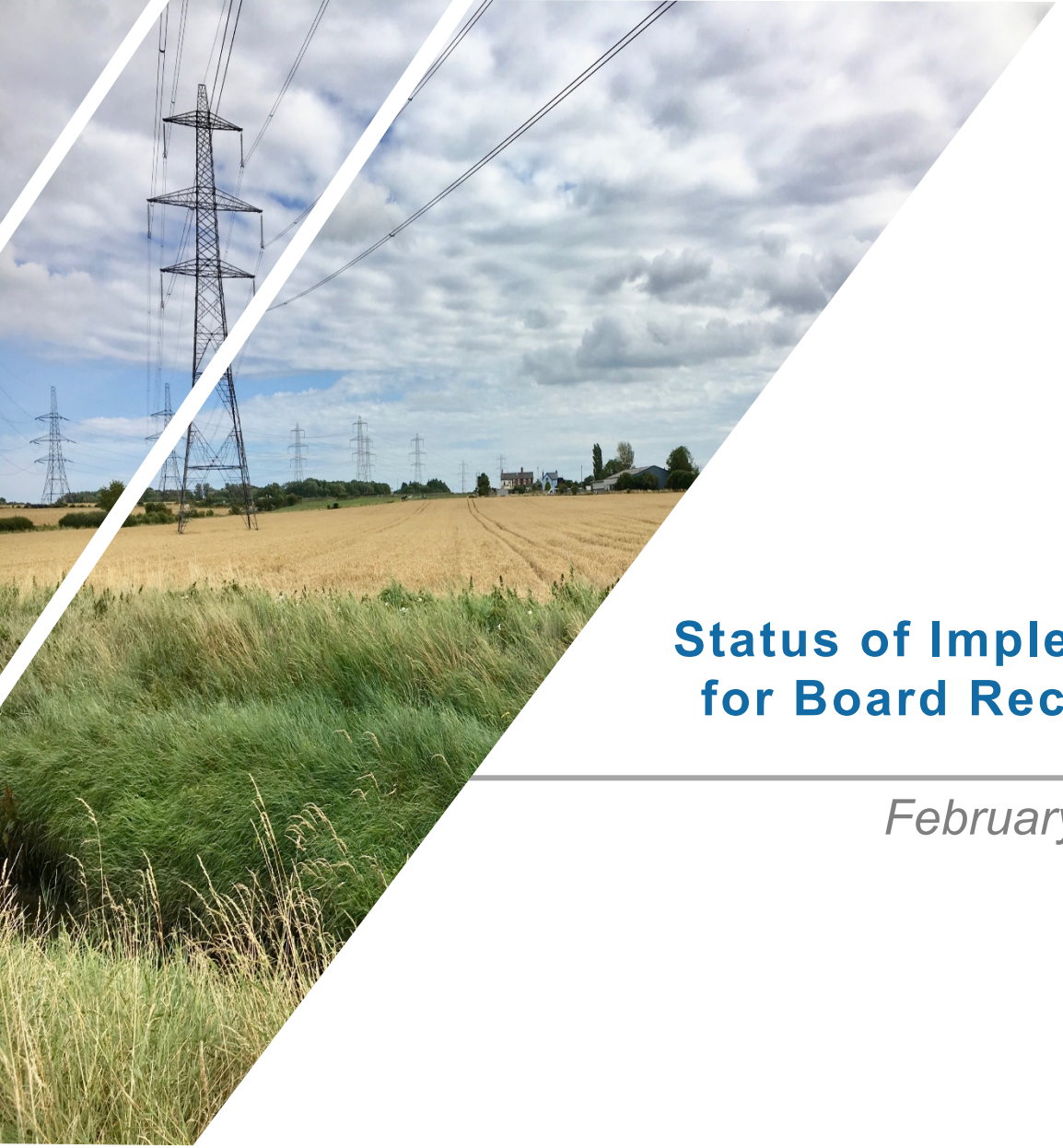

Status of Implementation Plans for Board Recommendations

February 17, 2022

LIPA
Long Island Power Authority

OVERVIEW

- **Board has adopted 168 recommendations resulting in 146 PIPs, which are in various stages of Implementation by PSEG Long Island:**
  - **78 Isaias Task Force** Project Implementation Plans (PIPs)
  - **68 Management PIPs** to correct other PSEG Long Island operational deficiencies

- The Board has directed LIPA staff to:
  - Monitor PSEG Long Island's execution of the PIPs
  - Independently verify and validate (IV&V) the remediation of each recommendation
  - Report to the Board Quarterly until all PIPs are complete

ISAIAS TASK FORCE RECOMMENDATIONS

- LIPA received **12 PIPs** in December and January
  - **4 PIPs: Accepted**
  - **8 PIPs: Resubmit in March to address LIPA Comments**

- LIPA received **1 deliverable** for a project marked “complete” by PSEG
  - Pending IV&V by LIPA

STATUS OF REMEDIATION OF PSEG LONG ISLAND COMMUNICATIONS AND OMS

- **PSEG Long Island deployed OMS v 6.7.8 (the current widely-deployed OMS version) into production on February 6, 2022**
  - PSEG Long Island has reported that the system is functioning as expected. As of last Wednesday (2/9/22), users have encountered 1 “critical” defect and a temporary workaround has been implemented. We have requested that PSEG Long Island undertake a thorough Root Cause Analysis and provide LIPA their findings
  - This deployment consists of the latest broadly-deployed version of OMS and related CGI products. PSEG Long Island is yet to deploy the planned integration of AMI with OMS which now has a projected go-live date of April 2022. Until the AMI-OMS integration is properly implemented several important storm management/restoration feature will not be available to Long Island customers

Note: OMS 7.5 is the latest released OMS version. However, we understand that only 2 utilities have deployed it.

INDEPENDENT VERIFICATION AND VALIDATION (IV&V)

- **Now that OMS v 6.7.8 has been deployed, LIPA has kicked off Phase I of OMS IV&V**

- **Phase I of OMS IV&V will consist of initiation, shakedown, and functional checkout of the deployed system.** It includes the following:
  - Knowledge transfer from PSEG Long Island and third-party contractors
  - Project initiation tasks (planning, project management, securing resources)
  - Review of final design specifications, configuration reviews, interface implementations
  - Standing-up of test environment and testing infrastructure
  - Undertaking initial functional tests to ensure that OMS v 6.7.8 complies with functional requirements
  - Development of Phase 2 plans for further functional testing and performance reviews

- Results for Phase 1 IV&V will be reported to the Board by July 2022. The ITF will provide periodic reporting to the Board on the status of IV&V

- LIPA's IV&V schedule depends on prompt and urgent cooperation from PSEG Long Island. PSEG Long Island's ability to timely deliver on LIPA's asks from an IV&V perspective will be critical to project success

Discussion

FOR CONSIDERATION
February 17, 2022

TO: The Board of Trustees

FROM: Thomas Falcone

SUBJECT: Consideration of Adoption of Certain Isaias Task Force Implementation Plans

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Requested Action

The Board of Trustees (the "Board") of the Long Island Power Authority ("LIPA") is requested to approve a resolution adopting certain Isaias Task Force (the "Task Force") Project Implementation Plans ("PIPs"), which resolution is attached hereto as **Exhibit "A."**

Background

On Tuesday, August 4, 2020, Tropical Storm Isaias landed on Long Island with rain and wind gusts of up to 70 miles per hour. The resulting damage to the electrical system caused approximately 646,000 customer outages.

