

SCOPE OF WORK, TECHNICAL SPECIFICATIONS AND ESTIMATED COST FOR THE UPGRADATION OF PESCO GIS INFRASTRUCTURE INTO ENTERPRISE GIS SOLUTION



PLANNING & ENGINEERING
PESCO

N. Logan

**PROPOSED SCOPE OF WORK, TECHNICAL
SPECIFICATIONS AND ESTIMATED COST FOR THE
UPGRADATION OF PESCO GIS INFRASTRUCTURE
INTO ENTERPRISE GIS SOLUTION**

**UNDER ELECTRICITY DISTRIBUTION EFFICIENCY
IMPROVEMENT PROJECT (EDEIP)**

RFP: PK-PESCO-CS/2023



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February 2026



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1. Introduction / Executive Summary

In 2013–2015, under the USAID program, PESCO initiated its GIS journey by acquiring two ESRI's ArcGIS Desktop Client licenses to begin mapping its electrical network. Along with this, two Load Flow software licenses of SynerGEE Electric 5 of DNV, were also obtained, and a GIS data model was developed to align with the Load Flow system requirements. Based on the consultant's guidance at that time, each feeder's High Tension (HT) network was represented as a separate layer (table) in the GIS database to ensure compatibility with the Load Flow software.

Following this model, PESCO began field data collection of all HT network components using handheld GPS devices (Garmin eTrex 10, Garmin GPSMAP 78s) and paper-based forms (Annexure A). Over time, PESCO successfully completed the mapping of its entire HT network and transformer assets, with subsequent updates made wherever new information became available. Additionally, PESCO undertook limited mapping of Low Tension (LT) networks using internal resource surveys. However, this work followed the older, traditional method—maintaining separate layers and MS Access tables for each feeder. As a result, PESCO currently manages around 1,349 feeder-specific GIS layers and tables independently.

To meet evolving planning, operational and analytical needs, PESCO now plans to modernize and consolidate its GIS platform into a centralized, enterprise-level system based on the latest Utility Network Model, integrating with other existing system like Load Flow Software, ERP, MM, AMR, MIS, PDC, CRM, Fleet Management, and Property Management Cell (PMC) systems. The new setup will provide web-based visualization and analysis tools, operational and management dashboards, and mobile applications for field operations.

The implementation of the Enterprise GIS will bring significant operational and financial benefits to PESCO. The automation of proposal generation for new transformer planning, feeder bifurcation, and network rehabilitation will streamline project preparation and approval processes. Field inspections and monitoring of ongoing works will become more efficient through mobile-enabled data collection and real-time reporting. Furthermore, on-spot identification of overloaded transformers and feeders will enable timely network reinforcement, thereby reducing technical losses. The system's advanced spatial analytics will also assist in identifying optimal locations for new grid stations and other network reinforcements, supporting evidence-based planning and investment decisions.

2. Scope of Work

The objective of this initiative is to design, develop, and implement a modern, enterprise-level GIS platform for PESCO that will serve as a single source of truth for all network and asset data. The upgraded GIS system will consolidate existing datasets, ensure interoperability through OGC-



compliant services, and integrate seamlessly with other enterprise systems such as Load Flow, ERP, AMR, MIS, PDC ,BI/BW and CRM.

The project scope includes the following major components:

2.1 Technical Design / System Architecture

Scope

Define and implement an enterprise-grade GIS system architecture serving as the centralized and authoritative spatial data platform for all network and asset information. The system shall be interoperable, scalable, and compliant with OGC standards, supporting seamless integration with enterprise systems such as Load Flow, ERP, AMR, PDC and CRM.

Key Deliverables

- Approved Enterprise GIS system architecture design.
- Defined GIS enterprise landscape (Non-HA and HA models).
- Infrastructure sizing and deployment diagrams.
- Integration-ready architecture aligned with OGC standards.

Technical Approach

- Design a centralized Enterprise GIS platform following industry best practices.
- Implement an initial Non-Highly Available (Non-HA) architecture as a cost-effective baseline.
- Ensure the architecture is scalable to a Highly Available (HA) configuration with redundancy and failover.
- Align system design with performance, security, and integration requirements.
- Refine architecture based on operational priorities and budget considerations.

Architecture Models:

- **Non-HA Configuration:** Cost-effective setup delivering core GIS capabilities for moderate operational use.
- **HA Configuration:** Redundant architecture ensuring high availability, resilience, and minimal downtime for critical operations.

Acceptance Criteria

- Architecture supports centralized, authoritative spatial data management.
- System complies with OGC interoperability standards.
- Non-HA environment is operational and scalable to HA without redesign.
- HA design ensures redundancy and minimal service disruption.
- Architecture is approved by PESCO technical stakeholders.



2.1.1 Overall Architecture Overview

Scope

The scope includes the design, deployment, and configuration of a secure, scalable, and interoperable Enterprise GIS architecture for PESCO based on a multi-tier enterprise model. The system shall function as the authoritative repository for all spatial and asset-related information and shall support advanced network modeling, enterprise integrations, and decision-support applications. The architecture shall be compliant with OGC and ISO standards and designed for long-term scalability and digital transformation.

Key Deliverables

- **Architecture & Design**
 - Detailed Enterprise GIS architecture document covering data, application, integration, and user access tiers.
 - Conceptual and logical architecture diagrams.
 - Infrastructure sizing and performance recommendations.
- **Data Tier**
 - Centralized Enterprise Geodatabase hosted in PESCO Data Center.
 - Utility Network-enabled data model for HT and LT assets.
 - Versioning, replication, and multi-user editing configuration.
 - OGC-compliant service exposure (WMS, WFS, WMTS, WCS).
- **Application Tier**
 - Fully configured Enterprise GIS Solution components (Server, Portal, Data Store).
 - Desktop GIS tools for advanced editing and analysis.
 - Mobile GIS applications for field data capture and verification.
- **Integration Layer**
 - Configured integrations with Load Flow, ERP, AMR, and CRM systems.
 - Secure REST and web service interfaces.
 - Data synchronization and automation workflows.
- **User Access & Analytics**
 - Role-based web GIS applications.
 - Executive and operational dashboards.
 - GIS-based planning and analysis tools.
- **Security & Governance**
 - Role-based access control and AD integration.

- Data encryption, audit logging, and backup mechanisms.
- **Standards & Scalability**
 - Compliance with OGC, ISO, and Utility Network standards.
 - Future-ready design supporting IoT, smart meters, and cloud adoption.

Technical Approach

- **Architecture Design**
 - Adopt a layered enterprise architecture separating data storage, application services, integration services, and user access to ensure performance, scalability, and security.
 - Implement a centralized geodatabase to eliminate data silos and ensure data consistency.
- **Data Tier Implementation**
 - Host the enterprise geodatabase on high-availability infrastructure within the PESCO Data Center.
 - Structure all asset and network data according to Utility Network specifications to enable advanced tracing, outage analysis, and connectivity management.
 - Enable versioning and replication to support concurrent editing by field and office users.
 - Publish all datasets through OGC-compliant services to ensure interoperability.
- **Application Tier Implementation**
 - Deploy Enterprise GIS Solution as the core GIS platform, providing services for visualization, analysis, and data sharing.
 - Configure desktop and mobile GIS tools to support operational, planning, and maintenance workflows.
 - Optimize services for performance, availability, and secure access.
- **Integration Strategy**
 - Establish a dedicated integration layer using REST APIs and OGC services for secure and reliable data exchange.
 - Integrate GIS with load flow systems for network simulations, with ERP for asset and financial alignment, with AMR for consumption analysis, and with CRM for customer service mapping.
 - Implement automated data synchronization and event-driven workflows where applicable.

