NYC Department of City Planning

Request For Expression of Interest

September 4, 2024

Geosupport System Modernization

Information Technology Division (ITD)

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1 EXECUTIVE SUMMARY

The New York City Department of City Planning (NYC DCP, or DCP) is responsible for establishing the framework for the city's physical and socioeconomic planning by overseeing land use, environmental reviews, zoning regulations, plans, and policies, and offering guidance and information to stakeholders such as the Mayor of New York City, Borough presidents, the New York City Council, Community Boards, and other local government bodies concerning citywide development. With a mission to improve living conditions and address community needs, DCP employs diverse talents in geography, planning, and technology, while promoting sustainable development, economic growth, and civic engagement.

The Geosupport System is the city's primary geocoding software service developed by DCP to enhance the management and validation of address and location data within the city. Designed to ensure accuracy and standardization, Geosupport serves as a critical resource for election districting, property tax assessment, and urban planning initiatives. Key functionalities include address validation, geocoding, borough and block-lot validation, street name and feature identification, street centerline information, and building identification. The geo-processed location references are made available to incorporate into internal and external system workflows and data analysis, to represent the geography of locations and assets, enabling map-based visual representation, conflict resolution, and collaboration. Continuously evolving to meet the dynamic demands of the city, Geosupport remains a vital tool for maintaining precise and up-to-date location data, supporting the operational efficiency and informed decision-making processes crucial for effective governance and sustainable urban development efforts of various NYC agencies, partners, and the public. DCP Information Technology Division’s (ITD) Geosupport Services (GSS) unit is responsible for the maintenance and continued enhancement of the Geosupport System.

The current mainframe-based technology framework that the Geosupport System is built on is aging. As the city looks to migrate mission-critical functions off the mainframe systems, DCP seeks to modernize Geosupport and its underlying legacy systems to ensure its long-term function and use.

The Geosupport System modernization effort plans to rearchitect the system using modern technology stacks, web services, relational databases, and cloud hosting to phase out the legacy mainframe and desktop services. The redesigned systems and services should provide enhanced performance, user experience, scalability, flexibility, improved security compliance, and integration capabilities to facilitate seamless data exchange and internal/external collaboration. This transformation aligns with industry best practices and ensures the agency remains agile and responsive in the dynamic field of geospatial services. A modernized Geosupport System should give the agency a competitive edge by providing better services, quicker response times, and improved data accuracy, all of which can positively impact the agency's reputation and efficiency.

2 BACKGROUND

The Geosupport System, initially developed by DCP in the early 1980s, was a pioneering software system conceived to tackle the challenges associated with managing complex address and location data within the bustling urban landscape of New York City. As the city grappled with the increasing demands of population growth, infrastructure development, and emergency response management, the need for a sophisticated and reliable tool to streamline and standardize location-related information became increasingly apparent.

The development of Geosupport System marked a significant milestone in the city's ongoing efforts to centralize and standardize its geographic data, ensuring the accuracy and consistency of critical information utilized across various administrative, planning, and emergency response functions. Geosupport System's comprehensive suite of functionalities encompasses a range of critical features, each tailored to meet the specific needs of New York City's intricate administrative framework and vital for various essential city services, facilitating efficient property tax assessments, precise emergency response operations, and informed urban planning initiatives.

Geosupport standardizes input addresses to conform to the addressing conventions of New York City, to ensure that addresses are entered correctly and consistently. It validates addresses to check if they are valid or existent within the city, an essential function for verifying addresses before using them in applications or databases. It geocodes addresses, which means it converts addresses into geographic data including coordinates or other location-based information for mapping and data analysis. It provides information about the borough and community district associated with a given address. It includes detailed street centerline data for New York City, which can be used for various spatial analysis and mapping tasks. It identifies street intersections and blocks related to a given address or a set of coordinates. It ensures the accurate validation of borough and block-lot combinations, which serves as a fundamental pillar for efficient property assessment and comprehensive land parcel identification across the city. These and other Geosupport functions foster seamless integration with an array of mapping, reporting, and geographic information systems (GIS) critical to the city operations.