On August 5, LIPA's Chief Executive Officer initiated an independent investigation of the circumstances and root causes that led to well-documented lapses in PSEG Long Island's storm response. The Task Force was charged with providing actionable recommendations and overseeing PSEG Long Island's remediation activities.

The Task Force presented a 30-Day Report to the Board on September 23, 2020, and a 90-Day Report to the Board on November 18, 2020. As set forth in Appendix 2 and Appendix 3 of the 90-Day Report, the Task Force provided actionable recommendations for the Board's consideration (the "Task Force Recommendations").

Between November 2020 and December 2021, the Board adopted various PIPs for the Task Force Recommendations and directed PSEG Long Island to resubmit certain PIPs to address the Board's objectives better.

Additionally, between December 2020 and December 2021, the Board adopted recommendations covering certain other operational areas, including, but not limited to, risk management, budgeting and reporting, real estate, asset management, inventory management, collections, affiliate services, strategic planning, information technology, small generator interconnection, workforce management, and data access, among others (the "Management Recommendations").

In total, the Board has adopted 168 recommendations resulting in 146 PIPs, which are in various stages of Implementation by PSEG Long Island. The Board also directed the Task Force, together with PSEG Long Island, to implement the Task Force Recommendations, including creating

Project Implementation Plans (PIPS) and reporting to the Board at least quarterly until such Task Force and Management Recommendations are fully implemented.

Discussion of Implementation Plans

In December and January, PSEG Long Island submitted revised PIPs for 12 of the 14 Task Force and Management open recommendations. PSEG Long Island also submitted one deliverable for Task Force review.

The Task Force recommends the Board adopt four (4) of the 12 PIPs submitted by PSEG Long Island as attached hereto as **Exhibit "C"**.

PSEG Long Island has not yet submitted one revised PIP rejected in June on Strategic Planning. The revised 9 Plans shall be submitted by PSEG Long Island for Task Force review no later than March 10, 2022, for consideration at the Board's March meeting.

Recommendation

Based upon the foregoing, I recommend approval of the above requested action by adoption of a resolution in the form attached hereto.

Attachments

Exhibit "A" Resolution
Exhibit "B" Implementation Plans

Exhibit "A"

RESOLUTION ADOPTING THE ISAIAS TASK FORCE QUARTERLY REPORT AND CERTAIN IMPLEMENTATION PLANS

WHEREAS, on Tuesday, August 4, 2020, Tropical Storm Isaias landed on Long Island with rain and wind gusts of up to 70 miles per hour, resulting in damage to the electrical system and causing approximately 646,000 customer outages; and

WHEREAS, pursuant to Section 1020-f(y) of the Public Authorities Law, General Powers of the Authority, LIPA, in part, may "make any inquiry, investigation, survey or study which the authority may deem necessary to enable it effectively to carry out the provisions of this title. . .''; and

WHEREAS, on August 5, 2020, LIPA's Chief Executive Officer initiated an independent review of the circumstances and root causes that led to the lapses in PSEG Long Island's Tropical Storm Isaias storm restoration; and

WHEREAS, LIPA's Chief Executive Officer appointed an Isaias Task Force that was charged with both providing actionable recommendations and overseeing PSEG Long Island's remediation activities; and

WHEREAS, the Task Force presented the 30-Day Report to the Board at the September 23, 2020 Board Meeting and released it to the public; and

WHEREAS, on November 18, 2020, the Task Force presented the 90-Day Report, which provided recommendations to, among other things, (i) Change Management Incentives and Accountabilities; (ii) Reform Information Technology and Emergency Management; and (iii) Strengthen LIPA's Oversight (together with the 30-Day Report recommendations, the "Task Force Recommendations"); and

WHEREAS, the Board has adopted additional recommendations since December 2020 to address management deficiencies outside the scope of the Task Force review; and

WHEREAS, the Board has requested written Quarterly Reports with a comprehensive summary of the status of the implementation of all the Board-adopted recommendations until all such recommendations have been completed; and

WHEREAS, LIPA Staff has submitted to the Board four (4) Implementation Plans recommended for the Board's approval: and

NOW, THEREFORE, BE IT RESOLVED, the Board hereby adopts Implementation Plans for the Task Force and Management Recommendations attached hereto as **Exhibit "B"**; and

Dated: February 17, 2022

Exhibit "B"

PSEG Long Island

Project Implementation Plan

for

Isaias Task Force Recommendation Implementations

Recommendation No. 3.2.2.4

Project Title: 3.2.2.4 Automate monitoring of OMS and CAD performance at the application level to detect application failures and give administrators an opportunity to adjust the configuration settings that affect performance.

PIP History, Feedback, and Actions

On January 26th, LIPA provided feedback on the submitted Tier 1 and Tier 2 implementation plans. On February 2nd PSEG-LI provided documented responses to the feedback from LIPA for all rejected IT implementation plans. PSEG-LI and LIPA met to discuss the specific feedback and proposed path forward for this Implementation plan in a meeting on 2/09/2021. The below are the PSEG-LI responses to the feedback. In the meeting PSEG-LI and LIPA discussed the feedback. No agreement was reached in the meeting, LIPA requested that we provide supporting data, rationale and updates to the Project implementations plans. LIPA stated they would take the feedback and input into consideration in reviewing the plans.

LIPA Response January 27:

The revised plan is non-responsive to the Board's adopted recommendation. It does not address the objection raised in the earlier PIP submittal. Indeed, the monitoring system's deployment (Identified in the original PIP), the fundamental requirement of this recommendation, is somehow missing from the revised plan as a d eliverable. Details are still needed on monitoring objectives, identification of problem areas, context/baseline, scenarios are still missing. The technical approach is weak and does not speak to monitoring. It is focused on changes to the application or web services.