➤ **User Access & Decision Support**

- Provide role-based web portals and dashboards tailored for management, planners, engineers, and field staff.
- Enable mobile access with offline capabilities for field operations.
- Ensure all applications consume data from the centralized GIS to maintain a single source of truth.

➤ **Security, Compliance & Continuity**

- Enforce role-based access through Active Directory integration.
- Implement encryption, audit trails, and logging to meet security and compliance requirements.
- Configure backup, failover, and disaster recovery mechanisms to ensure business continuity.

➤ **Future Scalability.**

- Design the system to support phased growth, cloud readiness, and integration of IoT, smart meters, and real-time sensor data without architectural redesign.

Acceptance Criteria

➤ **Architecture & Compliance**

- Architecture follows the approved multi-tier enterprise model.
- Full compliance with OGC and relevant ISO standards.

➤ **Data & Utility Network**

- Enterprise geodatabase is fully operational and Utility Network-enabled.
- Data quality, topology, and connectivity rules pass validation.

➤ **Applications & Integration**

- Enterprise GIS Solution components operate reliably and securely.
- Successful data exchange with Load Flow, ERP, AMR, and CRM systems.

➤ **User Access & Functionality**

- Role-based web, mobile, and dashboard applications function as specified.
- All applications consume data from a centralized authoritative source.

➤ **Security & Reliability**

- Security controls, backups, and recovery mechanisms are operational.
- System meets agreed performance and availability benchmarks.

➤ **Scalability & Sustainability**

- System supports future expansion without redesigning.

Architecture is approved by PESCO technical and IT stakeholders.



2.2 IT Infrastructure for Enterprise GIS Solution

Scope of Work:

Design, supply, installation, configuration, and commissioning of enterprise-grade IT infrastructure to host and support the Enterprise GIS platform including high availability, scalability, security, and disaster recovery. The major scope includes in the followings:

- Supply of enterprise-grade HCI nodes with GPU acceleration.
- Virtualization, compute, storage, and management software.
- Backup and disaster recovery infrastructure.
- High-speed core and access networking.
- Operating system and virtualization licensing.
- Turnkey deployment and integration with existing PESCO IT environment.
- Long-term OEM and onsite technical support.
- Capacity building and administrator training.

Main deliverable of this activity includes the followings:

- Fully operational data center environment.
- High availability GIS hosting platform.
- Performance and security testing reports.

2.2.1 Hyper converged Infrastructure – Technical Specifications

Each Hyperconverged Infrastructure Node shall meet or exceed the following minimum specifications:

Compute & Chassis:

- 2U Hyperconverged Infrastructure Node (2.5” SFF bays).
- Dual-socket server configuration.
- 32-core CPUs (2.1GHz base frequency, 160MB cache, 270W TDP).

Memory:

- 64GB DDR5-5600 RDIMM (scalable).
- DDR5 Memory Filler Modules.

Storage:

- Front 8SFF UniBay Drive Backplane Module.
- 15.36TB NVMe SSDs for high-performance workloads.
- 960GB 6G SATA SSDs for OS and tiered storage.
- SAS RAID Controller (8 ports, 12Gbps, 4GB cache).

GPU & Acceleration:

- NVIDIA L20 48GB PCIe 4.0 GPU Modules.
- NVIDIA L20 48GB PCIe 4.0 GPU Modules.
- vGPU licensing (NVIDIA RTX vWS – Perpetual + 5-Year SUMS).

Networking:

- Dual-port 10GbE Fiber Network Adapters.
- 10Gb SFP+ modules (850nm, LC).

Power & Cooling:

- 2700W Redundant Power Supplies.
- Fan modules, heat sinks, air baffle kits.
- Certified power cords and internal cabling.

Physical & Accessories:

- Rail kits, cable management arms, intelligent security bezel.
- All required PCIe, SAS, GPU, AUX and DC cables.

Software:

- Hyperconverged Infrastructure Software Suite.
- Hardware Device Management Module.
- HCI Management Software (UIS Manager, UIS CAS, UIS ONEStor).

Deliverable:

- Fully commissioned HCI cluster ready for Enterprise GIS workloads.

2.2.2 Backup & Disaster Recovery Infrastructure

Backup Appliance:

- 4U Backup Server with dual Intel CPUs.
- 256GB DDR5 RAM.
- RAID controller.
- 2 × 960GB SSD + 26 × 12TB SAS HDDs.
- Dual 10Gb NICs with SFP+.
- Redundant 2000W PSUs.
- 3-Year NBD warranty.

Backup Software:

- Central management server license.
- Deduplication module.
- Backup agents for:

- Virtual Machines
- Physical Servers
- Databases
- Replication and Disaster Recovery features.

Deliverable:

- Fully operational backup and DR environment.

2.2.3 Core & Management Networking

- Layer-3 Enterprise Ethernet Switches (H3C S6520X series or equivalent).
- Minimum $16 \times 1\text{G}/10\text{G}$ SFP+ ports.
- FP+ transceivers (850nm, LC).
- Dual redundant power supplies.
- Console and management accessories.
- 5-Year OEM onsite support (5 $\times$ 9 NBD).

Deliverable:

- High-speed, redundant network fabric for GIS infrastructure.

2.2.4 Operating Systems & Platform Software

- Windows Server 2022–2025 Datacenter Edition.
 - 8 packs of 16-core licenses.
 - Unlimited virtual machines.
- Linux Server support for GIS and supporting services.

Deliverable:

- Licensed and compliant server OS environment.

2.2.5 Services, Support & Human Resource Enablement

Professional Services:

- Turnkey installation and configuration of HCI nodes.
- Integration with existing PESCO network.
- Validation, testing, and readiness certification.

Support:

- 5-Year comprehensive OEM support for hardware & software.
- 3-Year backup software support.
- $2 \times$ Resident Engineers for 3 years.
 - Onsite Level-1 support.
 - Remote Level-2 support.

Training:

- HCI Administration – 5-day hands-on training.
- Linux Server Administration – 5-day training.
- Windows Server Administration – 5-day workshop.
- Certification vouchers for 3 employees.

Deliverable:

- Skilled PESCO IT team with certified administrators.

2.2.6 Compliance & Standards

- World Bank IT procurement guidelines.
- Enterprise security best practices.
- High availability and scalability design.
- Vendor-neutral, standards-based architecture.

2.3 Enterprise GIS Software Suit (Core & Advanced Modules)

The Enterprise GIS platform to be procured shall be supplied by a globally recognized leader in Geographic Information System (GIS) software for utility organizations, adhering to international geospatial standards established by the Open Geospatial Consortium (OGC) and the International Organization for Standardization (ISO). The platform must natively support the Utility Network Data Model (UNDM) as its foundational network topology framework, Enterprise GIS System Architecture Design Guidelines for multi-tier deployments, and all relevant national and international standards for geospatial data, integration, and interoperability. The solution must be a proven, commercially mature platform with an established global install base in electric utility organizations and must not be an open-source or community-supported distribution.