Over the years, Geosupport underwent several iterations and updates, incorporating advanced functionalities and refining its capabilities to meet the evolving demands of the city's dynamic environment. As it continued to evolve, Geosupport not only solidified its position as a crucial tool for DCP but also garnered recognition as a foundational asset for numerous other city agencies reliant on accurate and standardized location data. Its enduring legacy as a dependable and adaptive software system has contributed significantly to the effective governance and sustainable development of New York City, setting a benchmark for the integration of geospatial technology in urban planning and management on a global scale.

While Geosupport is now being developed on Windows PCs, it is still being installed on OTI's IBM mainframe, serving nearly ten city agencies. The Geosupport Desktop Edition (GDE) is utilized by nearly all city agencies and numerous state agencies and private organizations, which is available for Windows, Linux, and IBM mainframe operating systems, streamlining data integration into Microsoft .NET applications. The Geoservice API is a RESTful web service interface to the Geosupport system, which provides online Geosupport capabilities to various agencies and private organizations, eliminating the need for local installations.

Geosupport is available for download on the City Planning website under 'Data & Tools -> Open Data -> Geocoding Application:
https://www.nyc.gov/site/planning/data-maps/open-data.page#geocoding_application

Additional resources for reference:

- User Programming Guide for Geosupport: https://nycplanning.github.io/Geosupport-UPG/
- Geoservice API information: https://geoservice.planning.nyc.gov/
- Geographic Online Address Translator (GOAT): www.nyc.gov/goat

3 PROJECT GOALS

DCP recognizes the importance of adopting innovative and sustainable solutions for the Geosupport System modernization, and the aim is to thoroughly explore, test, and develop solutions that are not only cost-effective but also future proof, ensuring that the system remains adaptable and relevant in the long term.

Goals include:

1. **Adopt New-Generation Technologies:**
    - Implement new-generation programming languages and relational databases to improve development efficiency and system performance.
2. **Leverage Cloud-Based Solutions:**
    - Utilize cloud-based technology to enhance the performance and scalability of the Geosupport System.
3. **Enable Batch Processing:**
    - Implement robust batch processing capabilities to handle large volumes of data efficiently ensuring reliability, scalability, and error handling mechanisms are in place.
4. **Improve Operational Efficiency:**
    - Enhance the operational efficiency of maintaining the Geosupport System through process optimization and automation.
5. **Support Stakeholder Benefit:**
    - Continue to provide value to the Department of City Planning (DCP), other agencies, and external clients by maintaining and enhancing the Geosupport System.
6. **Ensure Cross-Platform Availability:**
    - Maintain the availability of the Geosupport System for both Windows and Linux operating systems.
7. **Eliminate Mainframe Dependencies:**
    - Remove dependencies on the ancillary mainframe-hosted systems and reduce reliance on legacy infrastructure to modernize and streamline operations.
8. **Streamline Data Generation:**
    - Optimize the data generation process to better meet the needs of clients and improve service delivery.
9. **Enhance Geoservice API:**
    - Enhance Geosupport API to provide online Geosupport capabilities to various agencies and private organizations.

4 SCOPE OF PROJECT

The Geosupport System is a set of complex technology services vital for city agencies and other stakeholders for their operations, and its modernization is crucial to DCP's mission. The adoption of new technology should ensure flexibility, scalability, and the ability to meet evolving service demands. The modernization effort should eliminate legacy system constraints, performance concerns, and supportability issues, enhancing the agency's capabilities to meet and exceed service level expectations.

DCP is planning for a multi-phase approach to a complete modernizing Geosupport.

Phase 1 will develop cloud-based Geosupport web services by moving output data from current processes to a cloud-hosted relational database and rebuild the existing mainframe legacy systems (BIN-on-Demand system, Full LION Street Attribute File Generation, and Election District/Assembly District Report Generation) as web applications in the cloud.

