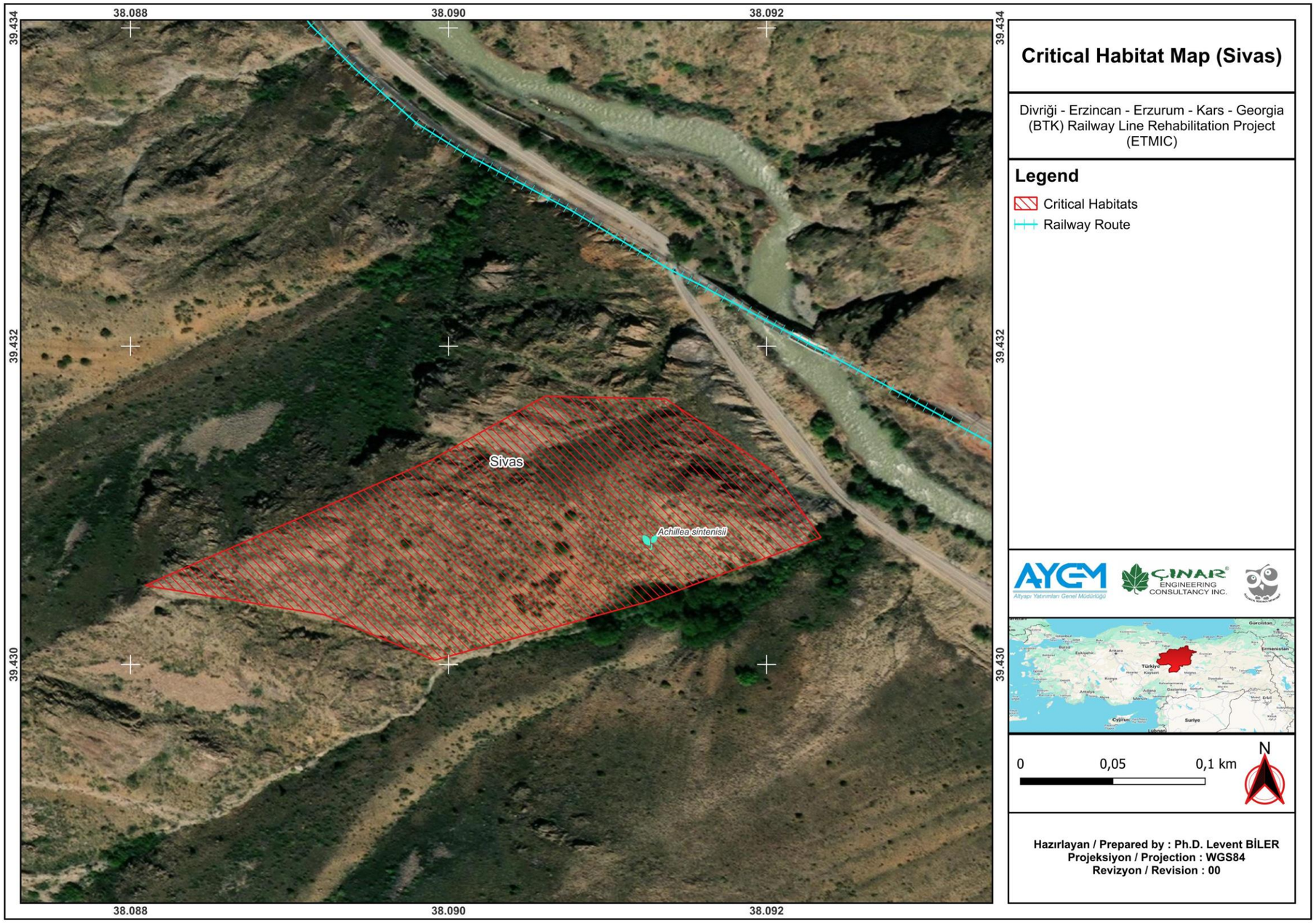


Figure 3. Critical Habitat Map

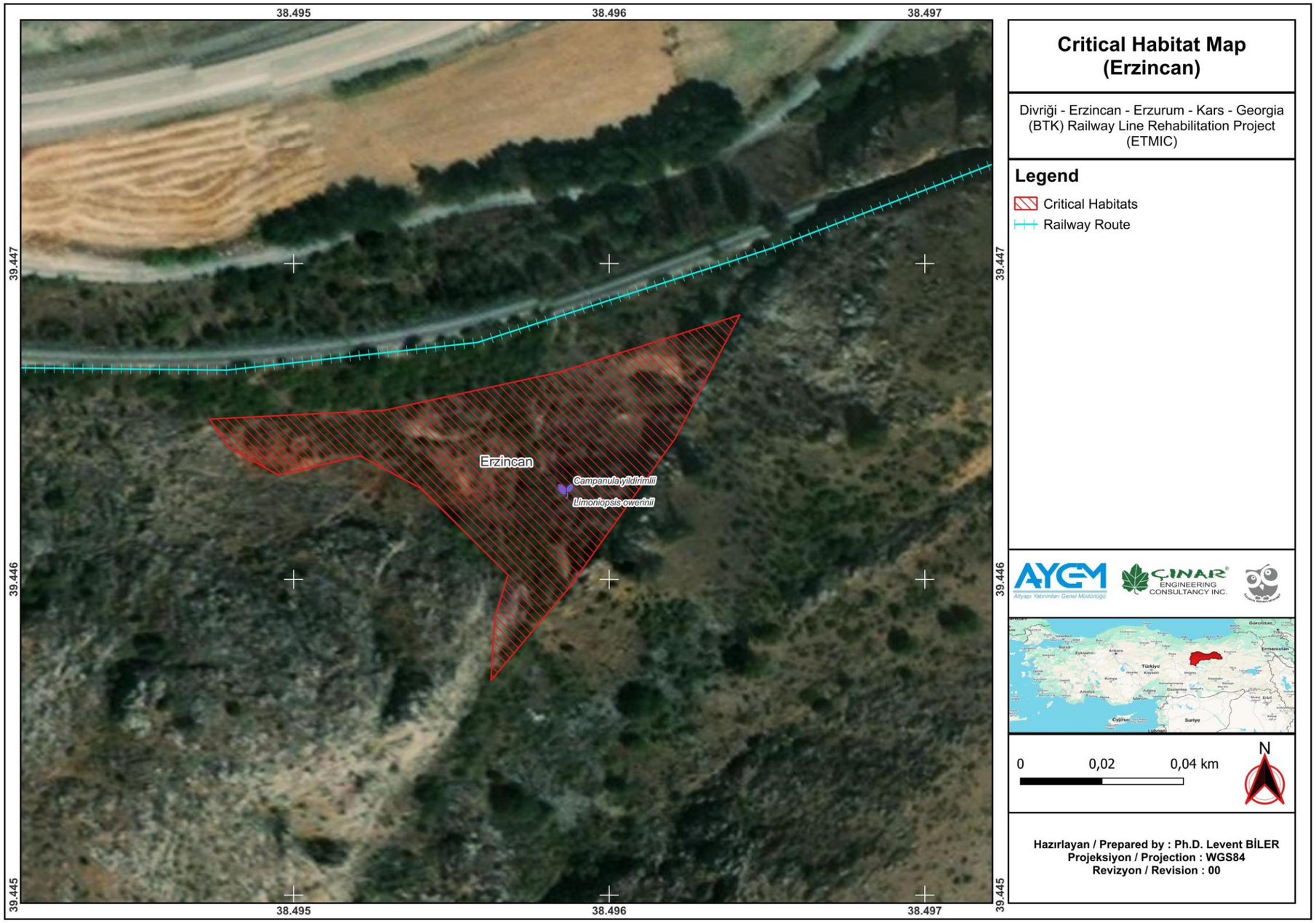


Figure 4. Critical Habitat Map

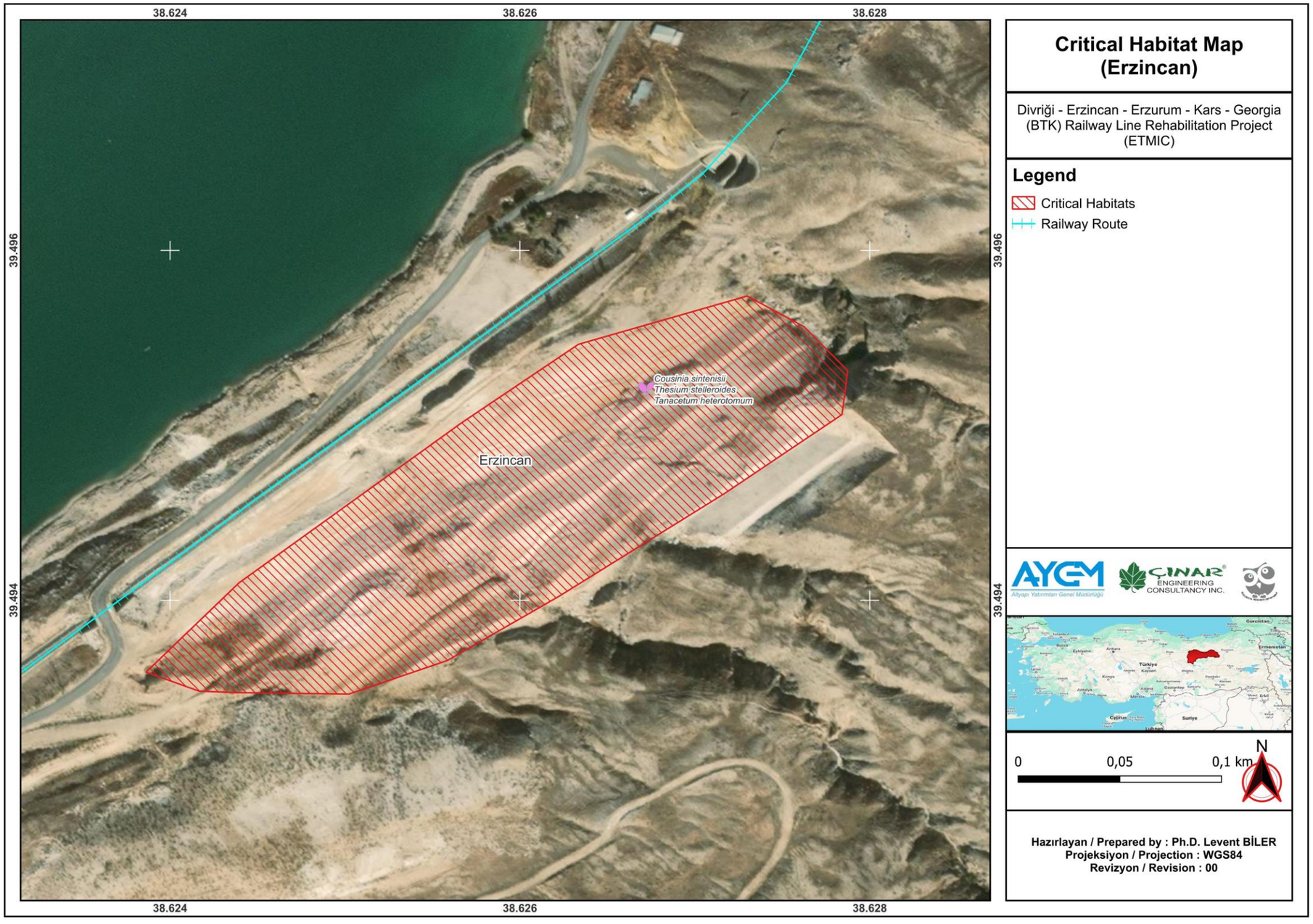


Figure 5. Critical Habitat Map

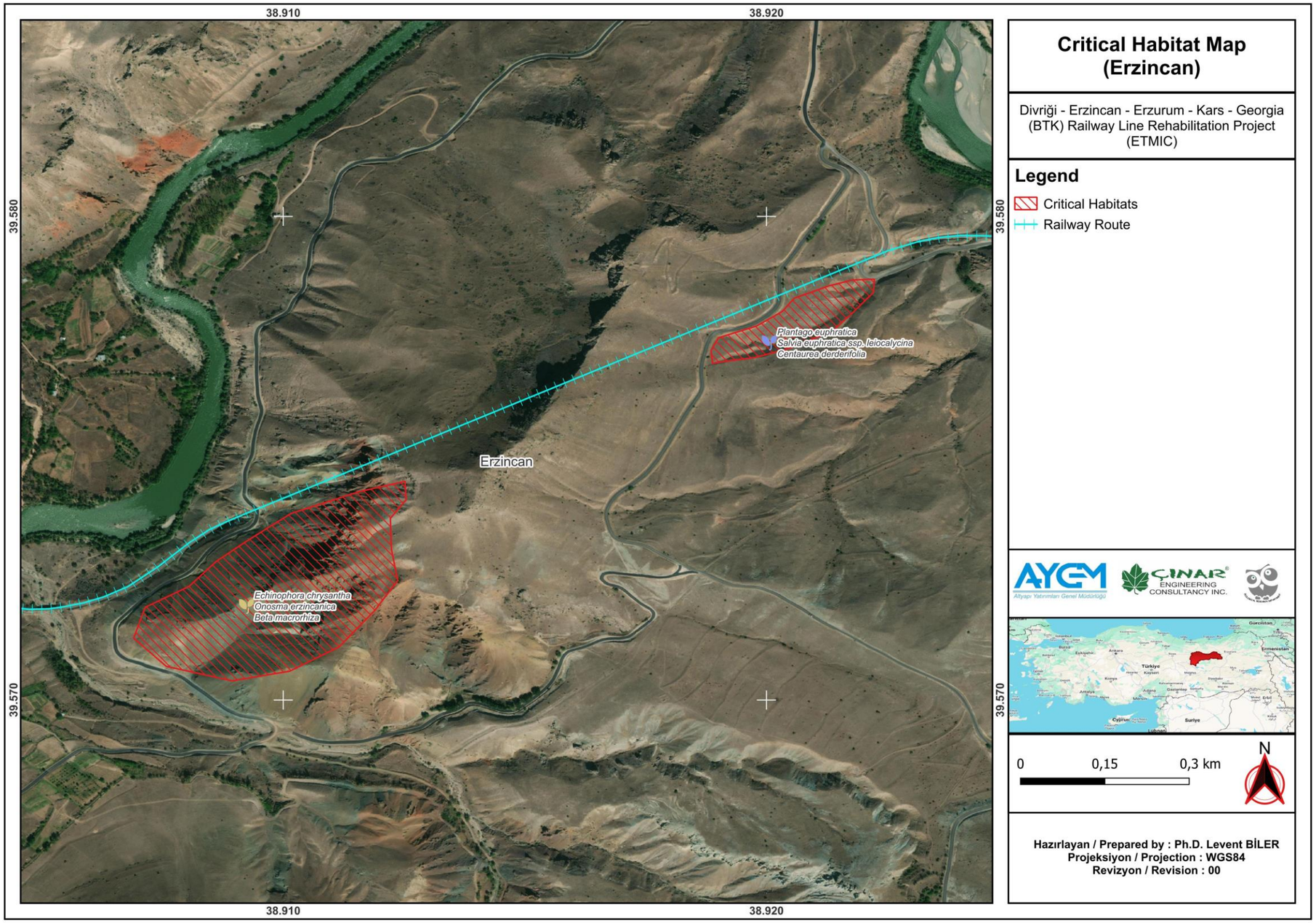


Figure 6. Critical Habitat Map

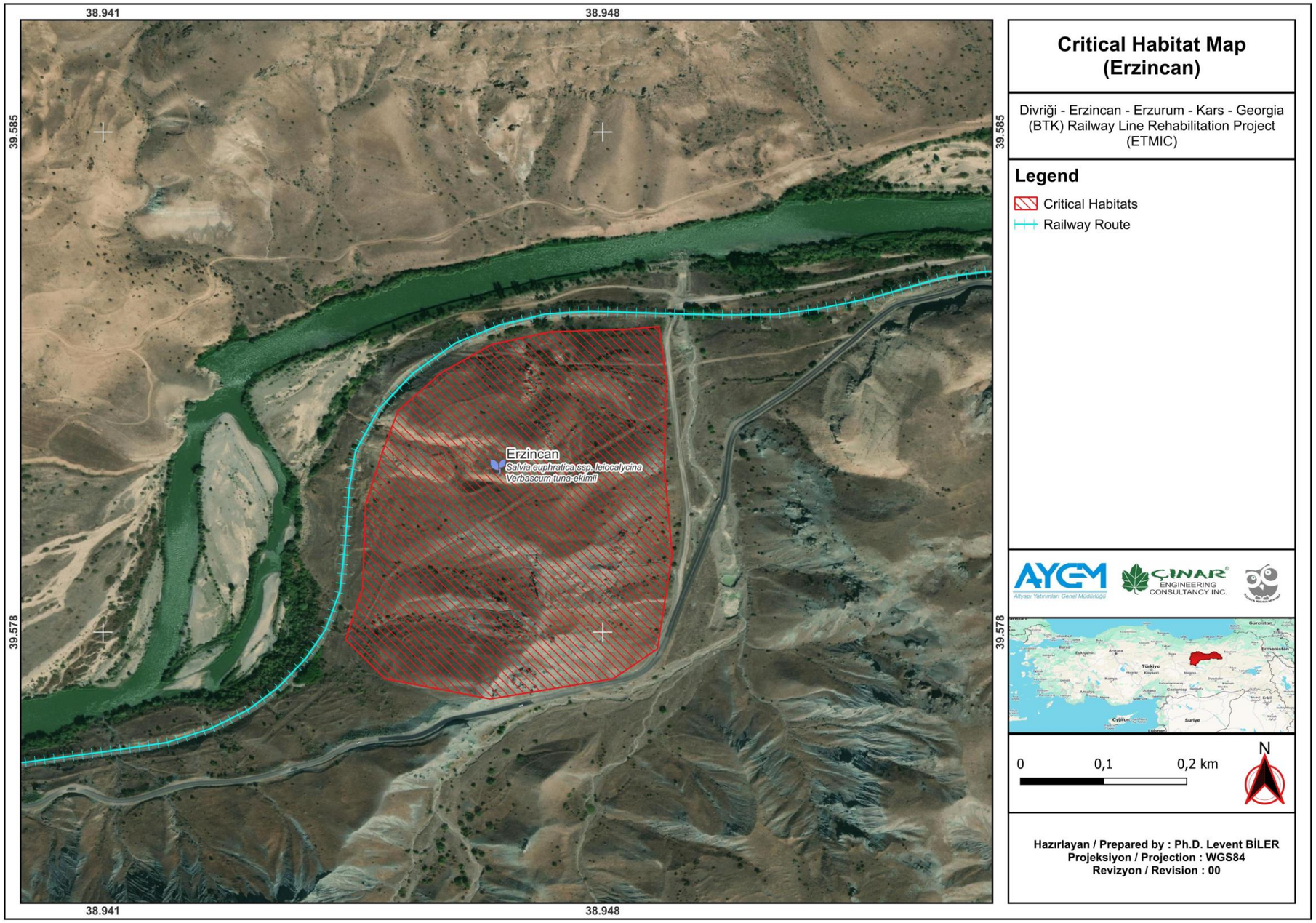


Figure 7. Critical Habitat Map

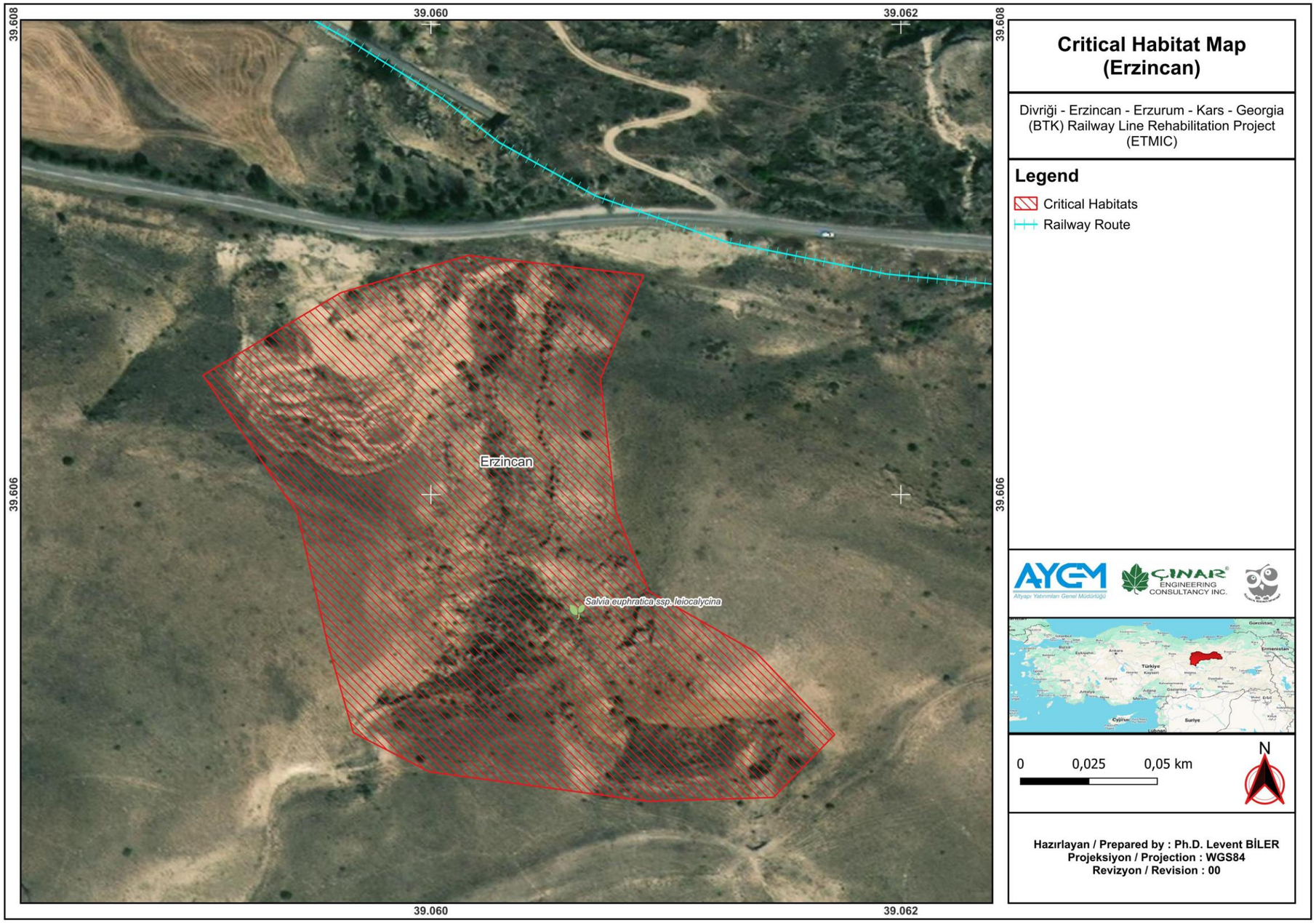


Figure 8. Critical Habitat Map

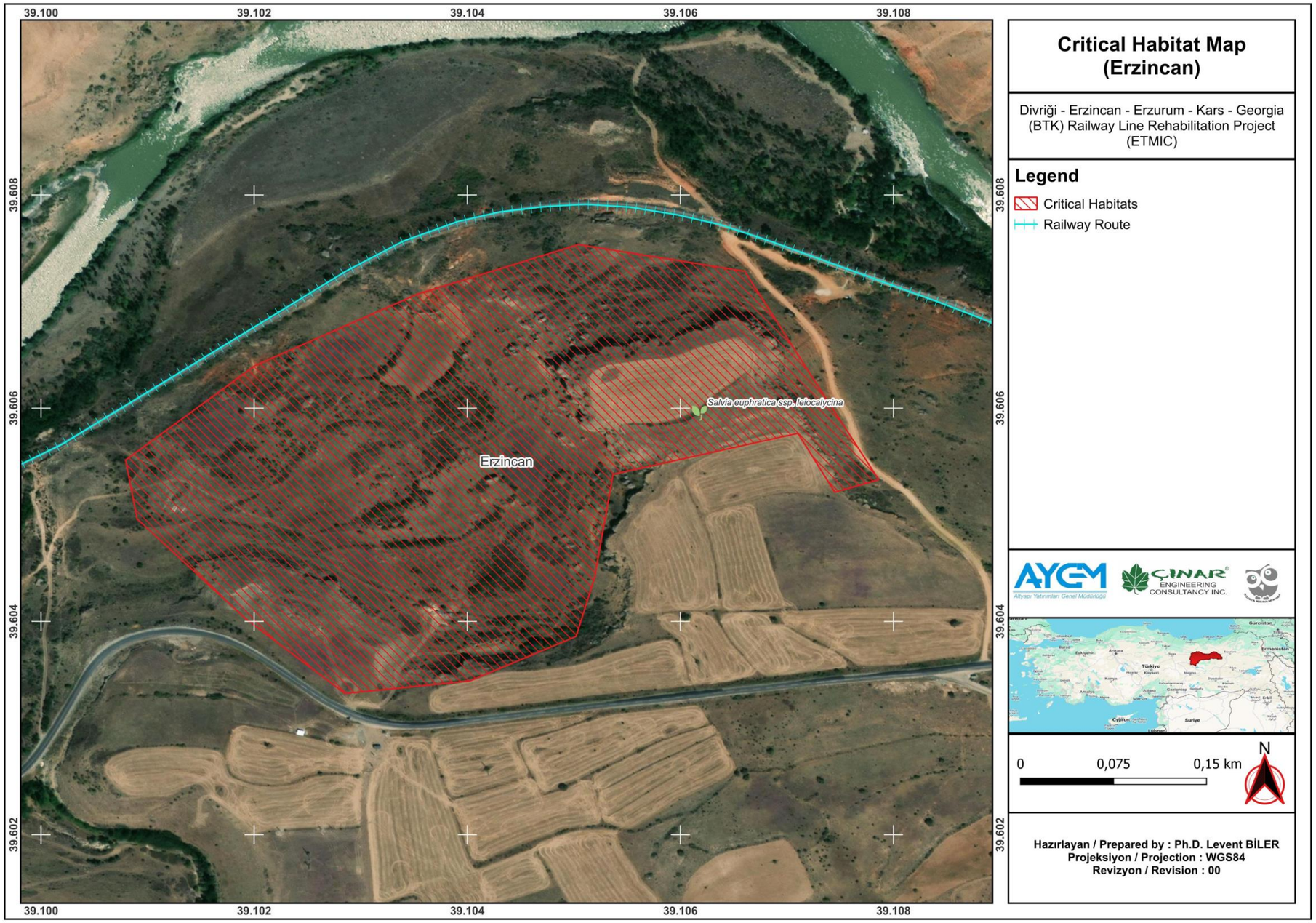


Figure 9. Critical Habitat Map

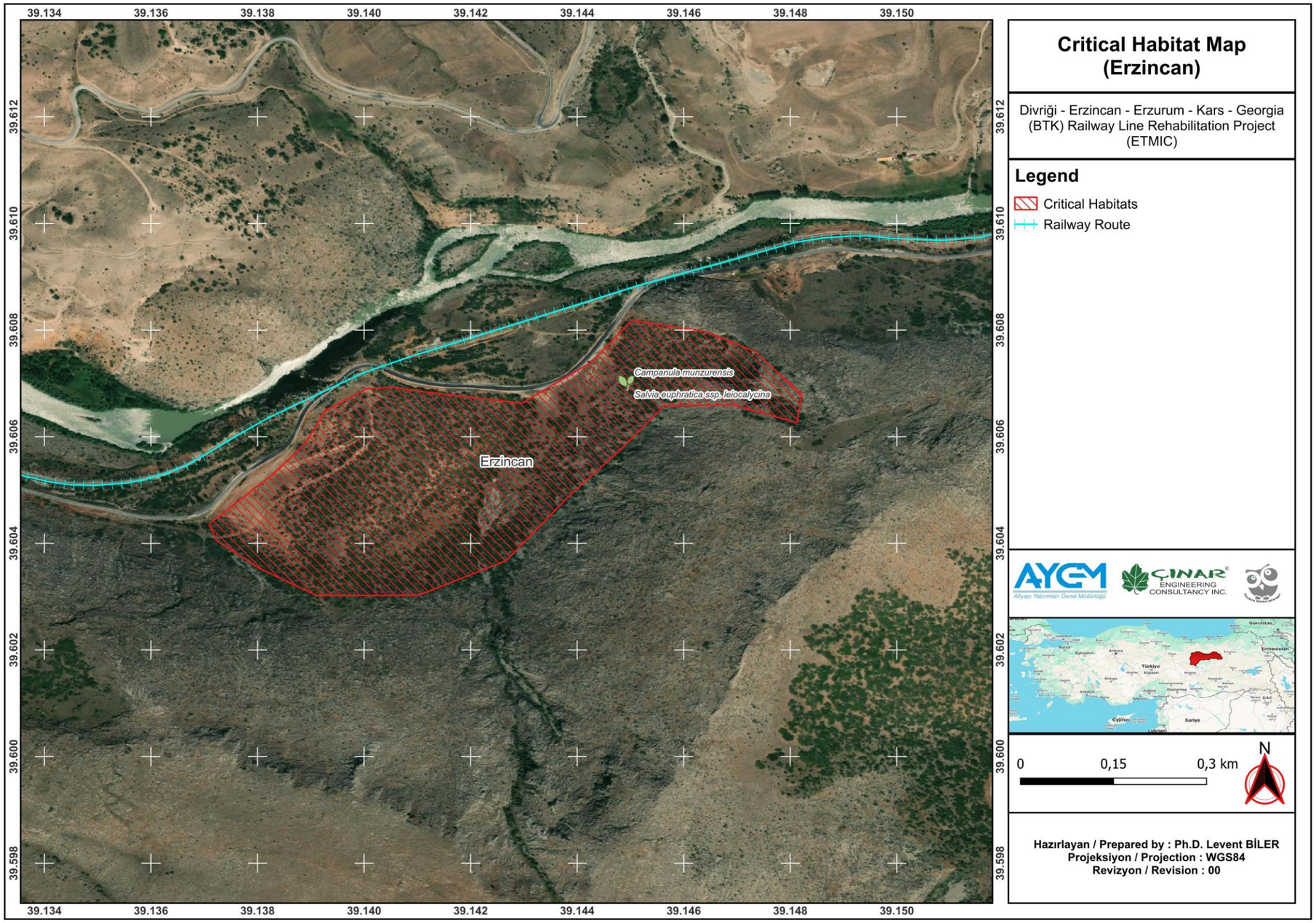


Figure 10. Critical Habitat Map

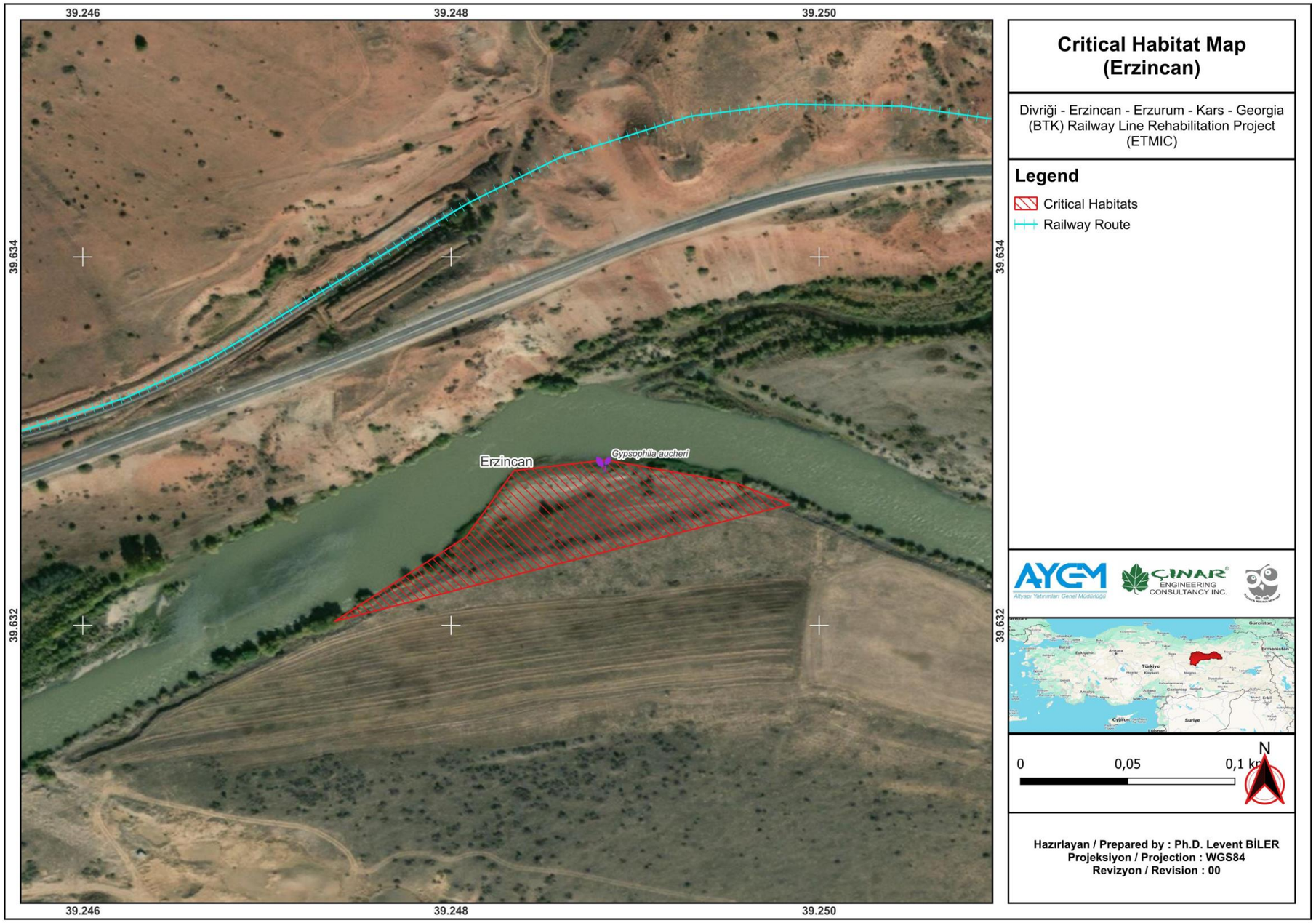


Figure 11. Critical Habitat Map

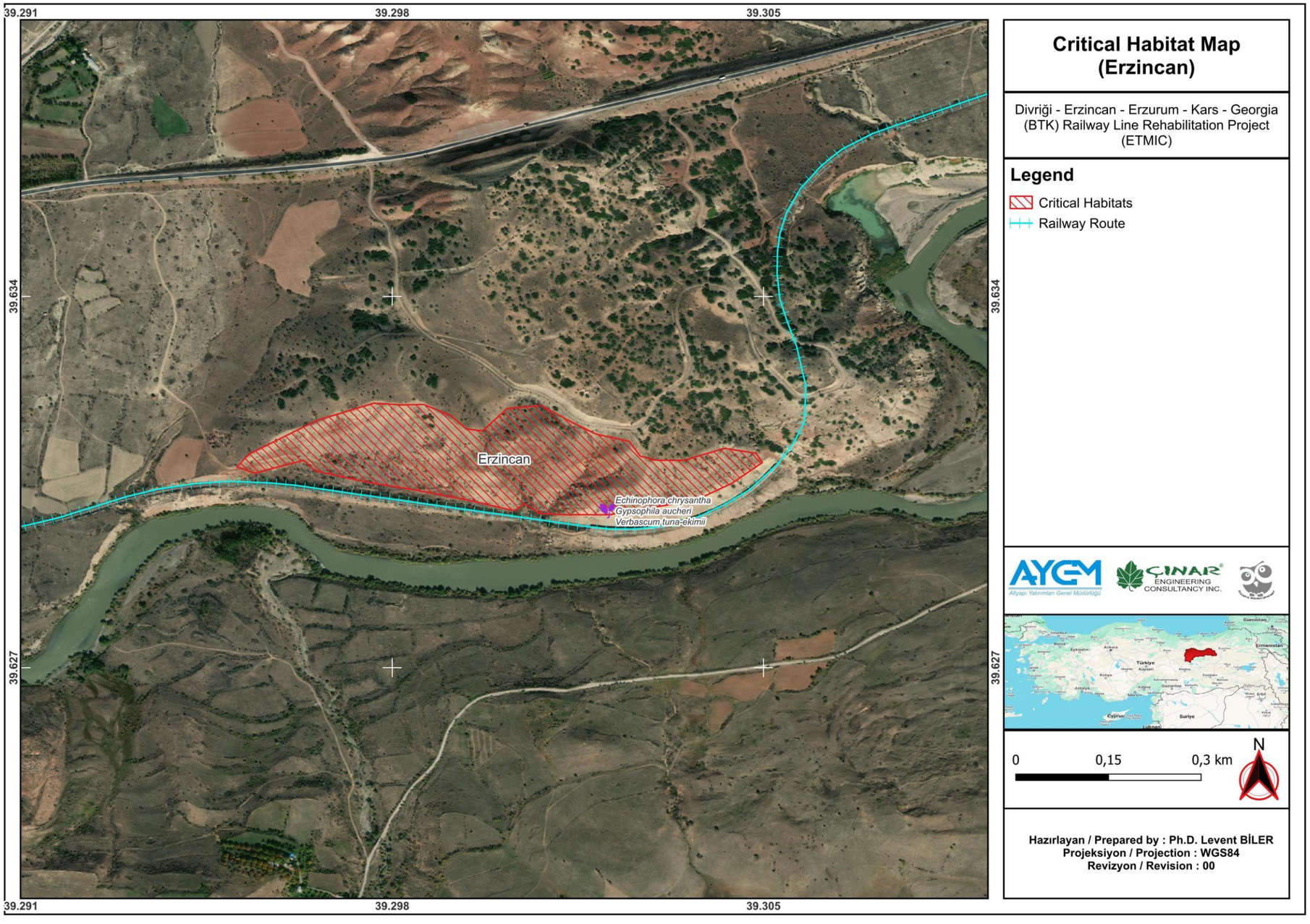


Figure 12. Critical Habitat Map

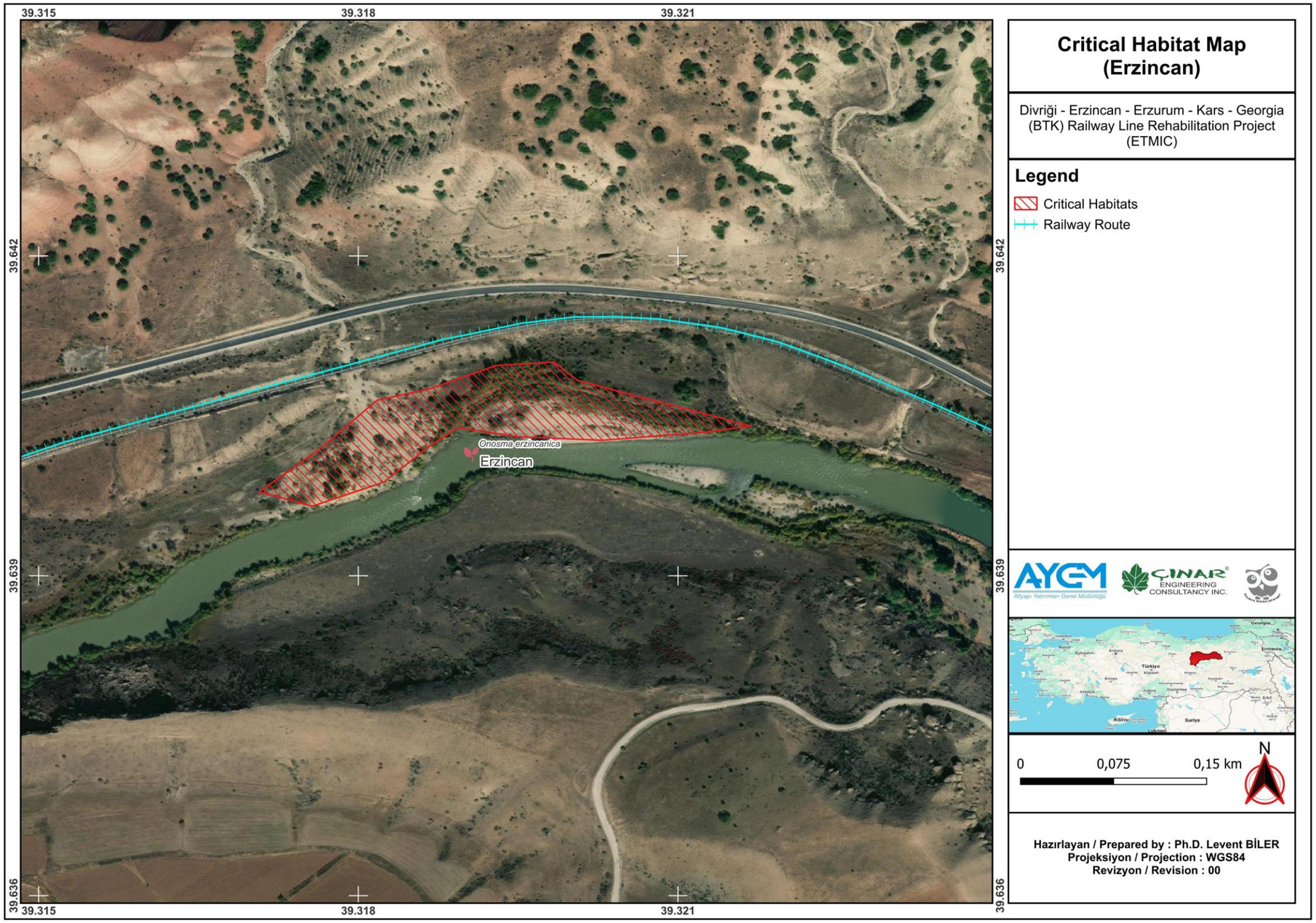


Figure 13. Critical Habitat Map

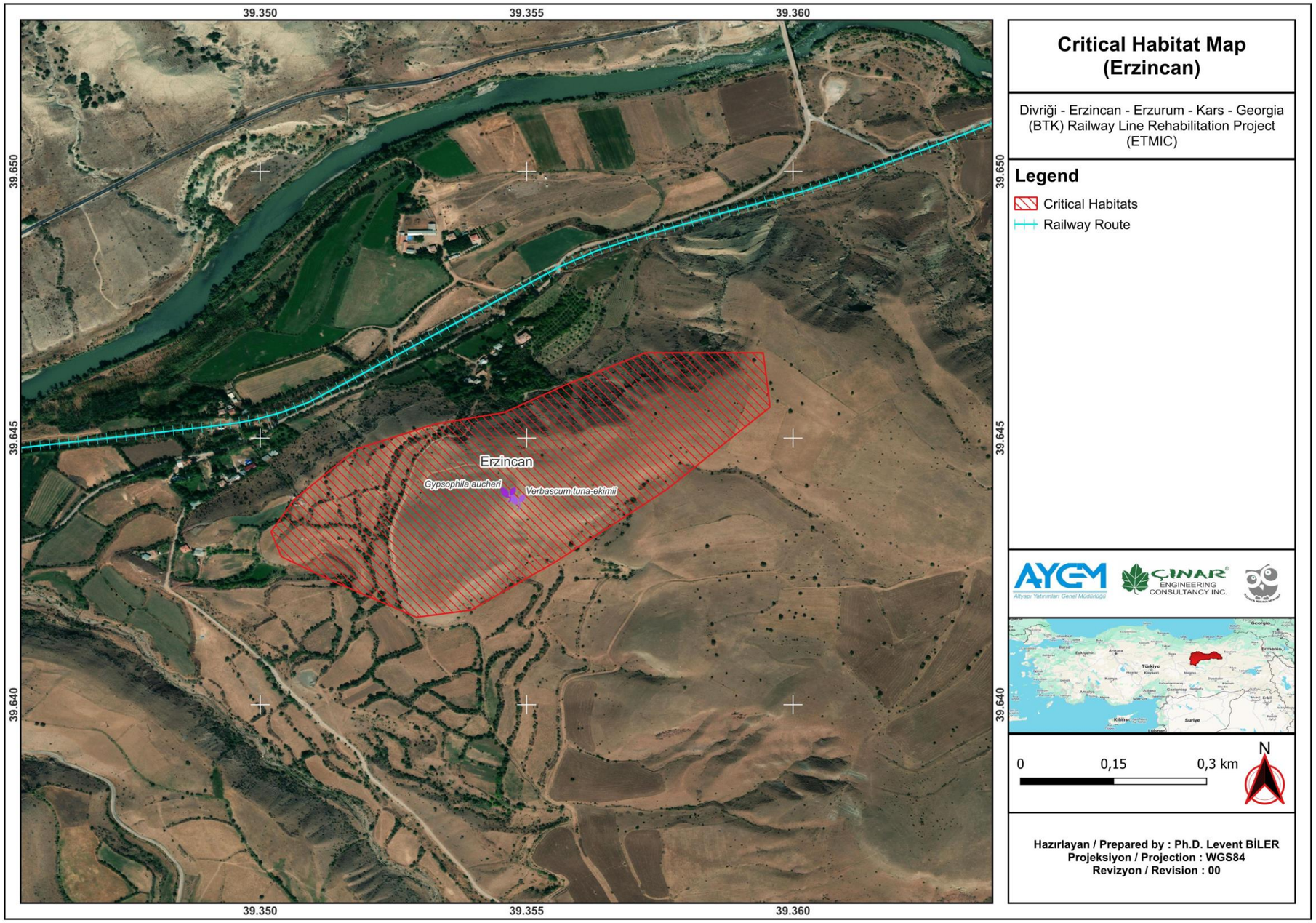


Figure 14. Critical Habitat Map

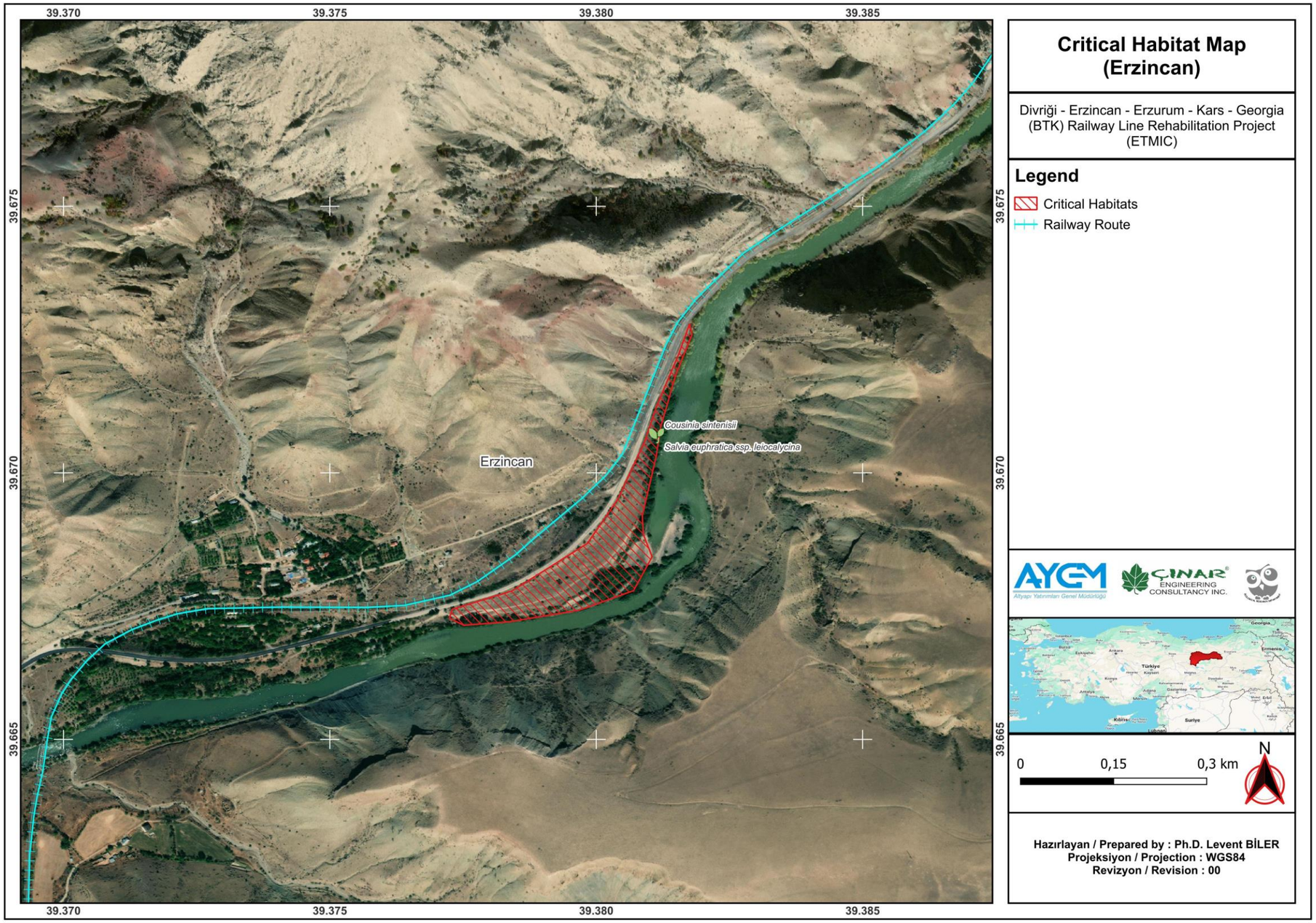


Figure 15. Critical Habitat Map

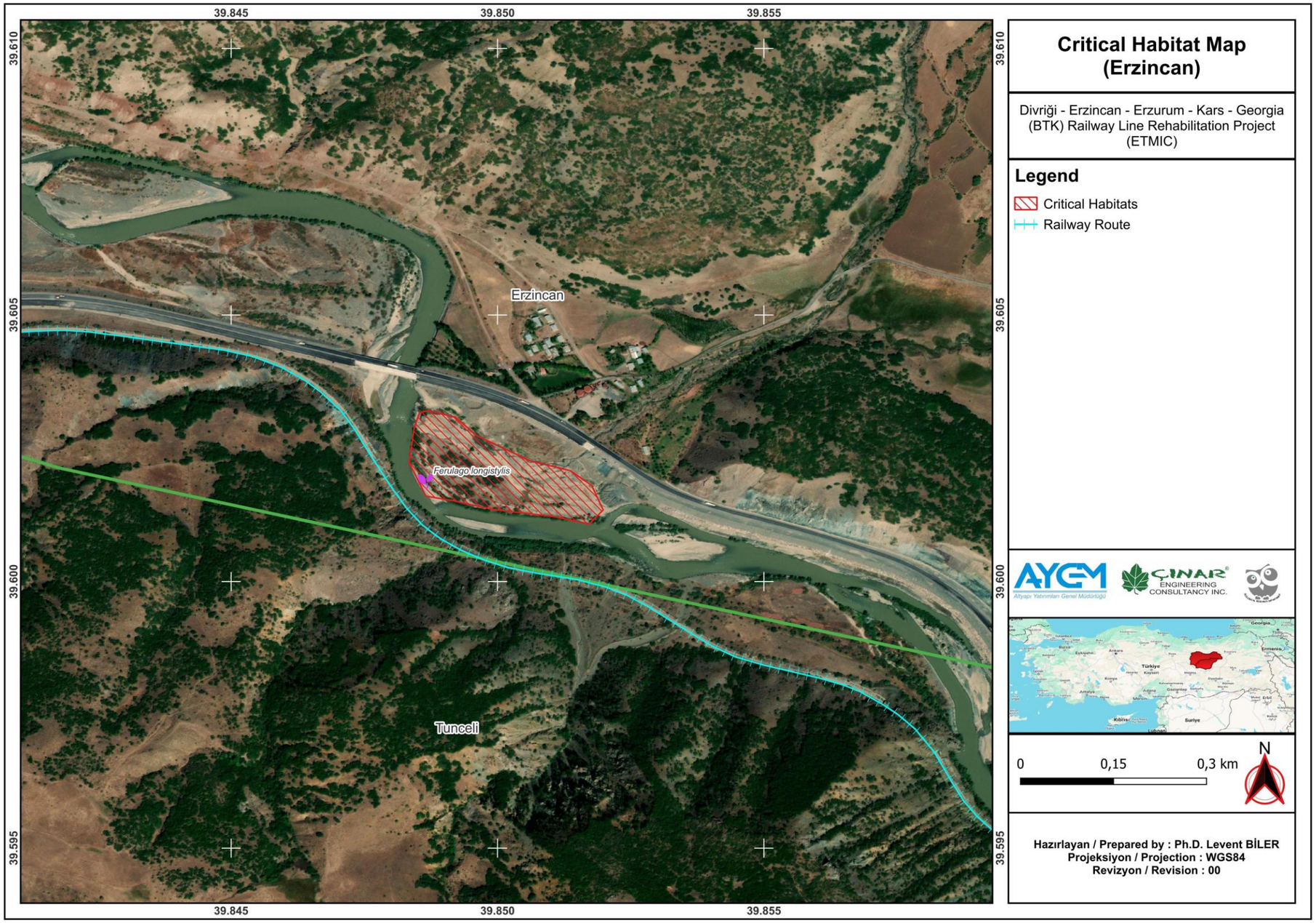