Scope of Work:

Procurement, licensing, installation, configuration, and commissioning of a full Enterprise GIS Software Suite to support utility network modeling, real-time event processing, workflow automation, field mobility, monitoring, and staging environments as highlighted below:

- Procurement of Enterprise GIS Solution licenses and related software components from a qualified vendor meeting all technical requirements specified herein.
- Installation, configuration, and deployment of the Enterprise GIS Solution platform, including Portal for GIS, GIS Server, GIS Data Store, and GIS Desktop.
- Configuration of user roles, permissions, and enterprise-level data access policies.
- Delivery of structured Enterprise GIS training and knowledge transfer to PESCO staff for sustainable in-house operation of the system.

Included Software & Licenses:

- Enterprise GIS Server – Advanced Tier, Up to Four Cores (Perpetual) – 1 No.
- Enterprise GIS Server – Standard Tier, Up to Four Cores (Perpetual) – 1 No.
- Enterprise Real-Time Event Processing Server, Up to Four Cores (Production) – 1 No.
- Enterprise GIS Workflow & Task Management Server – Advanced, Up to Four Cores (Production) – 1 No.
- Enterprise GIS Professional Plus Named User License (Full Geodatabase Administration & Utility Network Authoring) – 3 Nos.
- Enterprise GIS Professional Named User License (Advanced Editing & Spatial Analysis) – 10 Nos.
- Enterprise GIS Mobile Worker Named User License (Field Data Collection & Offline Sync) – 70 Nos.
- Enterprise GIS Infrastructure Health Monitoring Module, Up to Four Cores – 1 No.

Staging / Testing Environment Licenses:

- Enterprise Real-Time Event Processing Server, Up to Four Cores (Staging) – 1 No.
- Enterprise GIS Server – Advanced Tier, Up to Four Cores (Staging) – 1 No.
- Enterprise GIS Workflow & Task Management Server – Advanced, Up to Four Cores (Staging) – 1 No.

Technical Specifications:

- Perpetual enterprise licenses with vendor support.
- Role-based access and security.
- Utility Network data model support.
- Web GIS, desktop GIS, and mobile GIS enablement.
- API support for enterprise integrations.
- Native Utility Network Data Model (UNDM) support including asset groups, asset types, network categories, containment associations, structural attachments, connectivity associations, and junction-edge connectivity. The platform shall natively support Named Trace configurations stored in the geodatabase, enabling upstream/downstream, isolation, and subnetwork-based traces. SubnetworkLine and SubnetworkController feature classes shall be supported as first-class data model objects without third-party extensions.
- Branch Versioning for concurrent multi-user editing of the Utility Network, with support for named versions, version management lifecycle (create, reconcile, post, delete), conflict detection and resolution, and a version management dashboard. The system shall support

no fewer than 50 concurrent named editors operating on the live utility network without service degradation. Traditional file-locking or checkout/check-in versioning models are not acceptable.

- Integrated Image Server component capable of serving dynamic mosaic datasets, raster analytics, and orthorectified satellite imagery as managed image services. The Image Server shall support on-the-fly raster processing functions including hillshade, NDVI, band arithmetic, pan-sharpening, and dynamic range adjustment. Imagery shall be accessible through both WCS/WMS OGC services and native REST image service endpoints. The Image Server shall be fully integrated within the Enterprise GIS platform and shall not require a separate third-party raster management solution.
- Dedicated Real-Time Event Processing Server (GeoEvent Server) tightly integrated within the Enterprise GIS platform, supporting streaming data ingestion via MQTT, REST, TCP/IP, WebSocket, and file-based inputs. The server shall support event-driven alerting, geofencing rules, real-time dashboard feed publishing, and output connectors to enterprise GIS feature services. The Geo-Event Server shall be capable of sustaining a minimum of 1,000 events per second and shall be managed through the same administrative portal as the core GIS platform. Standalone stream processing solutions not natively integrated into the GIS platform are not acceptable.
- Enterprise GIS Infrastructure Monitoring component (Monitor) natively integrated with the GIS platform, capable of tracking individual service availability, response times, CPU and memory utilization, and request throughput in real time. The Monitor shall support configurable alerting thresholds with automated email and dashboard notifications to operations staff and shall provide historical health reports and audit logs for all GIS services. General-purpose IT monitoring tools used as a substitute are not acceptable.
- Professional Plus (Advanced) named user license type providing full Enterprise Geodatabase administration rights, Utility Network creation and full topology editing capabilities, advanced geoprocessing toolboxes, Python scripting via the platform API, and access to 3D analyst, spatial analyst, and network analyst extensions. Viewer-only or standard editing user types are not sufficient for the roles specified herein. A minimum of three (3) Professional Plus named user licenses shall be provided under this scope.
- Integrated Field Workforce Management module natively linked to the Enterprise GIS platform, supporting GPS-tracked field crew assignment and dispatch, asset-linked work order creation directly from the utility network map, task priority routing, real-time status updates from mobile devices, and supervisor dashboards showing crew locations and assignment progress. The Workforce module shall integrate bi-directionally with the utility



network feature services and shall not require a standalone third-party field service management system. A minimum of seventy (70) Mobile Worker user licenses shall be provisioned to support field operations across PESCO's operational areas.

Deliverables:

- Fully licensed and configured Enterprise GIS platform.
- Production and staging environments.
- License entitlement and compliance documentation.
- Comprehensive Enterprise GIS training for administrators, GIS users, and field staff.
 - Training materials, user manuals, and system administration guides.
 - Training completion and knowledge transfer documentation.

2.4 Specialized GIS Extensions & Data Processing Tools

Scope of Work:

Procurement and deployment of specialized GIS extensions for data creation, transformation, and field data integration.

Included Software:

- Drone to Map Software – 2 Licenses.
- FME (Feature Manipulation Engine) Module – 1 License.

Technical Specifications:

- Drone imagery processing, orthomosaic generation, and DEM creation.
- Advanced ETL workflows for spatial and non-spatial data.
- Integration with Enterprise GIS geodatabase.

Deliverables:

- Operational data processing tools.
- Configured workflows and sample datasets.
- Hands-on training for PESCO staff on drone data processing and ETL workflows.
- User guides and workflow documentation.

2.5 Power / Load Flow Analysis Software

Scope of Work:

Procurement, installation, and integration of advanced Power / Load Flow Analysis software (e.g., PSS® SINCAL, SynerGEE Electric, or equivalent) with Integration to Enterprise GIS for utility network analysis and planning.

Technical Specifications:



The software shall include the latest version with the following functional modules:

- Power Flow Analysis (Balanced & Unbalanced)
- Short Circuit Analysis (1-phase, 2-phase, 3-phase)
- Network Development / Load Development.
- Maximal Hosting Capacity / Integration Capacity Analysis
- Grid Code Compliance & EEG Analysis.
- Time Series Calculations / Operating Points
- Load Assignment & Demand Modeling
- Harmonics
- Harmonic Contingency
- Desktop GIS integration for Utility Network models.

Quantity:

- 3 Concurrent / Named User Licenses (or equivalent).

Deliverables:

- Installed and licensed power system analysis software.
- GIS-integrated network models.
- User and administrator training on power system analysis software.
- Technical documentation, user manuals, and GIS integration guides.

2.6 Satellite Imagery Acquisition

Scope of Work:

Procurement of high-resolution satellite imagery at least 0.3 to 0.5 meter for GIS base mapping, asset validation, planning, and analysis.

Technical Specifications:

- Coverage Area: Approx. 22,000 Square Kilometers.
- Coverage: Major cities and operational areas of PESCO in Khyber Pakhtunkhwa (KP) Province.
- Spatial Resolution: High-resolution imagery suitable for utility mapping.
- Recent capture (as per project requirement).
- Orthorectified and GIS-ready formats.
- Usage rights for enterprise GIS applications.

