Annex E - Scope of Work for IV&V Engagement

5. The following Scope of Work provides a list to consider what items will be included in an RFP and tender document. For more information on various topics, see the sections of the Handbook as noted.

ID No.	Tasks
1.0 IV&V Project Management	
1.1	**IV&V Management Plan** • Develop an IV&V Management Plan that describes the activities, personnel, schedule, standards, and methodology for conducting the IV&V services. • Review the IV&V Management Plan quarterly and provide updates to remain in alignment with Project activities and processes.
1.2	**IV&V Work Plan** • Develop an IV&V work plan compatible with MS Project that schedules and tracks the IV&V activities, including anticipated delivery dates for all IV&V deliverables. The IV&V work plan must be developed in accordance with the Project's schedule management plan. The IV&V Work Plan must be provided within 30 days of Contract execution. • Provide updates to the work plan monthly to report status and remain in alignment with the Project's master schedule.
1.3	**IV&V Monthly Activity Reports** • Provide reports that summarize the results of IV&V tasks performed for the reporting month. These reports may include updates to prior activity reports. Each monthly activity report shall contain: a) Initial IV&V required activities. b) Work in Progress: activities and deliverables currently underway. c) Scheduled Status: compares completed tasks and deliverables against those scheduled to date, and includes explanations of schedule variances, and recommendations for mitigating the variances. d) Work to Be Completed: IV&V activities and deliverables expected to be completed within the next reporting period. e) Issues, Problems, and Resolutions: includes a summary of anomalies and the resolutions; identification of technical project risks; assessment of software quality processes; and IV&V recommendations. f) Activities Completed within the Reporting Period: a description of the IV&V tasks performed and the status of the associated deliverables. • Prepare and deliver a formal presentation(s) on the status of the IV&V project.
1.4	**Management and Technical Reviews** Provide IV&V results at Project defined management and technical reviews. Evaluate review materials, attend meetings/ events (as required), and provide comments, risks and issues found in the course of the evaluation. It is anticipated these reviews will occur at a rate of two (2) per month.

ID No.	Tasks
2.0 Early Review	
2.1	**Business Processes and Systems Documentation** • Evaluate the current business processes documentation/ business requirements specification (BRS) for correctness, consistency, completeness, accuracy and readability. • Evaluate the to-be business processes for correctness, consistency, completeness, accuracy and readability. • Verify the Project has plans in place to transition from the current business processes to the to-be business processes.
2.2	**Requirements Evaluation** • Evaluate the mid-level solution requirements for correctness, consistency, completeness, accuracy, readability and the appropriate level of detail. Verify the requirements satisfy user needs and are consistent with the business processes and Project objectives. • Evaluate the solution requirements for correctness, consistency, completeness, accuracy, readability. Verify the requirements satisfy the user and acquisition needs, are consistent with and traceable to the mid-level solution requirements. • Evaluate the requirements baseline for correctness, consistency, completeness, accuracy, readability and testability. Verify the requirements are consistent with and traceable to the solution requirements.
3.0 Support Process IV&V	
3.1	**Project Management Assessment** • Verify that executive sponsorship has bought-in to all changes which impact project objectives, cost, or schedule. • Evaluate project reporting plan and actual project reports to verify project status is accurately traced using project metrics. • Verify milestones and completion dates are planned, monitored, and met. • Verify the existence and usage of an appropriate project issue tracking mechanism that documents issues as they arise, enables communication of issues to proper stakeholders, documents a mitigation strategy as appropriate, and tracks the issue to closure. This should include but is not limited to technical and development efforts.
3.2	**Communication Management Assessment** Verify that a Communication Plan is created and being followed. Evaluate the communication plans and strategies to verify they support communications and work product sharing between all project stakeholders; and assess if communication plans and strategies are effective, implemented, monitored and complete.
3.3	**Configuration Management Assessment** • Review and make recommendations on the configuration management plans and procedures associated with the development process. • Verify all critical development artifacts are maintained under appropriate controls, source and object libraries are maintained for each version, and mechanisms are in place to prevent unauthorized changes. • Verify that the processes and tools are in place to identify code versions and to rebuild system configurations from source code. • Verify that appropriate processes and tools are in place to manage system changes, including formal logging of change requests and the review, prioritization and timely scheduling of maintenance actions. • Verify that mechanisms are in place to prevent unauthorized changes being made to the system and to prevent authorized changes from being made to the wrong version. • Review the use of configuration management information (such as the number and type of corrective maintenance actions over time) in project management.