PSEG Long Island Actions:

- This PIP has been updated with the information shared in the slide deck "OMS Holistic Monitoring which was presented to LIPA in the February 9 "Monitoring 4.18, 3.2.2.4, 3.2.2.5, 3.2.2.7, 3.2.2.8: Holistic Monitoring Approach" meeting.
- Section 2 Project Deliverables now includes the latest date for deployment of the monitoring tool based on the current project plan (5/3/2021). This is based on the baseline dates for hardware installation, which is currently delayed. Once we evaluate the impacts of the hardware installation delays the schedule will be revised accordingly.
- As described in section 5.1.2 Approach to Address Monitoring Gaps and slide 5 in the attached deck, the project team will:
    - Complete requirements gathering for OMS and CAD application monitoring by the end of February
    - Review the feasibility for implementing a select number of high-priority monitoring enhancements with PSEG LI, CGI, and Xtensible in time for the v.6.7.x go-live
    - Translate these selected requirements into a Requirements Traceability Matrix for Monitoring High-Priority OMS Business Transactions to be submitted to LIPA by mid-March.
    - Concurrently, the project team will evaluate, select, and procure a monitoring tool and develop a detailed design to submit to LIPA by end of March.
- The objective of the overall monitoring solution can be found in the revised section 1.1 Project Purpose, Objectives, and Success Criteria. This information can also be found on slide 3 of the attached deck.
- The project team's assessment of the current state of OMS and CAD application-level monitoring and identified gaps can be found in the revised section 5.1.1 Current State Assessment. This refers to slide 13 in the attached deck.

- Section 5.1 Technical Approach has been revised to be more tailored to application-level monitoring of OMS and CAD. This references slide 13 in the attached deck.

On September 13th, LIPA and PSEG-LI had a meeting to discuss various recommendations, including 3.2.2.4. During the meeting, LIPA requested additional supporting documentation for the recommendation. PSEG-LI provided the required files on October 6th to move the recommendation from rejected to accepted. On November 23rd, LIPA had a meeting with PSEG-LI to discuss rejected PIPs and LIPA provided further comments. Below is a summary of the meeting, LIPA comments, and PSEG-LI actions.

LIPA Response September 13:
- *Provide RTM*
- *Provide updated milestones and deliverables for this PIP*

PSEG Long Island Actions:
- Submitted monitoring RTM document and updated project plan with milestones and deliverables on 10/6/21.

LIPA Response November 23:
- *Update the project plan to reflect milestones and dates as it stands today.*
- *Include a contingency plan to account for the case that OMS 6.7.8 go live to production slips further. This needs to consider ongoing operation with OMS 5.5 and its monitoring. Monitoring needs to be implemented before the next storm season.*
- *Add a test plan for testing the implementation of the proposed monitoring. This test plan must show the effectiveness of the monitoring system in catching various possible system failures during both blue sky and storm conditions.*

PSEG Long Island Actions:
- Updated 3.2.2.4 PIP to include:
    - Project Work Plan (reference section 4.1)
    - Contingency and Cutover Plan (reference section 4.5)
    - Splunk Test Plan (reference section 4.6)

Table of Contents

1. Project Definition

The OMS project is focused on improving the performance and reliability of the OMS and its ecosystem. The objective of this recommendation is to develop an automated system to proactively detect and notify PSEG support personnel to address failures in the OMS and CAD applications.

1.1. Project Purpose, Objectives, and Success Criteria

***Project Objectives*:** Automate monitoring of OMS and CAD performance at the application level to detect application failures and give administrators an opportunity to adjust the configuration settings that affect performance. The intent of the overall monitoring solution is to identify the source of errors, identify the root cause(s) of errors, monitor transactions across all the application layers, generate reconciliation reports for successful versus failed transactions, detect bad data, enable smart alerting on warnings and alarms, identify the channel for trouble calls, and provide E2E data integrity.

Project End State and Success Criteria: Evaluated and procured a monitoring tool (e.g., Splunk) and deployed monitoring solutions for high-priority OMS business transactions which provides and automates the ability to read log files and generate error alerts on application-level monitoring of OMS and CAD performance, providing administrators the ability to proactively monitor, detect and resolve application failures.

2. Project Deliverables:

Deliverable	Delivery Date	Comments
Requirements Traceability Matrix submitted to LIPA	3/15/2021	Revised version was shared on 10/6/2021 and updated again on 12/3/2021 with latest status.
Procurement of monitoring tool	3/26/2021	
Detailed design submitted to LIPA	3/31/2021	Submitted revised version 8/20/2021.
Standard Operating Procedure/ Pre-Storm Checklist / IT Runbook Updates Complete	4/2/2021	Submitted revised version 8/20/2021.
Deploy in 6.7 (Moving to production)	1/29/2022	
Test plan document for implementation of the proposed monitoring functionalities	12/03/2021	
Contingency plan for OMS 6.7.8 go live to production slipping	12/03/2021	

2.1. Assumptions, Dependencies, and Constraints

2.1.1 Assumptions:

- Monitoring of the v6.7 applications will employ the same monitoring methods currently in use on the OMS v5.5 system.
- CGI Vendor resources will be available to provide SME time and answer any questions on their applications
- Project implementation timeline is planned to complete all activities ahead of storm season
- Required environments will be available to perform testing of the OMS system and external integrations
- This implementation plan is only applicable to OMS v6.7
- Applicable Migration and Cutover Plans will be referenced.

2.1.2 Dependencies:

- CGI to make any required core development changes to the OMS v6.7 to enable performance
- Integrated testing of the OMS system with dependent vendors outlined in the Digital Channels and Telecom implementation plans, to provide outage information into the OMS
- The timeline to complete the migration and testing of recommendations is dependent on procurement of new hardware required for the re-platform of OMS v6.7
- Deployment date of monitoring tool dependent on timely selection and procurement of monitoring tool (e.g. Splunk, ELK and application insights)

2.1.3 Constraints:

- The number of qualified resources with subject matter expertise.
- Competing projects that further constrain available resources.
- Availability of vendor resources to provide application updates and support testing activities.

3. Project Structure

3.1. Internal Project Organization

The OMS Team and Testing Team along with support from various vendors will implement the OMS project

Role	Name	Responsibilities
Steering Committee	Dan Eichhorn (Chair) Zeeshan Sheikh Michael Sullivan Rick Walden	• Championing the PSEG LI Storm Restoration initiative • Establishing guiding principles for the project • Ensuring project activities remained aligned with the guiding principles as defined • Providing guidance and input on key project decisions • Challenging the project team where appropriate • Approving major changes to the project's scope, objectives, timelines, costs, etc. • Acting as the decision maker for issues requiring *escalation* • Removing institutional barriers when they arise by serving as a project advocate
Leadership	PSEG LI CIO – Greg Filipkowski Exec Dir, Special Proj – David Lyons	• Ensuring workstreams adhere to guiding principles as defined by project leadership • Managing issues and decision making • Removing obstacles that impede the success of the overall project Providing strategic guidance • Challenging the project team where appropriate • Approve procurement of external parties (as needed)
Team Lead	Camila Sierra Kirankumar Ramayanam	• Drive workstream tasks and deliver recommendations for Solution Design Specification • Provide support for Testing • Aid in the development *functional requirements* • Provide input on requirement / design • Coo*rdinating Business Resources to support the project* • Key Point of contact to for questions from the OMS vendor • Providing sign off for deliverables that require business *input/acceptance* • Delivering the OMS project on time and on budget
Workstream Lead	Vishnu Vardhan Reddy (ACN)	• Reporting overall status of the project to Stakeholders and Program Leadership • Identifying and escalating resource issues • Providing status reports for delivery to internal and external stakeholders (LIPA, DPS) • Manage resources*, schedule, issues, risks and change requests* • Process development, requirements definition, • Providing subject matter expertise to th*e project* • User Impact Analysis • Facilitating workshops
Performance Engineer	Sri Kanaparthy (ACN)	• Supporting Build/Test/Deploy Activities • Assist with Environment setup • Coordinating Development activities • Assist with Technical Design and Architecture • Assist with Transfer of Environments
Business Lead	Anthony Vota Mahamudul Chowdhury Gurkirat Singh Paul Mattera Matthew Otto	• Process development, requirements defini*tion, functional design* • Technical Design • Supporting vendor questions and workshops • Testing Execution
Test Lead	Miguel Ramos (ACN)	• Providing overall management across testing activities • Develop Test Strategy • Develop Test Data
Test Coordinator	Sikder Islam	• Test Coordination between Vendor and PSEG resources • Responsible for execution of Test Scripts • Test Script Development
Environment Lead	Anish Thomas Sohan Patel Vikas Vohra	• Technical Design development • Environment design support