Deliverables:

- Georectified Satellite imagery datasets.
- Metadata and quality reports



- Integrated imagery layers in Enterprise GIS.

2.7 Migration of Existing PESCO Distribution Network Data to Enterprise GIS

Background

PESCO has already developed a significant portion of its electricity distribution network using an Enterprise GIS Desktop Client (legacy v10.x), where spatial and attribute data have been mapped and maintained using Enterprise File/Personal Geodatabases and Microsoft Access databases.

The existing mapped assets include, but are not limited to:

- Approximately 33,000 km of High Tension (HT) distribution lines.
- Approximately 32,000 km of Low Tension (LT) distribution lines.
- Approximately 3,000 km of 132 kV transmission and sub-transmission network.
- Associated substations, feeders, transformers, poles, consumers, and related network assets.

This existing GIS investment shall be preserved and systematically migrated into the proposed Enterprise GIS Utility Network environment.

Scope of Work

The scope of work shall include complete assessment, cleansing, transformation, migration, and validation of all existing GIS data into the Enterprise GIS Solution, ensuring data integrity, continuity of operations, and alignment with International Utility Network standards.

The scope shall include, but not be limited to, the following activities:

- Review and assessment of existing Enterprise GIS Desktop Client legacy geodatabases and Microsoft Access databases.
- Data profiling to identify gaps, inconsistencies, topology errors, and attribute completeness.
- Design and implementation of a target Enterprise Geodatabase schema compliant with Utility Network Data Model (UNDM).
- Mapping of legacy datasets and attributes to the Enterprise GIS Utility Network schema.
- Data cleansing, standardization, and quality improvement prior to migration.
- Migration of spatial and non-spatial data into Enterprise GIS Solution Geodatabase.
- Configuration of network connectivity rules, domains, subtypes, and asset groups.
- Validation of migrated network data using topology rules, network tracing, and integrity checks.
- Migration of both distribution (HT/LT) and 132 kV network assets into the Enterprise GIS environment.
- Integration of migrated data with Web GIS, Desktop GIS, and Mobile GIS workflows.



Technical Approach

- Migration shall be performed using Internationally recommended tools and methodologies, including Desktop, Utility Network migration tools, and FME where required.
- Data shall be migrated into an enterprise-grade RDBMS (e.g., PostgreSQL / SQL Server / Oracle) supported by Enterprise GIS Solution.
- Versioned, multi-user editing shall be enabled in the Enterprise GIS environment.
- Data accuracy, connectivity, and completeness shall be verified through automated and manual validation processes.

Deliverables

The following deliverables shall be provided to PESCO as part of the data migration scope:

- Data assessment and gap analysis report.
- Approved Enterprise GIS Utility Network data model and schema.
- Migrated Enterprise Geodatabase containing:
 - HT, LT, and 132 kV network datasets.
 - Substations, feeders, transformers, and related assets.
 - Associated attribute and connectivity data.
- Data quality and validation report (before and after migration).
- Configured network tracing and validation rules.
- Migration scripts, tools, and documentation.
- Updated GIS layers published to Enterprise GIS (Web, Desktop, and Mobile).
- Knowledge transfer and hands-on training for PESCO staff on:
 - Managing migrated datasets.
 - Editing and maintaining Utility Network data.
 - Data validation and quality control.

Acceptance Criteria

- All migrated data shall maintain spatial accuracy, connectivity, and attribute integrity.
- Network tracing and analysis shall function correctly on migrated data.
- No loss of existing mapped assets or historical information shall occur.
- Migration shall be formally accepted by PESCO based on validation reports and functional testing.

2.8 Integration of Enterprise GIS with Existing PESCO Systems

Background



PESCO operates multiple enterprises and operational systems, including Management Information System (MIS), ERP, AMR/ AMI, PESCO Power Distribution Center (PDC), Load Flow / Planning systems, and other business applications, which are critical for day-to-day utility operations, planning, billing, asset /property management, and performance monitoring.

The proposed Enterprise GIS Solution shall serve as a spatial backbone for these systems by enabling seamless, secure, and standards-based integration to support data sharing, analytics, operational efficiency, and informed decision-making.

Scope of Work

The scope shall include the design, development, configuration, testing, and commissioning of bi-directional integration between the Enterprise GIS platform and PESCO's existing enterprise and operational systems.

The scope shall include, but not be limited to, the following activities:

- Assessment and documentation of existing PESCO systems, databases, data flows, and integration interfaces.
- Identification of GIS-enabled use cases for MIS, ERP, AMR, AMI, and other operational systems
- Design of an Enterprise GIS Integration Architecture aligned with PESCO's IT policies and World Bank cybersecurity requirements.
- Development of secure, scalable integration interfaces using:
 - REST / SOAP APIs
 - Web services
 - Database-level integration
 - Message queues or middleware (where applicable)
- Integration of Enterprise GIS with the following systems (or equivalent):
 - MIS for authentication of Transformer wise consumers for Lv proposal generation, reporting, performance monitoring, and spatial analytics.
 - ERP for asset management, work orders, inventory, inspection and financial systems.
 - AMR / AMI for meter data visualization, outage analysis, and load monitoring.
 - Load Flow / Planning Software for spatially enabled network analysis.
 - PESCO Business Intelligence and Business Warehousing system
 - Other relevant PESCO applications as identified during implementation.
- Configuration of real-time or near-real-time data exchange using GeoEvent Server where applicable.
- Implementation of role-based access control and data security across integrated systems.



- Data validation, synchronization, and error handling mechanisms.

Technical Approach

- Integration shall comply with OGC, ISO, and recommended standards.
- GIS services shall be exposed through secured APIs and web services.
- Integration shall support both read-only and transactional workflows, as approved by PESCO.
- All integrations shall be scalable to support future systems and data volumes.
- Logging, monitoring, and audit mechanisms shall be implemented.

Deliverables

The following deliverables shall be provided to PESCO:

- Enterprise GIS Integration Strategy and Architecture Document.
- System interface specifications and data mapping documents.
- Configured and operational integrations between Enterprise GIS and:
 - MIS
 - ERP (PESCO Material Management Directorate)
 - AMR / AMI
 - PESCO Business Intelligence and Business Warehousing system
 - PESCO PDC (Power Distribution Center)
 - Load Flow / Planning systems
 - Other identified enterprise systems
- Published GIS services, dashboards, and spatial analytics outputs consuming integrated data.
- Integration testing and validation reports.
- User and administrator documentation for integrated workflows.
- Knowledge transfer and training for PESCO IT and GIS staff on:
 - Managing integrations.
 - Monitoring data flows.
 - Troubleshooting integration issues.

Acceptance Criteria

- Integrated systems shall exchange data reliably and securely.
- GIS dashboards and applications shall reflect accurate, synchronized enterprise data.
- Performance and security requirements shall be met as per PESCO and World Bank standards.

- All integrations shall be formally validated and accepted by PESCO.

Sustainability & Future Expansion

- Integration of architecture shall support onboarding of future systems.
- All integration components shall be documented and handed over to PESCO.
- PESCO staff shall be enabled to maintain and extend integrations independently.

2.9 Implementation of Utility Network and System Integration

Scope of Work

This phase covers the implementation of a centralized, enterprise-grade GIS based on an advanced utility network data model, integrated with core enterprise systems. The objective is to establish an OGC-compliant, authoritative Single Source of Truth for all spatial, network, and asset-related information across the organization.

