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Data Management System - Water Supply and Channeling with GIS Mapping

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Abstract: GIS mapping enables visualizing spatial data related to water sources, distribution networks, infrastructure assets, and other pertinent information crucial for effective management. Asset management functionalities enable tracking the condition, maintenance schedules, and lifecycle of water infrastructure assets, ensuring optimal utilization and performance. This paper presents the design and implementation of an integrated data management system tailored for water supply and channeling, augmented with Geographic Information System (GIS) mapping capabilities. The system aims to streamline the management of water resources, optimize distribution networks, and enhance decision making processes for water utility providers and stakeholders. The system architecture comprises several key components: GIS mapping, data collection mechanisms, database management, sensor integration, network analysis tools, asset management functionalities, decision support systems, remote monitoring and control capabilities, and user interfaces. Data collection mechanisms encompass various sources such as sensors, surveys, satellite imagery, and existing databases to gather comprehensive datasets on water sources, quality parameters, infrastructure condition, and demographic factors. A robust database management system is employed to efficiently store, manage, and secure the collected data, facilitating easy retrieval and analysis. Real-time sensor data from water meters, flow meters, and pressure sensors are integrated into the system to provide insights into water usage patterns, network performance, and system health. Network analysis tools utilize GIS capabilities to optimize the layout of distribution networks, identify areas for expansion, and improve operational efficiency Remote monitoring and control capabilities empower operators to monitor and manage water systems from a centralized location, enabling proactive maintenance, leak detection, and emergency response. Security measures are implemented to safeguard sensitive water infrastructure data against unauthorized access, cyber threats, and data breaches, ensuring the integrity and confidentiality of the system. Overall, the integrated data management system presented herein offers a comprehensive solution for optimizing water supply and channeling operations, enhancing efficiency, reliability, and sustainability while minimizing costs and environmental impact

Keywords: Geographic Information System, Channeling, Database management, Remote monitoring, visualizing spatial data

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