OMS Developers and Subject Matter Advisors (CGI)	Peter Barnes Guillaume Simard-Lebrun Stephane Dumouchel Mark DeAgazio Neel Rana Jeffery Clark	• Responsible for working with PSEG LI to install and validate the OMS solution • Responsible for defect fixes and troubleshooting functional and performance issues

PSEG NJ IT Subject Matter Advisor	Damon LoBoi
	Michal Szopinski
	Timothy Weeks
	Michael Casella
	Ryan Wilson
	Ajith Elayidom
		• Subject Matter support with:
		  • Build/Test/Deploy Activities
		  • Assist with Environment setup
		  • Coordinating Development activities
		  • Assist with Technical Design and Architecture
		• Assist with Transfer of Environments

3.2. Other Stakeholders

Identification of other internal and external project stakeholders is shown below*:*

Organization/Team	Name	Responsibilities
Long Island Power Authority	Mujib Lodhi, Rick Shansky	• Overall oversight of the entire project portfolio
Department of Public Service	Joseph Suich, Kevin Wisely	• Overall oversight of the entire project portfolio

4. Project Plan

4.1. Project Work Plan

Project Work Plan Objectives

This project work plan below outlines implementation steps to Monitor application performance and error logs of all mission critical application systems, such as OMS, CAD, SCADA, ESB for v5.5 and to migrate that functionality to v6.7.

- Automate the real time data ingestion
- Monitoring Dashboards for NOC and OMS support team
- Triggering the alerts based on the configurable thresholds(Blue Sky and Storm mode)

Task Name	% Complete	Start Date	Finish Date
Monitoring Implementation Plan for 6.7 go live	**78%**	**Mon 11/2/20**	**Tue 1/29/22**
OMS - Webservice logs - complete ingestion, alerts & dashboard	*100%*	*Tue 6/1/21*	*Tue 6/30/21*
OMS - Priority 1 logs - Complete ingestion, alerts & dashboard	*100%*	*Mon 7/5/21*	*Thu 10/28/21*
OMS - Priority 1 logs - Splunk ingestion Dev/Test env [7]	100%	Mon 7/5/21	Wed 8/18/21
OMS - Priority 1 logs - Splunk Ingestion Prod env [7]	100%	Thu 8/19/21	Wed 9/8/21

OMS - Priority 1 logs - Splunk log analysis	100%	Wed 9/8/21	Thu 9/30/21
OMS - Priority 1 logs - Splunk alerts/dashboards	100%	Thu 9/30/21	Thu 10/28/21
OMS - Priority 2 logs - Complete ingestion, alerts & dashboard	*100%*	*Mon 7/5/21*	*Tue 12/14/21*
OMS - Priority 2 logs - Splunk ingestion Dev/Test env [43]	100%	Mon 7/5/21	Mon 8/30/21
OMS - Priority 2 logs - Splunk Ingestion Prod env [43]	100%	Mon 8/30/21	Fri 10/8/21
OMS - Priority 2 logs - Splunk log analysis	100%	Wed 9/22/21	Fri 10/29/21
OMS - Priority 2 logs - Splunk alerts/dashboards	100%	Mon 11/1/21	Tue 12/14/21
MS: CAD - Priority 1 logs - Completed ingestion, alerts & dashboard	*100%*	*Mon 7/5/21*	*Mon 11/29/21*
CAD - Priority 1 logs - Splunk ingestion Dev/Test env [3]	100%	Mon 7/5/21	Thu 8/19/21
CAD - Priority 1 logs - Splunk Ingestion Prod env [3]	100%	Thu 8/19/21	Wed 9/8/21
CAD - Priority 1 logs - Splunk log analysis	100%	Wed 9/8/21	Mon 11/15/21
CAD - Priority 1 logs - Splunk logs alerts/dashboards	100%	Fri 10/15/21	Mon 11/29/21
Report Automation (ESB,SCADA,Database,OMS)	75%	Mon 9/27/21	Mon 1/17/22
OMS Queue Monitoring	100%	Mon 9/27/21	Fri 10/15/21
Storm Monitoring Report [ESB, SCADA,OMS]	75%	Wed 9/1/21	Fri 1/7/22
GetOutageReports	100%	Fri 10/1/21	Fri 12/31/21
Monitoring Testing	75%	Mon 8/16/21	Sat 1/17/22
Requirements Documentation, Mock up, and Sign Off	75%	Wed 9/15/21	Mon 1/17/22
6.7 Log Analysis	100%	Wed 8/18/21	Fri 12/31/21
6.7 Go Live (Migration to production)	**0%**	**Sat 1/29/22**	**Sat 1/29/22**
6.7 Post Production Support	0%	Mon 1/31/22	Fri 2/11/22
Splunk Technical Architecture	92%	Mon 7/12/21	Sat 1/29/22
Splunk Existing Feed - Review	100%	Mon 7/12/21	Fri 10/15/21
Splunk Existing Feed - Enhancements	100%	Mon 10/18/21	Thu 10/21/21
Cont. Architecture Review/Documentation	100%	Mon 5/3/21	Mon 1/17/22
Splunk Architecture Detailed Design	100%	Mon 5/3/21	Mon 6/7/21
Splunk Messaging/Email	100%	Tue 6/1/21	Tue 9/14/21
Splunk Admin/SSH Access	100%	Tue 6/1/21	Fri 7/30/21
Assist with New User Onboarding	50%	Fri 10/1/21	Sat 1/29/22
Splunk Admin Tools	100%	Mon 8/16/21	Mon 10/4/21
Additional Systems Monitoring	**90%**	**Mon 5/3/21**	**Mon 1/17/22**
Database	**100%**	**Mon 7/26/21**	**Fri 10/15/21**
OEM Critical Errors	100%	Mon 7/26/21	Mon 8/30/21
DR Database	100%	Mon 7/26/21	Mon 8/30/21
Long-Running Queries	100%	Mon 7/26/21	Fri 10/15/21
Tablespace Usage	100%	Mon 7/26/21	Mon 8/30/21
Monitoring Testing	100%	Mon 8/30/21	Fri 10/15/21
Digital Channels	**100%**	**Mon 8/9/21**	**Fri 9/24/21**
HVCA Outage Reports	100%	Mon 8/9/21	Fri 9/24/21
Mobile App Outage Reports	100%	Mon 8/9/21	Fri 9/24/21
Monitoring Testing	100%	Mon 8/30/2021	Fri 10/15/2021