Figure 16. Critical Habitat Map

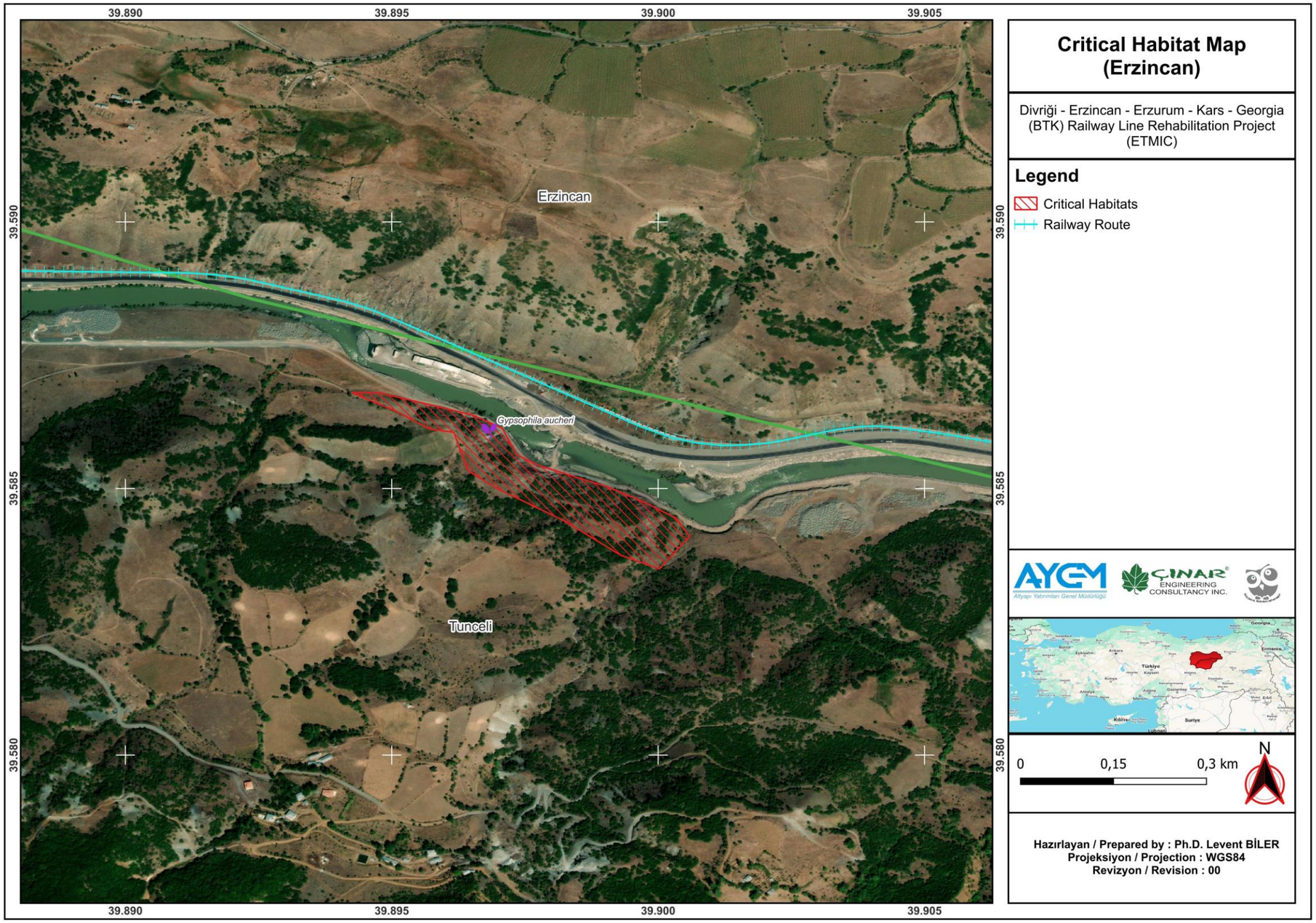


Figure 17. Critical Habitat Map

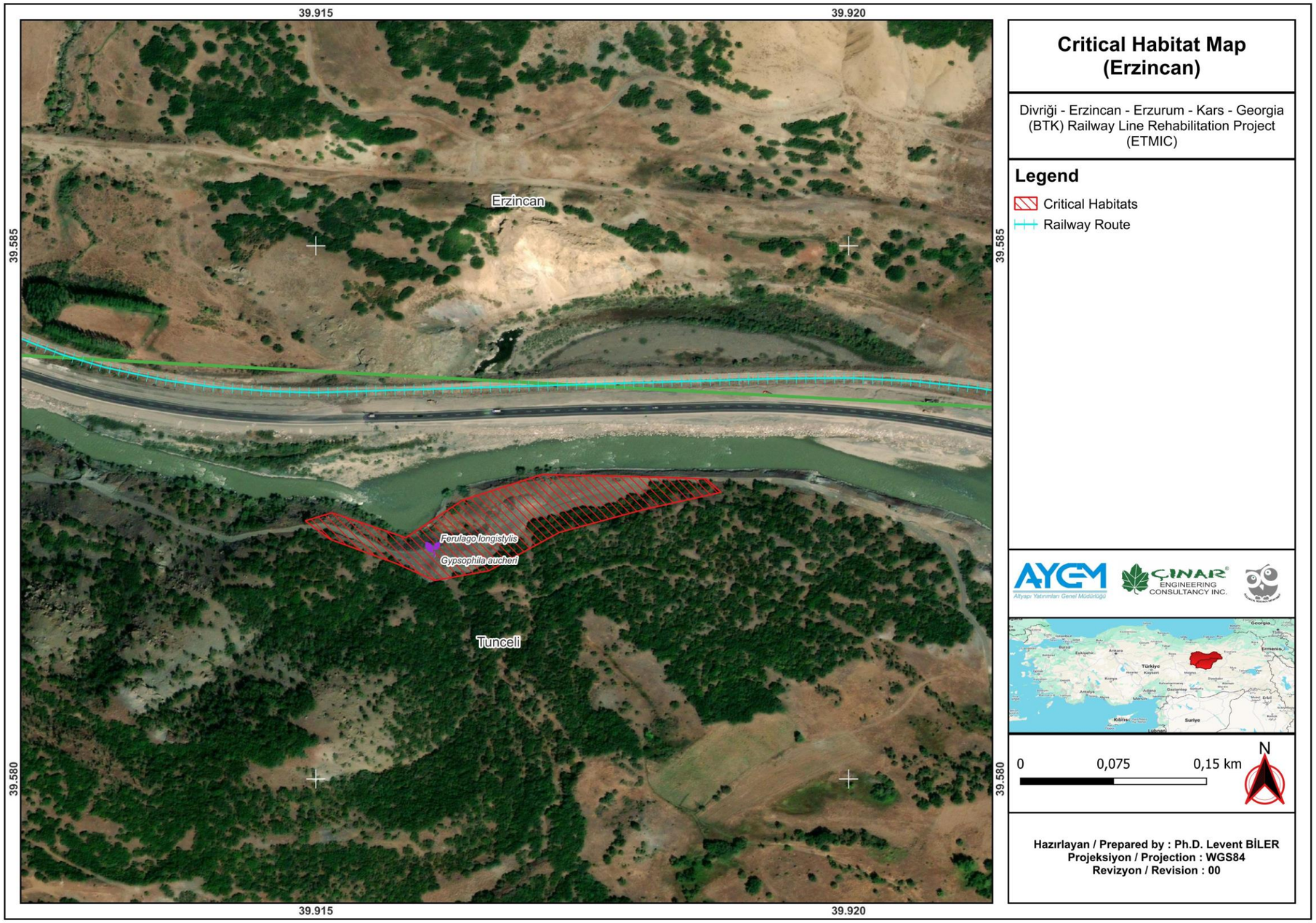


Figure 18. Critical Habitat Map

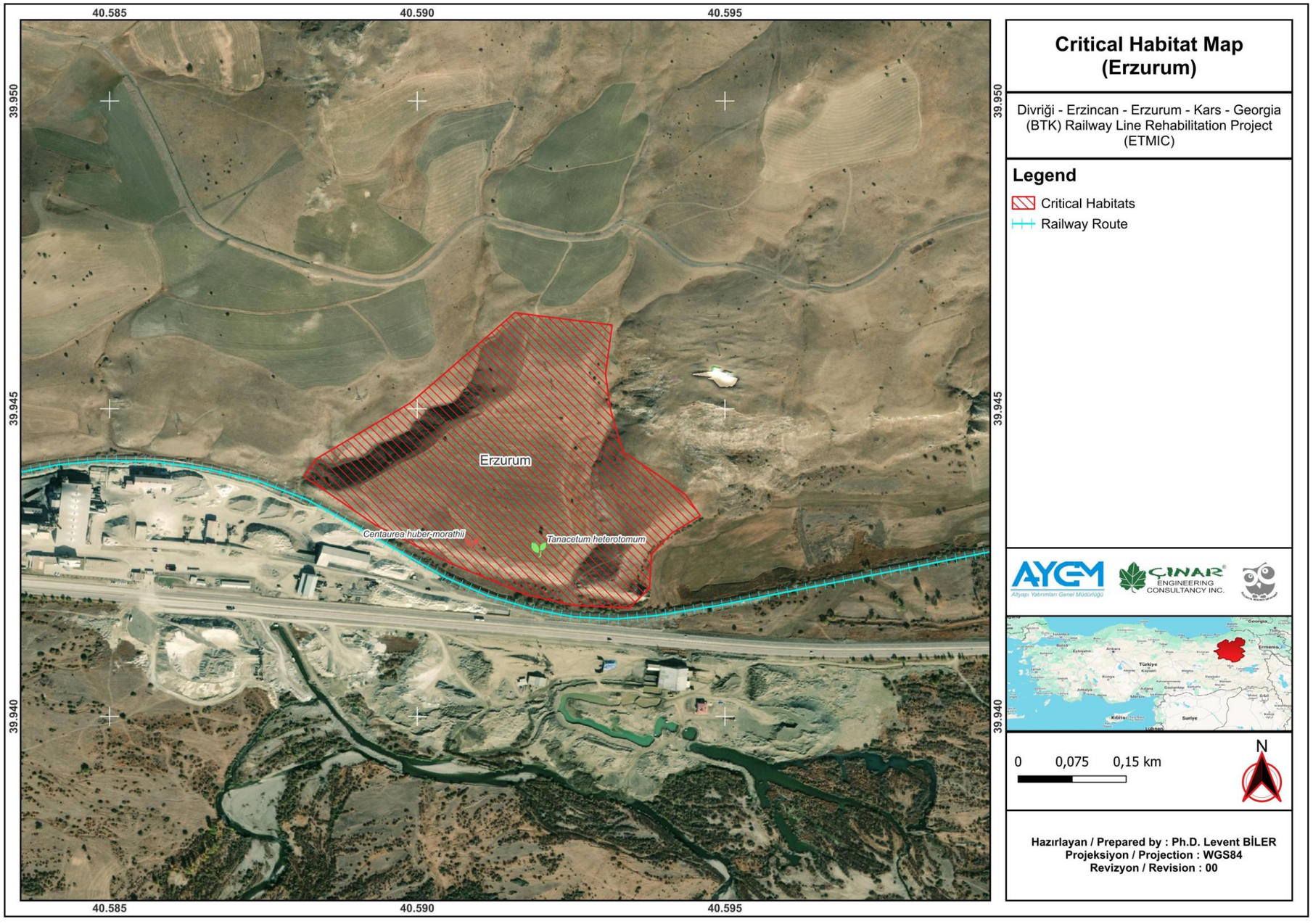


Figure 19. Critical Habitat Map

4 TRAINING, REPORTING AND MONITORING

4.1 Training

AYGM and Project contractors share the responsibility of ensuring that all Project personnel and sub-contractors are well-informed about biodiversity values and conservation priorities. Project staff are obligated to undergo training sessions, encompassing their roles and responsibilities in terms of BMP implementation, site-specific measures, and compliance with relevant environmental plans, Project standards, and protocols, tailored to their specific job roles. A general framework for biodiversity training should include:

Overview of Biodiversity:

- Understanding the concept of biodiversity.
- Recognizing the significance of biodiversity in the context of the Project.

