Bosnia and Herzegovina

Federation of Bosnia and Herzegovina

Federal Administration for Geodetic and Real Property Affairs

Geospatial Infrastructure and Valuation Enhancement (GIVE)

Project implementation unit

TERMS OF REFERENCE (ToR):

Development of FBiH SDI data standards and model

Activity: A.1.2.1

Duration: Up to 180 calendar days per Call-Off Contract

Client: Federal Administration for Geodetic and

Real Property Affairs, Project implementation unit

February 2026, Bosnia and Herzegovina

Common Abbreviations, Acronyms and Defined Terms

Abbreviation/Acronym/Term	Full terminology/Definition
ToR	(This) Terms of Reference
Client/Contracting Authority	Federal Administration for Geodetic and Real Property Affairs (FGA)
Consultant	The legal entity (firm or organization) contracted to deliver the services described in this Terms of Reference
SDI	Spatial Data Infrastructure
FBiH	Federation of Bosnia and Herzegovina
SDI FBiH	Spatial Data Infrastructure of the Federation of Bosnia and Herzegovina
SDI Stakeholder	Authorities and organizations of the federal administration, authorities and organizations of the cantonal administration, local self-government bodies, public enterprises, legal entities entrusted with the management of spatial data, and legal entities that use the data and services covered by SDI FBiH and that provide public services based on such spatial data. These entities, within their jurisdiction or scope of work, are responsible for the establishment or maintenance of spatial data.
INSPIRE	INfrastructure for SPatial InfoRmation in Europe. EU directive (2007/2/EC) establishing a spatial data infrastructure to make environmental and spatial information more accessible and interoperable across Europe.
ISO	International Organization for Standardization. Independent, non-governmental international organization that develops and publishes global technical, industrial, and commercial standards.
OGC	Open Geospatial Consortium. International industry consortium that develops and promotes open standards for geospatial content and services, GIS data processing, and data sharing.
OGC API	OGC API. A family of OGC standards that provide resource-oriented Web APIs (e.g., OGC API - Features/Tiles/Records/Processes) for SDI network services, aligned with SDI FBiH Network Services implementing rules.
FA (Framework Agreement)	An arrangement establishing the general terms and conditions under which multiple Call-Off Contracts/Work Orders may be awarded for specific spatial data sources.
Call-Off Contract / Work Order	A specific contract issued under the Framework Agreement for one clearly identified spatial data source (or theme), defining the scope, schedule, and price for that assignment.

Data Source Package	The complete set of deliverables produced for one spatial data source under one Call-Off Contract, in accordance with this ToR.

Contents

1. Introduction

Spatial data management in the Federation of Bosnia and Herzegovina faces numerous challenges, among which the most notable are the inconsistent data structure, the lack of standardized models, limited interoperability between institutions, and hindered information exchange. These obstacles directly affect the quality, availability, and reusability of spatial data at all levels of government, thereby limiting the public sector's capacity for modern, efficient, and data-driven management of space and resources.

Although certain spatial data sources have already been established by various SDI stakeholders, their technical structures are not harmonized, and the data models are often partial, outdated, or entirely absent. At the same time, in the context of European integration and alignment with the European Union acquis, Bosnia and Herzegovina, including the Federation of BiH, has undertaken the obligation to implement Directive 2007/2/EC establishing an Infrastructure for Spatial Information in the European Community (INSPIRE Directive). This Directive clearly prescribes the need for harmonization of spatial data through unified models, technical specifications, and standards that enable interoperability and data accessibility both within and beyond national borders.

Within this context, the GIVE (Geospatial Infrastructure and Valuation Enhancement) project is of particular significance. It is implemented through the cooperation between the World Bank and the Federal Administration for Geodetic and Real Property Affairs (FGA). The GIVE project aims to improve the accuracy and availability of land and spatial data and to modernize land administration in the Federation of BiH through digitization, harmonization, and standardization of data.

The project is structured into four key components:

- **Component A** focuses on the establishment of the Spatial Data Infrastructure (SDI), including the development of standards, data harmonization, digitization of analogue sources, and the creation of an SDI Center.

- **Component B** entails the establishment of a Building Register through methodological development and field data collection

- **Component C** involves the development of a mass real estate valuation system, including the enhancement of the Sale Price Register and the creation of an information portal.

- **Component D** covers capacity building and project management through training, legal framework development, and public outreach.

Through the activities under Component A, the GIVE project directly contributes to the development and implementation of spatial data models. One of its key goals is the harmonization of existing datasets and compliance with ISO, OGC and INSPIRE requirements, which includes the development of conceptual, logical, and physical models enabling consistent structuring and interoperability of spatial information. In doing so, GIVE becomes a key instrument in operationalizing the Law on Spatial Data Infrastructure of the Federation of BiH, providing institutional and technical support for establishing a functional and sustainable spatial data infrastructure.