ID No.	Tasks
3.4	**Project Estimating and Scheduling** • Evaluate and make recommendations on the estimating and scheduling process of the project to ensure that the project budget and resources are adequate for the work-breakdown structure and schedule. • Review schedules to verify that adequate time and resources are assigned for planning, development, review, testing and rework. • Examine historical data to determine if the project/department has been able to accurately estimate the time, labor and cost of software development efforts.
3.5	**Quality Management Assessment** • Review and make recommendations on the Project's Quality Assurance (QA) plans, procedures and organization. Monitor the performance of the QA organization to ensure procedures are followed and quality metrics reported accurately. • Verify that the quality of all products produced by the Project is monitored by formal reviews and sign-offs. • Evaluate and make recommendations on the project's Quality Assurance plans, procedures and organization. • Verify that QA has an appropriate level of independence from project management. • Verify that the QA organization monitors the fidelity of all defined processes in all phases of the project. • Verify that the quality of all products produced by the project is monitored by formal reviews and sign-offs. • Verify that project self-evaluations are performed and that measures are continually taken to improve the process. • Verify that QA has an appropriate level of independence; evaluate and make recommendations on the project's Quality Assurance plans, procedures and organization. • Evaluate if appropriate mechanisms are in place for project self-evaluation and process improvement. • Review and make recommendations on all defined processes and product standards associated with the system development. • Verify that all major development processes are defined and that the defined and approved processes and standards are followed in development. • Verify that the processes and standards are compatible with each other and with the system development methodology. • Verify that all process definitions and standards are complete, clear, up-to-date, consistent in format, and easily available to project personnel.
3.6	**Risk Analysis** Identify any technical and management risks discovered in the course of any IV&V task and provide recommendations to eliminate, reduce, or mitigate the risk. Identified risks and updates to the risk analysis are to be included in the IV&V Monthly Activity Reports.
4.0 Requirements IV&V	
4.1	**Requirements Management Plan Assessment** Review and make recommendations on the Project's plans, processes, procedures and tools for managing requirements.
4.2	**Requirements Evaluation** • Evaluate the requirements for correctness, consistency, completeness, accuracy, readability and testability. • Evaluate the allocation of system requirements to hardware and software requirements. • Verify that requirements are under formal configuration control.

ID No.	Tasks
4.3	**Requirements Analysis** • Verify that an analysis of client, Agency needs and objectives has been performed to verify that requirements of the system are well understood, well defined, and satisfy Agency regulations. • Verify that all stakeholders have been consulted to the desired functionality of the system, and that users have been involved in prototyping of the user interface. • Verify that all stakeholders have bought-in to all changes which impact project objectives, cost, or schedule. • Verify that performance requirements (e.g. timing, response time and throughput) satisfy user needs. • Verify that user's maintenance requirements for the system are completely specified.
4.4	**Requirements Allocation and Specification** • Verify that all system requirements have been allocated to either a software or hardware subsystem. • Verify that requirements specifications have been developed for all hardware and software subsystems in a sufficient level of detail to ensure successful implementation. • Verify that a well-defined plan and process for reengineering the system is in place and is followed (if a legacy system or a transfer system is or will be used in development).
4.5	**Interface Analysis** • Verify that all system interfaces are exactly described, by medium and by function, including input/output control codes, data format, polarity, range, units, and frequency. • Verify the requirements for interfaces with other systems are correct, complete, accurate, and testable. • Verify appropriate relationships are in place with all organizations supporting the interfaces.
4.6	**Traceability Analysis** • Verify requirements can be traced through design, code and test artifacts to verify that the system performs as intended and contains no unnecessary elements. • Evaluate identified relationships for correctness, consistency, completeness, and accuracy. • This task is iterative and anticipated to be repeated as the artifacts from each development phase are incorporated.
4.7	**Security Analysis** • Evaluate the requirements from a security perspective and assure that potential security risks with respect to confidentiality, integrity, availability, and accountability have been identified. Consider security risks introduced by the system itself as well as those associated with the environment. • Verify the system security requirements will mitigate the identified security risks to an acceptable level. • Evaluate and make recommendations on project policies and procedures for ensuring that the system is secure and that the privacy of client data is maintained. • Evaluate the projects restrictions on system and data access. • Evaluate the projects security and risk analysis. • Verify that processes and equipment are in place to back up client and project data and files and archive them safely at appropriate intervals.
5.0 Design IV&V	
5.1	**System Architecture Design Evaluation** • Evaluate the system architectural design for correctness, consistency, completeness, and testability.