Project-Specific Biodiversity Values:

- Identifying and understanding the specific biodiversity values associated with the Project.
- Recognizing key conservation priorities.

Roles and Responsibilities:

- Clarifying individual roles and responsibilities regarding biodiversity conservation.
- Emphasizing the importance of collaboration for effective biodiversity management.

BMP Implementation:

- Detailing the strategies outlined in the Biodiversity Management Plan (BMP).
- Understanding the step-by-step implementation process.

Site-Specific Measures:

- Providing insights into measures tailored to the specific characteristics of project sites.
- Emphasizing the need for adaptability in implementing site-specific biodiversity measures.

Compliance with Environmental Plans and Standards:

- Familiarizing personnel with relevant environmental plans and standards.
- Ensuring a comprehensive understanding of the protocols in place.

Protocols and Procedures:

- Detailing specific protocols and procedures for biodiversity management.
- Highlighting emergency response plans in case of unexpected biodiversity-related incidents.

Interactive Training Exercises:

- Engaging participants in practical exercises to reinforce theoretical knowledge.
- Encouraging hands-on learning to enhance comprehension.

Every biodiversity training should be recorded and reported.

4.2 Reporting

Internal reporting requirements for biodiversity conservation principles and the on-site implementation of management controls, as outlined in the BMP, will be defined by AYGM,

with contractors and sub-contractors expected to adhere to these specifications. External experts engaged for biodiversity studies within the Project will submit reports detailing the implementation of mitigation measures, management controls, and monitoring strategies, along with their site-specific findings, directly to AYGM.

Biodiversity management and monitoring results, as addressed in the BMP, will be disseminated to all relevant stakeholders within the framework of the Social and Environmental Performance (SEP). This approach ensures transparency and communication with interested parties regarding the outcomes of biodiversity conservation efforts within the Project.

Reports should be given as a "Field Evaluation Report" after each field survey, containing a summary of the operations. At the end of the year, an "Annual Field Monitoring and Evaluation Report" detailing all the work done should be prepared and presented.

BMP will also be updated after the completion of pre-construction surveys for fauna species and as necessary.

4.3 Monitoring

A Project-specific Biodiversity Monitoring and Evaluation Program is provided in Appendix-4to assess the effective management of impacts on biodiversity. The identification of biodiversity features for monitoring will be carried out during pre-construction surveys, with biodiversity monitoring parameters tailored to reflect the characteristics of the habitat and species composition in the area.

Biodiversity monitoring strategies, aligned with Project standards and conservation objectives, will be developed to cover the land preparation, construction, and operation phases. Based on monitoring results at different Project phases, additional measures will be implemented as necessary. The general framework for periodic monitoring studies throughout the Project, along with the biodiversity features to be monitored, includes:

- Status of critical habitat
- Status of natural habitats and species of high conservation concern, including the implementation of related management controls
- Effectiveness of mitigation measures to restrict impacts on natural habitats within the construction corridor
- Effectiveness of wires and crossings to prevent animal mortality
- Management of environmental issues and the significance of impacts on biodiversity
- Presence of invasive alien species in the area
- Changes in populations of target fauna species identified through pre-construction surveys
- Status of post-construction restoration areas

Monitoring reports, outlining outcomes for each monitoring period, will be prepared by external experts and submitted to AYGM. Management controls necessitated by monitoring results will be addressed within the scope of the BMP. This comprehensive approach ensures a systematic evaluation of biodiversity-related aspects throughout the Project lifecycle.

APPENDIX-1: Images of Endemic/Rare Plant Species



Figure 20. ***Campanula munzurensis*** **(IUCN: VU)**



Figure 21. ***Plantago euphratica*** **(IUCN: VU)**



Figure 22. *Centaurea derderifolia* (IUCN: VU)



Figure 23. *Echinophora chrysantha* (IUCN: EN)



Figure 24. *Tchihatchewia isatidea* (basal leaf) (IUCN: VU)



Figure 25. *Silene nerimaniae* (IUCN: VU)



Figure 26. *Physoptychis haussknechtii* (IUCN: EN)



Figure 27. *Verbascum alyssifolium* (IUCN: CR)



Figure 28. *Verbascum alyssifolium* (IUCN: CR)



Figure 29. *Ebenus macrophylla* (IUCN: VU)



Figure 30. ***Centaurea huber-morathii*** **(IUCN: VU)**



Figure 31. ***Glaucium cappadocicum*** **(IUCN: VU)**



Figure 32. *Salvia euphratica* subsp. *leiocalycina* (IUCN: VU)



Figure 33. *Onosma erzincanica* (IUCN: CR)



Figure 34. ***Allium purpureoviride*** **(IUCN: VU)**



Figure 35. ***Beta macrorhiza*** **(IUCN: VU)**



Figure 36. *Paronychia arabica* subsp. *euphratica* (IUCN: VU)



Figure 37. *Campanula yildirimlii* (IUCN: EN)



Figure 38. ***Hesperis breviscapa*** **(IUCN: EN)**



Figure 39. ***Thymus cappadocicus*** **var.** ***cappadocicus*** **(IUCN: VU)**



Figure 40. *Achillea pseudoaleppica* (IUCN: VU)



Figure 41. *Asphodeline tenuior* var. *puberulenta* (IUCN: VU)



Figure 42. *Centaurea aucherana* (IUCN: EN)



Figure 43. *Cousinia sintenisii* (IUCN: VU)



Figure 44. ***Hyacinhella acutiloba*** **(IUCN: VU)**



Figure 45. ***Limoniopsis owerinii*** **(IUCN: VU)**



Figure 46. *Origanum haussknechtii* (IUCN: VU)



Figure 47. *Reseda armena* var. *scabridula* (IUCN: VU)



Figure 48. ***Verbascum tuna-ekimii*** **(IUCN: CR)**

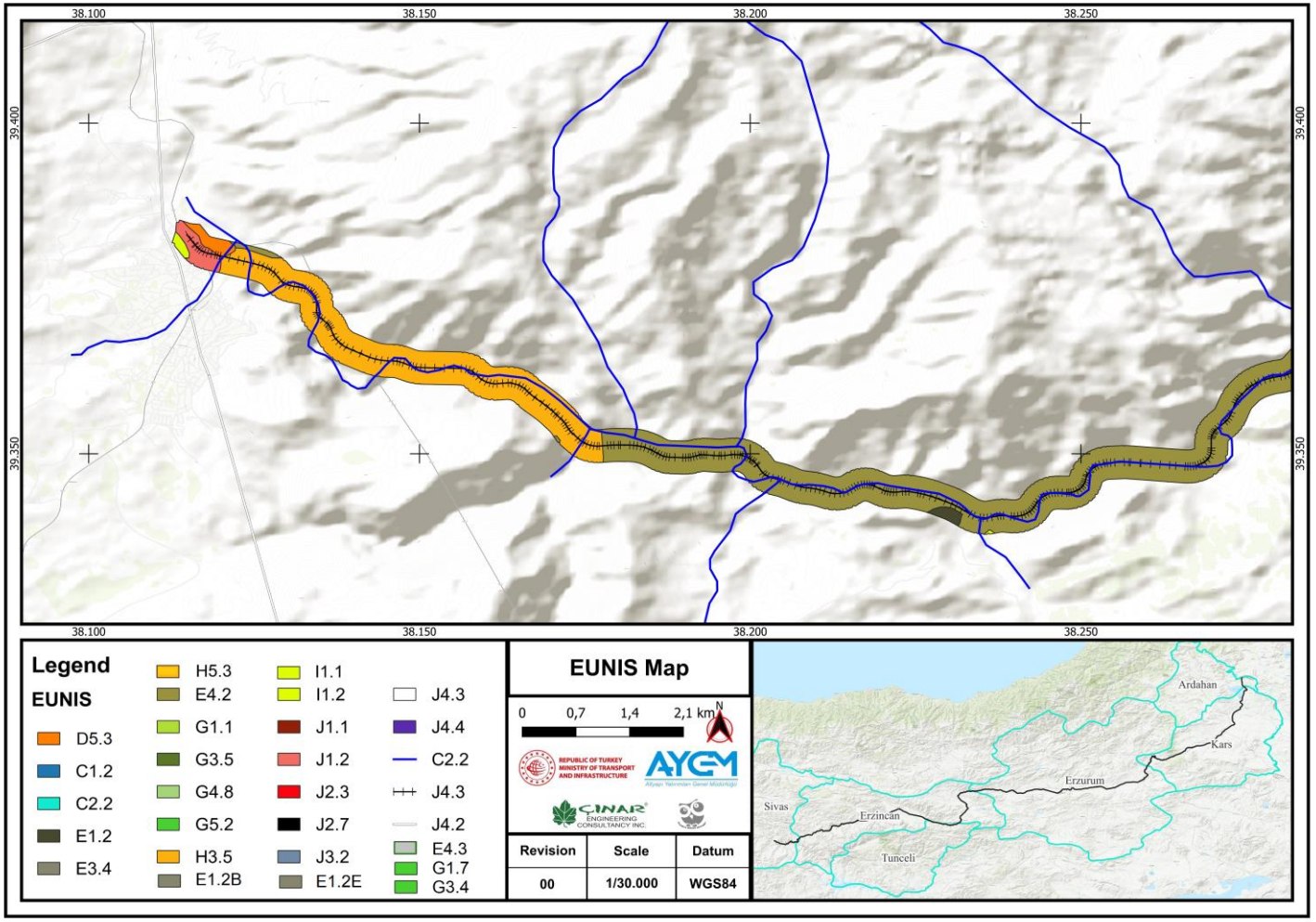


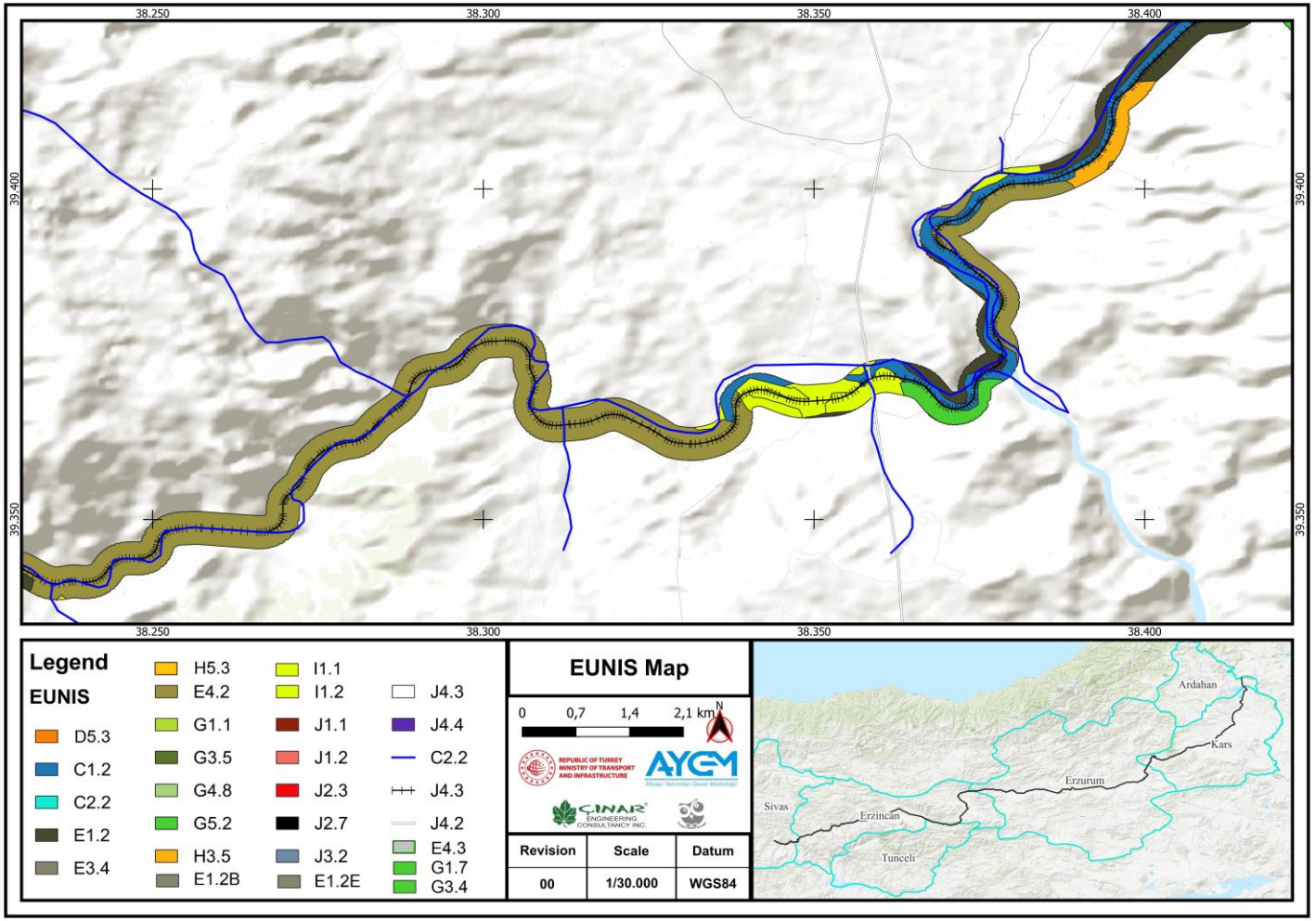
Figure 49. ***Gladiolus hamzaoglui*** **(IUCN: VU)**

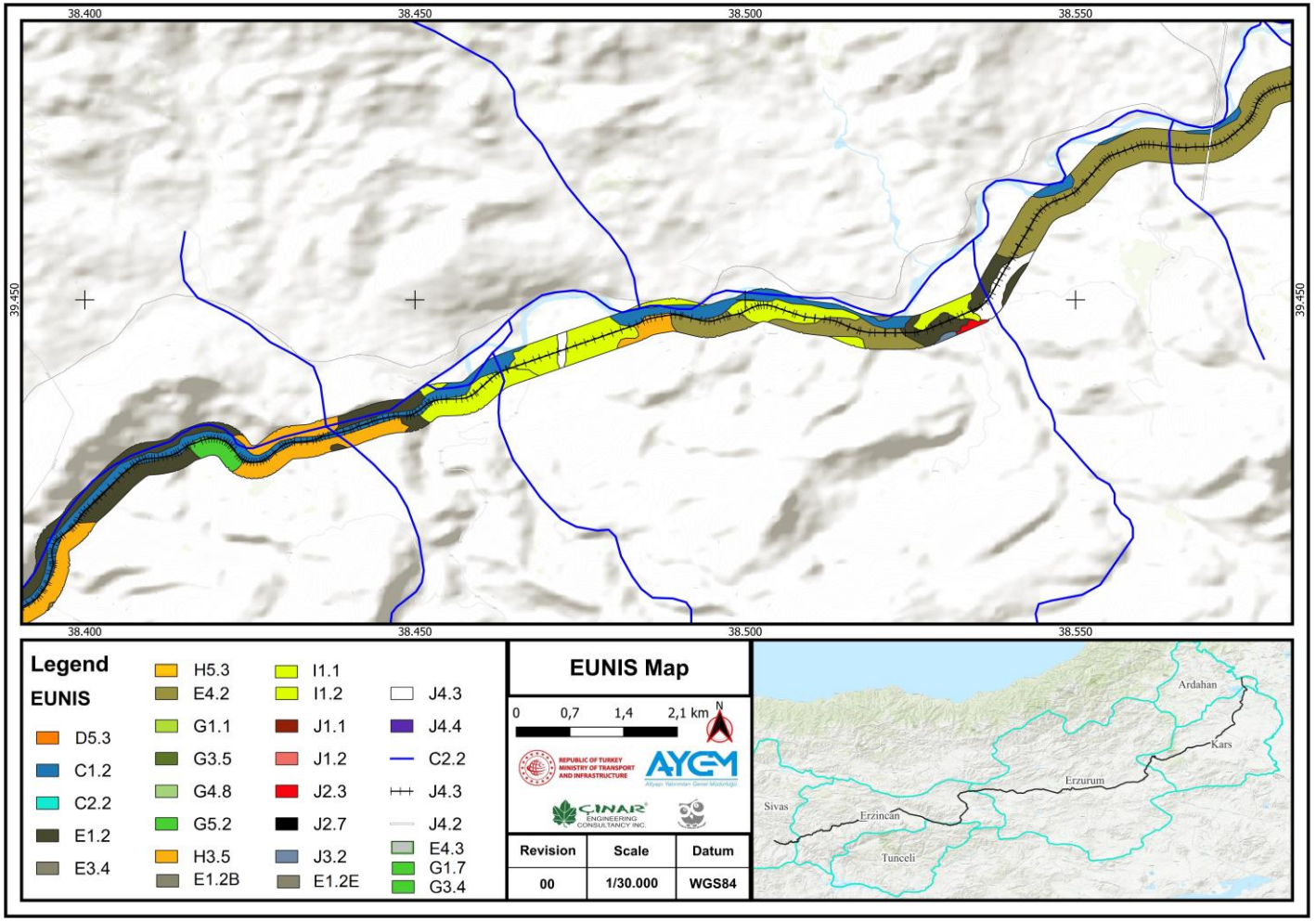


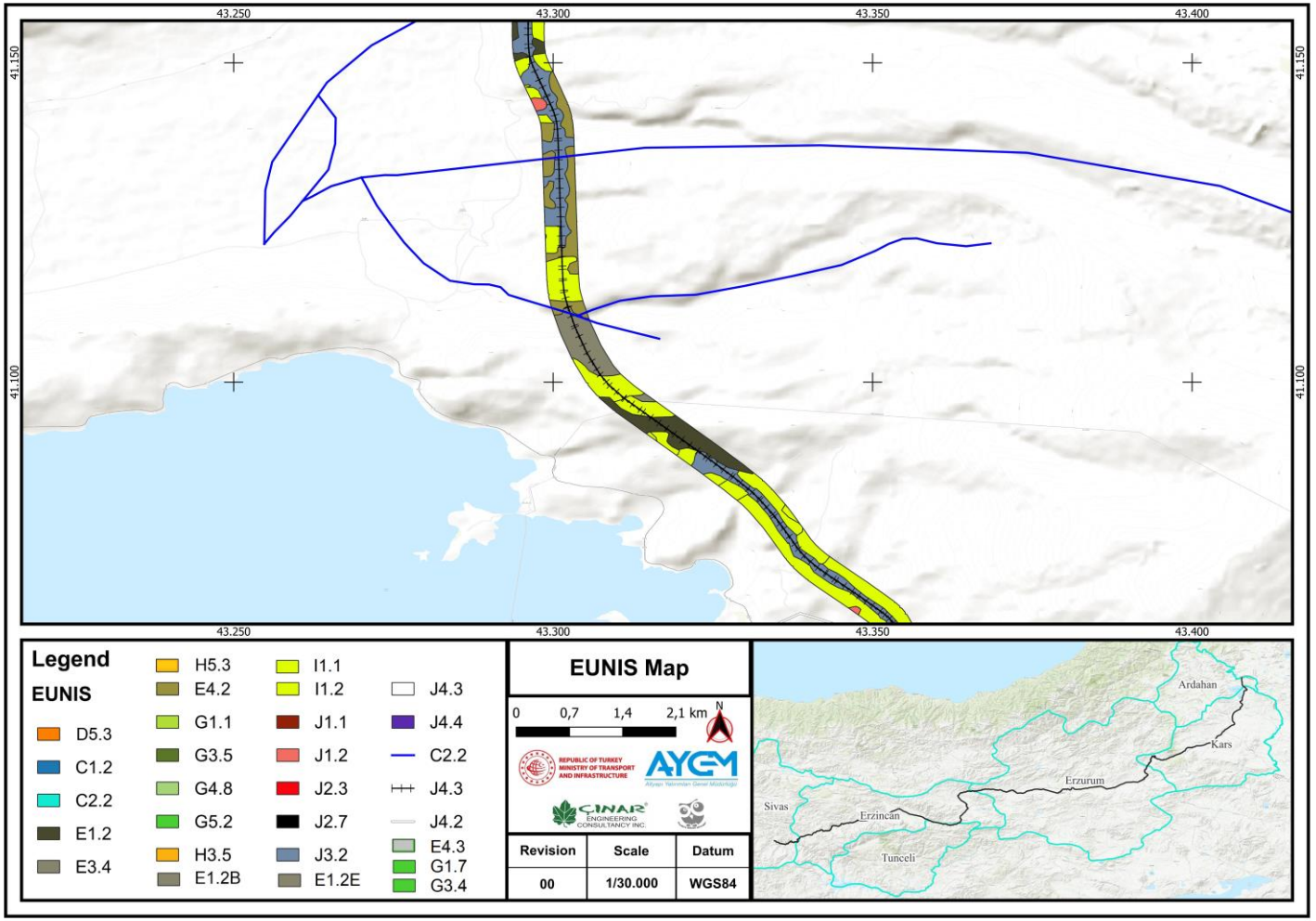
Figure 50. ***Hedysarum yilmazunalii*** **(IUCN: CR)**