The scope includes:

- Deployment and configuration of an intelligent utility network model for HT (11kv) and LT (0.4 kv), and 132kv electrical assets.
- Generation of automatic/semi-automatic proposal generation for Hv, Lv under different PESCO heads including ELR (Energy Loss Reduction) DOP (Distribution of Power).
- Customization of Enterprise GIS System for automation of existing system of PESCO including proposal generation, monitoring of work orders, inspection, new connection.
- Standardization and finalization of enterprise geospatial data models, rules, and schemas.
- Integration of GIS with enterprise applications including load flow, MIS, ERP, AMR, CRM, and material management systems.
- Development of planning, analytics, automation, and decision-support capabilities.
- Enablement of web-based and mobile GIS applications for office and field operations.
- Establishment of network analysis, tracing, and outage impact assessment capabilities.
- Implementation of governance mechanisms to ensure data quality, consistency, and compliance with OGC standards.

Key Deliverables

➤ Utility Network Implementation

- Configured Utility Network data model covering HT and LT assets.
- Defined network topology, connectivity rules, and asset associations.
- Configured network domains, subtypes, and attribute rules.
- Network tracing and analysis functions (upstream/downstream, isolation, outage impact).



➤ **Standardized Data Model**

- Approved enterprise geodatabase schema.
- OGC-compliant data structures and metadata.
- Documented data standards, naming conventions, and symbology.
- Validated topology and data quality rules.

➤ **Enterprise Systems Integration**

- Secure GIS integration with:
 - Load flow and network analysis systems.
 - ERP and asset management systems.
 - AMR and CRM systems.
 - Material management systems.
 - PESCO Power Distribution Center (PDC)
- Configured OGC-compliant services (WMS, WFS) and REST-based APIs.
- Data synchronization and update mechanisms.

➤ **Planning and BOQ Generation Platform**

- GIS-based planning tools for new feeders and network extensions.
- Automated BOQ generation based on planned or upgraded assets.
- Integration with material and cost databases.
- Cost estimation reports and planning outputs.

➤ **Automation and System Improvement**

- Workflow automation for proposal generation ,asset creation, update, and work order approval.
- Data validation and quality assurance tools.
- Digital approval and audit trail mechanisms.

➤ **Dashboards and Analytics**

- Real-time operational dashboards.
- Management-level analytical views.
- Configurable KPIs and performance indicators.

➤ **Web and Mobile GIS Applications**

- Web-based GIS applications for visualization, editing, and reporting.
- Role-based access control.
- Mobile GIS applications for field inspection, verification, and maintenance.

- Offline data capture and synchronization.
- **Single Source of Truth Enablement**
 - Centralized enterprise GIS repository.
 - Governance framework for data ownership and stewardship.
 - OGC-compliant access for all consuming systems.

Technical Approach

- **Architecture Design**
 - Design a scalable, service-oriented GIS architecture.
 - Ensure high availability, security, and performance.
 - Adopt OGC standards for interoperability and data exchange.
- **Utility Network Configuration**
 - Implement an industry-aligned utility network model.
 - Configure rules, associations, and network behavior.
 - Enable advanced network analysis and tracing capabilities.
- **Data Standardization and Migration**
 - Review and harmonize existing spatial and asset datasets.
 - Migrate legacy data into the standardized utility network model.
 - Perform data validation and cleansing.
- **Integration Strategy**
 - Use OGC-compliant web services (WMS, WFS) and REST APIs.
 - Implement secure, role-based data access.
 - Ensure near real-time or scheduled data synchronization.
- **Planning and BOQ Automation**
 - Develop rule-based asset quantity calculation mechanisms.
 - Link GIS assets with material master and cost data.
 - Generate BOQs automatically during planning workflows.
- **Application Development**
 - Develop modular, role-based web and mobile applications.
 - Ensure usability for planners, engineers, managers, and field staff.
 - Enable offline and online operational modes.
- **Quality Assurance and Governance**
 - Implement automated validation rules.
 - Enforce approval workflows and audit logs.
 - Establish long-term data governance processes.

Acceptance Criteria

➤ Functional Acceptance

- Utility Network model successfully manages HT and LT assets.
- Network tracing and outage analysis functions operate correctly.
- BOQs are generated accurately based on GIS planning data.
- Web and mobile applications meet defined functional requirements.

➤ Technical Acceptance

- All integrations operate using OGC-compliant services and APIs.
- System performance meets agreed benchmarks.
- Data synchronization between GIS and enterprise systems is reliable.

➤ Data Quality Acceptance

- Topology rules and validation checks pass without critical errors.
- Attribute completeness and accuracy meet defined thresholds.
- Legacy data is successfully migrated and validated.

➤ User Acceptance

- Key user groups successfully perform operational tasks.
- Dashboards and reports support decision-making needs.
- Training and documentation enable effective system usage.

➤ Compliance Acceptance

- System adheres to OGC interoperability standards.
- GIS is established as the authoritative Single Source of Truth.
- **Security and access controls comply** with organizational policies.

2.10 GIS-Enabled Planning and Decision Support for Transformer Planning, Augmentation and Installation

Background:

At present in PESCO, the installation of new distribution transformers and augmentation works is carried out through the traditional manual system in field operations, based on hand-drawn sketches. Proposals are prepared on the basis of these sketches and forwarded to Planning & Engineering (P&E) Directorate PESCO HQ, for approval.

Every year, millions of rupees are allocated for the installation and augmentation of distribution transformers to cater to increasing consumer demand and to reduce technical losses caused by overloaded transformers. However, in practice, transformer installations and replacements are often carried out based on complaints or political influence, while many critically overloaded transformers

remain unattended. In several cases, damaged transformers are repaired or replaced by consumers themselves due to delays.

Furthermore, hundreds of work orders are issued annually for transformer installation and augmentation. However, there is no transparent mechanism to verify:

- Whether the sketches/proposals are correctly prepared as per approved standards and methodology.
- Whether technical analysis (load assessment, justification for augmentation/new installation) has been correctly carried out.
- Whether the proposal has been prepared in accordance with approved planning criteria and PESCO SOPs.
- Whether materials have been installed strictly as per the approved BOQ and technical specifications.
- Whether transformers have been installed at the approved/proposed locations (no deviation without approval).
- Under which head of account the work has been executed (ELR, DOP, SDG, Cost Deposit, etc.).
- Whether physical installation on ground matches the approved job-wise scope of work.
- Whether mandatory inspections and verification have been conducted and documented.

To introduce transparency, technical justification, accountability, and verification, PESCO intends to shift from the manual sketch-based system to a GIS-based digital planning, approval, installation, and inspection mechanism using mobile GIS applications integrated with the Enterprise GIS platform.

Scope of Work (GIS-Based Planning, Installation & Inspection of Transformers)

The scope of work shall include the following GIS-related services and activities:

1. GIS-Based Transformer Planning & Proposal Generation

- Development of GIS workflows for identification of overloaded transformers using:
 - Transformer capacity
 - Connected load
 - Number of consumers
 - Historical complaint data
- GIS-based prioritization of transformer augmentation and new installations based on technical criteria (load, losses, feeder performance).
- Preparation of **digital GIS proposals** instead of manual sketches.
- Geo-referenced proposed locations of new transformers and augmentation works on feeder maps.
- Generation of job-wise GIS maps for submission to P&E HQ for approval.