Phase 2 will redesign the Geosupport generation processes to eliminate the file-based outputs and develop self-contained batch processing options for clients to handle geoprocessing requests at scale.

4.1 Geosupport Web Services

Designing web services is a critical step toward the modernization effort as it will streamline processes, enhance connectivity, and improve overall efficiency and access to the latest data. A web service for each function of Geosupport should facilitate seamless integration, but DCP is open to other solutions that allow more frequent data exchange with other city agencies and improve accessibility from anywhere. This scalable solution should future proof the Geosupport infrastructure, promote efficient resource utilization, and provide enhanced security measures.

The web services to be developed for core Geosupport functions are listed below.

4.1.1 Property Information by Address

The Property Information by Address web service function returns the tax lot to which an address or place name has been assigned. If an address is provided, the function returns property level information for that tax lot, including buildings on the lot. The coordinates shown are for the tax lot centroid.

4.1.2 Street and Property Information by Address

The Street and Property Information by Address web service returns an address or place name in two ways. The first option contains geographic information on the street segment to which the address number is assigned. In addition to information about the street itself, it includes information on city services and political districts for the side of the street on which the address is located. The coordinates shown are for the interpolated location of the address on the street segment. The coordinates are offset from the centerline to the correct side of the street. The second option contains property level information for the tax lot to which the address or place name has been assigned, including buildings on the lot. The coordinates shown are for the tax lot centroid.

4.1.3 Street Information by Address

The Street Information by Address web service returns the street segment to which an address number or place name is assigned, returning information for that street segment. In addition to information about the street itself, it includes information on city services and political districts for the side of the street on which

the address is located. The coordinates returned are for the interpolated location of the address on the street segment. The coordinates are offset from the centerline to the correct side of the street.

4.1.4 Address Point Information by Address

The Display Address Point Information by Address web service returns the address point for a given address. Address points are point locations located approximately five feet inside the building along the corresponding street frontage. Address points do not exist for all administrative address ranges assigned to a building, but usually only reflect the posted address. The service returns the address point's coordinates and identifier, as well as information on the tax lot and building associated with the address point.

4.1.5 Geographic Information by Street Intersection

The Geographic Information by Street Intersection web service returns information on any street intersection, including the names of any additional streets that are at the intersection, for two street names or a named intersection. It also returns the administrative districts within which the intersection is located. If an intersection lies on a boundary of two or more districts of a particular type, only one of those districts is listed. If the streets intersect twice, the compass direction should be provided. If the streets intersect more than twice, the service lists all node IDs to select from.

4.1.6 Geographic Information by Street Segment

The Geographic Information by Street Segment web service returns information on any street segment, by specifying a segment by entering a street name (the 'on street') and the two consecutive cross streets that define the segment. For information for one side of the street segment (a single block face), the side of street should be provided. The information returned includes information about the street segment, administrative districts for the left and/or right side of the segment, and the names of any additional cross streets that exist at the two endpoints of the segment.

4.1.7 Geographic Information by Street Stretch

The Geographic Information by Street Stretch web service returns the stretch information, by specifying a street name (the 'on street') and two cross streets. If no cross streets are entered, the stretch is from the beginning of the street to its end. If a cross street intersects the 'on street' exactly twice, the compass direction should be provided to select the desired intersection.

4.1.8 Property Information by Block and Lot

The Property Information by Block and Lot web service returns the tax lot and building information for a block and lot number. It also returns a list of addresses that apply to the tax lot and a list of Building Identification Numbers (BINs) for buildings on the tax lot.

4.1.9 Property Information by Building Identification Number

The Property Information by Building Identification Number web service returns tax lot and building information for a Building Identification Number (BIN). It also returns a list of addresses that apply to the BIN.