2. Legal and Strategic Framework

The Law on the Spatial Data Infrastructure of the Federation of BiH ("Official Gazette of FBiH", No. 55/21) is in force since July 24, 2021, and it defines the establishment, maintenance, and development of the SDI FBiH, including its content, competent authorities, and the manner of appointment and operation of the SDI Council and Coordination Body. The Federal Administration for Geodetic and Real Property Affairs was assigned the key role as the Coordination Body, responsible for preparing operational programs, monitoring regulatory compliance, and coordinating SDI activities.

In 2024, a series of implementing regulations were adopted, including:

- Implementing rules for populating the SDI FBiH Registers,

- Implementing rules for SDI FBiH metadata with accompanying annexes (profile and specification),

- Decision on definitions and detailed descriptions of SDI FBiH spatial data themes.

The publication of these acts ("Official Gazette of FBiH" No. 75/24 and the SDI Council decision of 18 December 2024) has created a complete regulatory framework for the establishment and management of standardized data models.

The strategic framework is further defined through the **Federation of BiH Spatial Data Infrastructure Strategy 2023–2027**, whose main goals are:

- Improvement and functionality of SDI FBiH,

- Alignment with EU legislation,

- Data accessibility to all users – institutions, citizens, and the private sector,

- Sustainability and the development of a geospatially-enabled society.

The vision of the SDI FBiH is to enable simple, fast, and efficient use of harmonized spatial data, while its mission is to ensure open access to spatial information for all sectors of society.

In this regard, the GIVE project represents a concrete instrument for implementing the legal and strategic goals of the SDI FBiH and serves as a foundation for the systematic development and implementation of spatial data models in accordance with interoperability and digital transformation requirements.

SDI stakeholders, as defined by the Law, include all relevant institutions at the federal, cantonal, and local levels, as well as public companies, institutions, and other legal entities that manage or use spatial data. They have a legal obligation to actively participate in the establishment and development of the SDI. The status of an SDI stakeholder may also be extended to other legal entities that meet the prescribed technical and institutional requirements.

By establishing common models and standards, it becomes possible to connect heterogeneous data sources, reduce the need for subsequent harmonization, accelerate the development of web services (including OGC Web Services and, where applicable, equivalent OGC API standards, in line with SDI FBiH Network Services implementing rules), and ensure timely spatial policy-

making. A particular value lies in the ability to integrate data from different sectors (e.g., spatial planning, environment, infrastructure, property rights) into a single and understandable format that meets both domestic and international requirements

3. Spatial Data Sources

Spatial data sources represent a fundamental element of the Spatial Data Infrastructure of the Federation of Bosnia and Herzegovina (SDI FBiH) and have a clearly defined legal and technical framework, as prescribed by the Law on the Spatial Data Infrastructure of FBiH ("Official Gazette of FBiH", No. 55/21).

Under this law, a spatial data source is defined as a spatial dataset, a series of spatial datasets, or a spatial data service that meets certain conditions. These conditions include that the data relate to the territory of the Federation of BiH, are available in electronic form, are under the jurisdiction of an authority or entity formally recognized as an SDI stakeholder, cover at least one spatial theme prescribed by law, and are not classified as confidential.

Within the context of the SDI FBiH, spatial data sources include:

- **Spatial dataset** – a type of source consisting of a collection of individual items collected and/or compiled from existing sources for the specific purpose of creating new information (dataset).

- **Series of spatial datasets** – a collection of datasets created according to the same specification or with similar characteristics (dataset series).

The law applies exclusively to the original version of the data, meaning that copies or derived data are not included in this category. Spatial data sources are key to ensuring interoperability, standardization, and reliable information exchange within the SDI, and their availability through the SDI FBiH Geoportal enables search, viewing, downloading, and other spatial services.

In the context of this project assignment, identifying and processing spatial data sources forms the basis for planning and implementing all further activities. Well-defined sources ensure

compliance with legal and technical requirements, enable the production of high-quality metadata, facilitate connections with other institutions, and contribute to the overall functionality and sustainability of the spatial data infrastructure in the Federation of BiH.

4. Beneficiaries of Project Activities

The direct beneficiaries of this project assignment are the SDI stakeholders. These stakeholders include federal and cantonal administrative bodies and organizations, local self-government authorities, public companies, legal entities entrusted with the management of spatial data (sources), as well as those using spatial data and SDI services and providing public interest services based on such data.

All other users, including the Coordination Body – the Federal Administration for Geodetic and Real Property Affairs (FGA), academic institutions, the private sector, and citizens, are indirect beneficiaries who will benefit from the improved structure, availability, and interoperability of spatial data.