2. Mobile GIS-Based Field Survey & Data Collection

- Development and deployment of mobile GIS forms for field staff to:
 - Capture proposed transformer locations (GPS coordinates)
 - Capture existing transformer attributes (capacity, conductors, condition, loading)
 - Upload site photos and field remarks
- Validation of field data against existing GIS network data.
- Elimination of hand-drawn sketches and replacement with geo-tagged digital survey records integrated with PESCO's Management Information System (MIS) to automatically retrieve and analyze consumer records connected to the existing transformers under consideration.

3. GIS-Based Work Order Mapping & Job Tracking

- Linking of each approved work order with:
 - GIS job polygon/point
 - Feeder name
 - Transformer ID
 - Head of account (ELR, DOP, Cost Deposit, etc.)
- Job-wise GIS layers for:
 - Proposed works
 - Approved works
 - Completed works
- Tracking of work status (Pending / In Progress / Completed) through GIS dashboard.

4. GIS-Based Installation Verification & Inspection

- Mobile GIS-based verification of installed transformers and materials by:
 - Project Director / XEN Construction
 - GIS Section
- Geo-tagged inspection of:
 - Installed transformer location vs approved location
 - Installed capacity vs approved capacity
 - Installed materials vs BOQ
- Upload of:
 - Installation photos
 - Serial numbers of transformers
 - Pole numbers
 - Date of installation

- GIS validation to ensure that:
 - Transformers are installed at approved GIS locations
 - No deviation is made without documented approval

5. BOQ & Head-of-Account Validation through GIS

- Integration of jobwise BOQ data with GIS jobs.
- GIS tagging each work order with:
 - Head of account (ELR / DOP / Cost Deposit / Others)
- GIS-based reports to verify:
 - Whether materials installed on ground match approved BOQ
 - Whether works are executed under correct financial head
- Prevention of misclassification or misreporting of executed works.

6. GIS-Based Monitoring, Dashboards & Reporting

- Development of GIS dashboards for management showing:
 - Number of transformers installed
 - Areas with overloaded transformers
 - Pending vs completed jobs
 - Head-wise financial execution (ELR, DOP, CD, etc.)
- Monthly and quarterly GIS-based progress reports.
- Thematic maps showing:
 - Transformer loading status
 - Areas prioritized for augmentation
 - Installation compliance vs deviation

7. Data Updating & Asset Management

- Updating of GIS asset database after each verified installation.
- Assignment of unique GIS IDs to newly installed transformers.
- Linking transformer records with:
 - Feeder
 - Consumer clusters
 - Installation job ID
- Ensuring that updated GIS data is used for:
 - Load flow studies

- Loss reduction planning
- Future network planning

Deliverables

The consultant/contractor shall deliver the following:

1. GIS-Based Planning System

- Digital GIS templates for transformer planning and augmentation proposals
- Job-wise GIS maps for approval
- Overloaded transformer prioritization maps

2. Mobile GIS Data Collection System

- Configured mobile GIS forms for:
 - Proposal survey
 - Installation verification
 - Inspection reporting
- Geo-tagged photos and coordinates
- Standardized digital survey formats

3. Work Order & BOQ GIS Integration

- GIS database linking:
 - Work orders
 - BOQs
 - Head of account
 - Installation status
- Job-wise GIS layers and reports

4. Installation Verification & Inspection Records

- Geo-tagged inspection reports
- GIS-verified installation locations
- Photo evidence of installed transformers and materials
- Compliance/non-compliance reports

5. Dashboards & Reports

- Management dashboard for transformer works
- Monthly GIS progress reports
- Thematic maps for overloaded transformers and augmentation coverage

6. Updated GIS Asset Database

- Updated transformer inventory
- Verified location-based asset records
- Network maps reflecting actual installed assets

7. SOPs & Training

- Standard Operating Procedures (SOPs) for:
 - GIS-based planning
 - Mobile data collection
 - Installation verification
- Training of PESCO staff (P&E, Construction, GIS Section)
- User manuals

Expected Outcomes

- Elimination of hand-made sketches
- Transparent, technically justified transformer planning
- Prevention of politically influenced installations
- Verification of material installation as per BOQ
- Clear tracking of works under ELR, DOP, Cost Deposit
- Reduction in transformer overloading
- Audit-compliant GIS evidence
- Accurate asset records for load flow and loss reduction studies

2.11 Capacity Building and Knowledge Transfer

Scope

Provide structured capacity building to enable PESCO's GIS, IT, and operational teams to independently operate, manage, and sustain the enterprise GIS and Utility Network platform.

Key Deliverables

- Role-based training sessions for GIS, IT, and operations staff.
- User manuals, technical documentation, and SOPs.
- Knowledge transfer sessions and handover materials.

Technical Approach

- Conduct classroom and hands-on training aligned with operational workflows.
- Deliver standardized documentation covering data management, system administration, and maintenance.

- Gradual transition of responsibilities to PESCO teams through guided operations.

Acceptance Criteria

- Designated staff demonstrate operational competency.
- Documentation is approved and useable for day-to-day operations.
- PESCO teams can independently manage routine GIS and Utility Network activities.

2.12 Technical Support and Maintenance

Scope

Provide post-implementation technical support and maintenance services to ensure system stability, performance, and long-term reliability.

Key Deliverables

- Post-go-live support and issue resolution.
- Periodic system health checks and performance optimization.
- Software updates and enhancements aligned with vendor releases.
- Ongoing technical advisory support.

Technical Approach

- Establish a structured support and escalation mechanism.
- Apply updates and patches in a controlled manner.
- Provide proactive advisory services aligned with evolving operational needs.

Acceptance Criteria

- System operates stably within agreed performance parameters.
- Issues are resolved within defined response times.
- GIS platform remains up to date and aligned with business requirements.

2.13 Supply and Establishment / Renovation of GIS Rooms Across PESCO

2.12.1 Background

PESCO intends to establish and renovate dedicated GIS Rooms/Offices at its Headquarters, Circles, Divisions and Construction Offices to facilitate GIS operations, data management, field coordination, and integration with Enterprise GIS. These facilities will provide standardized workspaces for GIS staff with proper furniture, IT connectivity, power arrangements, security, and climate control.

2.12.2 Objective

The objective of this project is to renovate existing rooms and establish standardized GIS offices across PESCO with uniform layout, furniture, IT infrastructure, power works, and security features to ensure efficient GIS operations and safe custody of GIS equipment and data.

2.12.3 Scope of Work

The contractor shall be responsible for complete supply, renovation, installation, testing and commissioning of GIS rooms at the following locations:

S.No	Office Name (For GIS Staff)	Location	Rooms	Dimension (Feet)	Specification
1	GIS PESCO HQ	Shami Road	1	16 x 48	Revenovation of DM (GIS) Office , [Aluminum Office Partition Cubicle Workstation Cabins 12 Nos] ,AC-02 No ,Curtin's (04Nos), LAN, Smart Wi-Fi Fingerprint Door Lock, CCT Camera, File Racks, Electric Works, Celling fans other miscellaneous works
2	PESHAWAR CIRCLE + CITY RURAL DIVISION,CANTT URBAN	Khyber Bazar	1	30 X 15	Office Partition Cubicle Workstation 03Nos, AC-1 No, File Racks, Smart Wi-Fi Fingerprint Door Lock, Celling fan, Electric Works , other miscellaneous works
3	CANTT RURAL + PD CONSTRUCTION +CONSTRUCTION DIVISION PESHAWAR	Salwan Bulding Peshawar Cantt	1	20 X 20	Office Partition Cubicle Workstation 03 Nos, AC-1 No, File Racks, Smart Wi-Fi Fingerprint Door Lock, ceiling fan, Electric Works , other miscellaneous works
4	CITY URBAN DIVISION+PD GSC+XEN GSC Peshawar Circle +XEN SS&TL Peshawar	Nishtar Abad	1	16.5 X 23	Office Partition Cubicle Workstation 03Nos, AC-1 No, File Racks, Smart Wi-Fi Fingerprint Door Lock, ceiling fan, Electric Works , other miscellaneous works
5	CHARSADDA +SHABQADAR	Charsadda	1	18 X 13	Office Partition Cubicle Workstation 02 Nos, AC-1 No, File Racks, Smart Wi-Fi fingerprint Door Lock, ceiling fan, Electric Works , other miscellaneous works
6	KHYBER CIRCLE + KHYBER DIVISION	Hayatabat Phase-V	1	11 X 30	Office Partition Cubicle Workstation 02 Nos, AC-1 No, File Racks, Smart Wi-Fi fingerprint Door Lock, ceiling fan, Electric Works , other miscellaneous works
7	NOWSHERA CITY + NOWSHERA CANTT	Thsil Road Near DHQ Hospital	1	16.3 X 15.10	Office Partition Cubicle Workstation 02Nos, AC-1 No, File Racks, Smart Wi-Fi Fingerprint Door Lock, Celling fan, Electric Works, other miscellaneous works
8	KOHAT CITY + KOHAT RURAL+Hangu Division	MP Gate Near Signals Training Center	1	12*15	Office Partition Cubicle Workstation 03 Nos, AC-1 No, File Racks, Smart WiFi Fingerprint Door Lock, ceiling fan, Electric Works, other miscellaneous works



9	MARDAN CIRCLE + MARDAN-II +MARDAN-I DIVISION+CONSTRUCTION DIVISION MARDAN +XEN SS&TL Mardan	Moqam Chowak Malkand Road	1	16 x 22	Office Partition Cubicle Workstation 05 Nos, AC-1 No, File Racks, Smart Wi-Fi Fingerprint Door Lock, Ceiling fan, Electric Works , other miscellaneous works
10	TAKHTBAI DIVISION	Malkand Road Near Rahman Cotton Mills	1	16 x 24	AC-1 No, File Racks, Smart WiFi Fingerprint Door Lock, Ceiling fan, Electric Works , other miscellaneous works
11	SWAT CIRCLE + SWAT-I +CONSTRUCTION DIVISION SWAT	Mingora Swat	1	12x14	Office Partition Cubicle Workstation 03 Nos, File Racks,Smart WiFi Fingerprint Door Lock, Ceiling fan, Electric Works , other miscellaneous works
12	SWAT-II	Khwazakhel a	1	18X21	File Racks,Smart WiFi Fingerprint Door Lock, Ceiling fan, Electric Works , other miscellaneous works
13	TIMERGARA	Timergara near 132 KV GSS	1	17.6X14.8	AC-1 No, File Racks,Smart WiFi Fingerprint Door Lock, Ceiling fan, Electric Works , other miscellaneous works
14	DIR	Dir Bazar	1	14X14	File Racks,Smart WiFi Fingerprint Door Lock, Ceiling fan, Electric Works , other miscellaneous works
15	DARGAI	Wapda Colony Dargai	1	14X14	AC-1 No, File Racks,Smart WiFi Fingerprint Door Lock, Ceiling fan, Electric Works , other miscellaneous works
16	BUNIR	132 KV GSS Buner Swari	1	17x25	AC-1 No, File Racks,Smart WiFi Fingerprint Door Lock, Ceiling fan, Electric Works , other miscellaneous works
17	SHANGLA	Alpuri Bazar	1	15*12	File Racks,Smart WiFi Fingerprint Door Lock, Ceiling fan, Electric Works , other miscellaneous works
18	BANNU CIRCLE + BANNU-I + BANNU-II+Lakki+Karak + XEN (SS&TL)+XEN Construction		2	15*16, 12*10	Office Partition Cubicle Workstation 06 Nos, AC-02 No File Racks,Smart WiFi Fingerprint Door Lock, Ceiling fan, Electric Works , other miscellaneous works
19	SWABI CIRCLE + SWABI-I + SWABI-II+ Razar Division, + Topi	Swabi	1	12 X 16	Office Partition Cubicle Workstation 04 Nos, AC-01 No File Racks,Smart WiFi Fingerprint Door Lock, Ceiling fan, Electric Works , other miscellaneous works
20	D. I KHAN Circle + CITY DIVISION + RURAL	D.I Khan	1	10 X 18	Office Partition Cubicle Workstation 04 Nos, AC-01 No File Racks,Smart WiFi Fingerprint Door Lock, Ceiling fan, Electric Works , other miscellaneous works



	DIVISION +Tank				
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2.12.4 Civil & Renovation Works

- Minor civil works including surface preparation, repair of damaged walls/floors, plastering and painting.
- Provision of aluminum office partitions and cubicle workstation cabins as specified for each location.
- False ceiling where required, including finishing and access panels.
- Installation of curtains/blinds where specified.
- Any other miscellaneous renovation works required to make rooms functional for office use.

2.12.5 Furniture & Fixtures

- Supply and installation of aluminum partitioned cubicles/workstations as per site-wise requirement.
- Provision and fixing of file racks/shelving units.
- Any required counters, cabinets, or storage units for GIS records and equipment.

2.12.6 Electrical Works

- Provision of complete internal electrical wiring, switches, sockets and power outlets for computers, printers, servers and peripherals.
- Installation of ceiling fans as specified.
- Provision of energy-efficient LED lighting fixtures.
- Proper earthing and safety arrangements.
- Power backup readiness (provision of wiring points for UPS/backup where required).

2.12.7 HVAC (Air Conditioning)

- Supply and installation of split air-conditioners as specified for each office.
- Testing and commissioning of installed AC units including piping, brackets, insulation and electrical connections.

2.12.8 IT & Networking Infrastructure

- Provision of LAN cabling with proper termination, patch panels and faceplates.
- Network points for all GIS workstations.
- Testing and certification of LAN points.

2.12.9 Security & Access Control

- Supply and installation of Smart Wi-Fi Fingerprint Door Locks at each GIS room.



- Supply and installation of CCTV cameras (where specified, e.g., GIS PESCO HQ) with complete wiring and recording setup.
- Proper routing and concealment of cables for security devices.

2.12.10 Testing, Commissioning & Handover

- Testing of all electrical, LAN, access control and HVAC installations.
- Rectification of any defects noticed during testing.
- Final handover of completed GIS rooms in operational condition.

2.12.11 General Requirements

All materials and equipment shall be new, genuine and of approved quality.

Workmanship shall comply with PESCO and applicable building/electrical standards.

Contractor shall carry out site surveys before execution. Any damage to existing structure during execution shall be rectified by the contractor at own cost.

Completion timeline and milestones shall be finalized in the contract agreement.

2.12.12 Deliverables

- Fully renovated and functional GIS rooms at all specified locations.
- As-built layout of partitions and electrical/network points.
- Testing and commissioning reports.
- Warranty/guarantee of installed equipment.