ESB	**75%**	**Mon 5/3/21**	**Mon 1/17/22**
Actional Report Enhancements	75%	Mon 8/2/21	Mon 1/17/22
Monitoring Testing	75%	Mon 8/30/21	Mon 1/17/22
OMS-Infrastructure Monitoring	**75%**	**Mon 8/9/21**	**Mon 1/17/22**
Xymon Heartbeat Monitoring	75%	Mon 8/9/21	Mon 1/17/22
Change Management	**72%**	**Thu 4/1/21**	**Fri 3/4/22**
Stakeholder Analysis	100%	Mon 5/3/21	Mon 8/16/21
Stakeholder Analysis	100%	Mon 5/3/21	Mon 8/16/21
Change Impact Assessment	100%	Fri 7/23/21	Fri 10/15/21
Process Documentation for Splunk Alert/Dashboards	90%	Mon 5/3/21	Fri 1/21/22
Splunk Web Based Basic User Training	100%	Thu 4/1/21	Wed 9/1/21
Splunk Web Based Basic User Training	100%	Thu 4/1/21	Wed 9/1/21
Training Execution	50%	Thu 4/1/21	Fri 1/21/22
User Adoption – Track user #s and logins	25%	Mon 8/2/21	Fri 3/4/22

4.2. Risk Management Plan

The table below outlines the applicable risks and associated risk mitigations for the Outage Management System project.

Category	Project Risk	Mitigation
Resources	Resource constraints from OMS team due to competing projects.	Assign and commit sufficient business and IT resources and they are available to support this project. As necessary, hire contract resources to back fill normal job responsibilities
Resources	No holistic solution owner from PSEG LI to oversee entirety of solution	PSEG LI to designate a resource to be the holistic oversight for entire solution
Resources	Availability of resources due to other Storm duty priorities	Careful prioritization of projects with LIPA recommendations as top priority in order to complete all tasks/milestones on time.
Schedule / Cost	The activities outlined in the OMS project become more complex than anticipated	Review the additional work required to complete the project with the steering committee. Add the scope required complete the project to the implementation plan. Clearly identify the steps that will be taken to anticipate this complexity in future projects.
Program Management	Lack of Scope/Requirements control including changes needed to legacy IT systems	The project scope has been defined; clear change control process will be established by the PMO to address requests for change
Program Management	Additional recommendations for improvement are developed and	Additional recommendations that have activities like those addressed in this project will be identified and logically grouped within

	will need to be added to this workstream	tracks. Resource requirements will be identified. Where necessary, contract resources will be hired to back fill normal job responsibilities
Resources	Availability of CGI resources to apply recommended changes to platform	Engage CGI early in detailed solutioning and clearly communicate requirements to CGI throughout development process
Resources	Effort confirmation based on detailed design may push out monitoring tool deployment	Align on high priority use cases/scenarios which will be incorporated into RTM

4.3. Issue Resolution Plan

Issues and risks will be identified by the PSEG LI Team and the PMO daily. These items will be logged in an issue/risk tracker. The information in the tracker will be reviewed by the steering committee each week. The steering committee will determine the appropriate actions (if necessary) to get the project on track. The issue/risk tracker will be used to track items to closure, identifying the resolution date and course of action taken.

4.4. LIPA Reporting Plan

Weekly status reports for all recommendations, containing project progress and documentation will be provided to LIPA by Zeeshan Sheikh, PSEG LI CIO (Interim).

4.5. Contingency and Cutover Plan

Current Splunk implementation strategy has two production versions running in parallel for **OMS 5.5 Prod** and **OMS 6.7 Pre-Prod environment**. Following is the high-level implementation strategy architecture diagram of these two versions.

OMS 5.5 – Real time log data is ingested into **pseg_oms & pseg_esb** Splunk indexes and all the related dashboards and alerts are configured in Splunk application named PSEG Monitoring. Alerts are configured to send the emails to NOC & OMS support team. This is currently monitored by OMS & NOC supported team in production.

OMS 6.7 pre-prod – Real time log data is ingested into **test_pseg_oms & test_pseg_esb** Splunk indexes and all the related dashboards and alerts are configured in Splunk application named **PSEG Monitoring 6.7**. Alerts are configured but no emails are triggered. This data is also used for validating the performance test results of 6.7.

With the current Splunk approach/strategy no specific contingency plan is required if there is a delay in OMS 6.7 go live date as OMS 5.5 Splunk production version will be available continuously monitor.

Embedded presentation has the details on the cut over Approach.

PSEG%20Splunk%20
–%205.5%20PROD%2

4.6. Splunk Test Plan

A Splunk test plan has been created and documented via a cause-and-effect matrix detailing limits and response for each of the functional requirements. Splunk Test plan is part of RTM document. Testing will be executed by either simulating/ injecting an error log or temporarily adjusting/modifying the alert thresholds to ensure emails are triggered for the NOC/OMS support team. Following alerts are tested with different threshold for Blue sky and Storm season. Alert thresholds are configurable in Splunk.

Alert	Blue Sky Threshold	Storm Threshold	Time Range	Email Alert
CAD CrewService API Errors	10	50	15 min	Yes
CAD SspCadAgent Service Errors	100	300	15 min	Yes
OMS InputCallProcessing CmsMgr High Response Time	5	10	15 min	Yes
OMS MPS to Middleware Bridge Errors	5	10	15 min	Yes
OMS OmsMgr Oracle Deadlock Error	1	1	15 min	Yes
OMS PragmaGeo CntMapGen High Response Time	5	10	15 min	Yes
OMS SCADA OMS Alarm Ingest Error	0 (no Data)	0 (no Data)	4 hrs	Yes
OMS SCADA PI Alarm Ingest Error	0 (no Data)	0 (no Data)	4 hrs	Yes
OMS SCADA WEB Alarm Ingest	0 (no Data)	0 (no Data)	4 hrs	Yes
OMS SCADA MultiSpeak Alarm Ingest Error	0 (no Data)	0 (no Data)	4 hrs	Yes
OMS SCADA Filter Alarm Ingest Error	0 (no Data)	0 (no Data)	15 min	Yes
WebService Cancel Customer Errors	10	100	15 min	Yes
WebService Confirm Customer_Errors	10	100	15 min	Yes
WebService Create Call Errors	10	100	15 min	Yes
WebService Logging Ingest Error	0 (no Data)	0 (no Data)	5 min	Yes
WebService Lost Middleware Connection Error	1	1	15 min	Yes
WebService Middleware Router Errors	1	1	15 min	Yes
WebService ProcessScadaEvent Errors	10	100	15 min	Yes
WebService High Response Time	50	60	15 min	Yes
WebService High Repeat Calls for Customer	20	100	15 min	Yes