5. Objective and Purpose

The objective of these Terms of Reference is to establish a repeatable methodology, set of deliverables and acceptance criteria for developing, implementing, and testing spatial data models for spatial data sources of SDI stakeholders. This ToR shall be used for contracting a Framework Agreement (FA), under which the Contracting Authority may issue multiple Call-Off Contracts/Work Orders. Each Call-Off Contract shall cover one clearly identified spatial data source (or theme) and shall be implemented through the phases and deliverables defined in this ToR. A systematic approach to spatial data model design must be established by defining the conceptual, logical, and physical structures for the selected sources, in line with the relevant international standards (such as ISO, OGC, INSPIRE, Law on SDI FBiH) and requests from SDI stakeholders. This will lay the foundation for long-term interoperability, better organization and accessibility of stakeholder data, and strengthen the role of the SDI as a framework for the digital

transformation of public administration and more effective spatial data management in the Federation of BiH.

For each Call-Off Contract, the Contracting Authority shall issue an Assignment Brief specifying: (i) the spatial data source/theme and responsible SDI stakeholder, (ii) available input datasets and formats, (iii) scope boundaries and assumptions, (iv) test environment and access arrangements, and (v) any source-specific constraints.

6. Implementation Phases

Each Call-Off Contract will be implemented through the following phases:

1. Baseline Study (35 calendar days)

- Conduct a detailed analysis of the current state of the spatial data source belonging to SDI stakeholder – legal framework, formats, etc.

- Assess compliance with legal and technical requirements (ISO, OGC, INSPIRE, SDI FBiH).

- Prepare an initial report with recommendations and a proposal for a dynamic plan for implementation of next project phases.

2. Data Model Design (105 calendar days)

- Develop a spatial data model (conceptual, logical, physical) in accordance with relevant international standards, SDI Stakeholder requirements and SDI FBiH legislation.

- Prepare full technical documentation.

3. Testing and Optimization (25 calendar days)

- Deploy the spatial data model in a test environment.

- Conduct functional, negative, and performance testing.

- Resolve identified deficiencies.

- Optimize the model and prepare it for the production environment.

4. Preparation of Final Report (15 calendar days)

- Final project report describing all the activities, deliverables, outcomes and suggestions for future projects.

At the end of each phase, the Consultant shall conduct a review meeting with FGU and the relevant stakeholder(s) to present results, confirm decisions, and agree the plan for the next phase.

Note:

If any implementation phase is completed and accepted before the planned timeframe, the Consultant may proceed with the next phase of this assignment.

6.1. Baseline Study

This phase establishes a comprehensive understanding of the existing conditions for the selected spatial data source, including its legal, institutional, technical, and semantic context. The Consultant will examine current datasets, data models, and maintenance procedures, assess compliance with INSPIRE and SDI FBiH requirements, and identify gaps and inconsistencies. Additionally, the Consultant will perform a comparative review of how similar data is managed in other countries, relevant institutions, or according to internationally recognized recommendations and frameworks. Through direct interviews and consultations with the relevant SDI FBiH Stakeholder, the Consultant will identify their operational needs, data management requirements, and specific priorities. Based on these findings, the Baseline Study will include the Consultant's own professional recommendations on the most suitable modelling approach for the subsequent phases.

Main activities:

- Collect and review all available datasets, metadata, documentation, and legal/institutional references.

- Identify data formats, coordinate reference systems, and update/maintenance processes.

- Review existing database structures and data models (if available).

- Analyze IT infrastructure and workflows used for storing, maintaining, and sharing data.

- Compare current data with relevant INSPIRE theme specifications and SDI FBiH Implementing Rules.

- Perform comparative research on how similar data is maintained in other countries or organizations and identify any internationally recognized recommendations or best practices.

- Conduct structured interviews/meetings with the SDI FBiH Stakeholder to establish current and future data management needs.

- Present professional proposals in the Baseline Study for the approach to be taken in modelling, based on identified requirements and best practices.

- Define and justify the proposed modelling toolchain for the assignment (e.g., UML/ER modelling tool(s) and schema derivation approach), including selection criteria such as vendor-neutral export capability, licensing implications, and long-term maintainability. Propose and agree with the Contracting Authority a model file governance approach covering repository structure, versioning, naming conventions, release procedure, and mandatory delivery of model source files and open-format exports (e.g., XMI, SQL DDL, and JSON Schema where GeoJSON examples are provided).

- Perform a detailed gap analysis (missing attributes, incorrect structures, outdated code lists, etc.).

- Develop a dynamic plan for Phases 2–4, including time frame, milestones and coordination points.

6.2. Data Model Design

In this phase, the Consultant will design a complete data model for the selected spatial data source — from high-level conceptual design down to the physical database implementation. The conceptual model will define the entities, attributes, semantics, relationships, and constraints using UML notation, aligned with the INSPIRE UML profile. The logical model will translate the conceptual structure into a platform-independent database schema. The physical model will be implemented in PostgreSQL/PostGIS. The model must remain fully consistent with international OGC and ISO standards, while also reflecting the specific requirements of the FGA and the SDI Stakeholder, as determined through consultations and review of current data usage and needs (based on the finding from the Baseline study).