ID No.	Tasks
5.2	**Software Design Evaluation** • Evaluate the software design elements for correctness, consistency, completeness, accuracy, readability, and testability. • Evaluate and make recommendations on existing high level design products to verify the design is workable, efficient, and satisfies all system and system interface requirements. • Evaluate and make recommendations on existing detailed design products to verify that the design is workable, efficient, and satisfies all high level design requirements. • Verify that design requirements can be traced back to system requirements, system requirements and high level design. • Verify that all design products are under configuration control and formally approved before the next activity begins.
5.3	**Interface Design Evaluation** Evaluate the interface designs between system elements and with other systems for correctness, consistency, completeness, accuracy, and testability.
5.4	**Database Design Evaluation** • Evaluate database designs to determine if they meet system requirements for maintainability, scalability, refreshability, concurrence, normalization, performance and data integrity, and make recommendations to improve data integrity and system performance. • Review and make recommendations to plans and processes for administering the database, including backup, recovery, performance analysis and control of data item creation.
5.5	**Security Analysis** • Evaluate the system and software designs from a security perspective. • Verify identified security requirements are adequately addressed in the system and software designs. Consider security risks introduced by the system itself as well as those associated with the environment. • Verify the identified security threats and vulnerabilities are prevented, controlled or mitigated within the system's design.
6.0 Build IV&V	
6.1	**Development Process and Product Standards Assessment** • Review and make recommendations on all defined process and product standards associated with the system development. • Verify all process definitions and standards are complete, clear, consistent, compatible, up-to-date and readily accessible to project personnel. • Evaluate the project's use of software metrics in management and quality assurance.
6.2	**Development Environment and Tools Assessment** Evaluate the development environment to determine if its capabilities are adequate to meet system development requirements, is maintainable and upgradeable, and demonstrates a degree of integration compatible with good development.
6.3	**System Element Implementation Analysis** • Evaluate the system element artifacts to derive an evolving assessment of each system element's performance and to recommend corrective actions to mitigate any projected performance shortfalls. • Verify hardware components are compatible with the existing processing environment, maintainable, and easily upgradeable.
6.4	**Source Code and Source Code Documentation Evaluation** • Evaluate the source code components and associated documentation for correctness, consistency, completeness, accuracy, readability, and testability. • Evaluate the project's use of software metrics in management and quality assurance.

ID No.	Tasks
6.5	**Security Analysis** • Verify the implementation is completed in accordance with the system architecture and design in that it addresses the identified security risks and the implementation does not introduce new security risks. • Verify the identified security threats and vulnerabilities are prevented, controlled, or mitigated.
7.0 Test IV&V	
7.1	**Software Component/ Unit Testing** • Verify the software component test plans, designs, cases, and procedures conform to the Project-defined test document purpose, format and content. • Validate the software component test plan is traceable to the software requirements and design, is consistent, and provides test coverage of all units. • Validate the software component test designs, cases, and procedures are complete, traceable to requirements, and consistent with the test plan. • Use the software component test results to verify the system satisfies the test acceptance criteria. • Verify that an appropriate level of test coverage is achieved by the test process, that test results are verified, that the correct code configuration has been tested, and that the tests are appropriately documented.
7.2	**~~Software~~ Integration Testing** • Verify the integration test plans, designs, cases, and procedures conform to the Project-defined test document purpose, format and content. • Evaluate the test environment, tools, and procedures used for integration testing of system modules. • Validate the integration test plan is traceable to the requirements and design, is consistent, provides test coverage of software requirements, contains appropriate test standards and methods and provides conformance to expected results. • Validate the integration test designs, cases, and procedures are complete, traceable to requirements, and consistent with the test plan. • Verify that an appropriate level of test coverage is achieved by the test process, that test results are verified, that the correct code configuration has been tested, and that the tests are appropriately documented, including formal logging of errors found in testing. • Use the integration test results to verify the system satisfies the test acceptance criteria.
7.3	**System Testing** • Verify the system test plans, designs, cases, and procedures conform to the Project-defined test document purpose, format and content. • Evaluate the test environment, tools, and procedures used for system testing. • Validate the system test plan is traceable to the system requirements, is consistent, provides test coverage of system requirements, contains appropriate test standards and methods and provides conformance to expected results. • Validate the system test designs, cases, and procedures are complete, traceable to requirements, provides complete coverage, and is consistent with the test plan. • Verify that a sufficient number and type of case scenarios are used to ensure comprehensive but manageable testing and that tests are run in a realistic, real-time environment. • Verify that test scripts are complete, with step-by-step procedures, required pre-existing events or triggers, and expected results. • Use the system test results to verify the system satisfies the test acceptance criteria.