5. Technical Execution Plan

5.1. Technical Approach

5.1.1 Current State Assessment

As was communicated in the February 9 meeting entitled "Monitoring 4.18, 3.2.2.4, 3.2.2.5, 3.2.2.7, 3.2.2.8: Holistic Monitoring approach", the project team has conducted an assessment of the current OMS and CAD monitoring schema which found that while error logs are generated, no monitoring of error logs occurs:

Monitoring Type	Assessment	Applications Monitored	Parameters Monitored	Findings
OMS Application	Broad enhancements needed	• OMS Application Server • OMS Web Server • Workstation • Incident Manager • PGEO • PWeb • PField • CAD	• N/A (Error logs are generated. However, no monitoring of error logs is in place)	• All OMS applications generate application logs • No monitoring or alerting of application logs in case of errors • Each application has multiple services. Each service generates its own log file. (Eg: OMS Application server has services like DBNotif.exe, MapGen.exe. Each service has separate log files)

5.1.2 Approach to Address Monitoring Gaps

- Complete gap analysis and requirements gathering in detailed design workshops with relevant business groups by end of February in order to identify high priority requirements
- Review feasibility of incorporating these changes in time for v6.7.x go-live with PSEG, Xtensible, and CGI by mid-March
- Produce Requirements Traceability Matrix for Monitoring High-Priority OMS Business Transactions and send to LIPA for review by mid-March
- Evaluate, select, and procure monitoring tool by 26-March
- Based on the outcome of the design workshops and the estimates for monitoring tool deployment the project team intends to complete pilot development of select high priority

requirements in time for v6.7.x go-live. Detailed design to be submitted to LIPA by end of March.

5.1.3 Configuration of Applications:

For any changes to configuration of applications, the vendor will be contacted when needed and internal infrastructure will be adjusted accordingly. Testing will be executed to verify changes are working as intended.

5.1.4 Changes to webservices:

Any required changes to existing webservices or development of new webservices will be developed on the preferred development platform at PSEG LI. Code will be reviewed and unit tested prior to deploying code to the test environment. SAT and SIT testing will occur in the test environment to verify functionality is working as intended.

5.2. Quality Assurance Plan

5.2.1 QA Methodology:

1. The team will adhere to the PSEG's IT standards for the deployment of this project.
2. PSEG LI IT SharePoint will be used as the document repository.
3. The deliverables will follow the following QA processes:
    a. Team lead review and signoff
    b. Peer Review (PSEG)
    c. Subject Matter Advisor Review as necessary
    d. PSEG Signoff by PSEGLI CIO and President & COO of PSEGLI
    e. Independent Verification and Validation by LIPA CIO

5.3. Documentation Plan

Throughout the project lifecycle the implementation team will document and deliver the key deliverables as listed above in Section 2. The due date of each deliverable will be based off the Project Schedule as outlined in Section 4.1. A final Project Closure Document will be delivered once all LIPA Recommendations in this implementation plan are completed.

Project Artifacts	Description
Standard Operating Procedure / IT Runbook	Documentation of routine operations processes
Pre-Storm Checklist	Steps to be taken prior to a storm event to ensure proper system configuration

Revision History

Name	Date	Reason for Changes	Version
Phillip Vallejo	12/10/2020	initial draft	1.0 draft 1
Kirankumar Ramayanam	12/10/2020	Reviewed and comments added	1.0 draft 2
Phillip Vallejo	12/11/2020	Updated to align with comments	1.0 draft 3
Laura Salgado/Brenda Mokua	2/11/2021	Added section to address LIPA feedback, modified Project Definition, Project Deliverables, Dependencies, Project Plan, Risk Management Plan, and Technical Execution Plan	2.0 draft 1
Kirankumar Ramayanam	2/17/2021	Reviewed and comments added	2.0 draft 2
Laura Salgado	2/17/2021	Updated to align with comments and updated project plan	2.0 draft 3
Laura Salgado	2/18/2021	Updated to align with legal feedback	2.0 draft 4
Laura Salgado	2/19/2021	Updated to reference OMS Holistic Monitoring deck in the feedback section up top	2.0 draft 5
Vishnu Reddy	12/7/2021	Updated Project Plan	3.0 draft 1
Terry Zasio Josh Galloway	12/9/2021	Updated Project Plan	3.0 draft 2
Brenda Mokua	12/14/2021	Updated Org Chart	3.0 draft 3
Brenda Mokua	12/15/2021	Updated PIP History	3.0 draft 4
Terry Zasio Josh Galloway	1/4/2022	Updated Deliverables Section Updated Project Plan	3.0 draft 5
Vishnu Reddy	1/5/2022	Updated Project plan	3.0 draft 6

PSEG Long Island

Project Implementation Plan

for

Isaias Task Force Recommendation Implementations

Recommendation No. 4.18

Project Title: Monitor application performance and error logs of all mission critical application systems, such as OMS, CAD, SCADA, ESB, etc.

PIP History, Feedback, and Actions

On January 26th, LIPA provided feedback on the submitted Tier 1 and Tier 2 implementation plans. On February 2nd PSEG-LI provided documented responses to the feedback from LIPA for all rejected IT implementation plans. PSEG-LI and LIPA met to discuss the specific feedback and proposed path forward for this Implementation plan in a meeting on 2/09/2021. The below are the PSEG-LI responses to the feedback. In the meeting PSEG-LI and LIPA discussed the feedback. No agreement was reached in the meeting, LIPA requested that we provide supporting data, rationale and updates to the Project implementations plans. LIPA stated they would take the feedback and input into consideration in reviewing the plans.

LIPA Response January 27:
"The revised plan is non-responsive to the Board's adopted recommendation. It does not fully address the objections raised in the earlier PIP submittal. More details needed on monitoring objectives, identifying problem areas, context/baseline, and scenarios are missing. The timeline for implementation of 5/21 is too long. Please provide an updated detailed project schedule by subtasks and accelerate project completion based on removing OMS 6.7 fix dependency. Implement a comprehensive monitoring solution for OMS 5.5, currently in production. Implement a solution that can easily be ported to OMS 6.7 without much reengineering when 6.7 is ready. Consider setting up priorities within systems/applications based on criticality levels. The technical approach section is weak. Consider performing the gap analysis on the capabilities of current monitoring application/s used at PSEG LI. The plan assumes that off-the-shelf monitoring tools will satisfy the requirements.