All newly developed models must, at minimum, be based on the INSPIRE data models and specifications for the relevant spatial data theme. The final model must be harmonized according to the instructions of FGA and the respective SDI Stakeholder, considering inputs, interviews, and the practical needs of managing the specific attributes. Models must ultimately conform to international OGC and ISO standards for spatial data management, covering formats, attributes, and data maintenance methods.

Main activities:

- Develop the conceptual model in UML notation based on INSPIRE and ISO 19103 rules.
- Define all feature types, attributes, semantics, relationships, constraints, and code lists.
- Create a complete feature (object) catalogue (ISO 19110).
- Create the logical model (ER diagram) mapping conceptual elements to platform-independent database structures.

- Define attribute types, keys, indexes, constraints, and relationships in line with ISO 19109.
- Build the physical model as SQL DDL scripts for PostgreSQL/PostGIS, including all spatial and attribute constraints, geometry types, and SRID settings.
- Ensure traceability from conceptual to logical to physical model.

The Consultant shall also produce an XML Schema Definition (XSD) derived from the approved physical data model, following the relevant INSPIRE UML-to-XSD encoding rules and national SDI FBiH requirements.

The XSD must enable schema-level validation of datasets in XML/GML format against the designed data model. The schema must be documented and accompanied by example instance documents. GML instance documents shall pass validation against the XSD. Where GeoJSON examples are provided, they shall be accompanied by an appropriate JSON Schema (or equivalent validation specification) and shall pass validation against that specification.

During all design phases, the Consultant is required to adhere to applicable legislative acts and technical standards governing spatial data management. Special emphasis will be placed on the application of INSPIRE technical specifications, as well as the consistent use of relevant international standards from the ISO 19100 family. In this context, the following standards are recommended as minimum key technical references:

- ISO 19103 – Conceptual Schema Language, defining rules for structuring models in UML notation, including data types, operations, and constraints.
- ISO 19107 – Spatial Schema, covering spatial types and the geometric component of data.
- ISO 19109 – Rules for Application Schema, providing guidance for developing application schemas based on conceptual models.
- ISO 19110 – Methodology for Feature Cataloguing, used for defining objects, attributes, and the semantic meaning of data.
- ISO 19157 – Data quality principles.

Data models and their UML specifications are developed in accordance with the above ISO standards, making their application essential for ensuring compliance with European interoperability guidelines.

6.3. Testing and Optimization

This phase verifies that the developed model functions correctly with real data and meets all functional, semantic, and performance requirements. The Consultant will test the model with a representative dataset, checking its ability to store and manage all required information while enforcing constraints and ensuring semantic accuracy. Optimization will focus on improving performance and removing unnecessary elements. All validation must ensure that the final model remains in line with INSPIRE specifications, SDI FBiH rules, and the agreed national needs of the FGA and the SDI FBiH Subject.

Main activities:

- Deploy the physical model in a test environment and load representative datasets.

- Perform functional testing to confirm the model supports all required content and relationships.

- Conduct semantic validation, checking code lists, constraints, and attribute logic.

- Carry out negative testing to confirm that invalid data is rejected.

- Assess performance and apply optimizations (indexes, query tuning, structure adjustments).

- Where applicable, validate using official INSPIRE and SDI FBiH validation tools.

- Use the XSD schema to validate test GML datasets, and use JSON Schema (or equivalent) to validate GeoJSON examples (if produced).

- Delivery of validator reports showing pass/fail status against the XSD and, where applicable, against the JSON Schema used for GeoJSON examples.

- Document the full testing procedure (including ETL procedures), used files, all issues found and actions taken to resolve them.

- Create a technical manual and relevant scripts for data model validations.

   Testing will be considered successfully completed only when the data model passes all predefined test scenarios without errors. Only a model that has passed validation and received formal approval from the FGA and SDI Stakeholder will be deemed accepted and ready for the production environment. Otherwise, the testing process will be repeated after revisions have been made.

Following successful testing, the Consultant will proceed with finalizing and optimizing the spatial data model. Optimization will involve a set of activities aimed at improving database performance and stability, including adjusting indexes to improve the efficiency of spatial and attribute queries, as well as modifying table structures and relationships to enable faster access and stable execution of spatial operations. Special attention will be given to verifying the correctness of spatial reference settings (SRID) and updating them in accordance with SDI FBiH requirements.

Upon completion of the optimization process, the Consultant will prepare a final technical report containing a description of the testing activities carried out and their results, an analysis of any identified issues with detailed explanations of how they were resolved, and an overview of all optimization measures undertaken with technical justification for their purpose and impact. The report will also include confirmation of the model's readiness for transition to the production environment, accompanied by a declaration from the Consultant that the model complies with the applicable technical and functional requirements specified in this assignment.

