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CONSULTING SERVICES OF CONSTRUCTION SUPERVISION FOR KARIAN DAM – SERPONG WATER CONVEYANCE SYSTEM (KSCS) PROJECT

Geographic Information System (GIS)

Contract number	:	HK.02.03/SNVT-ATAB/BBWSC3/2024/I
Contract Date	:	January 11th,2024
Implementation Period	:	during 1080 (One Thousand and Eighty) calender days and work must be completed by January 14th, 2027

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INTRODUCTION

1.1. Background

The Karian Dam – Serpong Water Conveyance System (KSCS) Project is a significant undertaking initiated in response to the escalating water demands in the Jabotabek area, encompassing Jakarta, Bogor, Tangerang, and Bekasi. The rapid industrialization and urbanization in this region have necessitated comprehensive water resources development to sustain the increasing municipal and industrial water needs. The current phase involves the implementation of the Karian Dam – Serpong Water Conveyance System (KSCS) Project, and the Consulting Services for Construction Supervision play a crucial role in ensuring the successful realization of the project. This involves overseeing the construction activities related to the KSCS, including the dams, conveyance systems, and associated infrastructure.

The KSCS Project aims to address these challenges through the construction of a comprehensive water conveyance infrastructure, which includes the development of the Karian Dam and associated conveyance systems. Given the scope and complexity of this initiative, Geographic Information Systems (GIS) have emerged as an indispensable tool in its planning, implementation, and monitoring phases.

GIS technology offers a multifaceted approach to managing the geographical and environmental data critical to the project. It facilitates detailed spatial analysis, allowing project managers to simulate water flow, analyze terrain and watershed characteristics, and assess the suitability of various construction sites. This level of analysis is crucial for optimizing the design and placement of the dam and conveyance systems to maximize efficiency and minimize environmental impact. Furthermore, GIS integration enables the handling of diverse data streams including topographical, hydrological, and infrastructural data, which are essential for creating a coherent overview of the project landscape.

The precision offered by GIS is particularly important given the environmental sensitivities and regulatory standards that the project must adhere to. Through accurate mapping and environmental impact assessments, GIS helps ensure that the project complies with environmental regulations and sustains the ecological balance. This is vital not only for securing regulatory approvals but also for maintaining public and stakeholder trust. The ability to visually represent and communicate the potential impacts and benefits of the project through GIS-generated maps and models is invaluable in public consultations and stakeholder meetings.

Moreover, GIS supports real-time monitoring and decision support systems which are crucial during the construction phase. The dynamic nature of large-scale construction projects like the KSCS often requires on-the-fly decision-making to address unforeseen challenges. GIS technology provides project managers and engineers with up-to-date data reflecting current conditions on the ground, enabling them to make informed decisions quickly and effectively. This capability is essential for keeping the project on schedule and within budget, while also ensuring safety and quality standards are met.

In addition to aiding in project management and execution, GIS also plays a key role in the post-construction phase. It supports the maintenance and operation of the water conveyance system by enabling continuous monitoring and management of the infrastructure. This ongoing application of GIS ensures that any issues can be promptly addressed and that the system continues to function optimally, thereby guaranteeing a consistent water supply to the region.

1.2. Objectives

For the Karian Dam – Serpong Water Conveyance System (KSCS) Project, Geographic Information Systems (GIS) play a pivotal role in enhancing the planning, implementation, and management of the project. Here are the specific objectives of employing GIS in this project:

- Spatial Analysis and Decision Making

  Utilize GIS to perform comprehensive spatial analysis, facilitating informed decision-making regarding the location, design, and construction of the water conveyance systems. This includes analyzing terrain, watershed data, and environmental sensitivities to optimize infrastructure placement and minimize ecological impacts.

- Data Integration and Management

  Employ GIS as a central platform to integrate various data types—such as topographical, hydrological, demographic, and environmental data—ensuring a holistic view of the project area. This integrated approach aids in managing complexities and aligning multiple project phases and components seamlessly.