2.14 Enterprise GIS – Property Management & Monitoring System

Scope of Work:

The scope of work includes the design, development, deployment, and commissioning of a centralized web-based Enterprise GIS Property Management & Monitoring System for PESCO, integrating spatial and non-spatial data into a unified platform. The system shall include development of an enterprise geodatabase; GIS mapping and geo-tagging of all properties (grid stations, offices, colonies, stores, warehouses, and vacant lands); administrative and district-wise drill-down dashboards; a comprehensive Property Master Information Module; legal and court case management; mutation and land acquisition tracking; digital document repository; encroachment monitoring; residential quarters management; property tax and financial/revenue monitoring; correspondence and audit compliance tracking; automated alerts and MIS reporting; and role-based access control with full audit trail. The solution shall support GIS-based visualization, document uploads, workflow automation, reporting (PDF/Excel export), and decision-support dashboards for management, ensuring data security, system integration with relevant departments (Legal, HR, Finance), user training, documentation, and post-implementation support.

2.14.1 Enterprise GIS Platform Design & Architecture

The contractor shall:

- Design and deploy an Enterprise GIS architecture (web-based, centralized).
- Configure GIS Server, Web GIS Portal, Spatial Database (Enterprise Geodatabase).
- Integrate spatial (GIS) and non-spatial (property/legal/financial) databases.
- Ensure role-based secure access across PESCO HQ, Circles, Divisions, and Subdivisions.
- Provide integration capability with:
 - Legal case records
 - HR (residential quarters)
 - Finance (rent, tax, dues)
 - Document Management System (DMS)

2.14.2 GIS-Based Property Mapping & Geo-Database Development

The system shall include:

- Creation of GIS layers for:
 - Grid Stations
 - Offices
 - Colonies / Residential Quarters
 - Stores / Warehouses
 - Vacant Lands
- Geo-referencing of all properties with:
 - GPS coordinates
 - Polygon boundary mapping
 - Division/Circle/Sub-Division tagging
- District-wise mapping across Khyber Pakhtunkhwa.
- Attribute database linked to each property polygon.
- Status tagging (Encroached / Disputed / Vacant / Under Use / Leasehold etc.)
- GIS mapping status dashboard (Completed / Pending).

2.14.3 Administrative & District-Wise Dashboard Development

Develop dynamic dashboards with drill-down capability:

A. Administrative Hierarchy

- Sub-Division → Division → Circle → PESCO Level

- Property count & category distribution
- Total land area & built-up area

B. District-Level Dashboard

- District-wise breakup across KPK
- Ownership status
- Legal status
- Utilization status

2.14.4 Property Master Information Module

Develop a comprehensive digital property registry containing:

- Auto-generated Property ID
- Location details (Province/District/Tehsil/Mouza)
- Khasra / Khata details
- Area (Kanal/Marla/Sq.Ft.)
- Built-up & vacant area
- Ownership & acquisition mode
- Mutation status & aging
- Land acquisition details (Award No., Date, Collector)
- Supporting documents upload module

2.14.5 Legal & Court Case Management System

Design a legal case tracking module including:

- Case number, title, court name
- Nature of dispute
- Advocate assigned
- Case priority & status
- Hearing dates & last order summary
- Alerts for:
 - Upcoming hearings
 - Missed hearings
 - Long-pending cases
 - Stayed cases

2.14.6 Mutation & Land Acquisition Tracking

- Mutation status workflow:



- Applied
- Pending
- Approved
- Disputed
- Reasons for pendency tagging
- Year-wise aging analysis
- Linkage of mutation record with GIS property layer

2.14.7 Document Management & Repository

Develop centralized digital repository:

- Upload facility (PDF/JPEG)
- Document categories:
 - Sale deed
 - Award
 - Lease deed
 - Mutation copy
 - NOC
 - Site plans
- Document verification status
- Missing/incomplete document alerts

2.14.8 Encroachment Monitoring Module

System shall include:

- Encroachment classification:
 - Private individuals
 - Ex-employees
 - Serving employees
- Action tracking:
 - Notices
 - FIR
 - Court filing
 - Vacation status
- Financial loss estimation
- GIS visual marking of encroached properties

2.14.9 Residential Quarters Management Module

- Unit-type categorization (A/B/C/D)
- Occupancy status:
 - Authorized
 - Unauthorized
 - Overstaying
- Employee-wise allotment tracking
- Rent deduction monitoring
- Alerts for retirement, transfer, death, overstay

2.14.10 Property Tax & Dues Monitoring

- Year-wise tax assessment vs payment
- Pending tax alerts
- Department-wise coordination tracking
- Risk alerts for penalties

2.14.11 Financial & Revenue Monitoring

- Rent recovery monitoring
- Outstanding dues
- Revenue from commercial properties
- Loss due to illegal occupation
- Expected vs Actual comparison dashboards

2.14.12 Correspondence & File Tracking System

- Inward/outward record
- File number tracking
- Officer-wise pendency
- Time-bound alerts

2.14.13 Inquiry, Audit & Compliance Module

- Audit paras tracking
- Compliance status
- Supporting document upload
- Dashboard summary for management

2.14.14 Alerts, Red Flags & MIS Reporting

Automated system alerts for:

- Long pending court cases
- Missing title documents
- Expired leases
- Overstaying occupants
- Delayed mutations

MIS Reports:

- Monthly / Quarterly reports
- Property-wise history logs
- CEO / Board level executive summaries
- Export to PDF / Excel

2.14.15 User Roles, Security & Audit Trail

- Role-based access control:
 - PMC
 - Legal
 - HR
 - Finance
 - Field Units
- Activity logs
- Update tracking
- Complete audit trail

2.14.16 DELIVERABLES

The contractor shall provide the following deliverables:

2.14.16.1 System & Infrastructure Deliverables

1. Enterprise GIS architecture design document.
2. Configured Enterprise Geodatabase.
3. Web-based GIS Portal (production environment).
4. Security & access control configuration.

2.14.16.2 GIS Data Deliverables

1. GIS property base map (Division-wise & District-wise).
2. Digitized property polygons.
3. Geo-tagged property database.

4. Encroachment GIS layer.
5. Residential quarters GIS layer.

2.14.16.3 Application Modules Deliverables

1. Property Master Information Module.
2. Legal Case Management Module.
3. Mutation & Land Acquisition Module.
4. Document Repository Module.
5. Encroachment Monitoring Dashboard.
6. Residential Quarters Management Module.
7. Financial & Revenue Monitoring Module.
8. Property Tax Monitoring Module.
9. Correspondence Tracking Module.
10. Audit & Compliance Module.
11. Alerts & MIS Reporting Engine.

2.14.16.4 Dashboard Deliverables

1. Executive Dashboard (CEO/BoD view).
2. Administrative Drill-down Dashboard.
3. District-wise GIS Dashboard.
4. Legal Monitoring Dashboard.
5. Financial Performance Dashboard.
6. Encroachment & Risk Dashboard.

2.14.16.5 Reports & Documentation Deliverables

1. System Requirement Specification (SRS).
2. Database Schema & Data Dictionary.
3. User Manual & Admin Manual.
4. SOPs for data entry & verification.
5. Training material.
6. Backup & Disaster Recovery Plan.

2.14.16.6 Capacity Building Deliverables

1. User training sessions (HQ & Field).

2. Administrator technical training.
3. Knowledge transfer documentation.

2.14.16.7 Post-Implementation Support

1. Warranty period support (minimum 1 year).
2. Bug fixing & performance optimization.
3. System health monitoring support.

2.14.17 EXPECTED OUTCOME

The Enterprise GIS PMC Dashboard shall function as:

- A **single-window control room** for all PESCO property matters.
- A litigation monitoring & compliance tool.
- A revenue protection system.
- A spatial decision-support system for senior management.