6.4. Final Report

In the final phase, all products from the previous phases will be finalized, consolidated, documented, and handed over to the FGA and the SDI Stakeholder. The documentation package will include the final versions of all models, catalogues, mapping tables, scripts, validation results and relevant documentation. This phase ensures that all necessary materials are provided for

future maintenance and use of the model, and that they are delivered in both digital and printed form (where applicable). The final model must be clearly documented and ready for operational implementation.

The Final Report shall be submitted to the Working Group for review and final approval. Approval of the Final Report represents the final confirmation of successful completion of the assignment.

7. Deliverables

The Consultant shall provide the following deliverables for each phase. All deliverables must be submitted in both digital and printed form, unless otherwise specified, and must be reviewed and formally approved by the FGA and the SDI Stakeholder before proceeding to the next phase. Digital deliverables shall be organized in a structured cloud repository and on physical media (external drive or USB), with clear versioning and folder structure by phases.

Phase	Description of Output Document	Format	Timeline
Phase 1: Baseline Study and Analysis of the Current State	• Baseline Study Report including: o detailed description of current data structure, maintenance processes, and infrastructure; o compliance assessment against INSPIRE, SDI FBiH, OGC/ISO standards; o service-readiness assessment and mapping of the target SDI FBiH network service types (discovery/view/download/invoke) to the model outputs, including identification of applicable OGC API equivalents (e.g., Features/Tiles/Records/Processes) and required endpoint documentation expectations (OpenAPI/conformance/collections). o comparative analysis of how similar data is managed in other countries/institutions or according to internationally recognized recommendations;	PDF, DOCX	35 calendar days from Call -off contract signing

Phase	Description of Output Document	Format	Timeline
	o results of interviews/consultations with SDI FBiH Subject(s) detailing their needs; o professional recommendations for modelling approach; o toolchain selection and model file governance plan (proposed modelling tool(s), selection criteria, required open-format exports, repository structure, versioning/release procedure, and handover/maintenance responsibilities); o gap analysis; o dynamic plan for subsequent phases.		
Phase 2: Design of the Conceptual, Logical, and Physical Data Models	• Conceptual Model in UML notation (XMI + PDF diagrams) following INSPIRE UML profile and ISO 19103; • Feature Catalogue in accordance with ISO 19110; • Logical Model (ER diagram, PDF + modelling file) consistent with ISO 19109; • Physical Model SQL DDL scripts for PostgreSQL/PostGIS including geometry types, SRIDs, constraints; • XSD schema derived from the approved physical model following INSPIRE UML-to-XSD encoding rules; mapping tables between conceptual/logical/physical models.	UML (XMI), PDF, Excel, SQL, XSD, GML, GeoJSON	105 calendar days from acceptance of Phase 1 deliverables
Phase 3: Testing, Validation, and Optimization	• Test and Validation Report including: o database-level structural validation results; o semantic checks against code lists and constraints;	PDF, DOCX, HTML/PDF (validator reports), SQL, UML, XSD, GML,	25 calendar days from acceptance of Phase 2

Phase	Description of Output Document	Format	Timeline
	o geometry validation (SRID, type, topology rules); o functional testing with representative datasets; o negative testing results; o performance test results; o INSPIRE compliance validation reports (GML validated against XSD schema from Phase 2); o SDI FBiH compliance validation reports; o optimization report with changes applied. Deliver a validated and optimized spatial data model ready for production, accompanied by a validation report, and a final technical report detailing all testing procedures, issue resolutions, optimization measures, etc.	GeoJSON (if schema changes applied)	
Phase 4: Final Documentation and Handover	Final Consolidated Report summarizing all phases, methodology, and standards used; Final versions of all models (UML, ER, SQL DDL, XSD); Feature Catalogue; mapping tables; validation and optimization reports; example GML instance files passing validation; maintenance plan and recommendations; data collection and update package aligned with the approved model, including: (i) specification and templates with a defined structure for 'elaborates'/technical reports, (ii) instructions and a QA checklist for data capture and updates, (iii) functional specification (and, where feasible, mock-ups) for data-entry tools/forms, and (iv) validation rules and procedures (including scripts/configurations) consistent with the model; complete structured digital package and printed key documents. The package shall also include a short "service publication readiness note" describing recommended	PDF, DOCX, UML (XMI), Excel, SQL, XSD, GML, GeoJSON	15 calendar days from acceptance of Phase 3

Phase	Description of Output Document	Format	Timeline
	layer/collection naming, identifier strategy, and how the model outputs support publication via OGC Web Services and applicable OGC API endpoints (including the expected OpenAPI/conformance/collections documentation elements).		

The Contracting Authority may request additional data formats of specified deliverables in the previous table. For each deliverable, the approval of the Contracting Authority is required before proceeding to the next phase or sub-phase of implementation. The deadlines presented in the table refer to the number of calendar days. The Consultant must consider that the supervisory team requires a minimum of three (3) calendar days to review the submitted materials and approve continuation to the next phase/sub-phase. Accordingly, slightly flexible deadlines have been defined for each phase to accommodate internal review processes, feedback loops, and possible iterations. Each phase must be completed within the prescribed timeframe, while the final deadline for all activities and deliverables under each Call-Off Contract is 180 calendar days from the date of Call-Off Contract signing, including all associated review and revision activities..