ID No.	Tasks
7.4	**~~System~~ Acceptance Testing** • Acceptance procedures and acceptance criteria for each product must be defined, reviewed, and approved prior to test and the results of the test must be documented. Acceptance procedures must also address the process by which any software product that does not pass acceptance testing will be corrected. • Verify the acceptance test plans, designs, cases, and procedures conform to the Project-defined test document purpose, format and content. • Verify the acceptance test plan addresses test coverage of acceptance requirements, expected results, and the feasibility of operation and maintenance. • Validate the acceptance test designs, cases, and procedures are complete, traceable to the system requirements, and consistent with the test plan. • Use the ~~system~~ acceptance test results to verify the system satisfies the test acceptance criteria.
7.5	**Security Analysis** • Verify the implemented system does not increase the security risk. • Verify the identified security threats and vulnerabilities are prevented, controlled, or mitigated.
8.0 Deployment IV&V	
8.1	**Organizational Change Management (OCM) Assessment** • Review and make recommendations on the OCM plans and procedures. Verify the plan has the strategy, management backing, resources, skills and incentives necessary for effective change. • Verify resistance to change is anticipated and prepared for at each step and has the appropriate leadership. • Evaluate Agency wide system's change request and defect tracking processes. • Evaluate impact of system on program goals and performance standards. • Review and evaluate implementation plan.
8.2	**Transition Strategy Evaluation** Verify the transition strategy has a defined approach to establishing the system in the operational environment that is consistent with requirements. Verify the transition strategy is comprehensive and includes the following: a) All the system parts and the system whole are included. b) Transition schedule and sequence. c) Identification of transition tools, equipment and instructions. d) Archiving system artifacts, such as documentation and code. e) Impact to interfacing systems in terms of transition timing and transition impacts. f) Continuity of capabilities when replacing or upgrading a legacy system. g) Site preparation for installation and legacy system retirement, storage, and/or incorporation. h) Provisions for documentation of the process results. i) A fallback or back-out plan in case of unsuccessful transition and other risk mitigation considerations.
8.3	**Data Conversion Assessment** • Review and make recommendations on the data conversion plans, procedures and tools relative to making the conversion process more efficient and on maintaining the integrity of the data during conversion. • Verify procedures are being followed to review the converted data for accuracy and completeness, and data clean-up activities are performed. • Determine conversion error rates and if the error rates are manageable. • Make recommendations on making the conversion process more efficient and on maintaining the integrity of data during the conversion.

ID No.	Tasks
8.4	**User Training Assessment** • Review and make recommendations on the training provided to system users. Verify the training provided is directly related to the business process and required job skills, and materials are user-friendly. Verify the training's effectiveness is evaluated and monitored. • Verify that training in using the contractor-supplied software is be on-going throughout the development process, especially If the software is to be turned over to Agency staff for operation.
8.5	**Installation Configuration Audit** • Validate all software products required to correctly install and operate the software are present in the installation package. • Verify supplied values for all site-dependent parameters or conditions are correct.
8.6	**Operational Readiness Assessment** • Evaluate operational readiness by analyzing installation and checkout data, test results and documented anomalies, risks, and issues. • Verify the complete installation of required installation items. Verify the system components initialize, execute, and terminate as specified.
8.7	**Security Analysis** • Verify that the installed system does not introduce new or increased vulnerabilities or security risks. • Verify the identified security threats and vulnerabilities are prevented, controlled, or mitigated.
9.0 Post-Deployment IV&V	
9.1	**Operations and Maintenance Procedures Assessment** • Evaluate the operational plans and procedures to verify conformance to the operational requirements and consistency with the user documentation. • Evaluate implementation of the process activities including backup, disaster recovery and day-to-day operations to verify the processes are being followed.
10.0 Project Closure	
10.1	**System Acceptance Report** Prepare recommendations concerning system acceptance, including an assessment of the software quality and the conformance to the system requirements.
10.2	**Final IV&V Report** Develop a Final IV&V Report that summarizes the IV&V activities, tasks, results, anomalies and dispositions, and provides an evaluation of the overall system quality. The report will also include an assessment of the system robustness and potential weak points within the architecture, make recommendations where the system, hardware, software, interfaces, and documentation could be improved, and specify technical lessons learned for inclusion in the Post Implementation Evaluation Report (PIER).
11.0 Ad hoc Assessments	
11.1	**Ad hoc Assessments** • It is anticipated that the IV&V resource(s) will spend up to 40 hours per month to perform as-needed tasks (such as contract-related ad hoc issue reports, briefing, presentation, technical assessments, cost estimate validation) to evaluate project components and artifacts outside the scope of other tasks defined in this SOW. • Ad hoc Assessment may be requested by the State or recommended by the vendor. All ad hoc assessments are subject to the Work Authorization process described in Section 11.

ID No.	Tasks
11.2	**Ad hoc Assessment Task Reports** Provide task report for each ad hoc assessment. Task report shall include a brief description of the task, the methodology for performing the task, task results, anomalies detected, and any risks or issues identified while executing the task.
12.0 Documents and Reports	
12.1	Prepare and deliver an Initial IV&V report on the required activities. Report on status of each activity.
12.2	Prepare and deliver a Follow-up IV&V report on the required activities. Report on status of each activity and progress since the previous report.
12.3	Prepare and deliver a formal presentation(s) on the status of the IV&V project. Presented as required. No more than once a month.