PSEG Long Island Actions:

- This PIP has been updated with the information shared in the slide deck "OMS Holistic Monitoring (attached) which was presented to LIPA in the February 9 "Monitoring 4.18, 3.2.2.4, 3.2.2.5, 3.2.2.7, 3.2.2.8: Holistic Monitoring Approach" meeting.
- Further details on monitoring objectives have been added to Section 1.1 Project Purpose, Objectives, and Success Criteria. This information is also captured in slide 3 of the attached deck.
- As shown in Section 4 Project Plan, the project plan has been updated to remove the OMS 6.7 fix dependency and reflects the original baseline go-live date of 5/3. This is based on the baseline dates for hardware installation, which is currently delayed. Once we evaluate the impacts of the hardware installation delays the schedule will be revised accordingly.
- In response to the Board's concern over the implementation timeline and the Board's recommendation to build a monitoring solution for OMS 5.5, the project team will:
    - Consult with PSEG LI business stakeholders through the remainder of February to identify and prioritize storm season fixes from the backlog which can be addressed without the new monitoring tool and be incrementally released between March and April to v5.5, as shown in Section 2 Project Deliverables.
    - Evaluate and procure a new monitoring tool in consultation with relevant stakeholders from PSEG LI, CGI, and Xtensible by end of March.
    - Detailed requirements to be submitted to LIPA by end of March.
    - Please refer to PIP 3.2.2.4 for more details on the implementation timeline.
    - This schedule aligns with the timeline in slide 5 of the attached deck.

- More details on the current state monitoring assessment, identified gaps, and the approach to implement proposed storm season fixes before the v6.7.x go-live can be found in the revised Section 5 Technical Execution Plan and in slides 12 and 13 of the attached deck.

On September 13th, LIPA and PSEG-LI had a meeting to discuss various recommendations, including 4.18. During the meeting, LIPA requested additional supporting documentation for the recommendation. PSEG-LI provided the required files on October 6th to move the recommendation from rejected to accepted. On November 23rd, LIPA had a meeting with PSEG-LI to discuss rejected PIPs and LIPA provided further comments. Below is a summary of the meeting, LIPA comments, and PSEG-LI actions.

LIPA Response September 13:
- *Set up a separate discussion around scenario document, automation, and any potential gaps*
- *Provide LIPA with a scenario document: potential failures, benefits of monitoring, actions taken, scenario testing*

PSEG Long Island Actions:
- Submitted monitoring RTM document on 10/6/21

LIPA Response November 23:
- *Include a plan to develop and deliver a detailed requirements document for business system monitoring, digital channel monitoring and OMS Application monitoring.*
- *Update the proposed project plan to reflect current dates.*
- *Provide a separate project plan for implementing monitoring for each system.*

PSEG Long Island Actions:
- Updated 4.18 PIP to include:
    - Project Work Plan (reference section 4.1)

Table of Contents

1. Project Definition

The OMS project is focused on improving the performance and reliability of the OMS and its ecosystem. The objectives of the OMS System Monitoring (recommendation 4.18) are to implement a tool to track application performance and analyze application error logs of all critical components of the OMS and supporting infrastructure.

1.1. Project Purpose, Objectives, and Success Criteria

Project Objectives: Implement a solution to monitor application performance and error logs of all mission critical application systems, such as OMS, CAD, SCADA, ESB, etc. The intent of the overall monitoring solution is to identify the source of errors, identify the root cause(s) of errors, monitor transactions across all the application layers, generate reconciliation reports for successful versus failed transactions, detect bad data, enable smart alerting on warnings and alarms, identify the channel for trouble calls, and provide E2E data integrity and loss monitoring.

Project End State and Success Criteria*:* All mission critical applications are monitored for performance against operational requirements. Application logs are monitored for warnings and errors that may indicate imminent application failures. Measured real-time performance and application metrics are consolidated into a single view to facilitate monitoring by the NOC. Processes and procedures including thresholds and corrective or preventative actions are established, documented, tested, and support personnel trained to provide resolution. The intent of the overall monitoring solution is to provide traceability for transactions, early detection of slowness, early detection of unresponsiveness, early detection of overconsumption of resources, and the ability to intelligently identify issues across all application layers.

This expands on the specific monitoring recommendations in the 30-Day Report (3.2.2.4, 3.2.2.5, 3.2.2.6, 3.2.2.7, 3.2.2.8 and 3.2.4.2) to encompass structured and documented monitoring of all mission critical systems.

2. Project Deliverables:

Deliverable	Delivery Date	Comments
Requirement's prioritization of short-term fixes	End Feb	
Monthly releases of short-term fixes	Between March and April	
Requirements Traceability Matrix for Monitoring High-Priority OMS Business Transactions submitted to LIPA	3/15/2021 - for v5.5 12/31/2021 - for v6.7	
Monitoring tool procurement	3/26/2021	
Detailed design submitted to LIPA	3/31/2021	
Standard Operating Procedure/ Pre-Storm Checklist / IT Runbook Updates Complete	4/2/2021 – for v5.5 01/30/2022 - for v6.7	Completed it for 5.5, will make changes for 6.7
Deploy in 6.7 (Moving to production)	2/4/2022	
Separate Project Plan for Implementing Monitoring of each System (OMS, CAD, SCADA, ESB, etc.)	1/21/2022	See section 4.1 for detailed project plan.

Detailed requirements document for business system monitoring, digital channel monitoring and OMS Application monitoring.	03/11/2022	For OMS application requirements – Please refer to PSEGLI_Monitoring_RTM_v6.xlsx document

2.1. Assumptions, Dependencies, and Constraints

2.1.1 Assumptions:

- Commercial off the shelf applications will be evaluated to provide the functionality required to monitor performance and application logging of error conditions across the OMS eco-system. Once an application has been selected, a design solution will be created and implemented.
- CGI Vendor resources will be available to provide SME time and answer any questions on their applications
- Project implementation timeline is planned to complete all activities ahead of storm season
- New OMS functionality is out of scope
- Required environments will be available to perform testing of the OMS system and integration points with Digital Channels
- This implementation plan is only available to OMS v6.7. If implementation of the OMS v6.7 is delayed, the monitoring functionality described in this document will be implemented in the OMS v5.5 environment.

2.1.2 Dependencies:

- CGI to make any required core development changes to the OMS v6.7 to enable performance
- Integrated testing of the OMS system with dependent vendors outlined in the Digital Channels and Telecom implementation plans, to provide outage information into the OMS
- CGI is required to make any necessary modifications to the OMS web services to provide outage status and report outages
- The timeline to complete the recommendations is dependent on procurement of new hardware required for the re-platform of OMS v6.7
- The timeline is dependent on alignment of overall test approach for all workstreams (OMS, Digital Channels, Telecom, Field Mobility) between PSEG LI and LIPA

2.1.3 Constraints:

- The number of qualified resources with subject matter expertise.
- Competing projects that further constrain available resources.
- Availability of vendor resources to provide application updates and support testing activities.