8. Data and Services Provided by the Consultant

For the purposes of communication and progress monitoring, the Consultant shall establish a cloud-based repository with a standardized directory structure, organized according to implementation phases, versions, and delivery dates. The repository shall include: (i) the original modelling source files (UML/ER), (ii) exports in open, vendor-neutral formats (at minimum XMI for UML and SQL DDL for the physical model, plus JSON Schema where GeoJSON examples are provided), and (iii) a CHANGELOG documenting all changes between versions, (iv) service-readiness artefacts (service mapping note, recommended endpoint patterns, and any OpenAPI/JSON Schema supporting files produced under the assignment).

This repository will serve as the official workspace for the exchange and review of deliverables throughout the duration of the project.

Knowledge transfer and handover: The Consultant shall deliver knowledge transfer to FGU and end users (SDI stakeholders) through practical sessions, including (i) walkthrough of the approved model and its implementation artefacts, (ii) guidance on maintaining and updating model files in the agreed repository, (iii) instructions for validating datasets and interpreting validation reports, and (iv) handover of all scripts/configurations and a maintenance guide. At minimum, one knowledge-transfer session shall be delivered per Call-Off (or per data source), and additional sessions may be requested as part of the Call-Off Assignment Brief.

For the final submission of all resulting materials and documentation, the Consultant is obliged to provide the resulting reports and documents (with any annexes) in hard copy via postal delivery, and all other materials, including reports, on an external hard drive or USB storage device, organized according to the implementation phases.

The Federal Administration for Geodetic and Real Property Affairs (FGA) retains the exclusive ownership rights to all delivered materials and documentation, and their further distribution, use, or reproduction is not permitted without the prior written consent of the Contracting Authority.

9. Inputs provided to the Consultant

Data and Services Provided by the Contracting Authority and SDI Stakeholder:

- Access to available datasets/extracts and documentation;

- Access to existing code lists / registers / business rules;

- Designated focal points and availability for interviews/reviews;

- Test environment or limited access to existing systems;

- Rules for data confidentiality and permitted sample datasets.

10.Qualification requirements/ Required skills and expertise

At the EoI stage, the evaluation shall be based solely on the qualifications and experience of the Consulting Firm (as an individual firm or as a joint venture/consortium). Curricula vitae (CVs) of Key Experts are not required and shall not be evaluated at the shortlisting stage. The maximum score is 100 points, awarded based on the cumulative assessment of the shortlisting criteria. An EoI shall be considered responsive and eligible for shortlisting only if it achieves a minimum score of fifty (50) points out of one hundred (100).

Consulting Firms may submit an EoI either as an individual firm or as a Joint Venture (JV) / consortium. JV/consortium submissions are encouraged to combine complementary expertise and delivery capacity. For JV/consortium submissions, the EoI shall clearly indicate: (i) the Lead Partner, (ii) the roles and responsibilities of each member, and (iii) proposed coordination arrangements. Shortlisting criteria may be fulfilled cumulatively by the JV/consortium, meaning that relevant experience, references, and capacity of all JV/consortium members may be aggregated and considered in the evaluation, considering their proposed roles and responsibilities. The Lead Partner shall act as the primary point of contact for FGA.

Required JV/consortium documentation (to be attached to the EoI): A signed Letter of Intent to form a JV/consortium (or equivalent written agreement) by all members, identifying the Lead Partner and confirming commitment to submit a proposal in case shortlisted; and A brief JV/consortium arrangement note describing roles, division of responsibilities, and allocation of references/experience to the proposed roles.

FGA intends to shortlist five (5) to eight (8) eligible Firms with the highest total scores. Shortlisted Firms shall subsequently receive the RFP. Following the RFP evaluation and award, FGA, as the Contracting Authority, intends to conclude a Framework Agreement (FA) with the selected Firm. During the FA period, individual call-off contracts / task orders shall be used to order defined quantities of services from the total offer provided in the Price Schedule / Financial Proposal (submitted at the RFP stage).

Quantities may vary by SDI stakeholder and by category of services; however, the cumulative quantities and cumulative payments under all call-off contracts shall not exceed:

(i) the maximum total value established under the Framework Agreement; and (ii) the maximum quantities specified for each respective category of services in the Price Schedule.

Shortlisting Criteria, Scoring and Expected Supporting Evidence (to be submitted with the EoI).

CRITERION 1: GENERAL EXPERIENCE (MAXIMUM 20 POINTS)

The Firm shall be awarded up to **20 points** based on the quality and relevance of corporate experience and references.

a) **Minimum years in business (up to 7 points):**

At least **two (2) years** in business providing professional services in one or more of the following fields: geodesy, geoinformatics, GIS/SDI, land administration, IT/software engineering, data engineering, enterprise architecture, digital transformation, environmental information systems, utilities/asset management systems, or related fields.