4.1.10 Convert Street Name to Street Code

The Convert Street Name to Street Code web service returns the normalized street name and its street code for a street name. It allows to specify a maximum street name length and whether leading blanks should be added to the numeric portion of a street name for sorting purposes.

4.1.11 Convert Street Code to Street Name

The Convert Street Code to Street Name web service returns the associated primary or principal street name for a street code. It allows to specify a maximum street name length and whether leading blanks should be added to the numeric portion of a street name for sorting purposes.

4.1.12 Browse Street Name Dictionary

The Browse Street Name Dictionary web service returns the street name with its street code and the next nine street names alphabetically for a street name.

4.1.13 Normalize Street Name

The Normalize Street Name web service checks if a street name is valid to use in other Geosupport services and return the normalized street name. It allows to specify a maximum street name length and whether leading blanks should be added to the numeric portion of a street name for sorting purposes.

4.1.14 Normalize Address Number

The Normalize Address Number web service checks if an address number is valid to use in other Geosupport services and return the normalized address number.

4.2 Re-platform Geosupport Mainframe Services

Mainframe-based legacy systems used for Geosupport processing are becoming outdated and challenging to maintain or integrate with newer technologies. Re-platforming of the mainframe systems allows the adoption of modern technologies, improving efficiency and functionality and making it easier for the agency to respond to evolving needs and regulatory requirements.

Below listed mainframe-based systems and services will need to be re-platformed with cloud-based web applications for better scalability to handle increased data volumes, transactions, and user loads. Improved user interfaces and overall user experience will enhance productivity and reduce the risk of system failures, data loss, or disruptions in critical services.

4.2.1 Redesign BIN-on-Demand System

The BIN-on-Demand mainframe service under Geosupport enables DCP to generate unique Building Identification Numbers (BINs), efficiently connecting multiple addresses of a building to a singular identifier, which is required for the Department of Buildings' (DOB) processing of new construction permits. The service relies on mainframe-based Transitional Property Address Directory (TPAD) files and tables, managing which involves a complex set of mainframe programs, making rectifications challenging in the event of system malfunctions. This system will be redesigned using cloud-based web technologies.

4.2.2 Redesign Full LION Street Base Map Generation

The extensive version of Full LION Street Base Map dataset generated under Geosupport System furnishes comprehensive street line segments with their corresponding addresses across the entire city and is critical to the Department of Transportation's (DOT) operations. The dataset is exclusively generated on the mainframe and faces an escalating risk of potential malfunctions, so it is imperative to transition it from the mainframe to a more sustainable platform the soonest. This service will be rearchitected using cloud-based web technologies.

4.2.3 Redesign Election District/Assembly District Reporting

The Election District/Assembly District Report function under Geosupport is a critical service for the NYC Board of Elections (BOE) and the entire city. Current vulnerabilities on the service stemming from the nonavailability of staff specialized in mainframe-related tasks necessitates immediate attention. It is crucial to transition this critical data to an alternate storage system promptly. Consequently, plans are underway to shift this function to a desktop system as an interim measure, pending the development of a more sustainable, long-term solution in collaboration with the NYC BOE. This service will be redesigned using cloud-based data and reporting technologies.

4.3 Geosupport Batch Processing

Batch applications run on the mainframe autonomously. A batch job is initiated on the computer, processing large volumes of data, sometimes in the order of terabytes, and generates the required output. To reduce dependency on the Geosupport mainframe services, establishing an expedited processing method for handling substantial record volumes is imperative. This includes enhancements to the web services or Geoservice client which currently processes data requests individually rather than in batch. Addressing this issue is crucial to modernize the web-based geoservice's data processing capabilities. Reducing mainframe dependency further necessitates an expedited method for handling substantial record volumes.

Enhancing the batch processing capability requires a more robust, non-mainframe, back-end system for handling large data calls. The specific architecture is pending definition but is essential for agency partners to work efficiently.