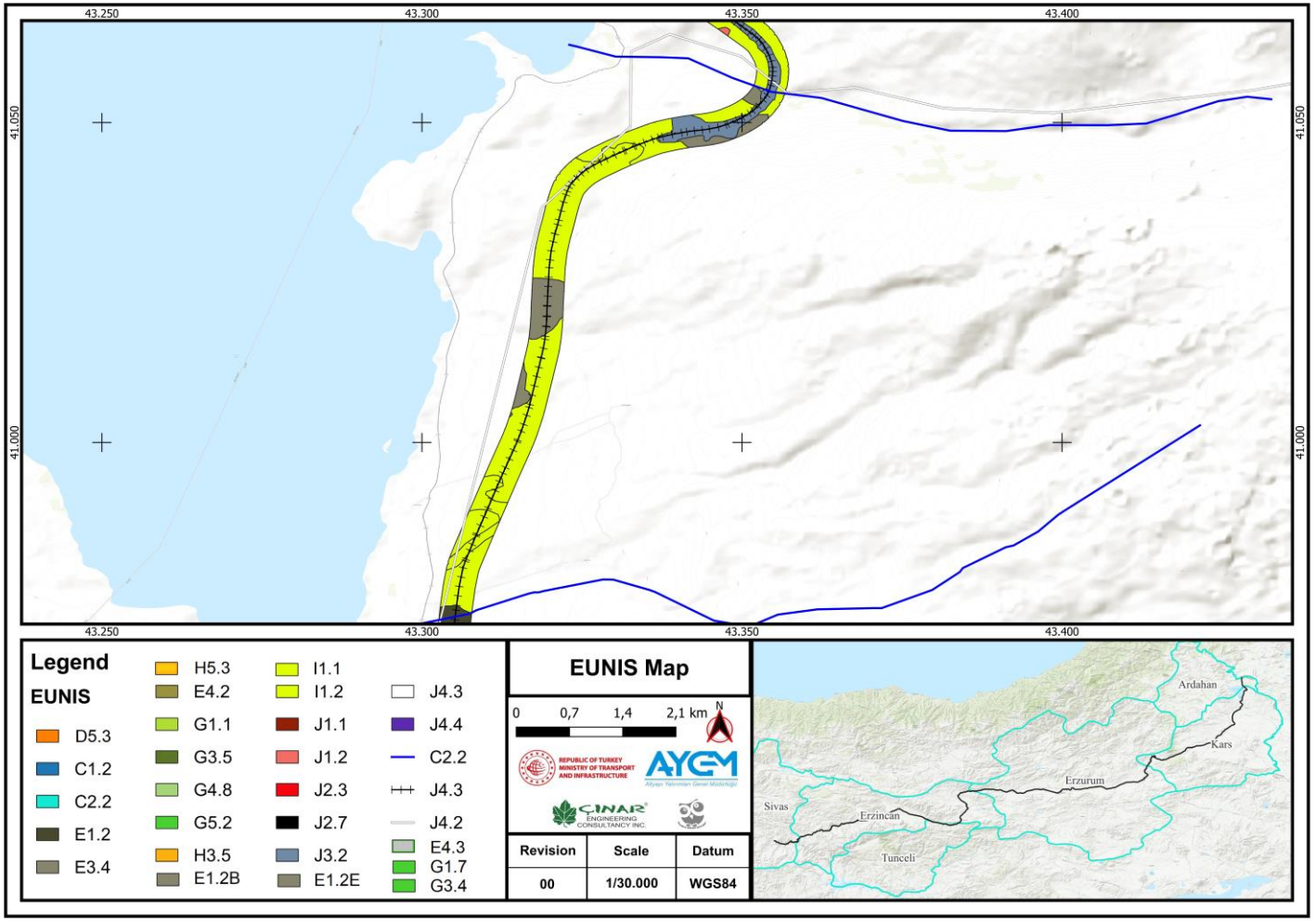
APPENDIX-2: EUNIS Habitats

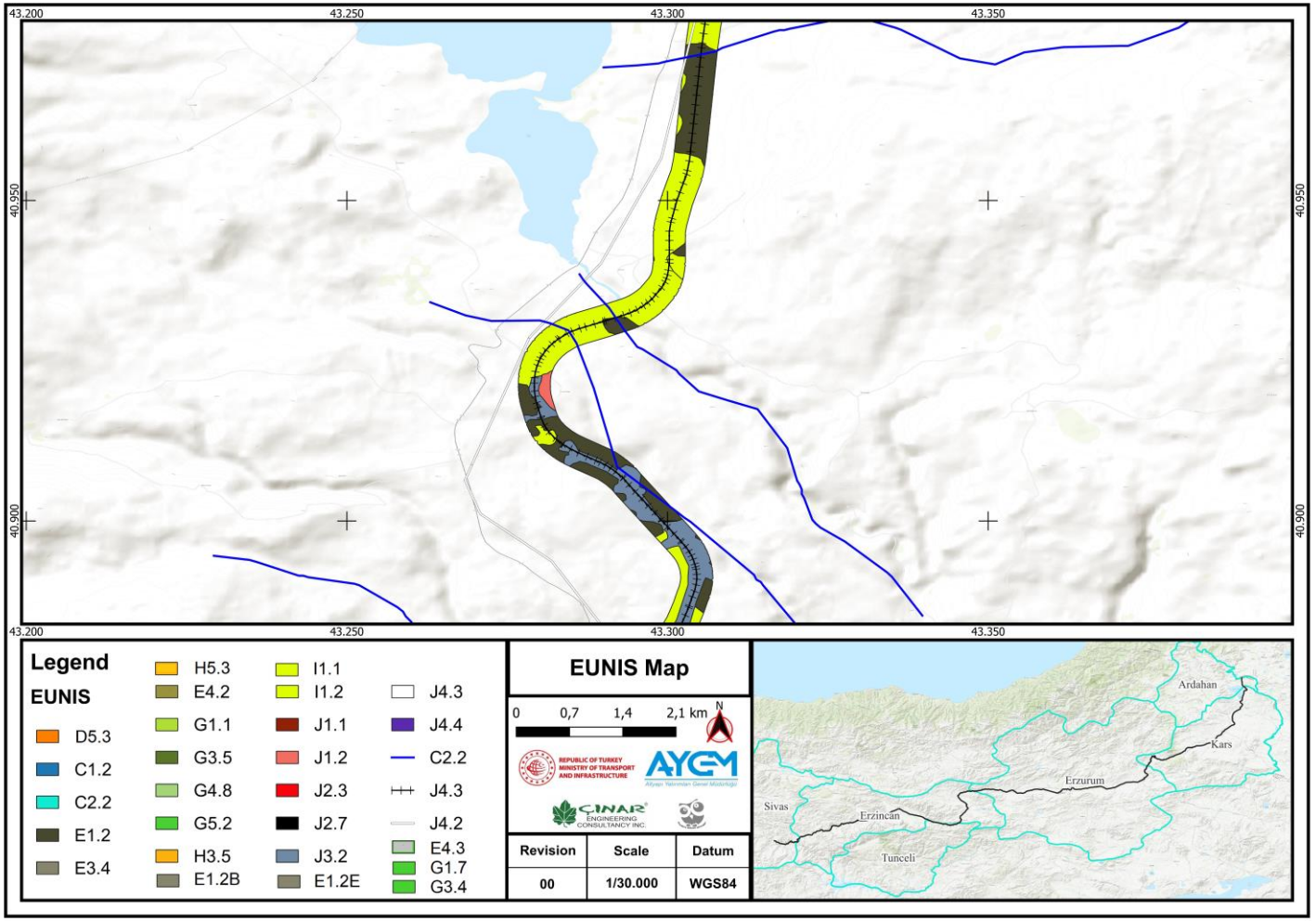


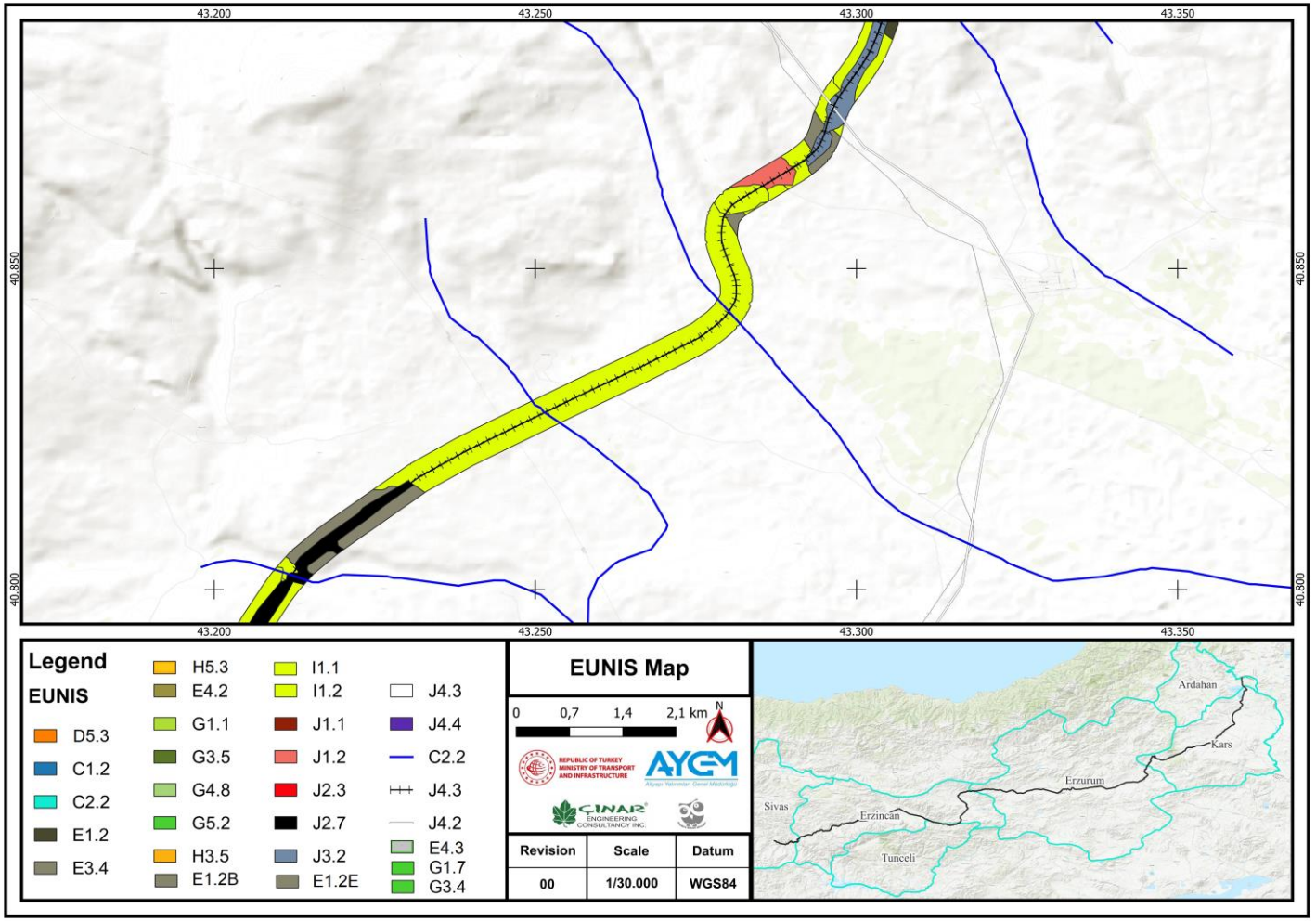

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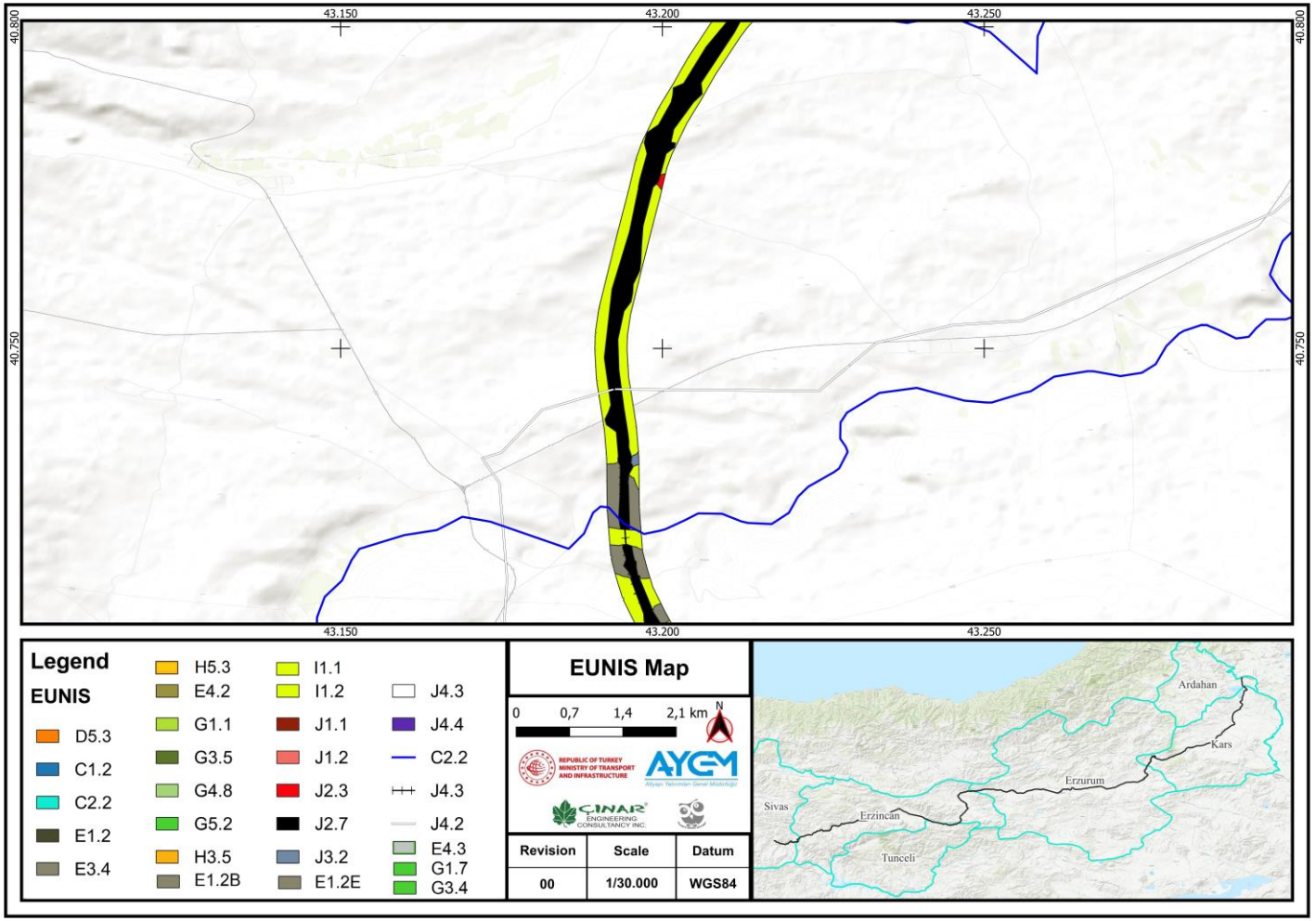

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Legend
EUNIS
D5.3
C1.2
C2.2
E1.2
E3.4
H5.3
E4.2
G1.1
G3.5
G4.8
G5.2
H3.5
E1.2B
I1.1
I1.2
J1.1
J1.2
J2.3
J2.7
J3.2
E1.2E
J4.3
J4.4
C2.2
J4.3
J4.2
E4.3
G1.7
G3.4
EUNIS Map
0 0,7 1,4 2,1 km
N
REPUBLIC OF TURKEY MINISTRY OF TRANSPORT AND INFRASTRUCTURE
AYGM
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ÇINAR ENGINEERING CONSULTANCY INC.
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Sivas
Erzincan
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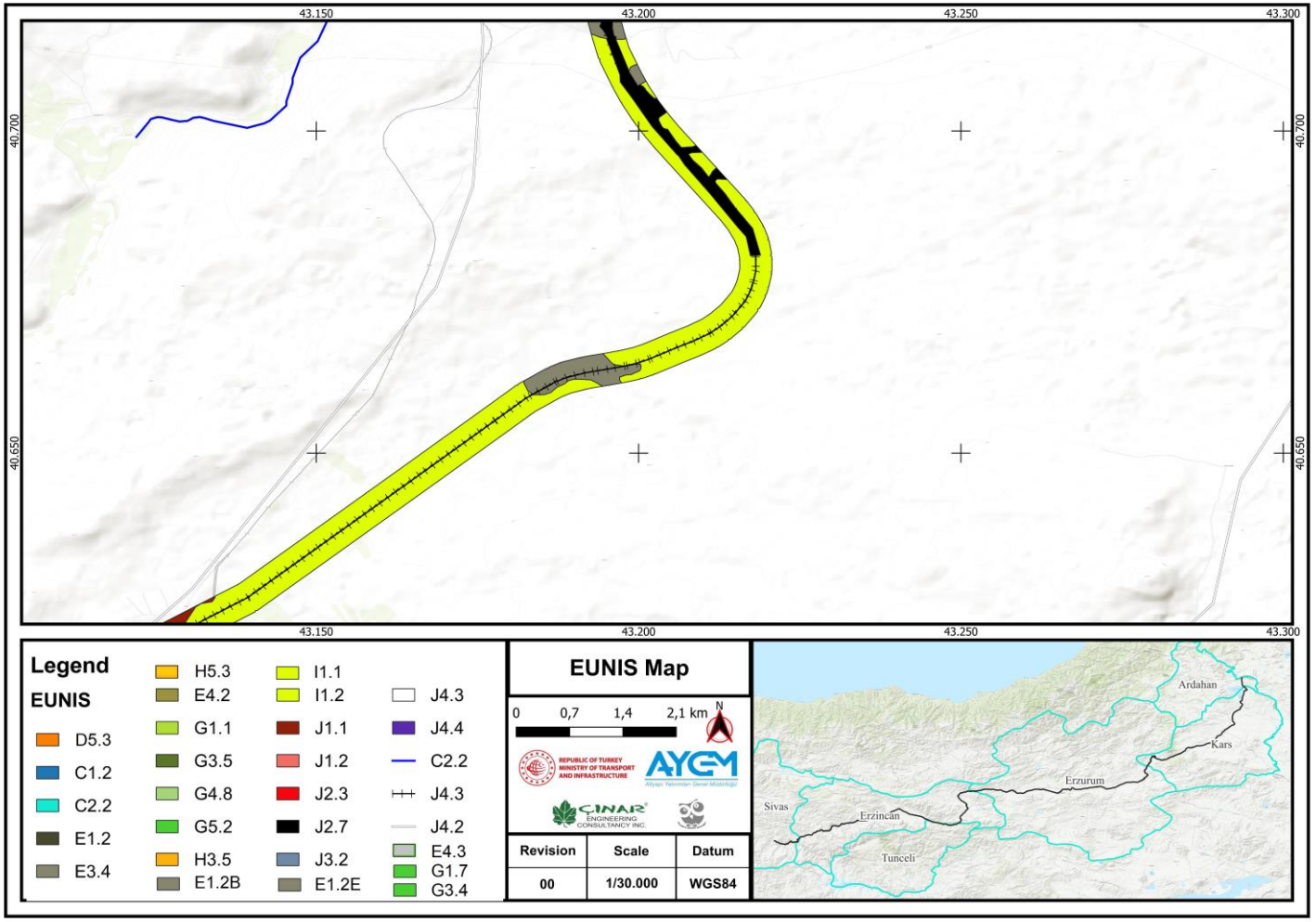

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C1.2
C2.2
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E3.4
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E4.2
G1.1
G3.5
G4.8
G5.2
H3.5
E1.2B
I1.1
I1.2
J1.1
J1.2
J2.3
J2.7
J3.2
E1.2E
J4.3
J4.4
C2.2
J4.3
J4.2
E4.3
G1.7
G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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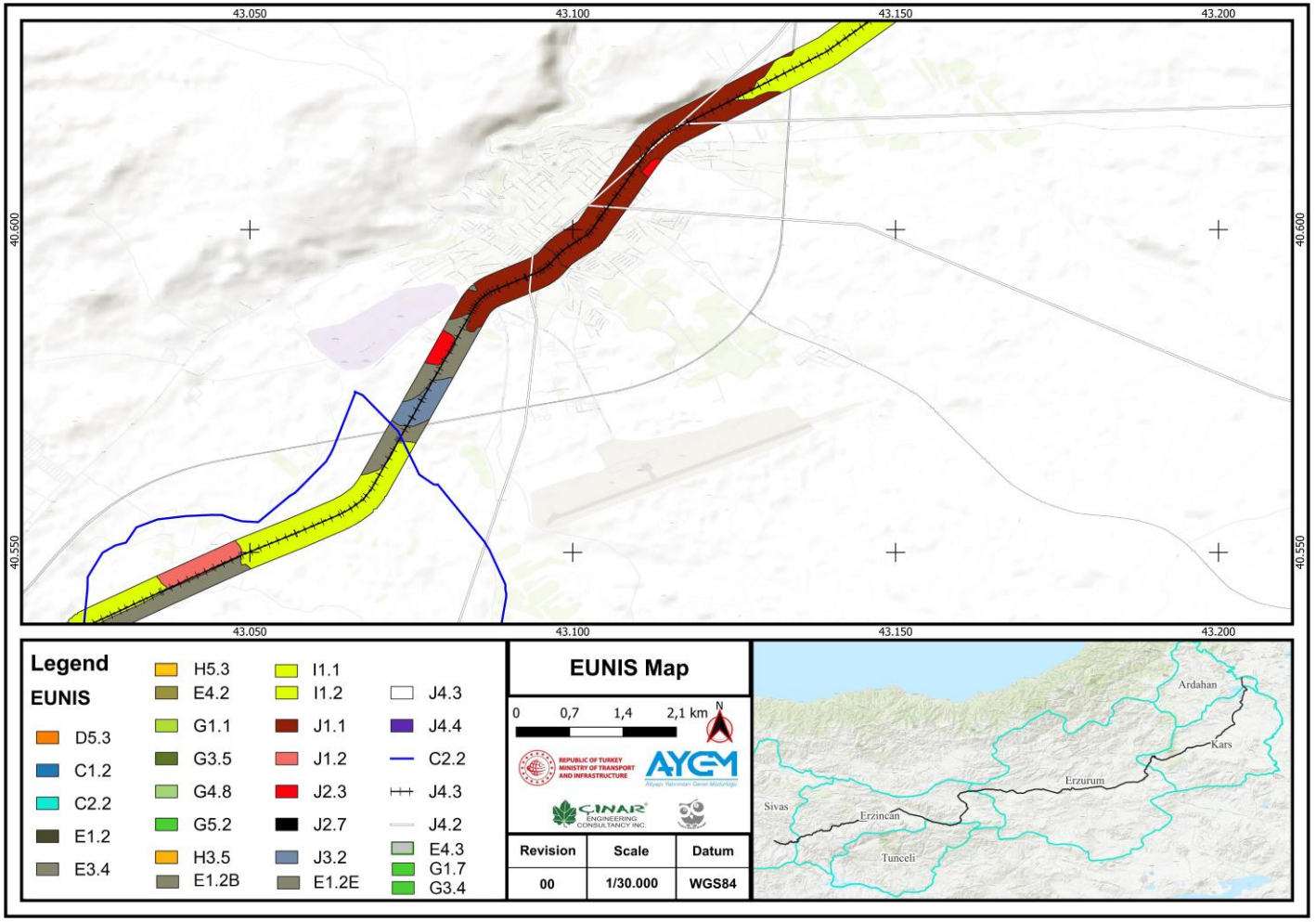

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D5.3
C1.2
C2.2
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H5.3
E4.2
G1.1
G3.5
G4.8
G5.2
H3.5
E1.2B
I1.1
I1.2
J1.1
J1.2
J2.3
J2.7
J3.2
E1.2E
J4.3
J4.4
C2.2
J4.3
J4.2
E4.3
G1.7
G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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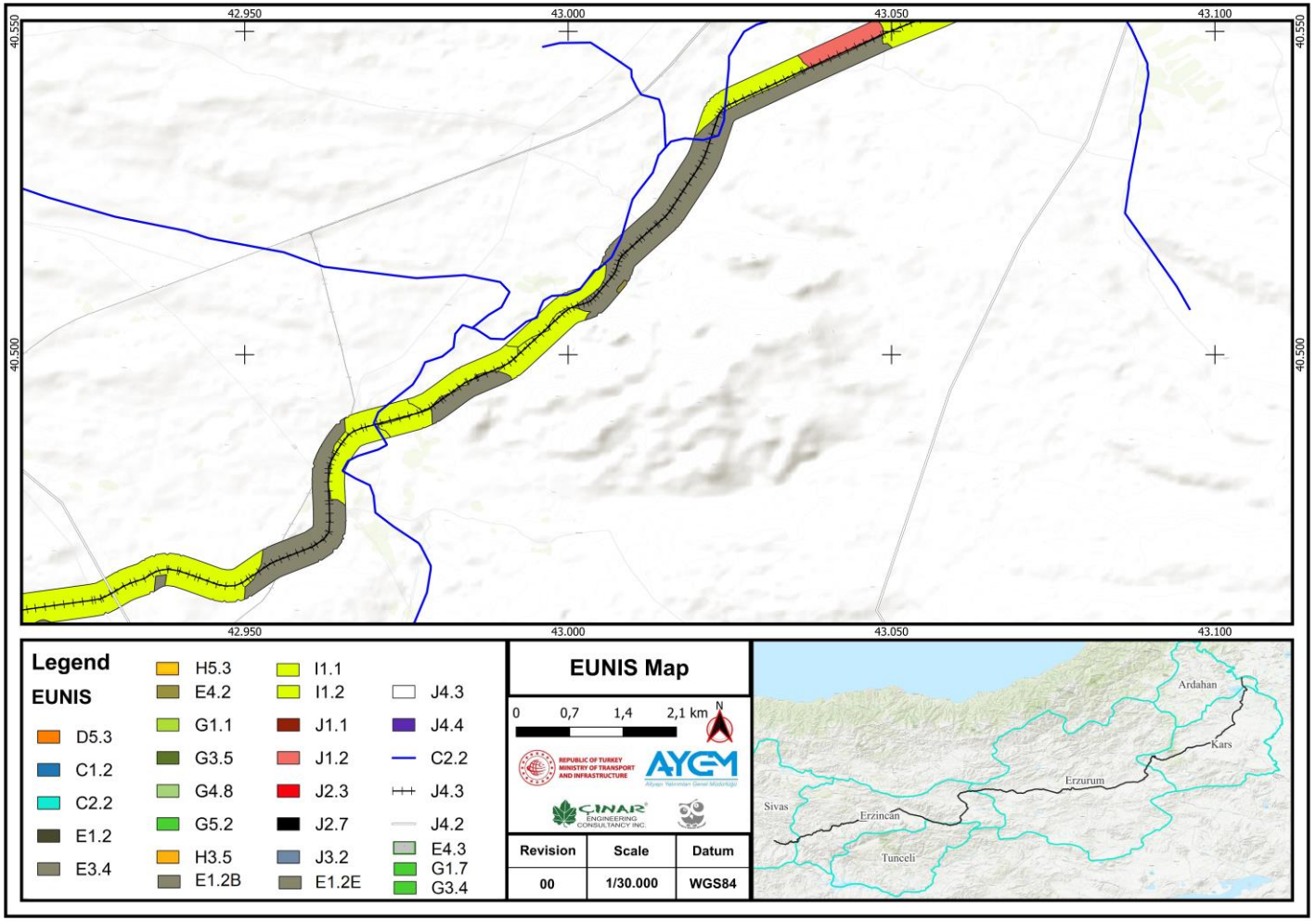

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H3.5
E1.2B
I1.1
I1.2
J1.1
J1.2
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J3.2
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J4.3
J4.4
C2.2
J4.3
J4.2
E4.3
G1.7
G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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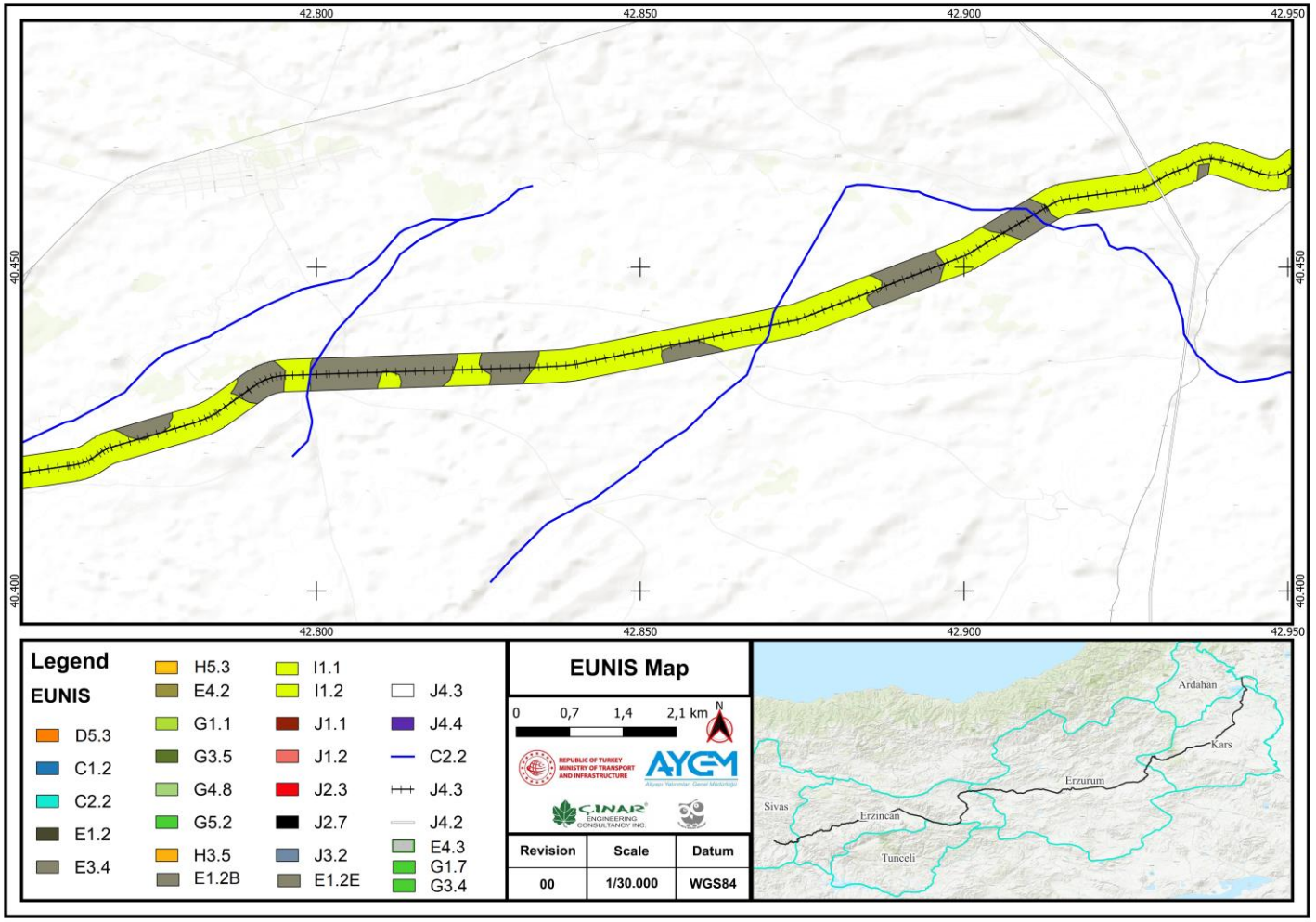

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H3.5
E1.2B
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J4.4
C2.2
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J4.2
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G1.7
G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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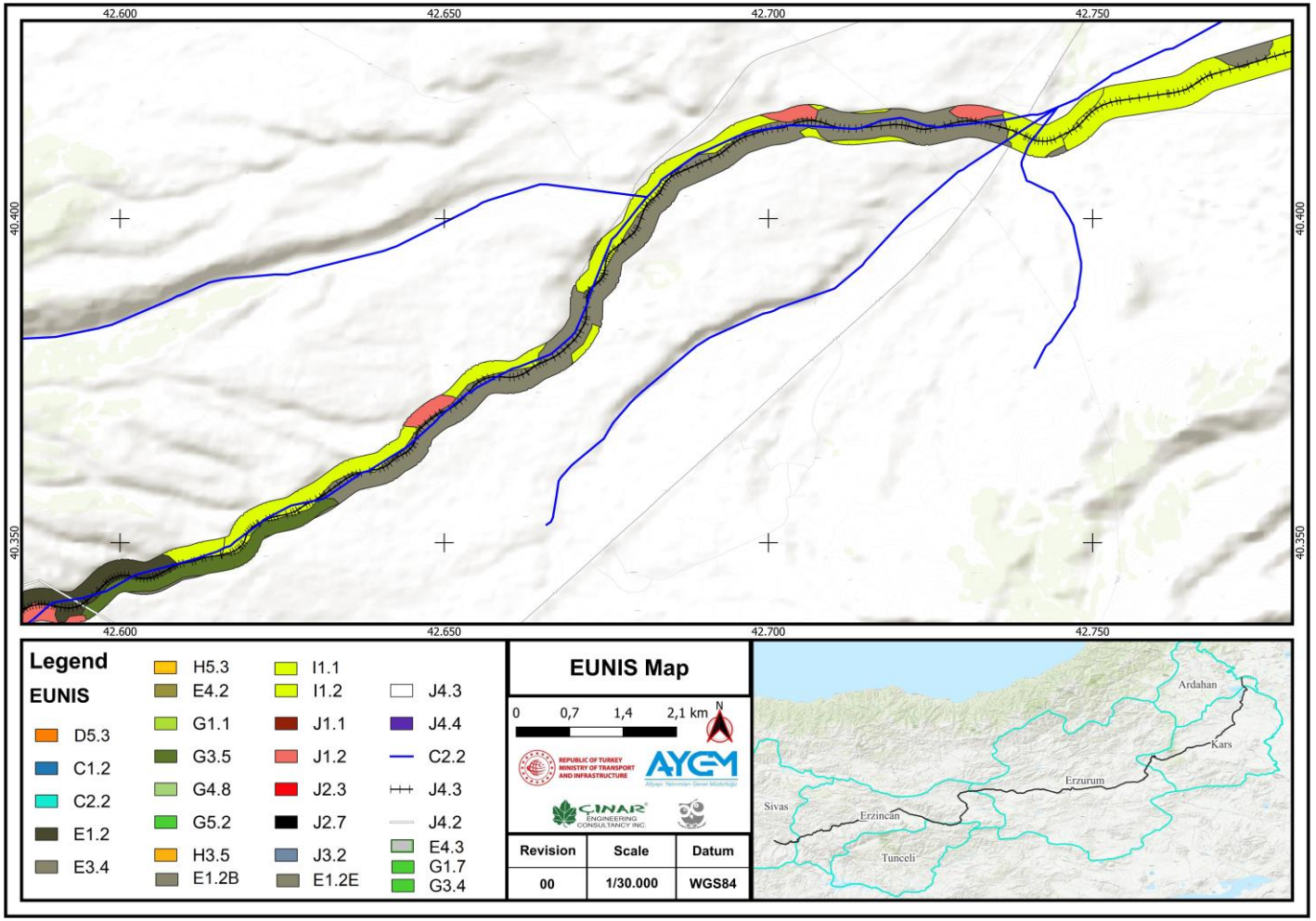

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J1.1
J1.2
J2.3
J2.7
J3.2
E1.2E
J4.3
J4.4
C2.2
J4.3
J4.2
E4.3
G1.7
G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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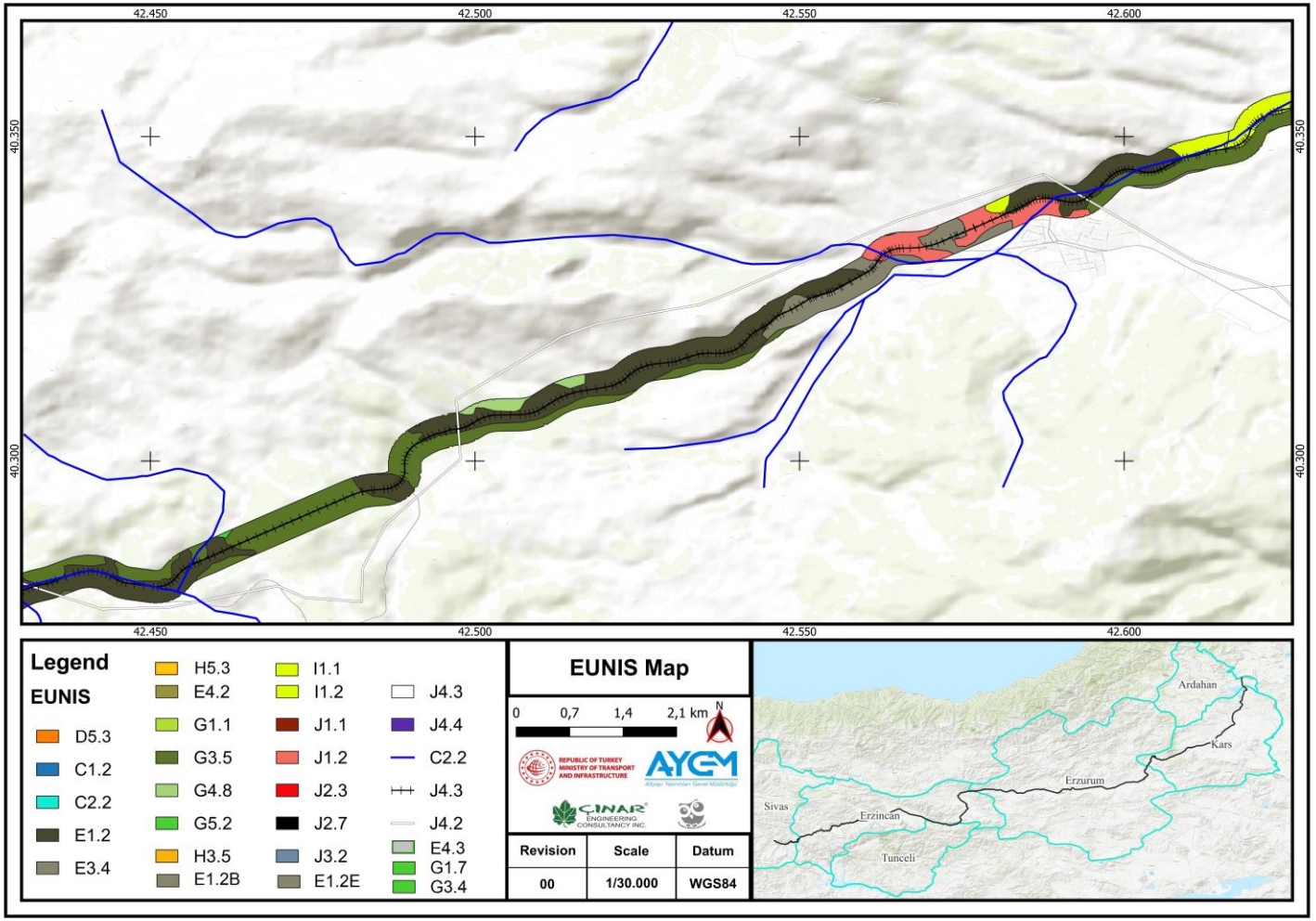