Expected evidence to be submitted with the EoI:

Proof of legal establishment and registration (e.g., company registry extract, certificate of incorporation, or equivalent official registration document) indicating the year of establishment (for JV/consortium submissions: for each member).

b) **Core business relevance (up to 13 points)**

Demonstrated corporate track record in delivering assignments such as: (i) development/integration of information systems or registries; (ii) data modelling and/or standardisation (spatial or non-spatial); (iii) database development and management; (iv) interoperability, data exchange, APIs, or service-oriented architectures; (v) implementation support, documentation and/or training for enterprise systems, for public sector or regulated industries.

Expected evidence to be submitted with the EoI:

Firm Profile (maximum 2 pages) summarising relevant business lines and service areas; and

Relevant project references documented through **Project Reference Sheets** and corresponding attachments (as described under Criterion 2). References may be provided cumulatively by JV/consortium members.

CRITERION 2: SPECIFIC EXPERIENCE RELEVANT TO THE ASSIGNMENT (MAXIMUM 60 POINTS)

The Firm shall be awarded up to **60 points** based on the quality and relevance of project references comparable in deliverables and complexity. References may relate to geospatial SDI work or equivalent data/standards/interoperability projects in other sectors, provided that outputs are transferable to the assignment. Relevant project areas include:

a) Data modelling / standards / interoperability specifications (up to **18 points**);

b) Standards and frameworks alignment (INSPIRE, ISO 191xx, OGC, CityGML, LADM, GML/XML, GeoPackage, or equivalent national/sectoral standards such as ISO/IEC, W3C, OpenAPI, industry reference models) (up to **14 points**);

c) Schema/API implementation and validation (XSD/JSON Schema, REST/OpenAPI, controlled vocabularies, validation workflows, QA pipelines) (up to **10 points**);

d) Database and platform implementation (spatial/enterprise DB, performance, integrity constraints, migration, ETL/ELT) (up to **10 points**);

e) Service enablement and publication (WMS/WFS/WCS, tile services, catalogues, portals, OGC API, REST services) (up to **8 points**).

Expected evidence to be submitted with the EoI (mandatory format): For each reference claimed under this criterion, the Firm shall submit a **Project Reference Sheet** (maximum 2 pages per reference) including, at minimum:

Project title; Client name and contact details; Country; Implementation period (start/end);

Firm's role (Lead / JV member / subcontractor) and brief description of scope;

Key deliverables relevant to the assignment;

Standards/technologies applied (where relevant);

Contract value (indicative, if available).

Expected reference attachments (mandatory – at least one per reference): For each reference, the Firm shall attach at least **one (1)** of the following (commercially sensitive information may be redacted):

- Contract extract / purchase order / work order evidencing the Firm's engagement; **or**

- Certificate of completion / acceptance certificate / client confirmation letter; **or**

- Client reference/recommendation letter; **or**

- Links or screenshots evidencing published deliverables (e.g., public documentation, geoportal/service endpoint), where applicable; **or**

- Other verifiable evidence acceptable to FGA confirming participation and delivery.

- For JV/consortium submissions, references may be submitted **cumulatively** by all members. Each reference sheet shall clearly indicate which member performed which part of the assignment and how it relates to the proposed role within the JV/consortium.

CRITERION 3: ADDITIONAL PREFERENTIAL CRITERIA (MAXIMUM 20 POINTS)

The Firm shall be awarded up to **20 points** based on attributes that enhance implementation feasibility:

a) Regional/BiH or comparable context experience (up to 8 points). Experience in Bosnia and Herzegovina and/or comparable contexts, or delivery of similar work for public institutions with complex governance arrangements.

Expected evidence to be submitted with the EoI:

Project Reference Sheets (as per Criterion 2), supported by at least one attachment per reference as listed under Criterion 2.

b) Local capacity and language (up to 6 points). Ability to operate in Bosnian/Croatian/Serbian and deliver meetings/workshops and key documentation in local language(s).

Expected evidence to be submitted with the EoI:

Self-declaration confirming operational capacity in Bosnian/Croatian/Serbian; and

Optional supporting evidence (recommended): sample excerpt of a prior deliverable/training agenda in local language(s) or client confirmation indicating local-language delivery.

c) Standards/model governance and maintenance (up to 6 points). Demonstrated experience in establishing or supporting governance and maintenance arrangements for data standards and models, including change management (versioning), stakeholder review cycles, issue tracking, and publication of updated versions (e.g., model repository, registry/catalogue updates).

Expected evidence to be submitted with the EoI:

One (1) to two (2) Project Reference Sheets where such governance/maintenance arrangements were implemented or supported; and

At least one supporting attachment per reference as defined under Criterion 2 (acceptance letter, client confirmation, or deliverable extract/link evidencing versioning/change process).