4.4 Geosupport Generation with Cloud Services

Implementing a cloud-based system to replicate the current on-premise Geosupport generation process stands as a critical step to expedite and optimize the redesign cost-effectively and will seamlessly restructure a complex system of interdependencies of the Geosupport data from fixed length records to a more flexible cloud-based relational database and storage, fostering a dynamic environment for more efficient data management. With this approach, new data elements can be channeled directly to the web services, eliminating the limitations imposed by the fixed record length of the current system. The integration of new data into Geosupport functions can be seamlessly executed by incorporating new tables and executing joined queries, thus streamlining the entire process without the need for intricate modifications to the existing Geosupport services.

5 TECHNICAL REQUIREMENTS

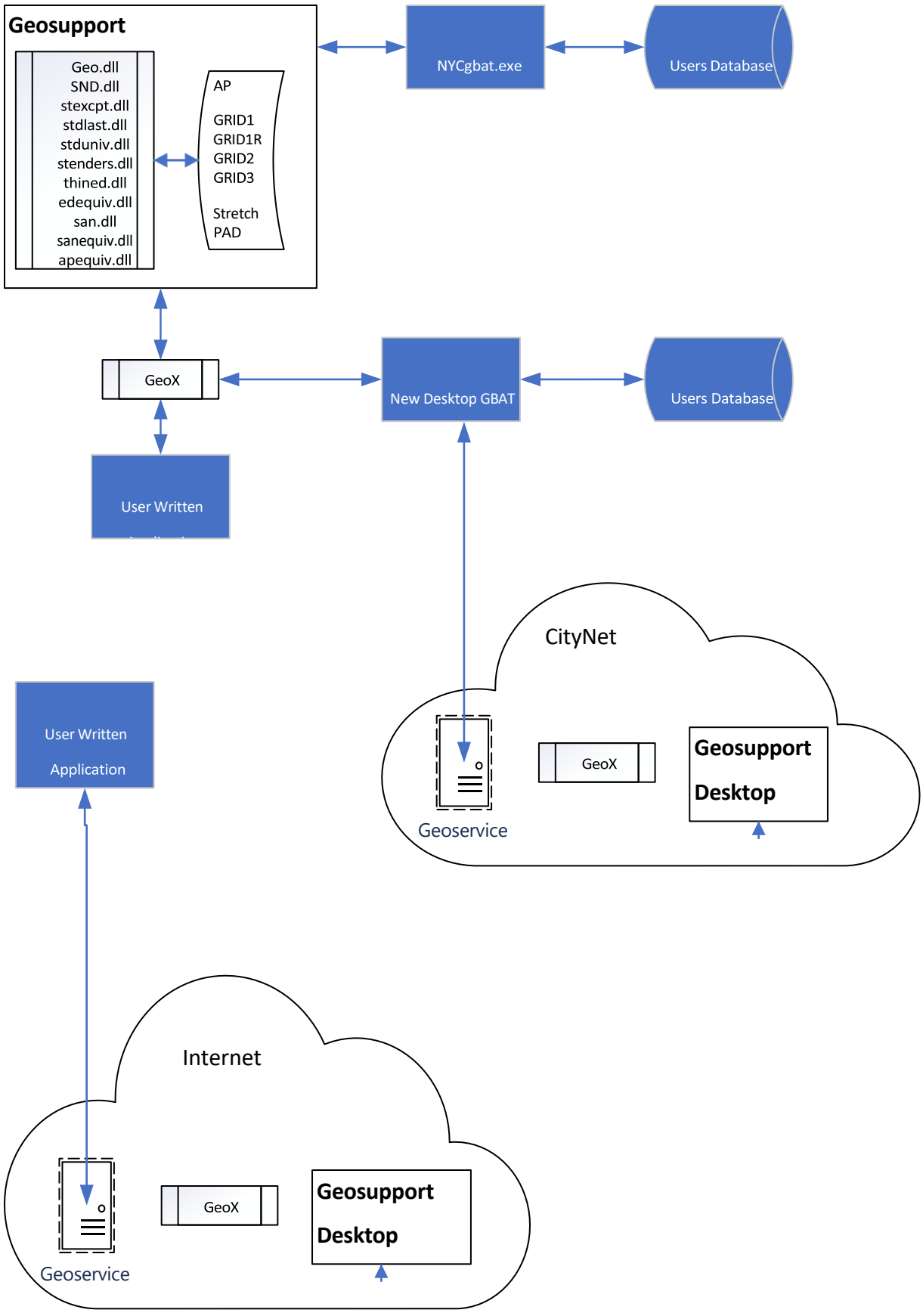
DCP is open to consider any solution that addresses the following challenges and add value and efficiency:

- Enhancement of Web Services
- Geosupport Batch Processing – robust batch processing on the cloud and offline
- Generation of Geosupport – system generation on the cloud and offline

Some technical requirements for consideration:

- Compliance and Security Standards
  - Data Encryption – Implement robust encryption for data at rest and in transit.
  - Access Controls – Use multi-factor authentication and role-based access controls (RBAC).
- Scalability and Performance
  - Cloud Integration – Leverage cloud services for scalability, flexibility, and disaster recovery.
  - Microservices Architecture – Break down the system into microservices for easier management and scalability.
  - Load Balancing – Implement load balancing to ensure high availability and performance.
- Interoperability and Integration
  - APIs and Webservices – Develop APIs for integration with other systems and third-party services.
  - Data Standardization – Use standardized data format (e.g., JSON, XML, etc.) for data exchange.
  - Middleware Solutions – Implement middleware for seamless communication between different system components.
- User Experience and Accessibility
  - Section 508 Compliance - Following Section 508 guidelines.
- Data Management and Analytics
  - Data – Develop comprehensive plan for data generation that will be used with the new solution.
  - Real-time Analytics – Implement real-time data analytics for better decision making.
  - Data Governance – Establish data governance policies for data quality, privacy, and security.
- Development and Deployment
  - CI/CD Pipelines - Set up continuous integration and continuous deployment (CI/CD) pipelines for automated testing and deployment.
  - Containerization - Use containerization technologies (e.g., Docker, Kubernetes) for consistent environments and easier deployment.
  - Version control – Utilize version control systems (e.g., Git) for tracking changes and collaboration.
- Legacy System Compatibility – ensure the new system can integrate or operate with the existing legacy system, at least during the transition to the new system.
- Monitoring and maintenance – Proactive monitoring, implement monitoring tools to track system performance, security, and availability. Use automated scripts and tools for routine maintenance tasks.
- Risk management – Contingency planning, develop contingency plans for system failures or data breaches.