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G4.8
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J1.1
J1.2
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J2.7
J3.2
E1.2E
J4.3
J4.4
C2.2
J4.3
J4.2
E4.3
G1.7
G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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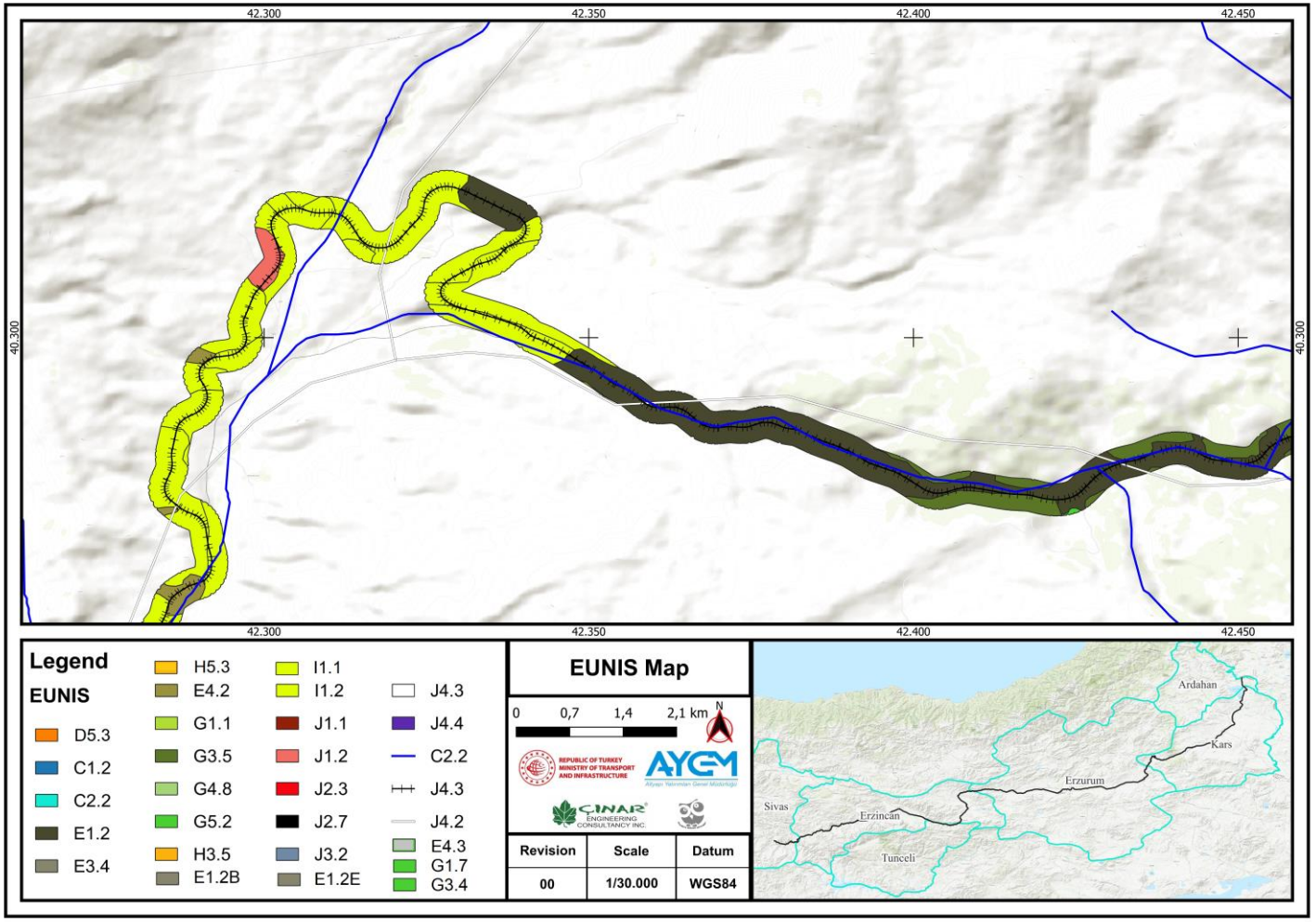

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J1.1
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J2.7
J3.2
E1.2E
J4.3
J4.4
C2.2
J4.3
J4.2
E4.3
G1.7
G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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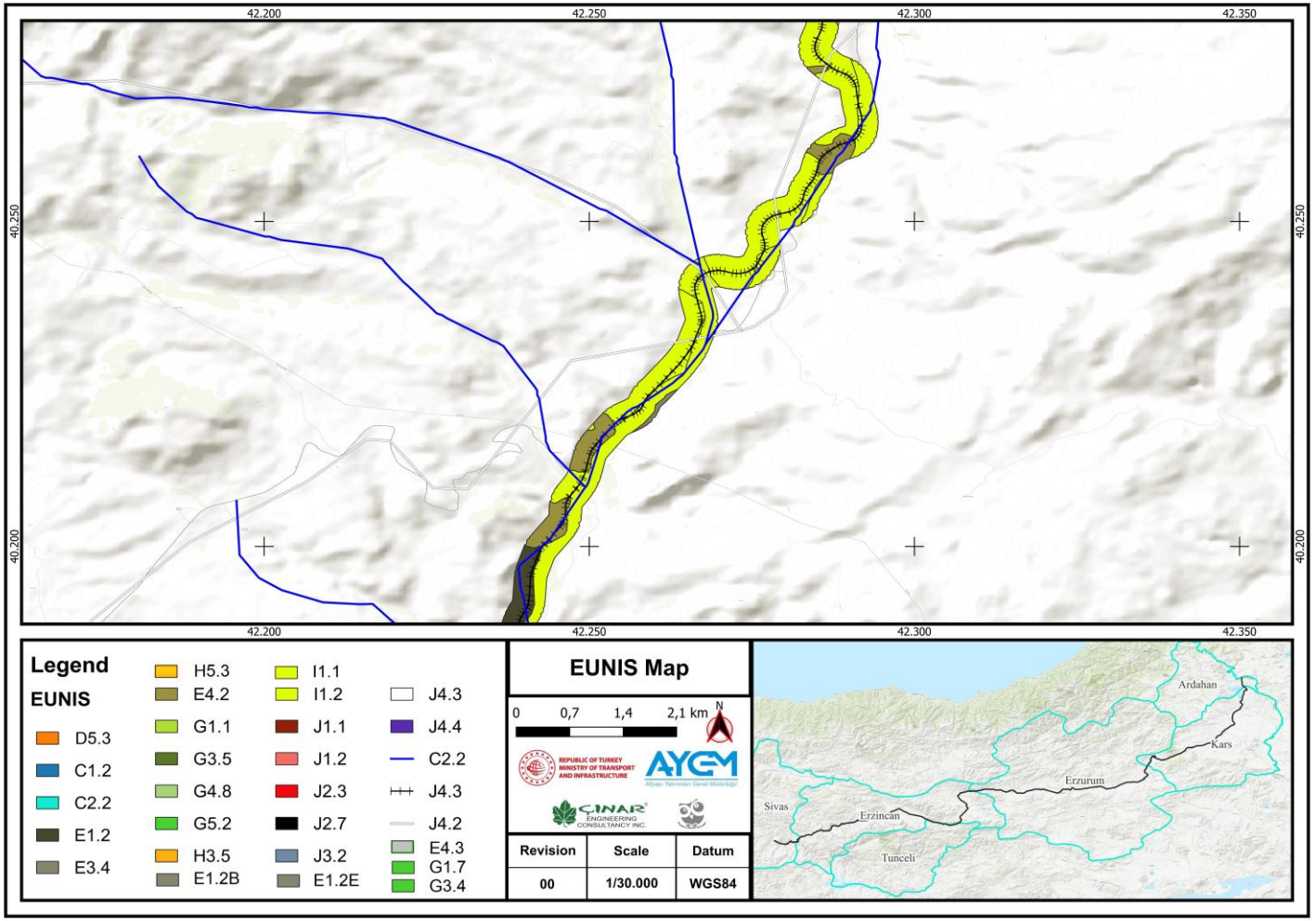

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C1.2
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G3.5
G4.8
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I1.2
J1.1
J1.2
J2.3
J2.7
J3.2
E1.2E
J4.3
J4.4
C2.2
J4.3
J4.2
E4.3
G1.7
G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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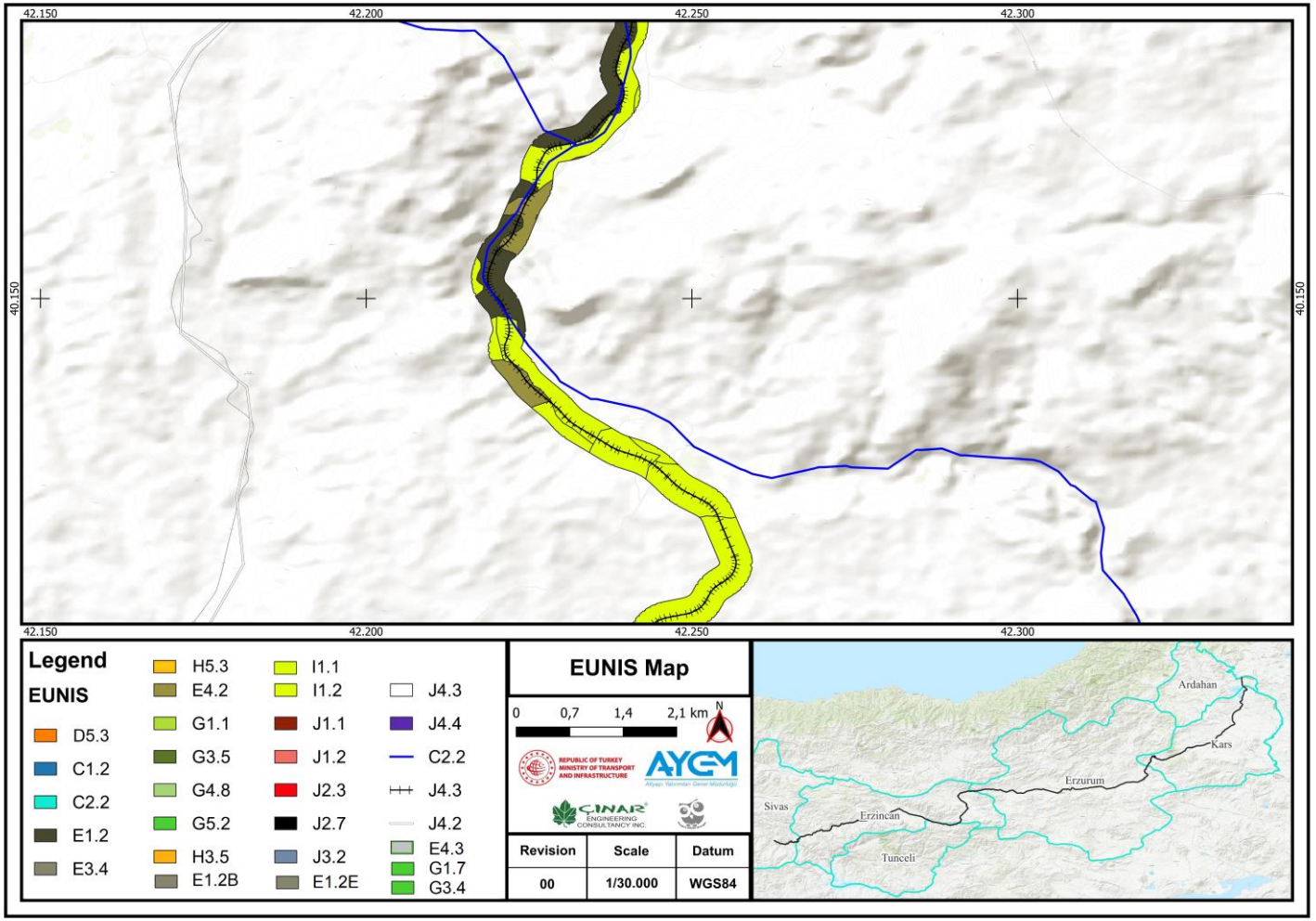

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J1.1
J1.2
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J2.7
J3.2
E1.2E
J4.3
J4.4
C2.2
J4.3
J4.2
E4.3
G1.7
G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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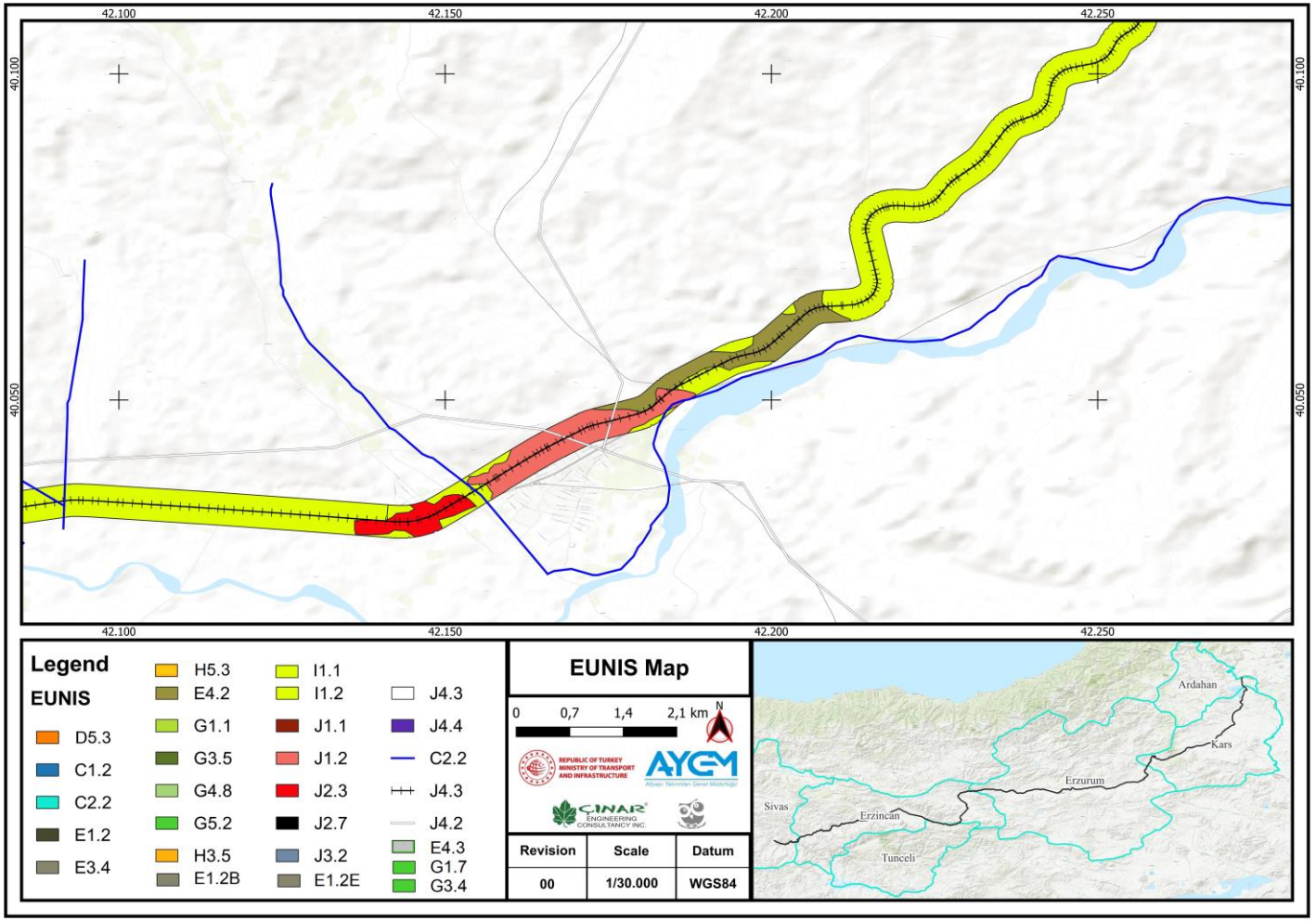

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C2.2
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E3.4
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E4.2
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G3.5
G4.8
G5.2
H3.5
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I1.2
J1.1
J1.2
J2.3
J2.7
J3.2
E1.2E
J4.3
J4.4
C2.2
J4.3
J4.2
E4.3
G1.7
G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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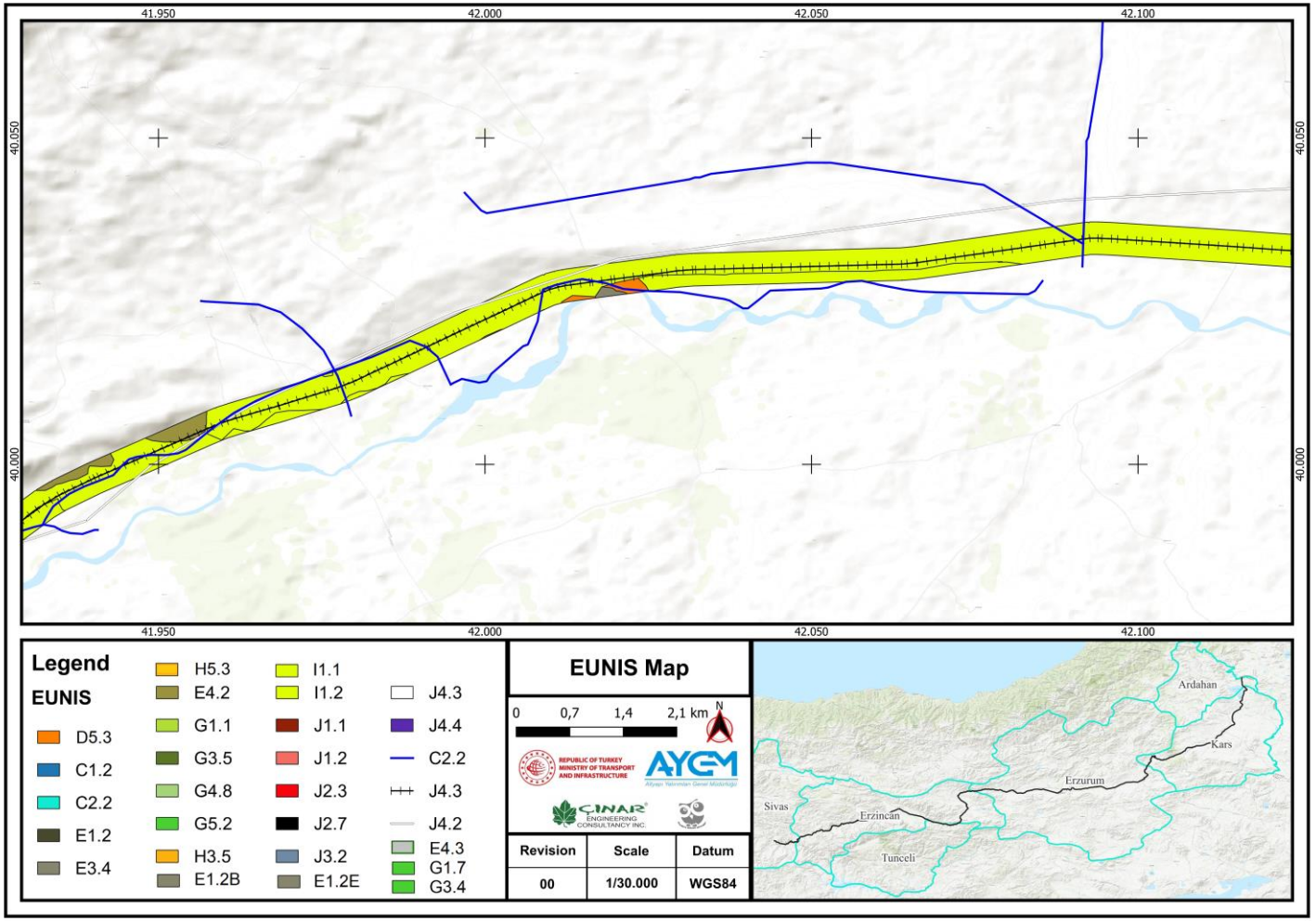

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I1.2
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G1.7
G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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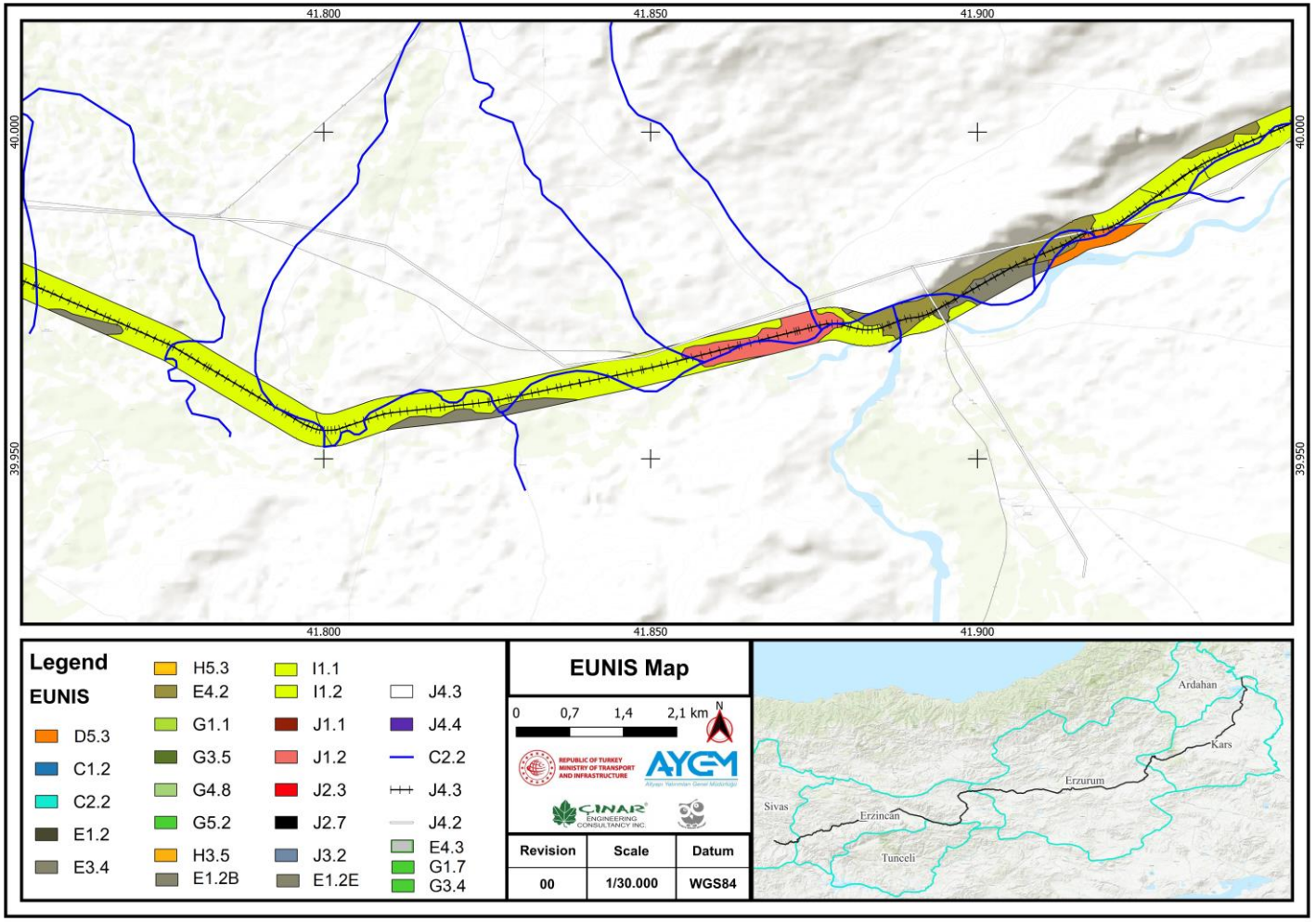

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J4.3
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J4.3
J4.2
E4.3
G1.7
G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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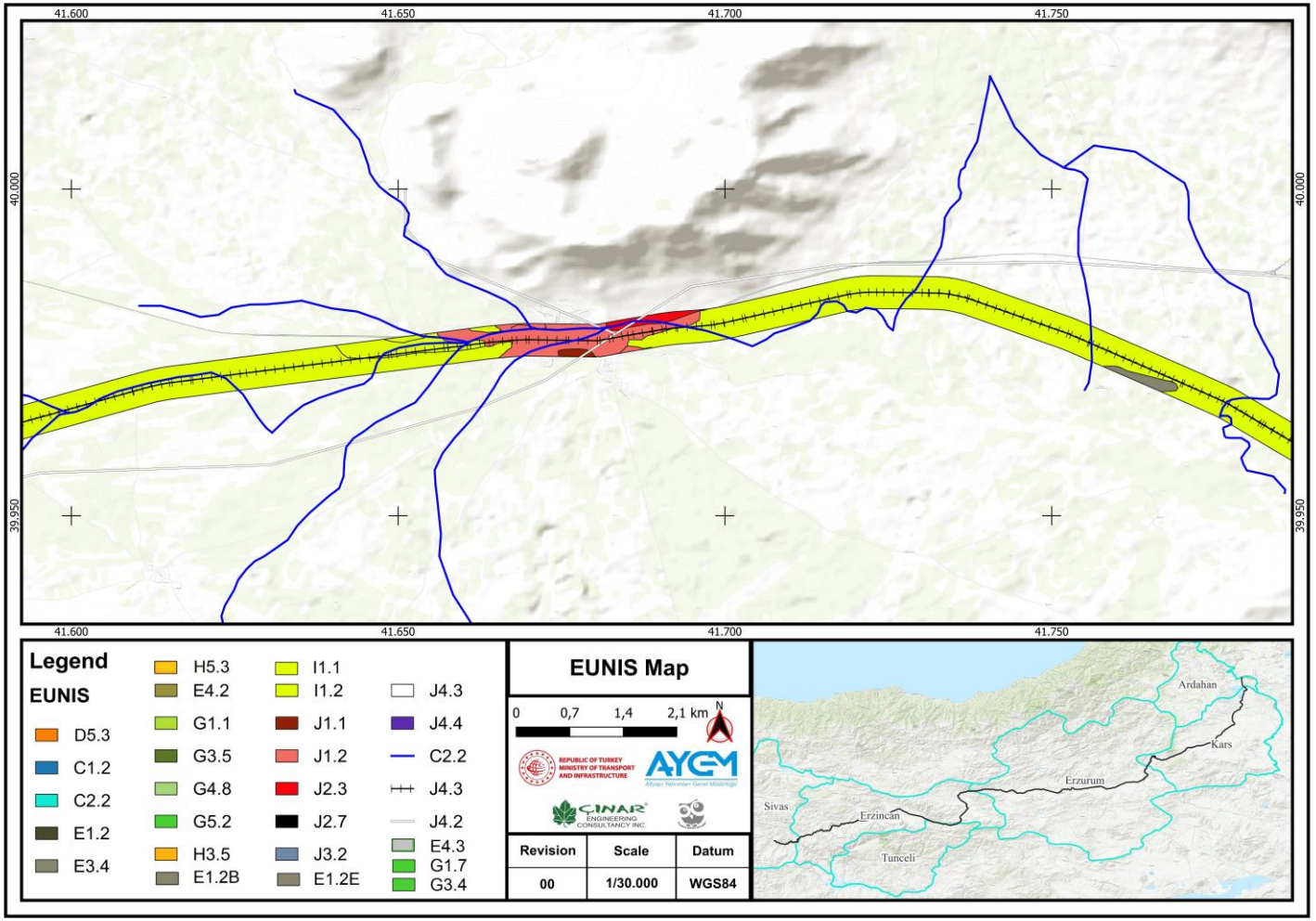

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I1.2
J1.1
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EUNIS Map
0 0,7 1,4 2,1 km
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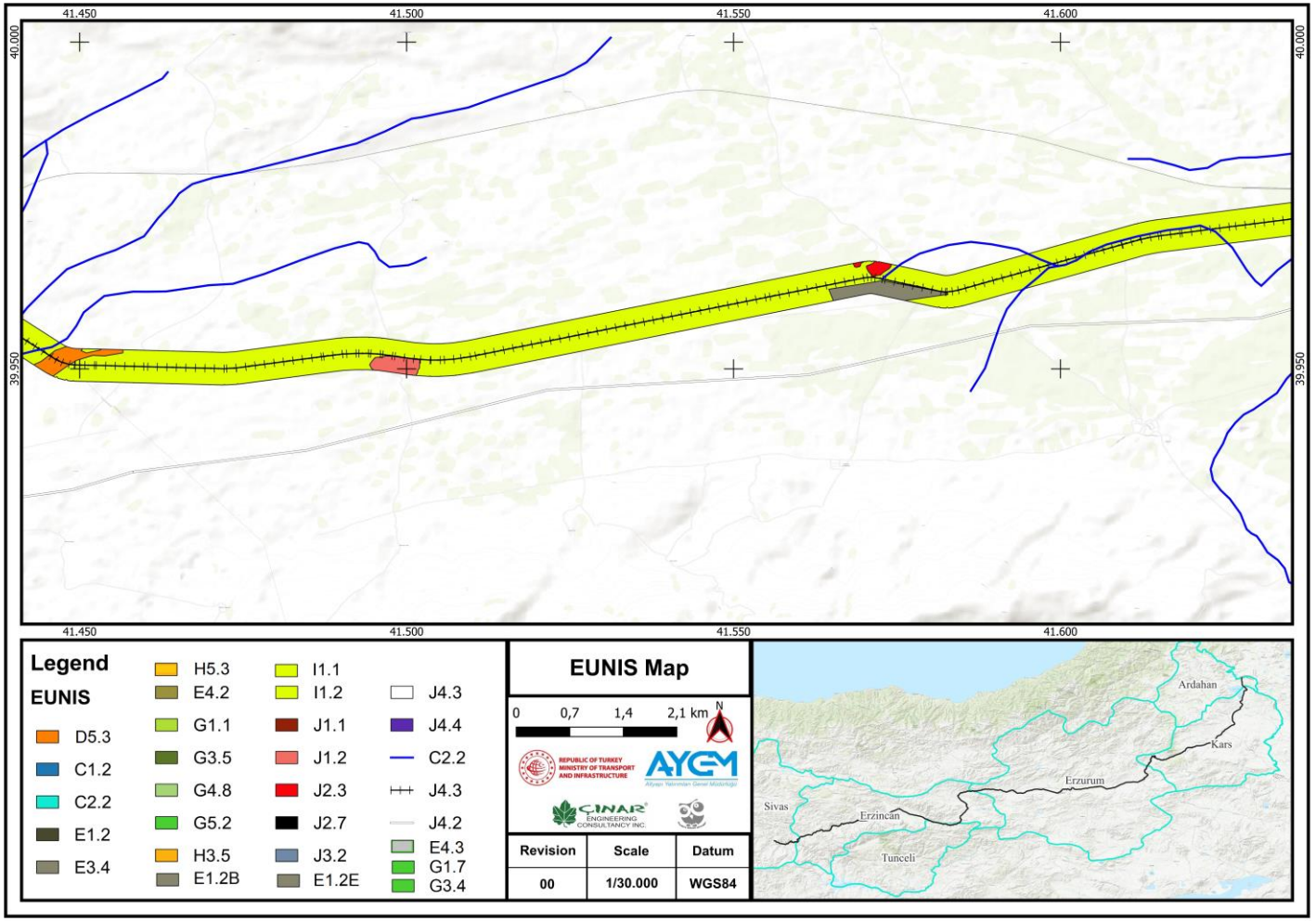