- Real-time Monitoring and Updates

  Use GIS technology to monitor construction progress and environmental conditions in real-time. This capability enables timely adjustments and interventions, which are crucial for maintaining project schedules and adapting to any unforeseen challenges during the construction phase.

- Regulatory Compliance and Reporting

  Leverage GIS to document and report on the project's adherence to environmental regulations and standards. The visual and analytical capabilities of GIS facilitate the production of detailed reports and maps that demonstrate compliance and the project's environmental stewardship.

- Enhanced Communication and Stakeholder Engagement

  Utilize the visual and interactive capabilities of GIS to produce maps and visualizations that can be used in public presentations and stakeholder meetings. This enhances transparency, aids in explaining complex project details, and facilitates more effective stakeholder engagement and community involvement.

- Post-Construction Management and Maintenance

  Post-construction, use GIS to support the ongoing management and maintenance of the water conveyance system. GIS can help track the performance of various infrastructure components, predict maintenance needs, and manage operational data, ensuring the system's long-term sustainability and efficiency.

- Disaster Management and Risk Mitigation

  Implement GIS tools to analyze and mitigate risks related to natural disasters, such as floods or earthquakes. By modeling disaster scenarios and their potential impacts on the water conveyance system, GIS helps in devising effective emergency response strategies and resilience plans.

1.3. Scope of Work

In the Detailed Engineering Design (DED) phase of the Karian Dam – Serpong Water Conveyance System (KSCS) Project, the scope of work for Geographic Information Systems

(GIS) is crucial for ensuring precise and informed engineering decisions. This phase focuses on finalizing designs and preparing for construction. Here is a comprehensive scope of work for GIS during the DED phase:

1. Data Collection and Integration
    - Acquire updated and high-resolution geospatial data relevant to the project area, including topographical, geological, and hydrological data.
    - Integrate various data sources into a centralized GIS system to ensure consistency and accessibility of data throughout the project lifecycle.
2. Advanced Spatial Analysis
    - Conduct detailed site analysis using GIS to understand terrain, soil stability, water flow, and other critical factors that influence the design of the dam and conveyance systems.
    - Model water flow patterns, flood zones, and catchment areas to support the design of hydraulic structures and optimize water management strategies.
3. Design Support and Optimization
    - Utilize GIS to assist in laying out infrastructure components, ensuring optimal placement with respect to environmental, technical, and social factors.
    - Develop 3D GIS models of the proposed infrastructure to visualize pipelines, and other structures within the actual landscape, aiding in design refinement and stakeholder presentations.
4. Impact Assessments
    - Use GIS to conduct environmental impact assessments (EIAs) by mapping and analyzing the potential effects of the project on the surrounding ecosystems and communities.
    - Assess potential social impacts, including displacement and changes to local communities, using GIS to map demographic data and predict impact zones.
5. Engineering Documentation
    - Produce detailed maps and engineering drawings that will be part of the engineering documentation, supporting construction planning and permitting processes.
    - Prepare GIS-based documentation required for environmental and construction permits, ensuring all designs comply with regulatory standards.
6. Risk Analysis and Mitigation Planning
    - Identify and map risk areas related to geotechnical issues, flooding, and other environmental hazards that could affect the project.
    - Develop mitigation strategies using GIS data to address potential risks and ensure the safety and sustainability of the project.
7. Stakeholder Engagement and Reporting
    - Develop interactive GIS platforms and visual tools to engage stakeholders during the DED phase, providing clear and detailed visualizations of the project plans.
    - Utilize GIS to generate detailed progress reports and compliance tracking, essential for keeping stakeholders informed and ensuring project transparency.

By executing these tasks during the DED phase, GIS provides a powerful toolset that enhances the precision of engineering designs, facilitates regulatory compliance, and

ensures the project is optimized for environmental and social sustainability. This detailed planning and analysis pave the way for a smoother transition into the construction phase, reducing risks and potential delays.