6 GEOSUPPORT DESKTOP EDITION DIAGRAM



7 QUESTIONS/REQUESTS FOR RESPONDENTS

- **Proposed Solution Description**: Respondents to the RFEI are requested to submit a detailed description of a proposed solution that meets the specified requirements.
- **Estimated Itemized Cost**: Provide an estimated itemized cost for a project of this scope, including all necessary components and services.
- **Estimated Project Duration**: Estimate the amount of time, in months, required to complete the proposed solution from initiation to deployment.
- **Estimated Support Cost and Total Cost of Ownership (TCO)**: Estimate the support cost for the system for the first five years after the full system deployment and the total cost of ownership.
- **DCP IT Resource Support Expectation**: Assess whether there would be a burden on DCP IT personnel during and after the delivery of the solution. Estimate the resources and efforts required from DCP IT team.
- **Workflow and Release Management Approach**: Explain the approach for managing workflows, as well as the processes for releasing and updating the solution.
- **Support for Existing Clients**: Describe how the new system will support existing clients by maintaining the same functions. Explain the approach to ensure continuity of services.
- **Offline Solution for Cloud Components**: For cloud-based components, provide an explanation of the offline solution to be used in case of temporary internet disruptions and support users that have privacy restrictions, ensuring continued access and the ability to prepare updates or changes.
- **Future Enhancement Opportunities**: Identify any additional opportunities enabled by the proposed solution that could be considered for future enhancements.
- **Security Measures**: Describe the security measures that will be implemented to protect data and ensure the integrity and confidentiality of the system.
- **Scalability and Performance**: Explain how the proposed solution will handle scalability and maintain performance under increased load and usage.
- **Integration with Existing Systems**: Outline how the proposed solution will integrate with existing systems and platforms currently in use by DCP and other stakeholders.
- **Training and Support**: Provide details on the training and support that will be available to DCP staff during and after the implementation of the solution.
- **Compliance and Standards**: Ensure the proposed solution adheres to relevant industry standards and complies with local, state, and federal regulations.
- **Disaster Recovery and Backup Plans**: Describe the disaster recovery and backup plans to ensure data protection and business continuity in case of system failures or other emergencies.
- **User Experience and Accessibility**: Explain how the proposed solution will ensure a positive user experience and be accessible to all users, including those with disabilities.

8 SUBMISSION DETAILS

All submissions must be no more than 10 pages (12 point, single spaced) including all photographs and illustrations. All submissions must be in digital format (electronic PDF), or in hard copy (printed on both sides on paper with no less than 20% post-consumer material content), by **October 4th, 2024**. Submit your complete submission electronically to DCPBids@planning.nyc.gov or in hard copy to: NYC Department of City Planning, 120 Broadway, 31st Floor, New York NY 10271. Attn: Maleenee Kaisaram, Agency Chief Contracting Officer.

9 INQUIRIES

Any inquiries concerning this RFEI should be directed by e-mail, under the subject line “Geosupport System Modernization RFEI Q&A”, to DCPBids@planning.nyc.gov. All questions must be submitted no later than Sept 16, 2024, by 4:00 p.m. EST.

10 ADDITIONAL INFORMATION

6.1 This RFEI is not intended as a formal offering for the award of a contract.

6.2 The New York City Department of City Planning, the City of New York and their officials, officers, agents and employees make no representation or warranty and assume no responsibility for the accuracy of the information set forth in this RFEI.

6.3 No information contained in submissions shall be deemed confidential and such information may be shared with others as deemed appropriate by The Agency.

6.4 Neither the New York City Department of City Planning nor the City of New York shall be liable for any costs incurred by any respondent in the preparation, submittal, presentation or revision of its submission.

6.5 All submissions shall become the property of The Agency and shall not be returned.

6.6 The Agency, at its sole discretion reserves, without limitation, has the right to:

6.6.1 Withdraw this RFEI at any time;

6.6.2 Use the ideas and/or submissions in any manner deemed to be in the best interests of The Agency, including but not limited to soliciting competitive submissions relating to such ideas or proposals and/or undertake the prescribed work in a manner other than that which is set forth herein; and

6.6.3 Change any terms of the RFEI.

11 GLOSSARY

Acronym	Description
API	Application Programming Interface
BIN	Building Identification Number
BOE	Board of Elections
CI/CD	Continuous Integration/Continuous Deployment
DCP	Department of City Planning
DOB	Department of Buildings
DOT	Department of Transportation
GDE	Geosupport Desktop Edition
GIS	Geographic Information Systems
GOAT	Geographic Online Address Translator
GRID	Geographic Reference Integrated Dictionary
GSS	Geosupport Services
IBM	International Business Machines Corporation
ITD	Information Technology Division
JSON	JavaScript Object Notation
LION	Linear Integrated Ordered Network
NYC	New York City
PAD	Property Address Directory
RBAC	Role-Based Access Controls
REST	Representational State Transfer
SND	Street Name Dictionary
TCO	Total Cost of Ownership
TPAD	Transitional Property Address Directory
XML	Extensible Markup Language