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EUNIS Map
0 0,7 1,4 2,1 km
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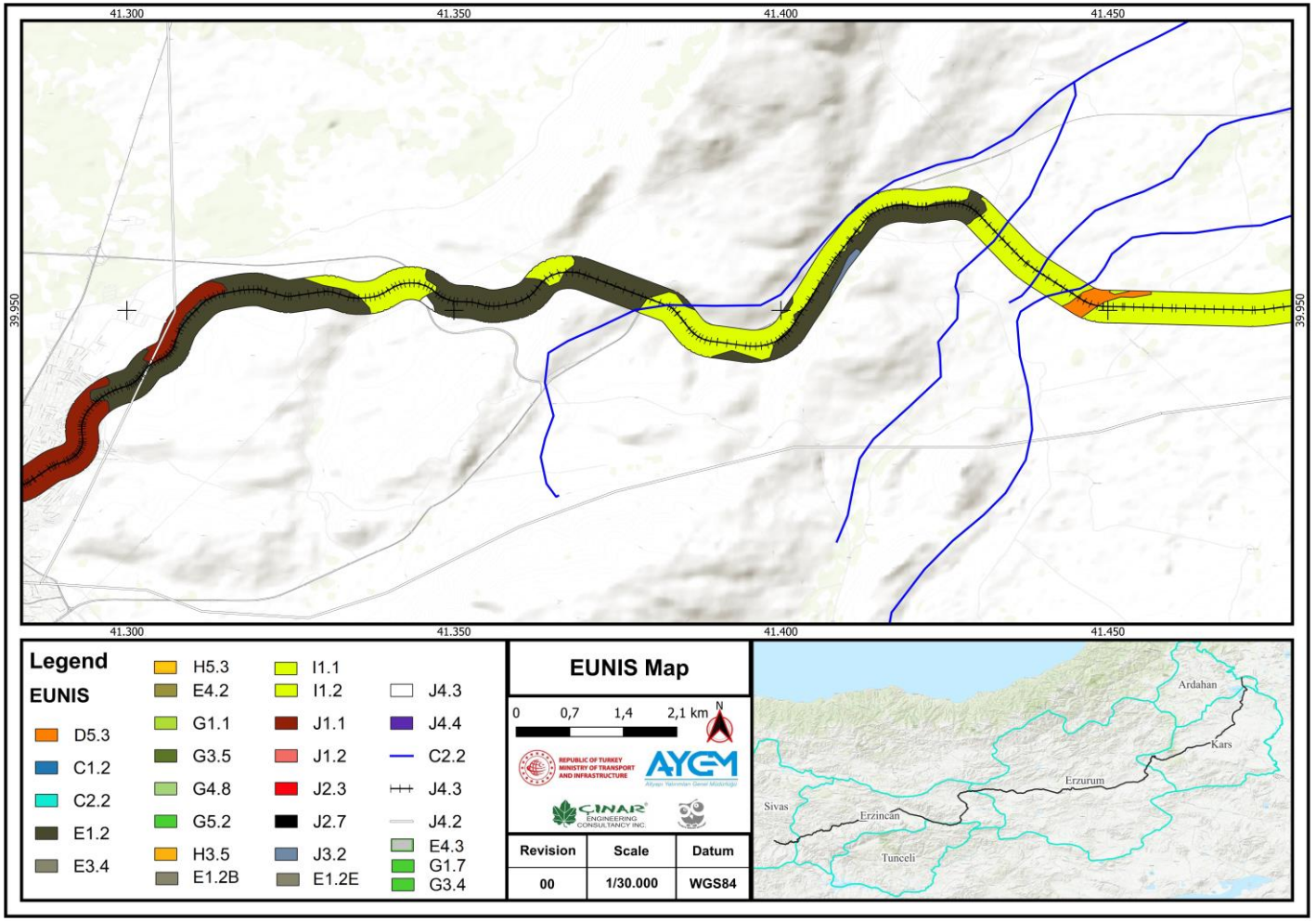

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G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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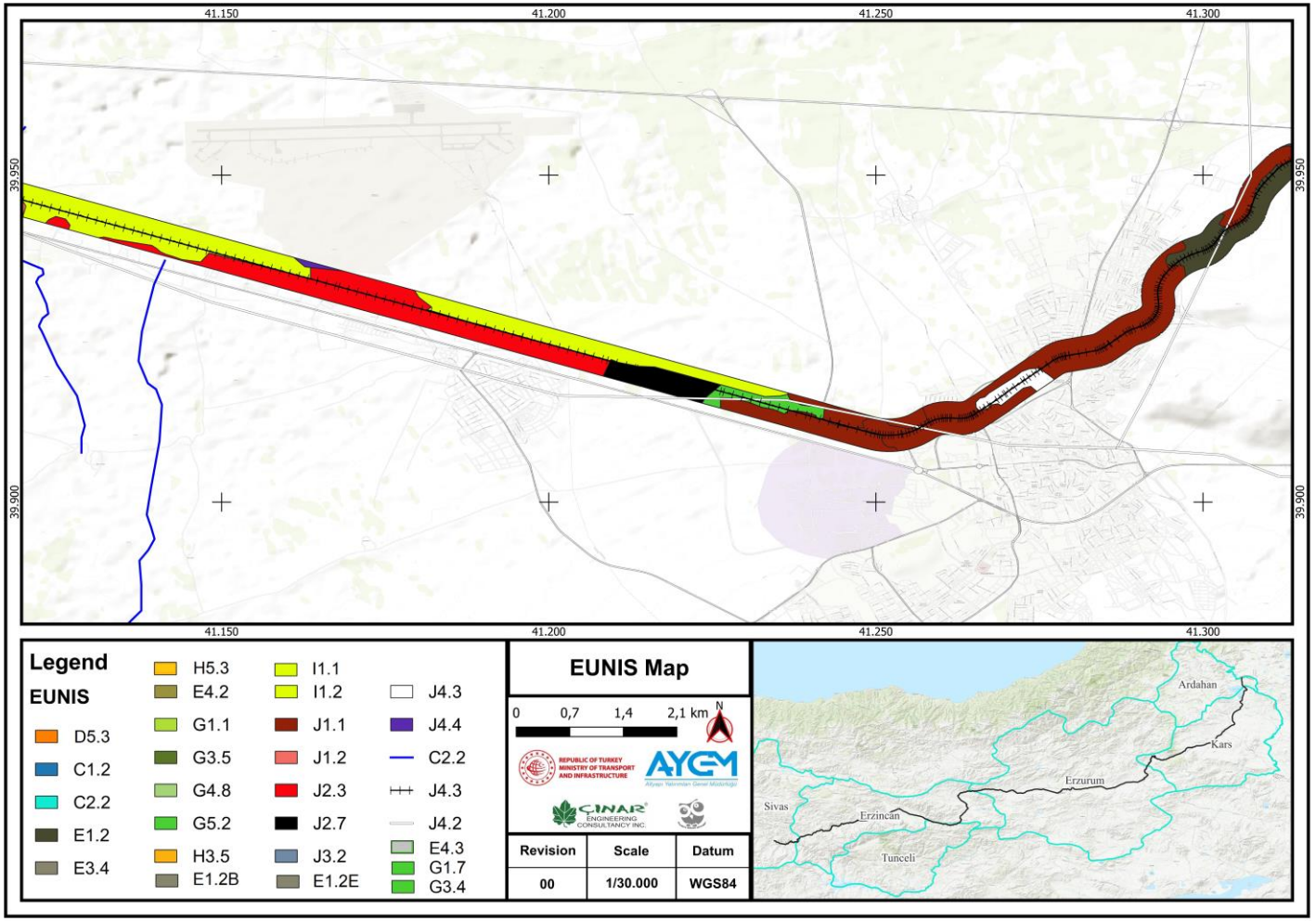

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EUNIS Map
0 0,7 1,4 2,1 km
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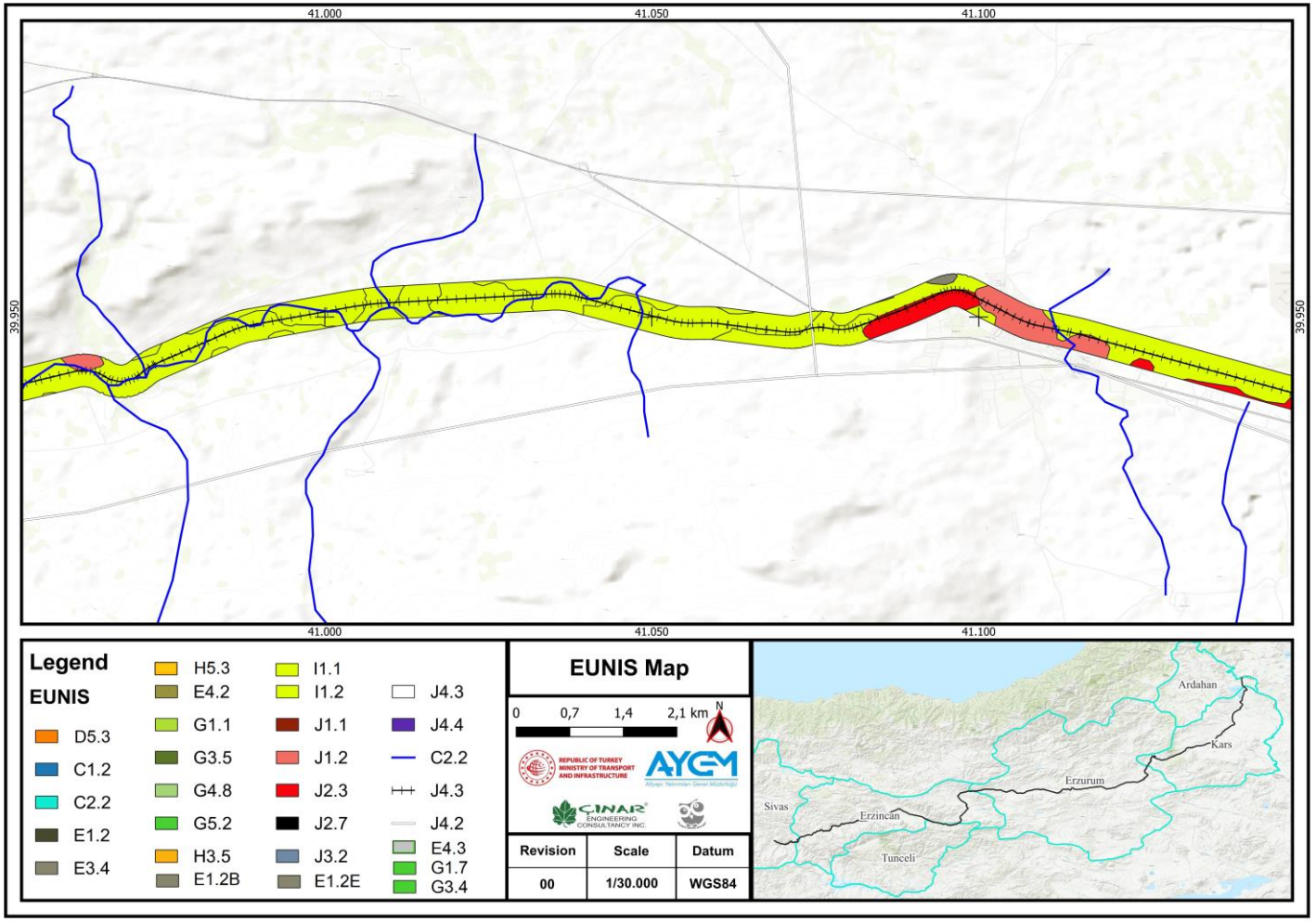

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EUNIS Map
0 0,7 1,4 2,1 km
N
REPUBLIC OF TURKEY MINISTRY OF TRANSPORT AND INFRASTRUCTURE
AYGM
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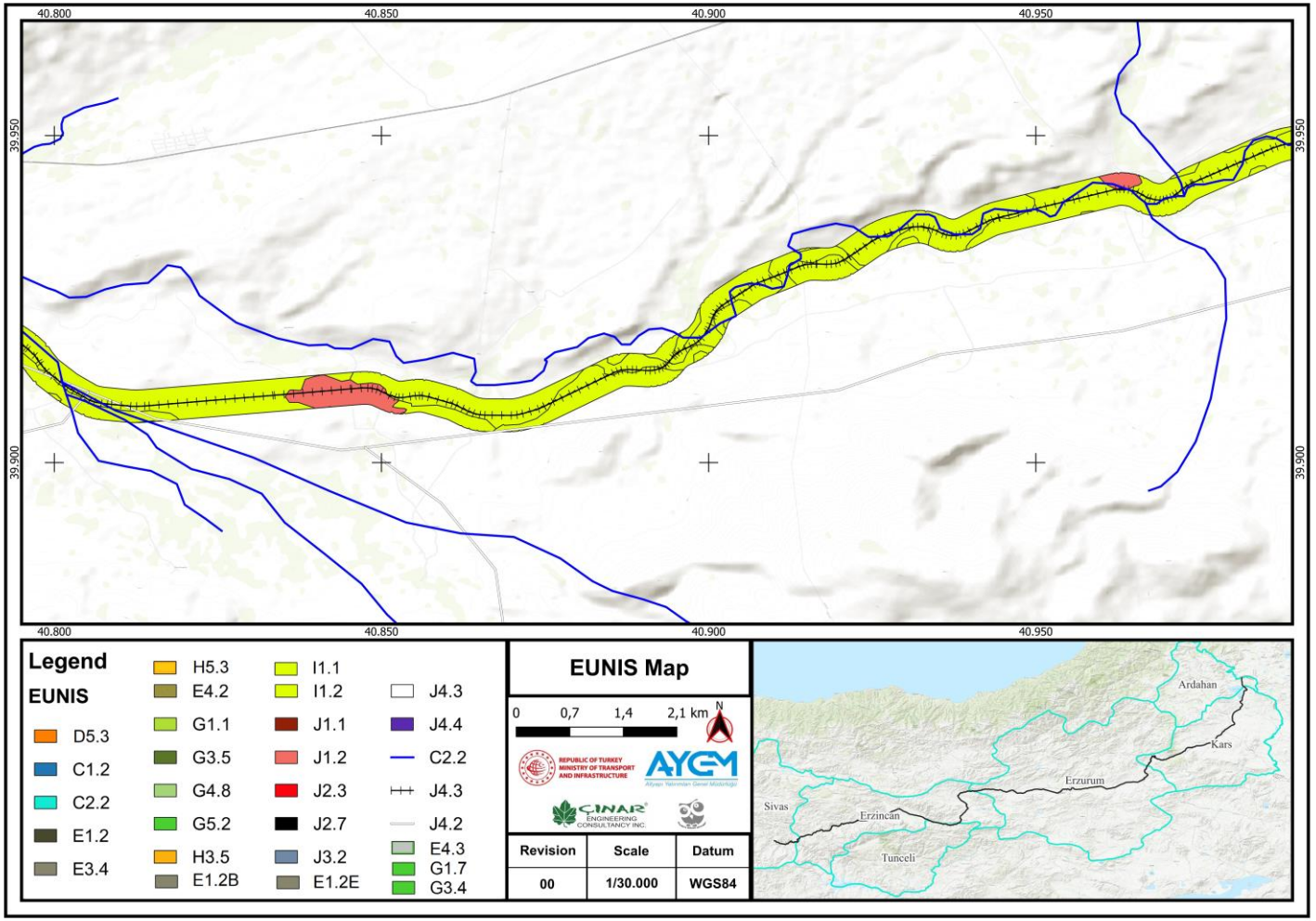

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C2.2
E1.2
E3.4
H5.3
E4.2
G1.1
G3.5
G4.8
G5.2
H3.5
E1.2B
I1.1
I1.2
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C2.2
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G1.7
G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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Datum
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WGS84
Ardahan
Kars
Erzurum
Sivas
Erzincan
Tunceli

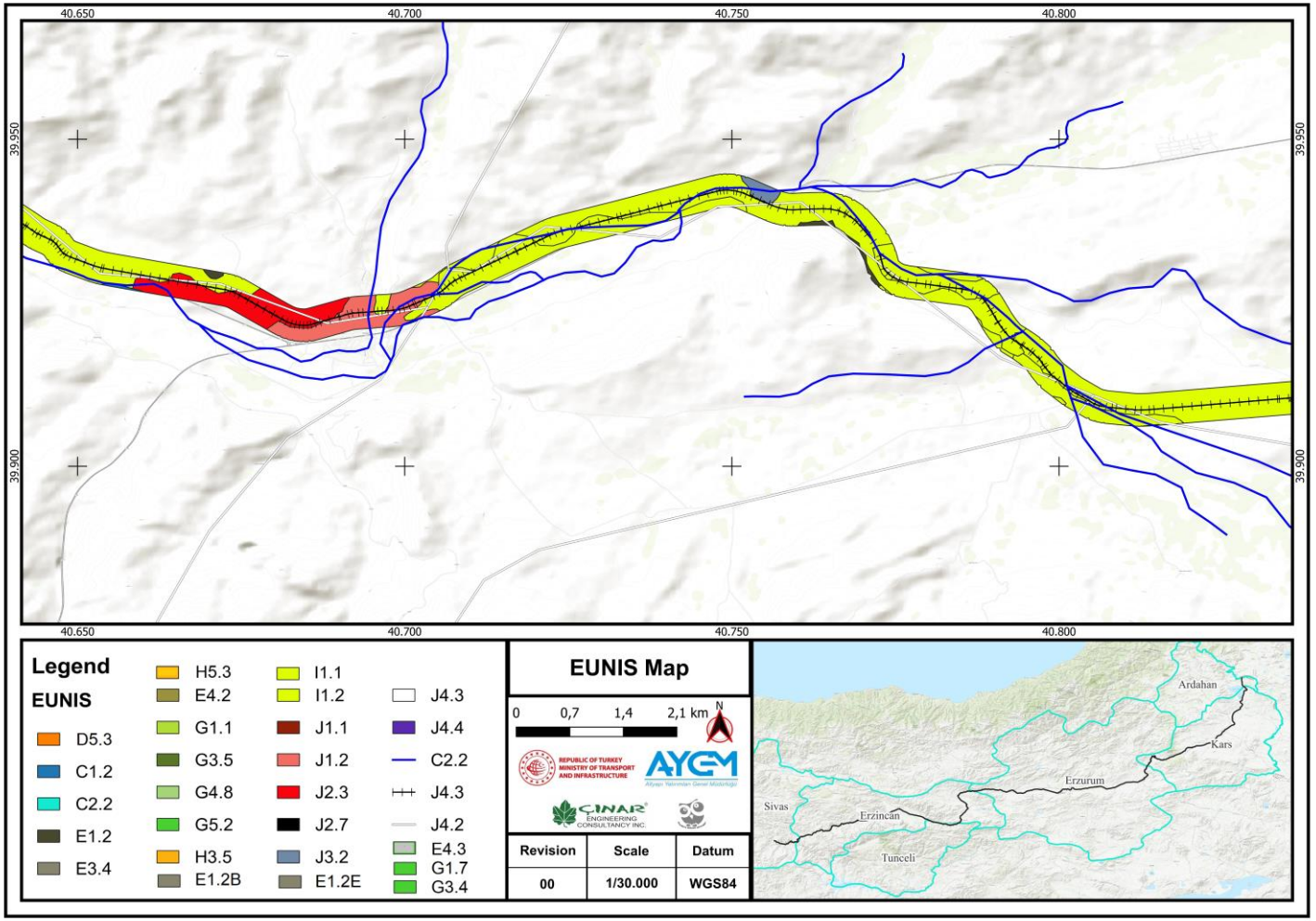

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J2.3
J2.7
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J4.4
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J4.3
J4.2
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G1.7
G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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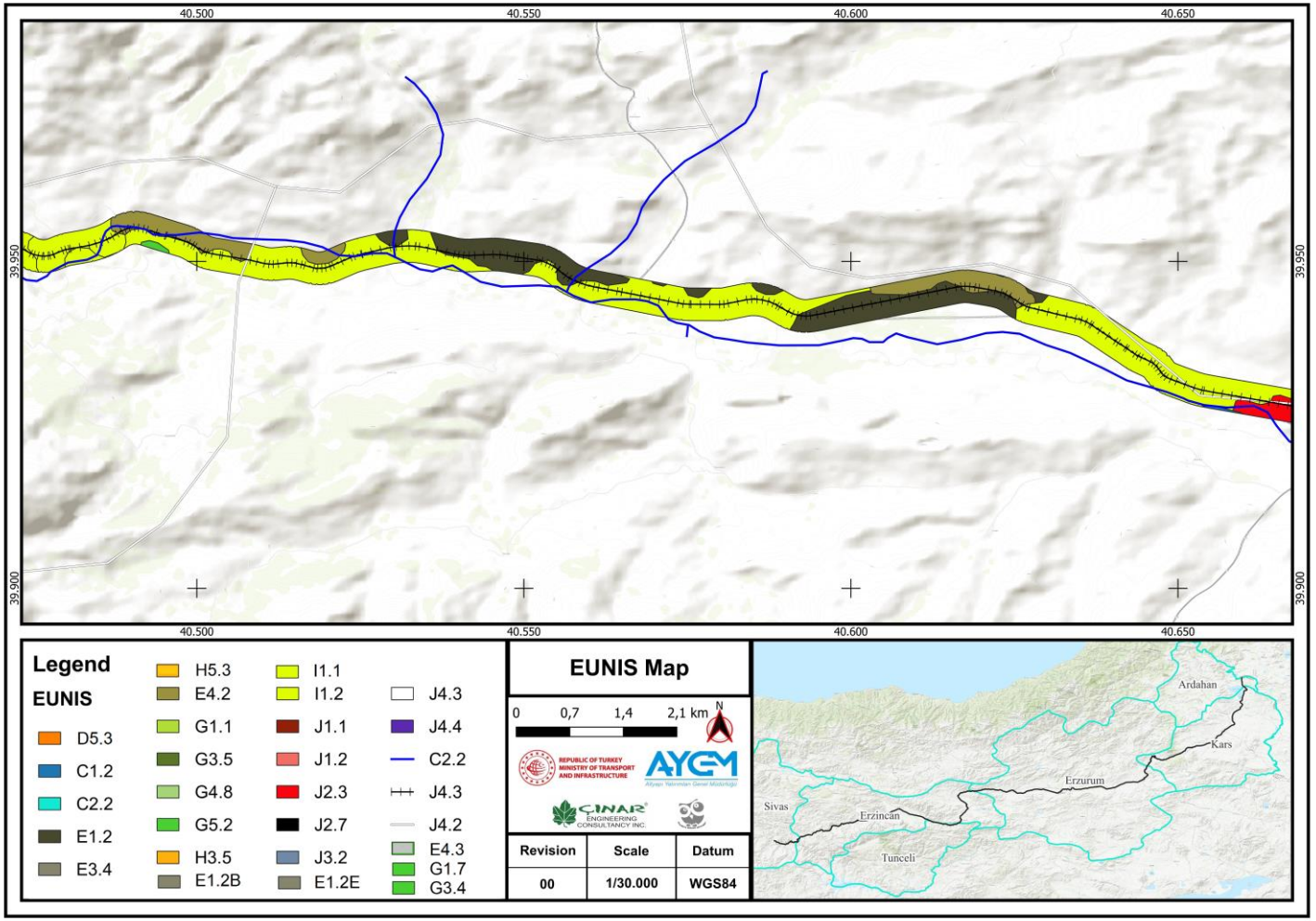

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EUNIS Map
0 0,7 1,4 2,1 km
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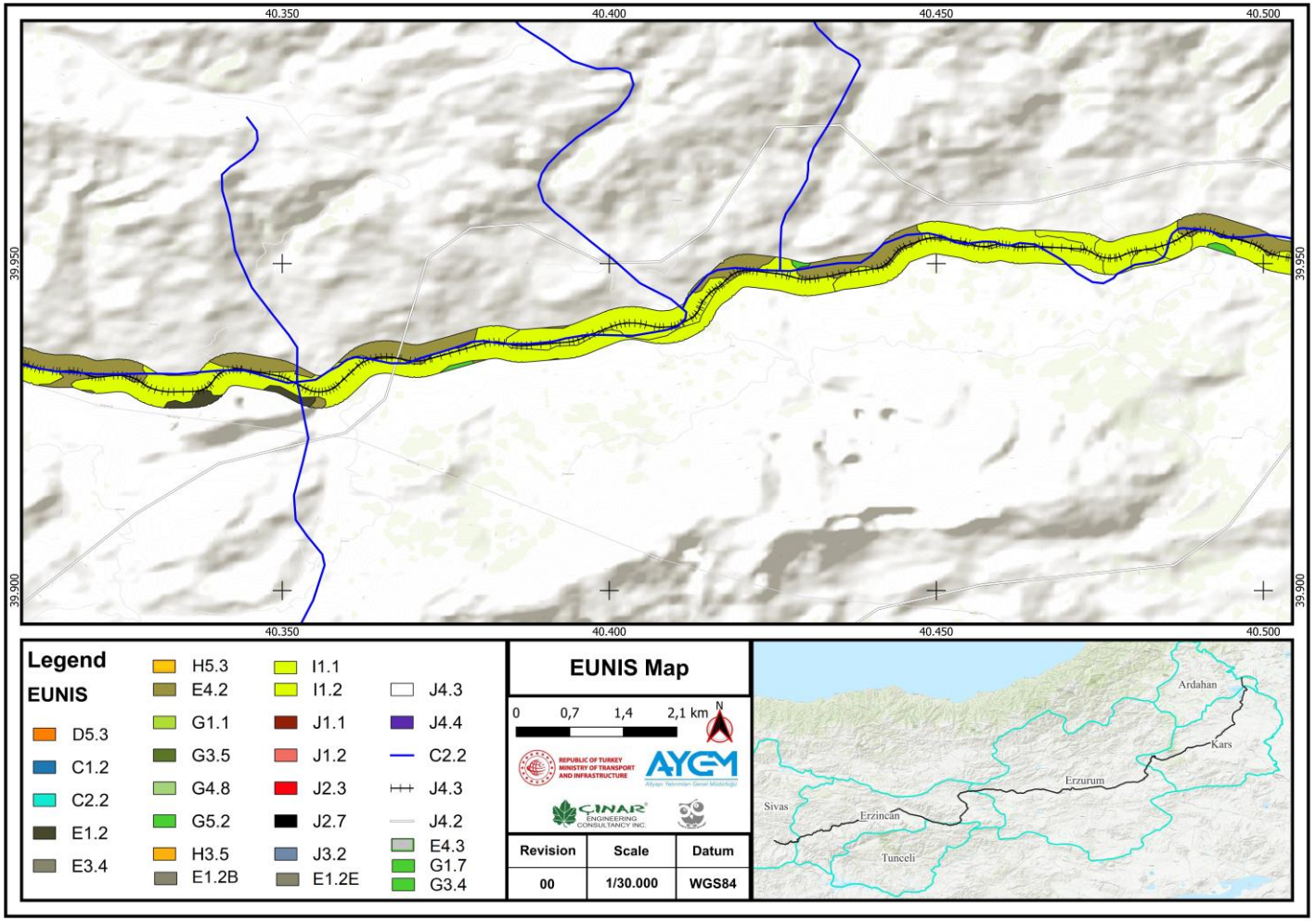

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J4.4
C2.2
J4.3
J4.2
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G1.7
G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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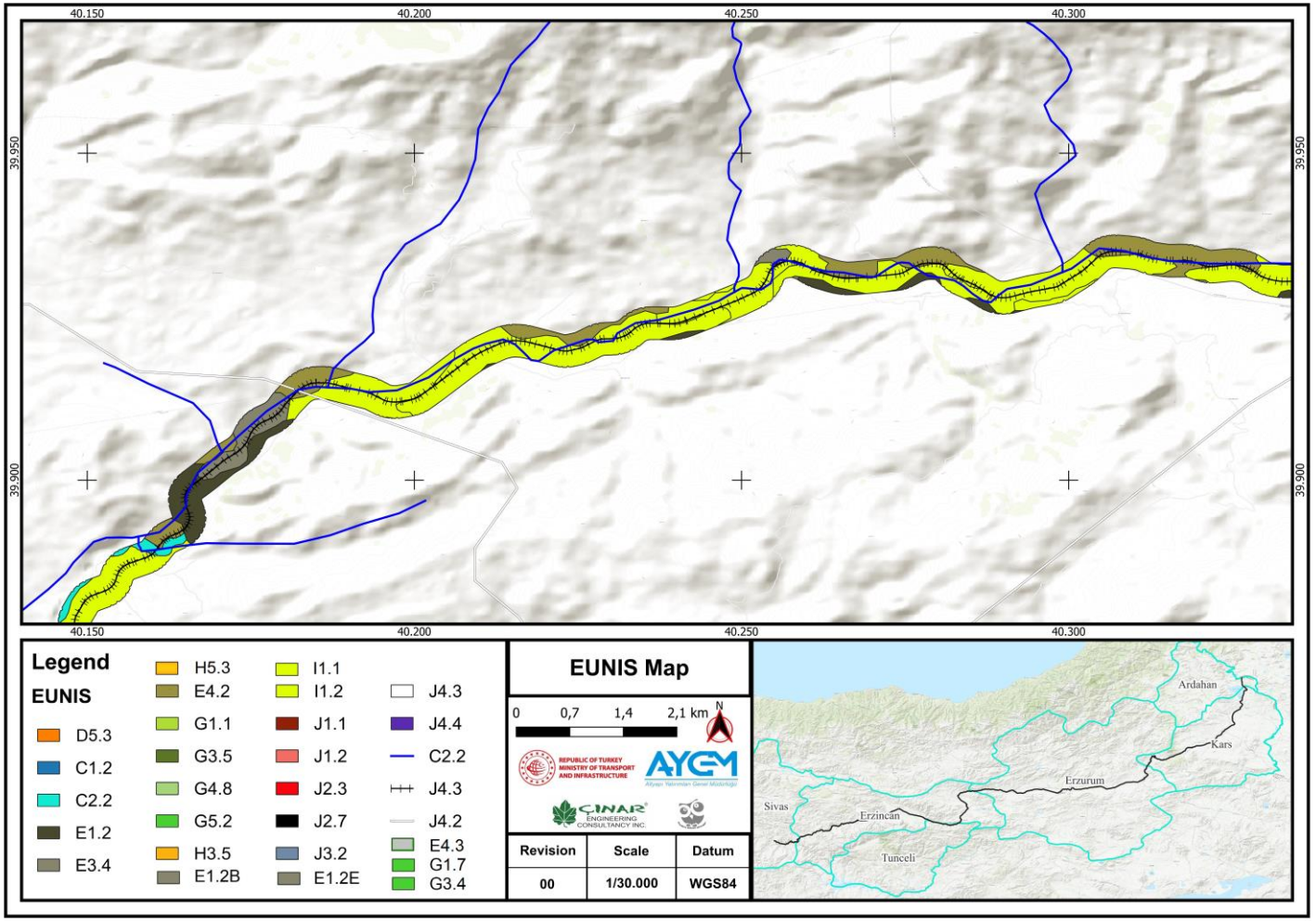