10.1.   Requirements for Key Experts within the Project Team

The Consultant must ensure that its project team includes, at minimum, the following qualified roles:

1. **Team Leader** – Responsible for overall project management, coordination of all project activities, quality assurance, and communication with the Contracting Authority.

    - University degree in Geodesy, Geoinformatics, Geography, Computer Science, Information Technology, or other related fields.

    - At least 5 years of relevant professional experience in geospatial projects, including leadership roles.

2. **SDI Specialist** – Expert in spatial data infrastructure, ensuring compliance with INSPIRE and SDI FBiH standards, best practices, and interoperability requirements.

- University degree in Geodesy, Geoinformatics, Geography, Computer Science, Information Technology, or other related fields.

- Minimum 3 years of relevant experience in working with Spatial Data Infrastructure, INSPIRE, GIS.

3. **Data modelling expert** – Proficient in GIS tools (ArcGIS, QGIS) and geospatial databases (PostgreSQL/PostGIS), with experience in UML modelling.

- Strong understanding of INSPIRE data models, ISO 19100 series, and UML modelling;

- Hands-on experience with modelling tools such as Enterprise Architect, StarUML, or similar;

- Minimum of 5 years of relevant experience.

The Consultant is obliged to:

- Ensure the engagement of additional technical, administrative, and support staff, as required by the scope and complexity of the project;
- Provide appropriate computer and software equipment, access to necessary tools and licenses, and any other logistical conditions needed to ensure smooth project implementation;
- Organize the team and resources in a way that enables timely delivery of all tasks within the prescribed deadlines and in accordance with the quality standards set forth in this ToR.

It is considered the sole responsibility of the Service Provider to independently assess and secure any additional capacities necessary for the efficient and high-quality performance of the team, including coordination with FGA and other relevant stakeholders.

11. Institutional and Organizational Arrangements

The Working Group (supervisory team appointed by Contracting Authority) will review, monitor, and approve all delivered documents. Once the Working Group has accepted all deliverables and, if necessary, provided feedback, it will be considered that all deliverables have been prepared in accordance with this Project Assignment.

The Working Group will provide the contact details of its designated team authorized to communicate with the Consultant, as well as to review, monitor, and approve all delivered outputs.

12. Language and Communication

The official language of communication during the implementation of this contract may be English or one of the official languages of Bosnia and Herzegovina, with a preference for conducting operational and day-to-day communication, whenever possible, in one of the local languages of the Federation of BiH. This is particularly important in the context of field activities, consultations with domestic institutions, and engagement with stakeholders.

The Federal Administration for Geodetic and Real Property Affairs shall appoint an official oversight and coordination team responsible for monitoring the implementation of the contract, participating in validation processes, and granting formal approvals of key deliverables. The FGA shall review, monitor, and approve all deliverables provided. Once all deliverables have been accepted by the FGA, and feedback is provided if necessary, it will be deemed that all deliverables have been produced in accordance with the Terms of Reference.

On the Consultant's side, a Project Manager (nominated in the proposal) shall be responsible for daily communication with FGA, coordination of expert inputs, and timely reporting on progress.

All major deliverables (e.g. documentation, reports, manuals, recommendations) must be submitted in **two** language versions:

- In English, as the standard language of international technical communication, and

- In one of the official languages of Bosnia and Herzegovina, to ensure accessibility for domestic institutions.

An exception to this rule applies exclusively to strictly technical documents, which include but are not limited to:

- Database schemas (ER models, SQL scripts);

- System diagrams (UML);

- Configuration files and technical manuals within the context of GIS software and web services.

These technical documents may be prepared in English only, due to their universal application in IT/GIS tools and systems if approved by the Contracting Authority.

13. Ownership and Confidentiality

All deliverables produced under this assignment shall be the sole property of the Federal Administration for Geodetic and Real Property Affairs or selected SDI stakeholders.

The Consultant shall not, without prior written approval from FGA:

- reproduce, distribute, transmit, publish, or make available to third parties,

- use or modify the materials for commercial or non-commercial purposes,

- share partial or complete results with other users, institutions, international organizations, or projects.

FGA retains the exclusive rights to publish, modify, publicly use, and further disseminate the developed materials.

The contracted Consultant is required to deliver all working drafts, final documents, databases, schemas, and accompanying materials to FGA in properly versioned and electronic format, along with the corresponding metadata and documentation.

Failure to comply with this clause shall be considered a serious breach of contractual obligations and may constitute grounds for legal sanctions and contract termination.

14. Payment

Payments under each Call-Off Contract shall be made in instalments upon acceptance of phase deliverables as follows: 20% upon acceptance of Phase 1; 40% upon acceptance of Phase 2; 25% upon acceptance of Phase 3; and 15% upon acceptance of Phase 4 (final documentation and handover).