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EUNIS Map
0 0,7 1,4 2,1 km
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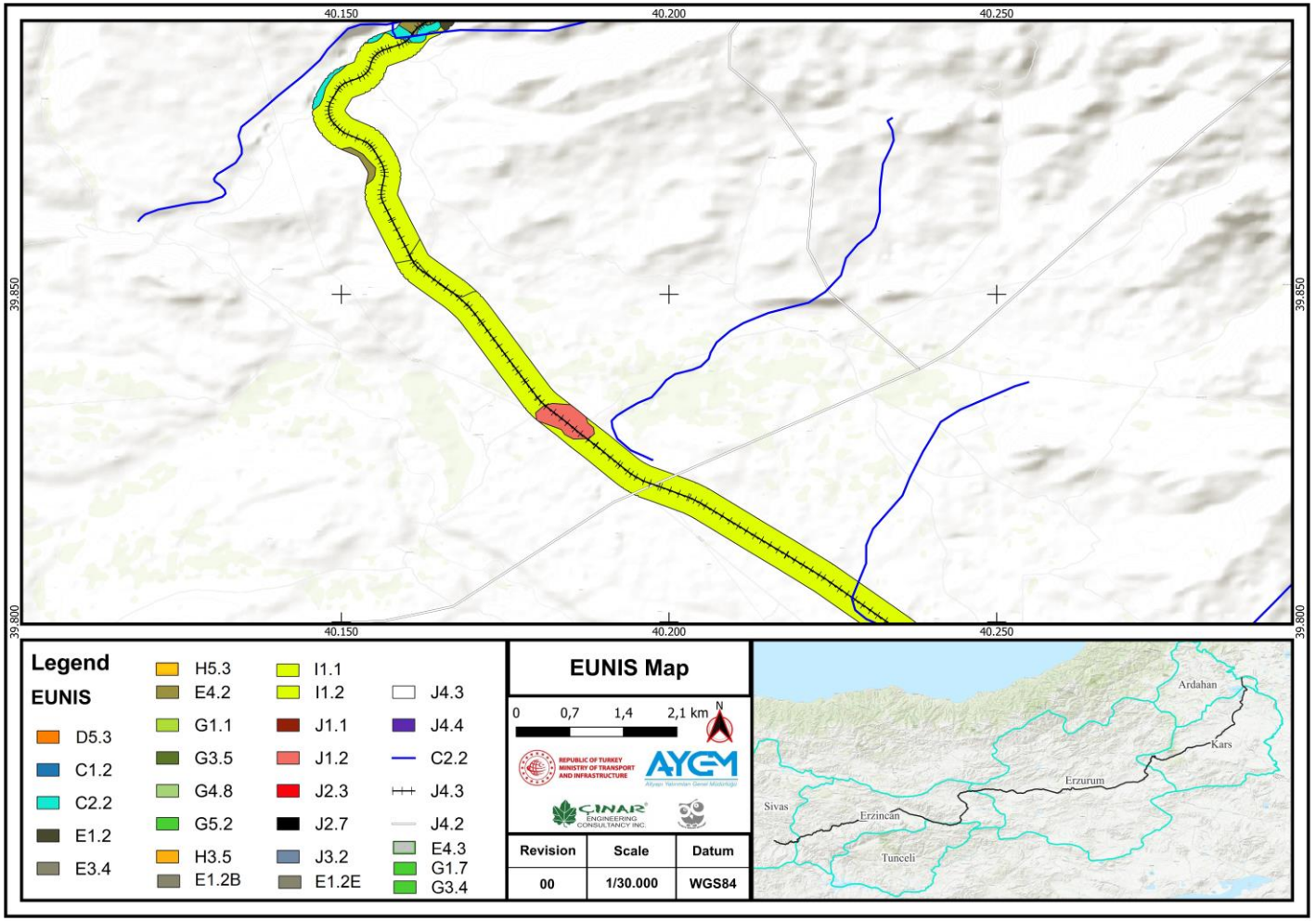

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I1.2
J1.1
J1.2
J2.3
J2.7
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EUNIS Map
0 0,7 1,4 2,1 km
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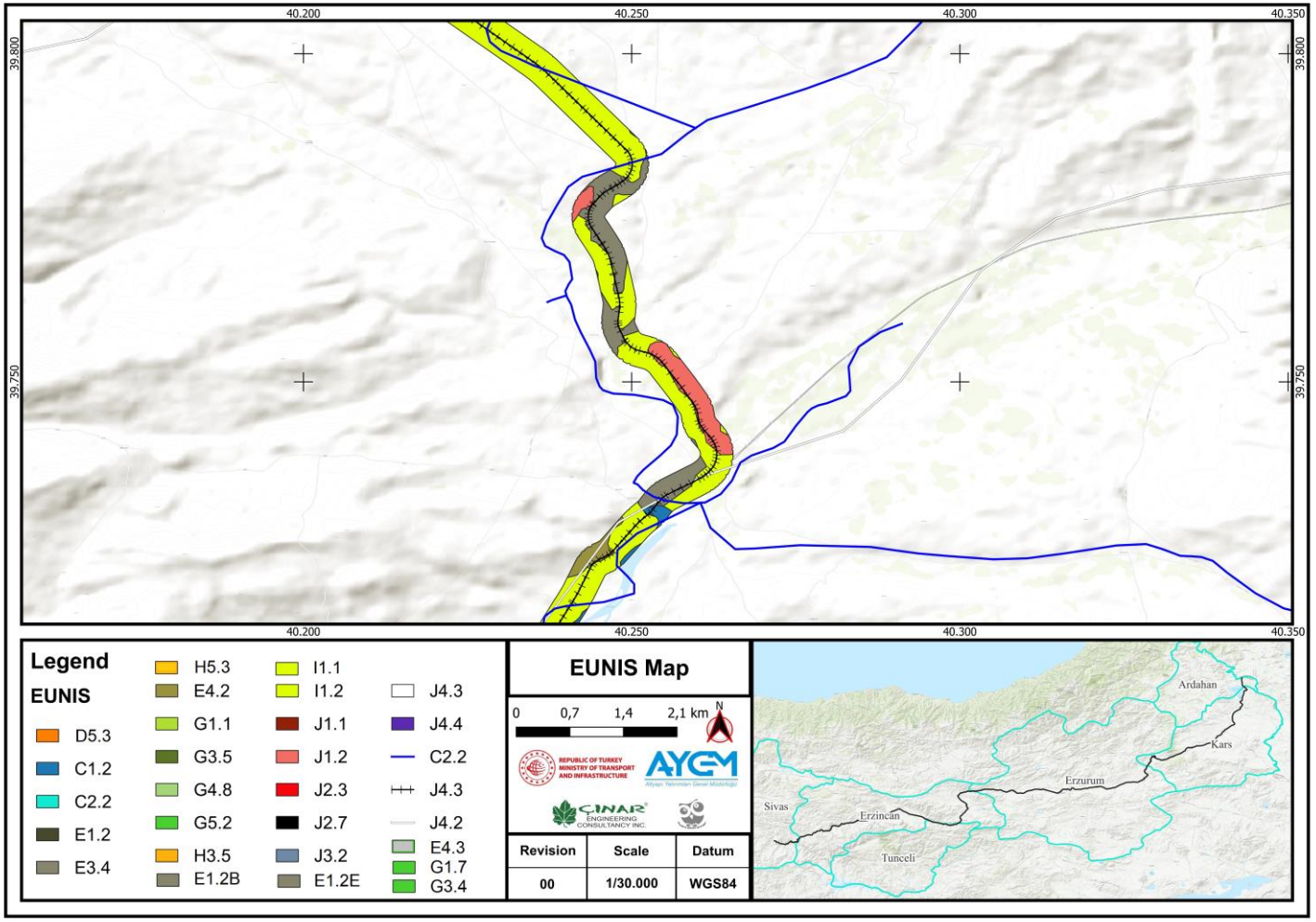

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J4.2
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G1.7
G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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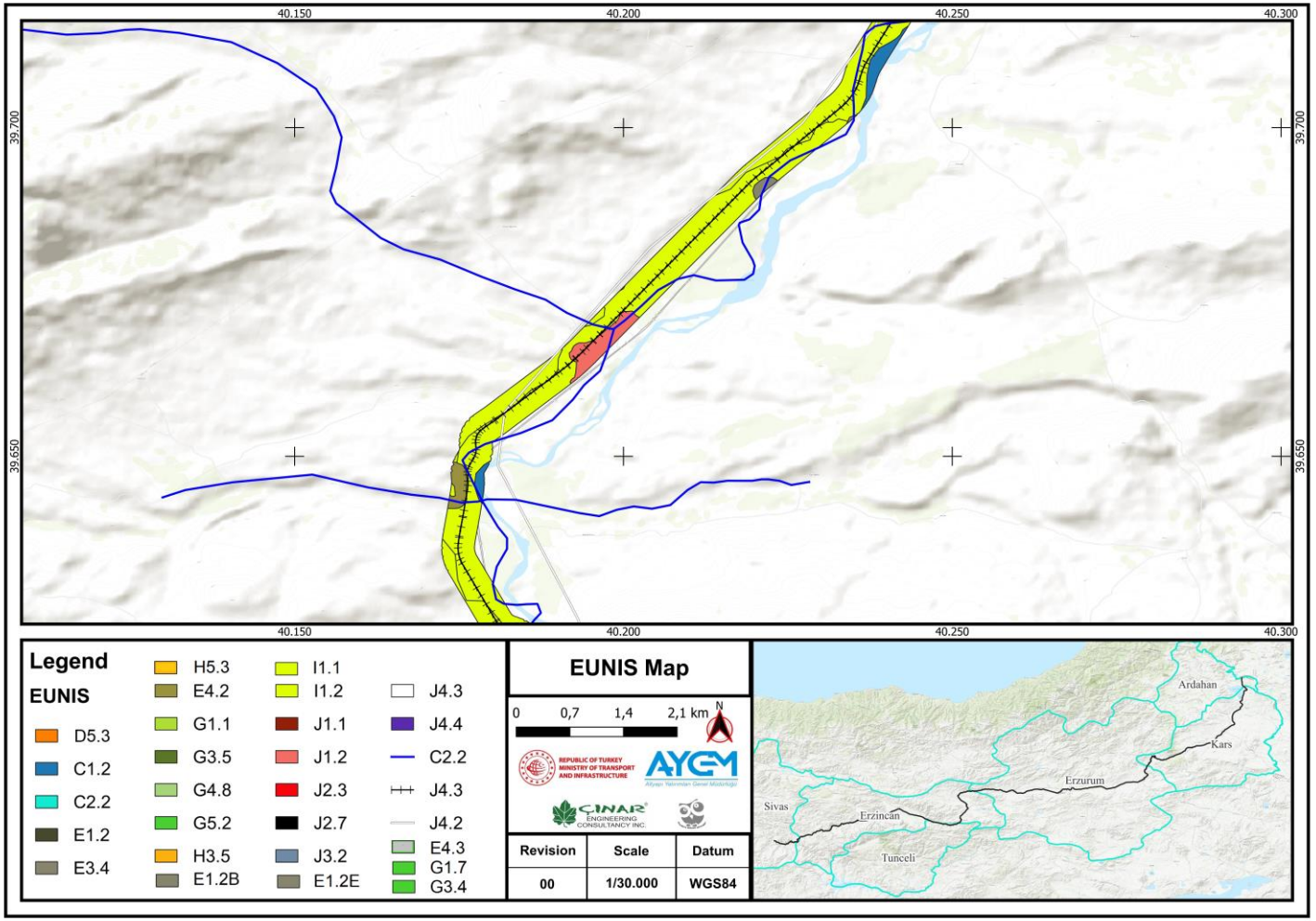

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EUNIS Map
0 0,7 1,4 2,1 km
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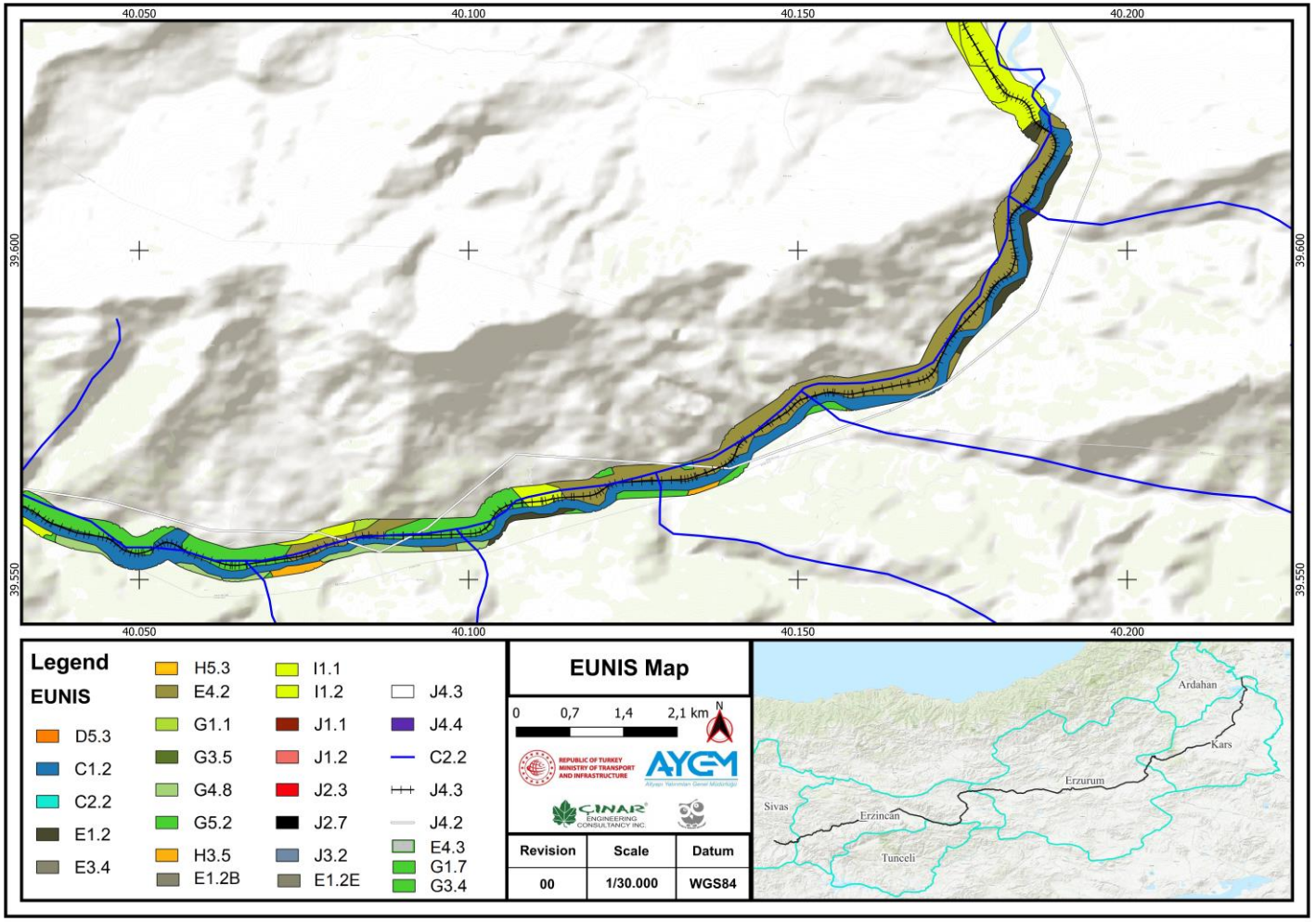

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EUNIS Map
0 0,7 1,4 2,1 km
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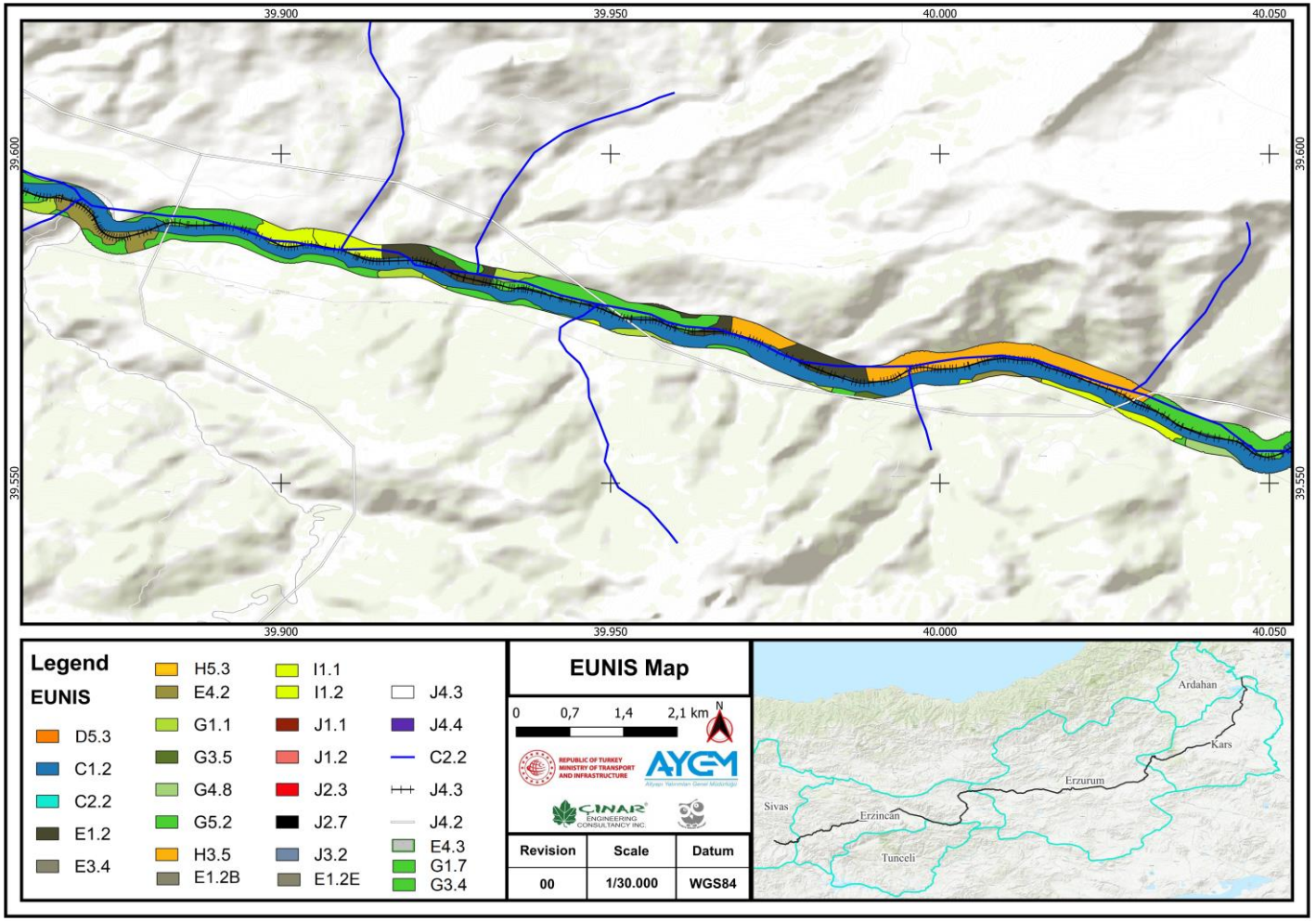

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G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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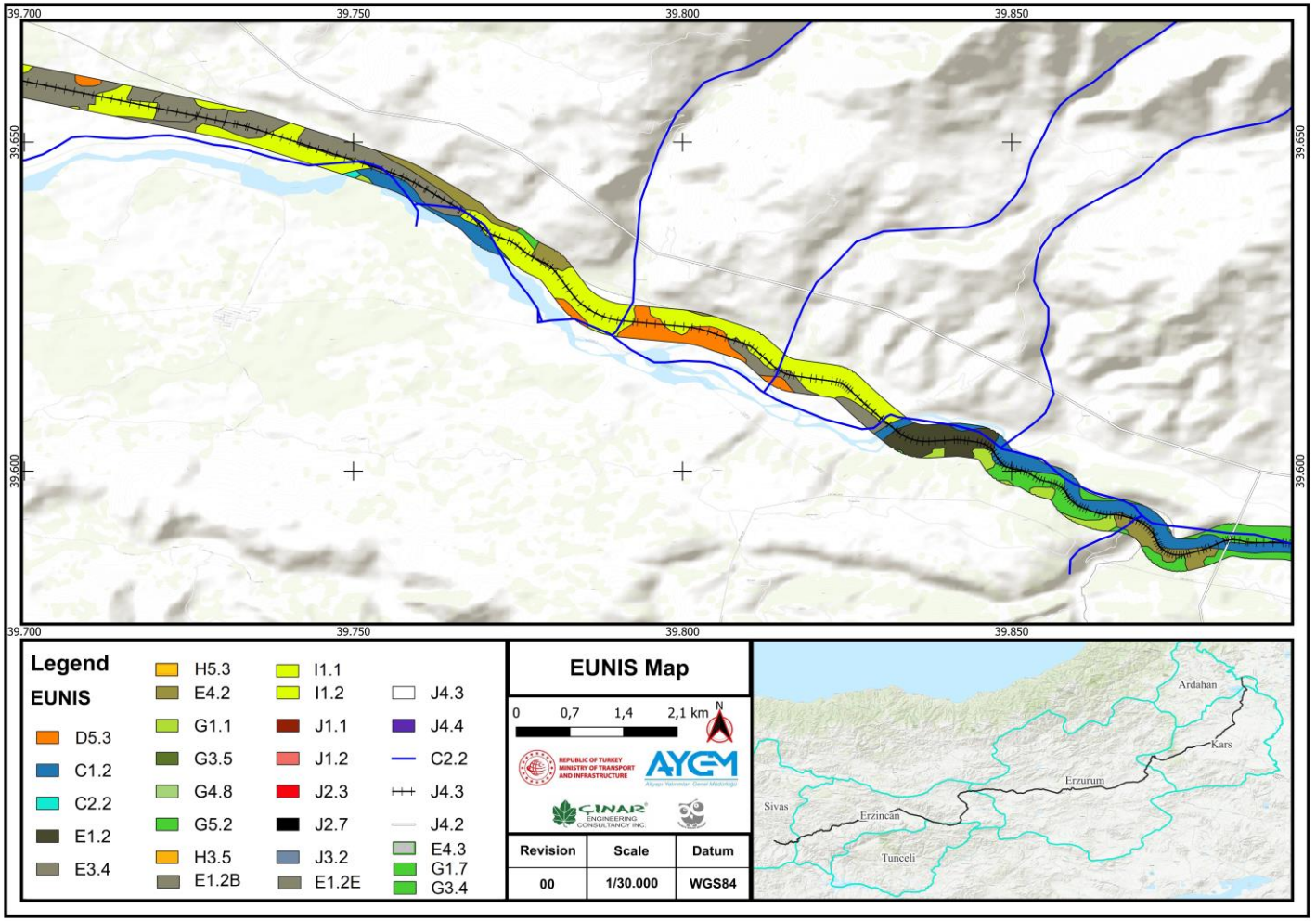

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G1.7
G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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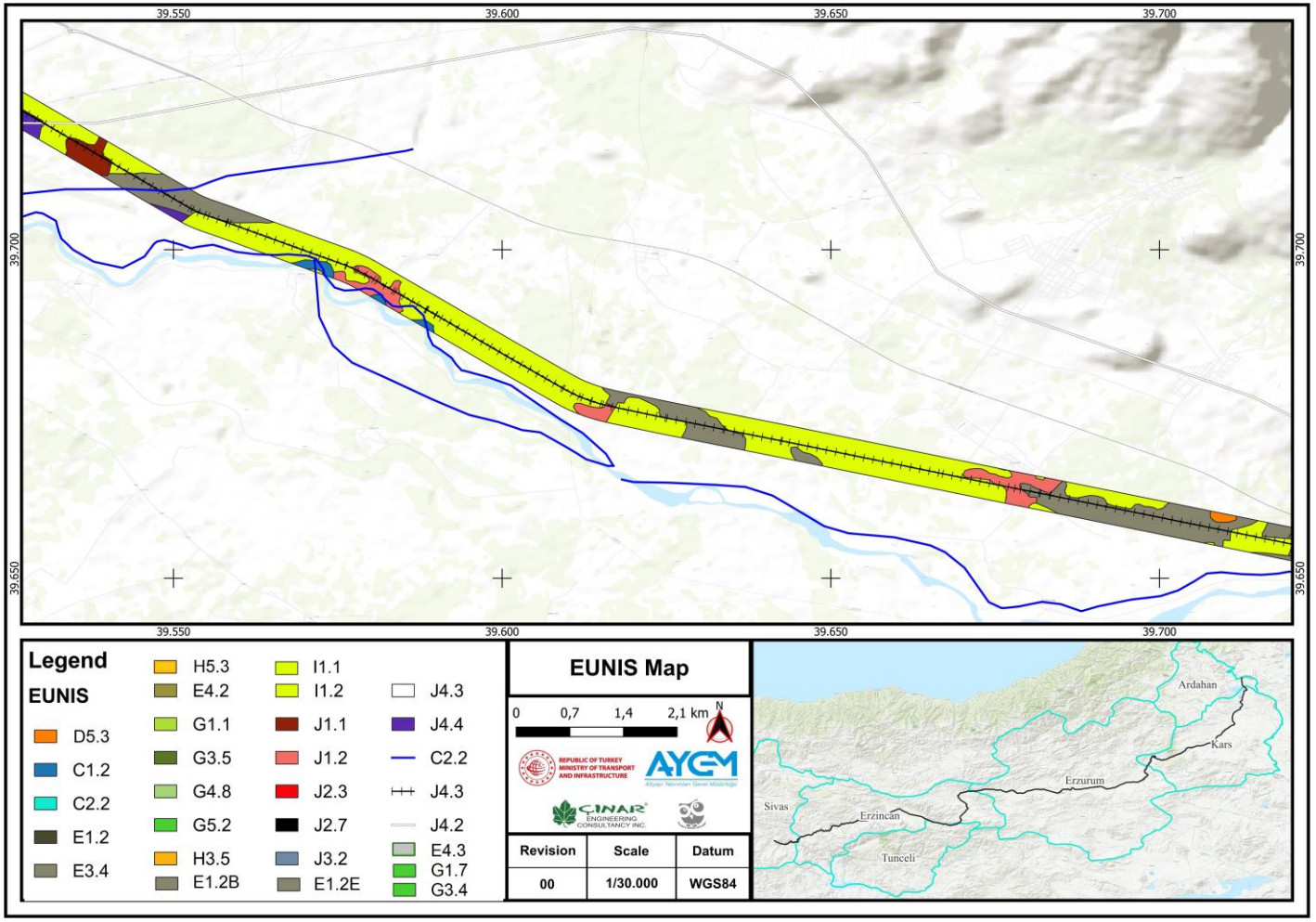

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EUNIS Map
0 0,7 1,4 2,1 km
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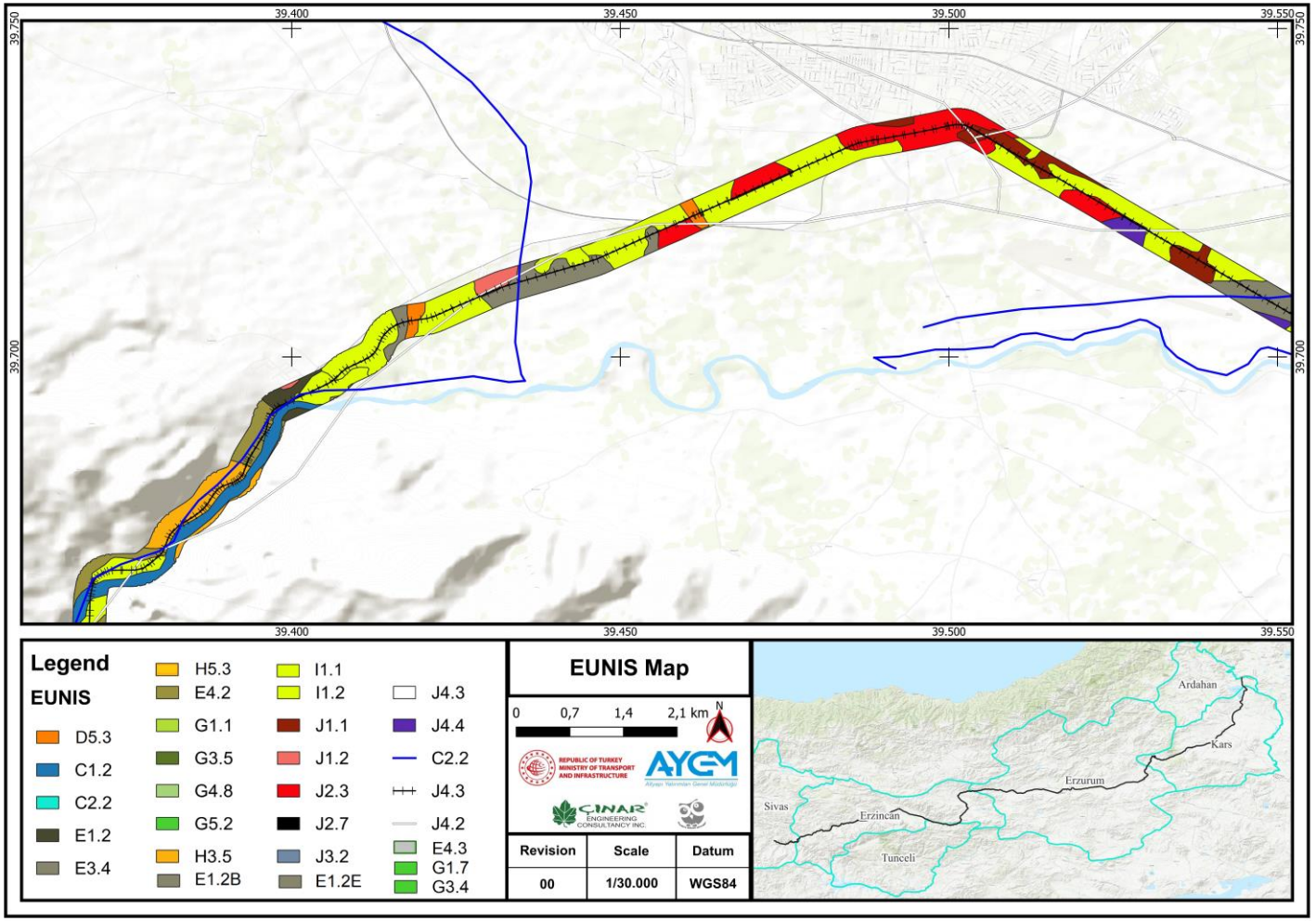

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E1.2E
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J4.2
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G1.7
G3.4
EUNIS Map
0 0,7 1,4 2,1 km
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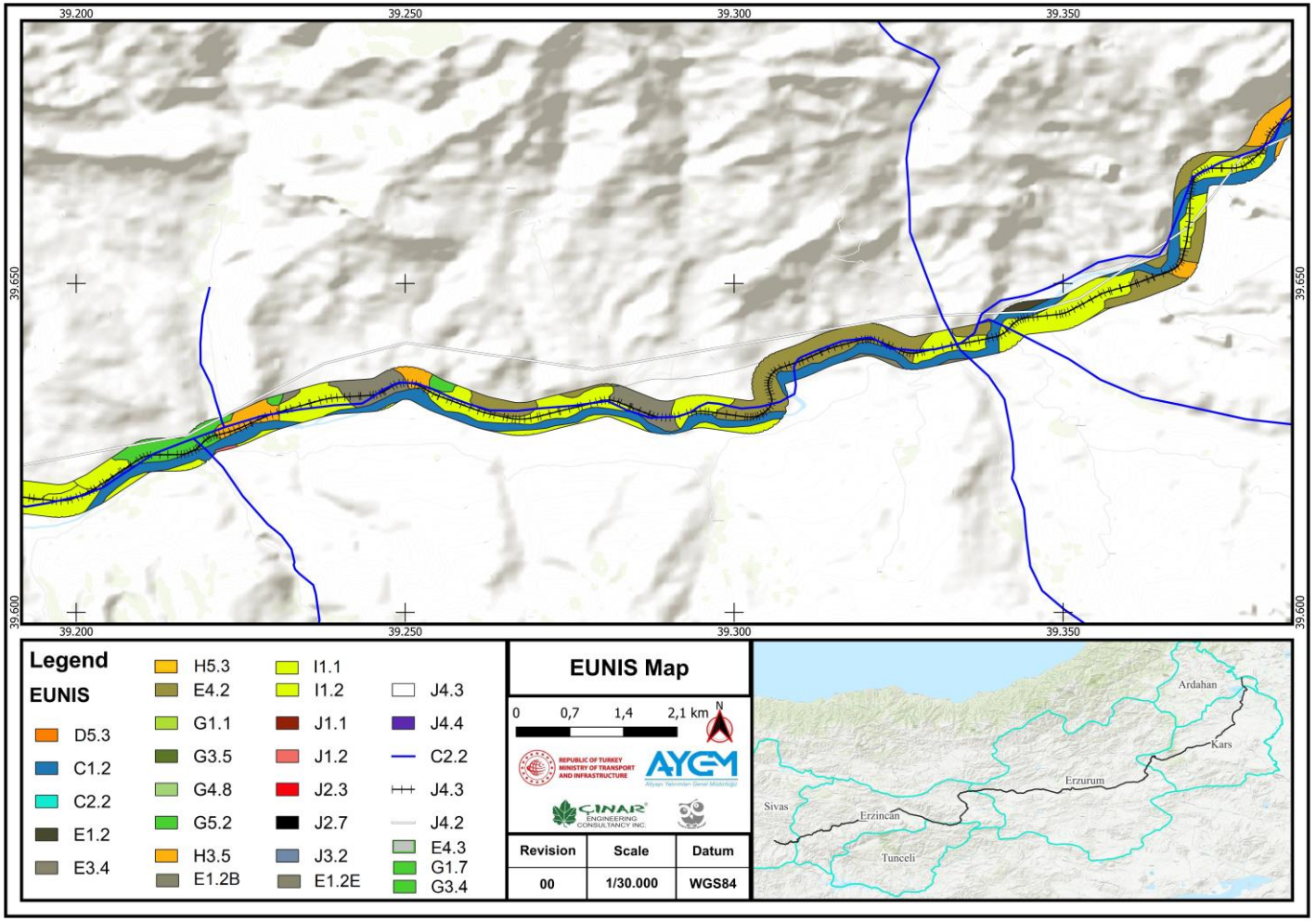

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EUNIS Map
0 0,7 1,4 2,1 km
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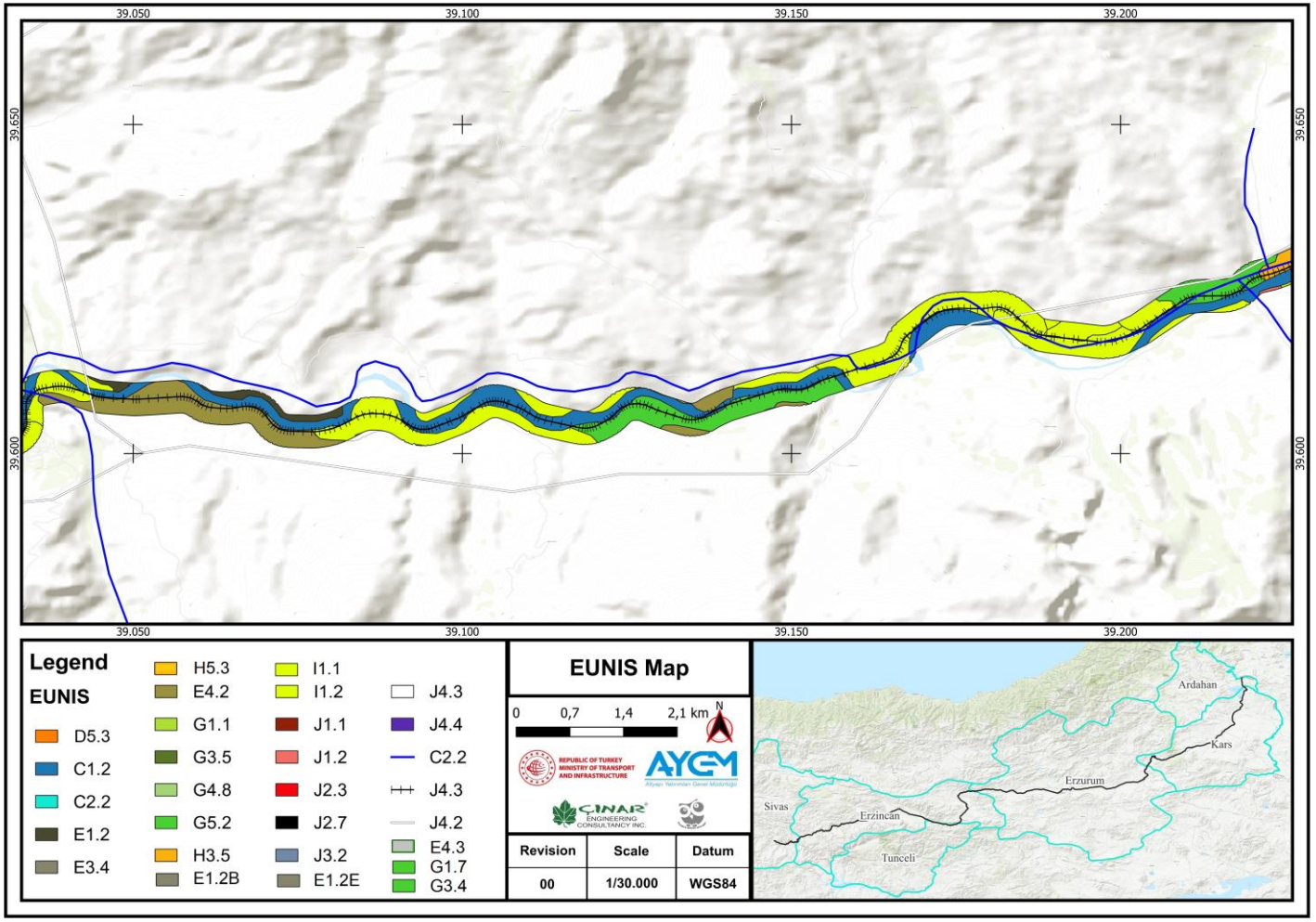

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EUNIS Map
0 0,7 1,4 2,1 km
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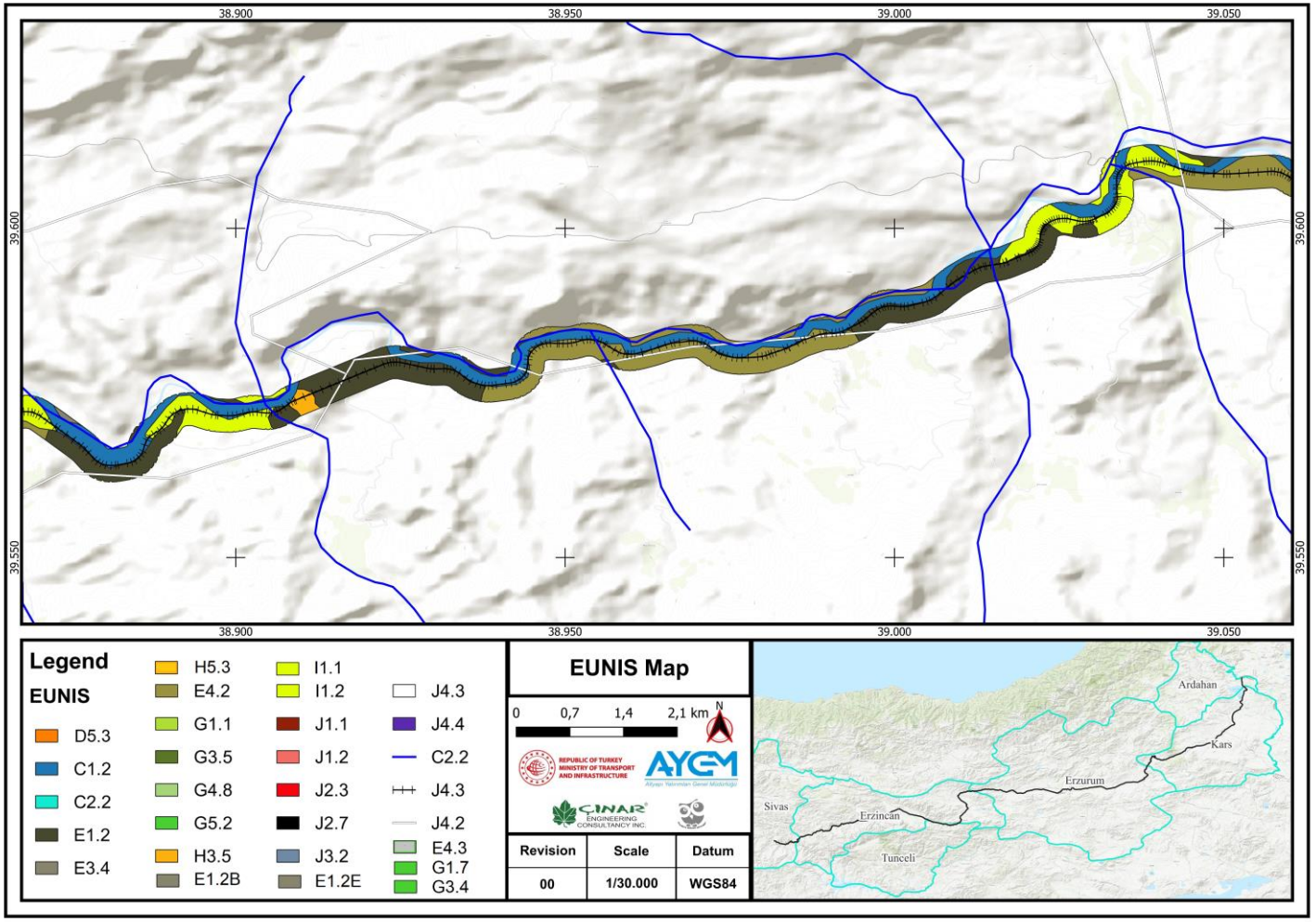

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EUNIS Map
0 0,7 1,4 2,1 km
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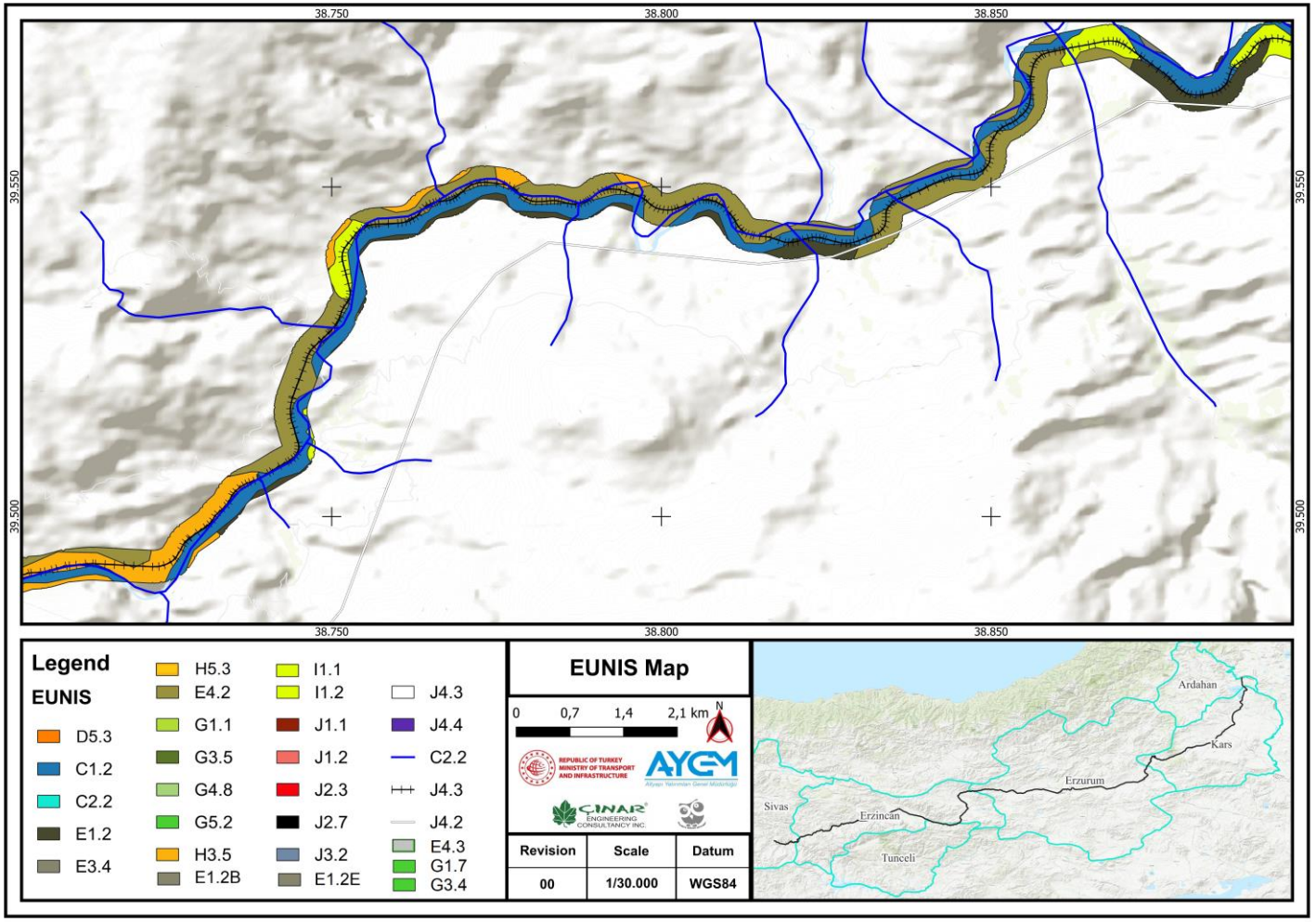

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EUNIS Map
0 0,7 1,4 2,1 km
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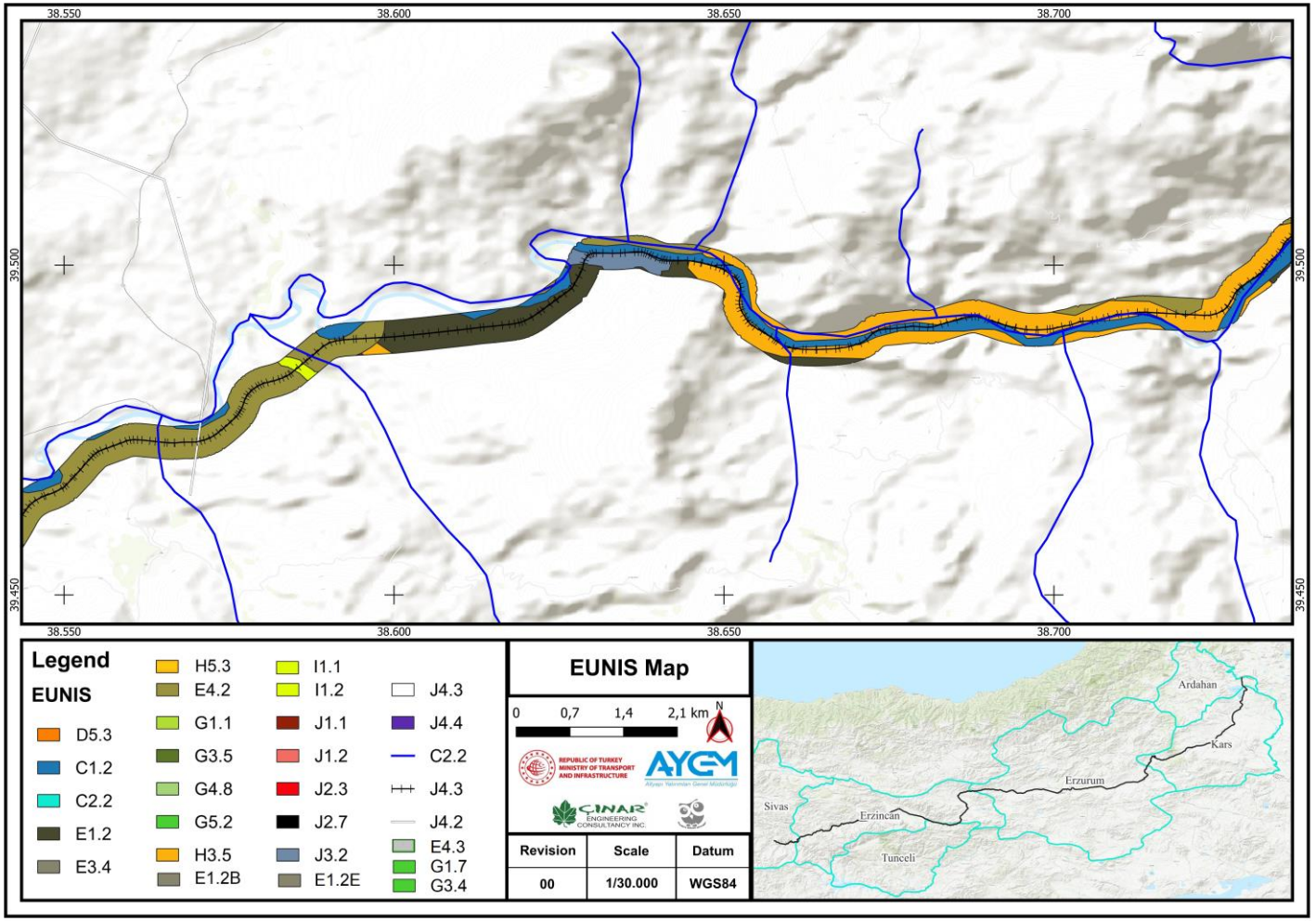

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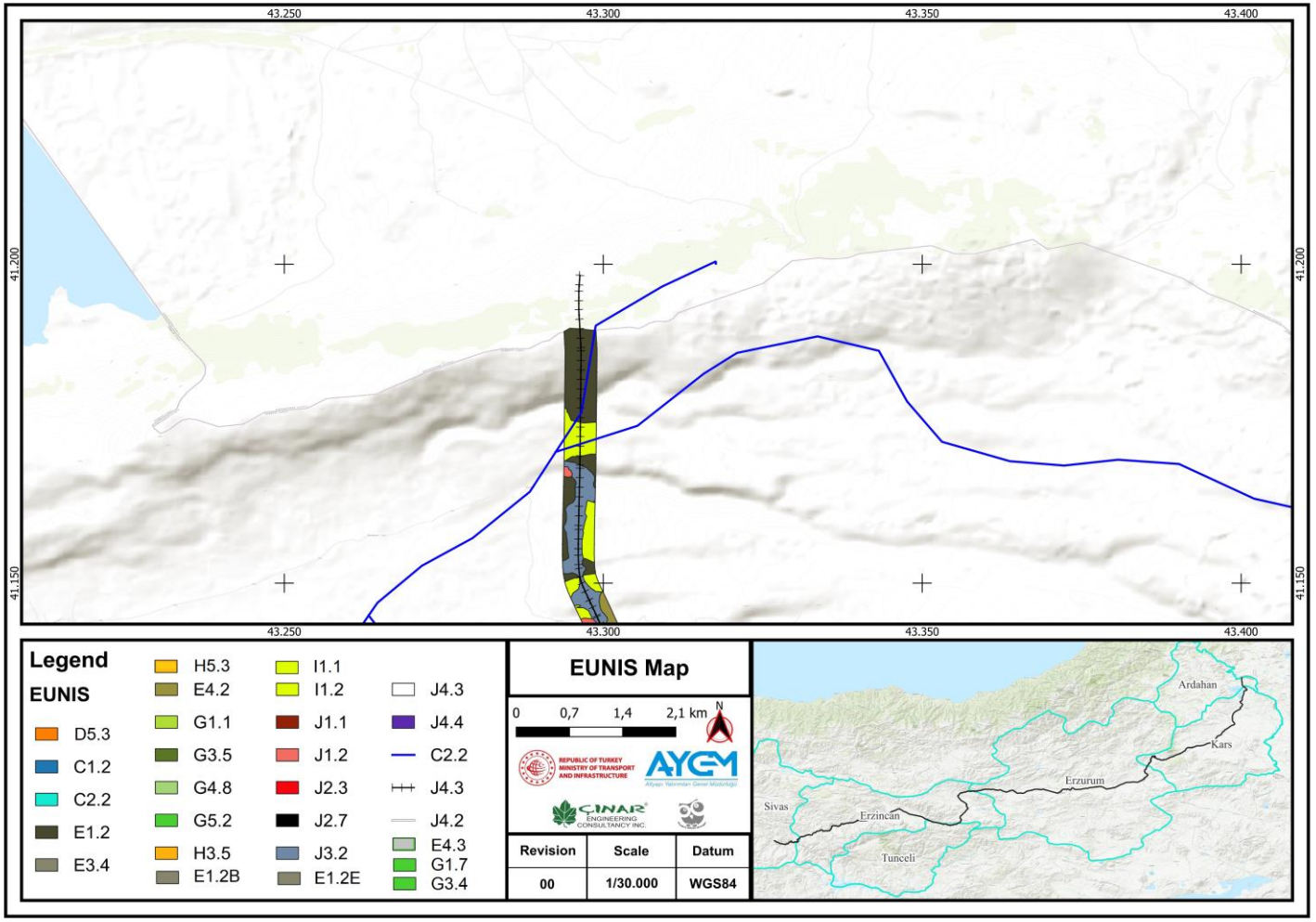

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E1.2
E3.4
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G1.1
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G4.8
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E1.2B
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I1.2
J1.1
J1.2
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J2.7
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APPENDIX-3: Tentative Table of Contents for The Integrated Vegetation Management Plan (IVMP)

INTEGRATED VEGETATION MANAGEMENT PLAN (IVMP) FOR

DIVRIĞI-ERZINCAN-ERZURUM-KARS-GEORGIA BORDER (BTK) RAILWAY CORRIDOR REHABILITATION PROJECT

TABLE OF CONTENTS

1. Introduction

- 1.1. Project Specifications
- 1.2. Environmental Setting
- 1.3. Purpose and Objectives
- 1.4. Structure of the IVMP

2. Scope

- 2.1. Project Standards
- 2.2. Geographic Boundaries and RoW Components
- 2.3. Term of the IVMP
- 2.4. Roles and Responsibilities
- 2.5. Stakeholder Engagement

3. Vegetation Management

- 3.1. Prevention
- 3.2. Vegetation Identification
- 3.3. Vegetation Monitoring
- 3.4. Vegetation Tolerance Thresholds
- 3.5. Vegetation Treatment Options (Chemical, Mechanical, and Manual Methods)

4. IVM Procedures for Railway Components

- 4.1. Railbed
- 4.2. Bridges, Culverts, and Water Crossings
- 4.3. Priority Habitats
- 4.4. Railway Shoulder

5. Herbicide Management

- 5.1. Transport and Application Methods
- 5.2. Accidents and Spills
- 5.3. Training

6. Monitoring and Evaluation

APPENDIX-4: Monitoring and Evaluation Program

Item	Phase	Action	Relevant Standard	Resources	Timeline and Frequency	Reporting
MO-1	Pre-Construction Phase	**Invertebrate Species Identification** (Invertebrate surveys should be performed at Divriği Hills Important Nature Area, Esence (Keşiş Mountains) Important Nature Area, and Kop Mountains Important Plant Area in vegetation period (April-August) once.)	WB ESS6	Biodiversity expert(s)/Specialized contractor(s)	Before construction works commence and once	Annually
MO-2	Pre-Construction Phase	**Herpetofauna Species Identification** (Amphibian and reptile surveys should be performed at Esence (Keşiş Mountains) Important Nature Area and Kop Mountains Important Plant Area in vegetation period (April-August) once.)	WB ESS6	Biodiversity expert(s)/Specialized contractor(s)	Before construction works commence and once	Annually
MO-3	Pre-Construction Phase	**Bird Species Identification** (Bird surveys should be performed at Ekşisu Reedbeds Wetland of National Importance, Erzurum Marshes Wetland of Local Importance, Çıldır Lake Wetland of National Importance, and Esence (Keşiş Mountains) Important Nature Area in migration and breeding periods for 5 days monthly.)	WB ESS6	Biodiversity expert(s)/Specialized contractor(s)	Before construction works commence and once	Annually
MO-4	Pre-Construction Phase	**Mammal Species Identification** (Mammal surveys should be performed at Esence (Keşiş Mountains) Important Nature Area in active period of mammals (April-September) once.)	WB ESS6	Biodiversity expert(s)/Specialized contractor(s)	Before construction works commence and once	Annually
MO-5	Land Preparation and Construction Phase	**Personal Training** (The project personnel will be informed on the sensitivity of natural habitats and species, conservation priorities, and also nesting areas that will be identified through pre-construction surveys. Any direct impact on plant and animal species will be prevented. Trainings will be organized for the project personnel to inform them about the biodiversity and sensitivity of endemic species.)	WB ESS6	Biodiversity expert(s)/Specialized contractor(s)	Before construction works commence and once (to be repeated as necessary during construction phase)	Training records
MO-6	Land Preparation and Construction Phase	**Critical Habitat Monitoring (including endemic/rare flora species)** (Endemic species seeds will be collected and seeds will be delivered to the Türkiye Gene Bank. These surveys and monitoring will be performed with a Botanist Specialist between May and September. No Project related activities will be carried out in the Critical Habitats.)	WB ESS6	Biodiversity expert(s)/Specialized contractor(s)	Seed collection before construction works commence, between May and September (monthly) and biannual monitoring during construction works	Biannually

Item	Phase	Action	Relevant Standard	Resources	Timeline and Frequency	Reporting
MO-7	Land Preparation and Construction Phase	**Wildlife Passages** (In line with the characteristics of the target species, it will be decided in consultation with experts whether passages planned within the scope of the project would be sufficient for wildlife. Where necessary, in order to ensure no net loss in populations of fauna species new structures will also be considered in areas that are identified to be significant for animal passages. Passages that will also enable human and cattle passage and provide access to grazelands will be identified through consultations within the scope of the Stakeholder Engagement Plan (SEP). To minimize animal mortality, locations along the route where animal passage will be prevented and methods that will be used to prevent passage of target species (fencing, sound signals, chemical repellents, lights and reflectors, etc.) will also be identified.)	WB ESS6	Biodiversity expert(s)/Specialized contractor(s)	Once before construction works commence, after the completion of fauna surveys defined	Annually
MO-8	Land Preparation and Construction Phase	**Invasive alien species** (Vehicles and equipment entering the site will be checked for invasive alien species. If identified, necessary measures will be taken in line with the project standards to eradicate the species. Instead of using herbicides, which would destroy the natural vegetation and enable introduction of invasive alien species, different vegetation management methods will be considered as appropriate spatially and temporally. During the land preparation and construction phase biodiversity monitoring studies, potential for presence of invasive alien species in the area will also be monitored)	WB ESS6	Biodiversity expert(s)/Specialized contractor(s)	Once before construction works commence and biannual monitoring during construction works	Biannually
MO-9	Land Preparation and Construction Phase	**Indirect impacts (dust, air emissions, noise, waste, and impacts on water and soil quality)** (To control dust emissions, vegetation clearance will only be undertaken in pre-determined activity areas, and habitats will be rehabilitated upon completion of construction activities. All related dust suppression measures will be taken to ensure prevention of indirect impacts on biodiversity features. On-site speed limits will be enforced to avoid direct mortality of animals. There will be no direct discharge into water resources. Project-related wastes will be collected at designated waste storage areas, and periodically removed from work areas. Solid wastes and wastewater that will result from land preparation and construction activities of the project will be managed through implementation of the related management plans (Pollution Prevention and Waste Management Plan, etc.).)	WB ESS6	Biodiversity expert(s)/Specialized contractor(s)	Seasonal during construction works	Biannually

Item	Phase	Action	Relevant Standard	Resources	Timeline and Frequency	Reporting
MO-10	Operation Phase	**Invasive alien species** (To avoid development of alien species along the railway route, natural plants will be used in restoration, and regular maintenance will continue throughout the operation phase. To take necessary measures against the risk of invasive alien species being transferred by the trains, there will be periodical controls and if identified, necessary measures will be taken in line with the project standards to avoid spread of invasive alien species.) **Monitoring of critical habitats and natural habitats for endemic flora species** (Natural habitats will be restored upon completion of construction activities (enabling species to re-inhabit these areas), statuses of habitats and associated species populations will be monitored, where necessary, habitat and species-specific measures will be developed and implemented with an adaptable management approach.)	WB ESS6	Biodiversity expert(s)/Specialized contractor(s)	Yearly during operation phase	Annually