3. Project Structure

3.1. Internal Project Organization

The OMS Team and Testing Team along with support from various vendors will implement the OMS project.

Role	Name	Responsibilities
Steering Committee	Dan Eichhorn (Chair) Zeeshan Sheikh Michael Sullivan Rick Walden	• Championing the PSEG LI Storm Restoration initiative • Establishing guiding principles for the project • Ensuring project activities remained aligned with the guiding principles as *defined* • Providing guidance and input on *key project decisions* • Challenging the project team where appropriate • Approving major *changes to the project's scope, objectives, timelines, costs, etc.* • Acting as the decision maker for issues requiring *escalation* • Removing institutional barriers when *they arise by serving as a project advocate*
Leadership	PSEG LI CIO – Greg Filipkowski Exec Dir, Special Proj – David Lyons	• Ensuring *workstreams adhere to guiding principles as defined by project leadership* • Managing issues and decision making • Removing *obstacles that impede the success of the overall project Providing strategic guidance* • Challenging the project team where appropriate • Approve procurement of external parties (as needed)
Team Lead	Camila Sierra Kirankumar Ramayanam	• Drive workstream tasks and deliver recommendations for Solution Design Specification • Provide support for Testing • Aid in the development *functional requirements* • Provide input on requirement / design • Coordinating *Business Resources to support the project* • Key Point of contact to for questions from the OMS vendor • Providing sign off for deliverables that require business *input/acceptance* • Delivering the OMS project on time and on budget
Workstream Lead	Vishnu Vardhan Reddy (ACN)	• Reporting overall status of the project to Stakeholders and Program Leadership • Identifying and escalating resource issues • Providing status reports for delivery to internal and external stakeholders (LIPA, DPS) • Manage resources, *schedule, issues, risks and change requests* • Process development, requirements definition, • Providing subject matter expertise to the *project* • User Impact Analysis • Facilitating workshops
Performance Engineer	Sri Kanaparthy (ACN)	• Supporting Build/Test/Deploy Activities • Assist with Environment setup • Coordinating Development activities • Assist with Technical Design and Architecture • Assist with Transfer of Environments
Business Lead	Anthony Vota Mahamudul Chowdhury Gurkirat Singh Paul Mattera Matthew Otto	• Process development, requirements definition, *functional design* • Technical Design • Supporting vendor questions and workshops • Testing Execution
Test Lead	Miguel Ramos (ACN)	• Providing overall management across testing activities • Develop Test Strategy • Develop Test Data
Test Coordinator	Sikder Islam	• Test Coordination between Vendor and PSEG resources • Responsible for execution of Test Scripts • Test Script Development
Environment Lead	Anish Thomas Sohan Patel Vikas Vohra	• Technical Design development • Environment design support
OMS Developers and Subject Matter Advisors (CGI)	Peter Barnes Guillaume Simard-Lebrun Stephane Dumouchel Mark DeAgazio Neel Rana	• Responsible for working with PSEG LI to install and validate the OMS solution • Responsible for defect fixes and troubleshooting functional and performance issues

	Jeffery Clark	

PSEG NJ IT Subject Matter Advisor	Damon LoBoi
	Michal Szopinski
	Timothy Weeks
	Michael Casella
	Ryan Wilson
	Ajith Elayidom
		• Subject Matter support with:
		  • Build/Test/Deploy Activities
		  • Assist with Environment setup
		  • Coordinating Development activities
		  • Assist with Technical Design and Architecture
		• Assist with Transfer of Environments

3.2. Other Stakeholders

Identification of other internal and external project stakeholders is shown below*:*

Organization/Team	Name	Responsibilities
Long Island Power Authority	Mujib Lodhi	• Overall oversight of the entire project portfolio
Department of Public Service	Joseph Suich, Kevin Wisely	• Overall oversight of the entire project portfolio

4. Project Plan

4.1. Project Work Plan

This project work plan below outlines implementation steps to Monitor application performance and error logs of all mission critical application systems, such as OMS, CAD, SCADA, ESB for v5.5 and to migrate that functionality to v6.7.

Project plan for business system monitoring and digital channel monitoring requirements will be published and following are the timelines

Digital Channels & Business system monitoring

Task Name	% Complete	Start Date	End Date
Detailed requirements document for business system monitoring, digital channel monitoring and OMS Application monitoring.	0	2/21/2022	3/11/2022
Detailed Project Plan	0	3/14/2022	3/18/2022

OMS Application

Task Name	% Complete	Start Date	Finish Date
Monitoring Implementation Plan for 6.7 go live	**95%**	**Mon 11/2/20**	**Fri 2/18/22**
OMS - Webservice logs - complete ingestion, alerts & dashboard	*100%*	*Tue 6/1/21*	*Tue 6/30/21*
OMS - Priority 1 logs - Complete ingestion, alerts & dashboard	*100%*	*Mon 7/5/21*	*Thu 10/28/21*
OMS - Priority 1 logs - Splunk ingestion Dev/Test env [7]	100%	Mon 7/5/21	Wed 8/18/21
OMS - Priority 1 logs - Splunk Ingestion Prod env [7]	100%	Thu 8/19/21	Wed 9/8/21
OMS - Priority 1 logs - Splunk log analysis	100%	Wed 9/8/21	Thu 9/30/21
OMS - Priority 1 logs - Splunk alerts/dashboards	100%	Thu 9/30/21	Thu 10/28/21
OMS - Priority 2 logs - Complete ingestion, alerts & dashboard	*100%*	*Mon 7/5/21*	*Tue 12/14/21*
OMS - Priority 2 logs - Splunk ingestion Dev/Test env [43]	100%	Mon 7/5/21	Mon 8/30/21
OMS - Priority 2 logs - Splunk Ingestion Prod env [43]	100%	Mon 8/30/21	Fri 10/8/21
OMS - Priority 2 logs - Splunk log analysis	100%	Wed 9/22/21	Fri 10/29/21
OMS - Priority 2 logs - Splunk alerts/dashboards	100%	Mon 11/1/21	Tue 12/14/21
MS: CAD - Priority 1 logs - Completed ingestion, alerts & dashboard	*100%*	*Mon 7/5/21*	*Mon 11/29/21*
CAD - Priority 1 logs - Splunk ingestion Dev/Test env [3]	100%	Mon 7/5/21	Thu 8/19/21
CAD - Priority 1 logs - Splunk Ingestion Prod env [3]	100%	Thu 8/19/21	Wed 9/8/21
CAD - Priority 1 logs - Splunk log analysis	100%	Wed 9/8/21	Mon 11/15/21
CAD - Priority 1 logs - Splunk logs alerts/dashboards	100%	Fri 10/15/21	Mon 11/29/21
Report Automation (ESB, SCADA, Database, OMS)	**100%**	**Mon 8/16/21**	**Sat 1/29/22**
OMS Queue Monitoring	100%	Mon 9/27/21	Fri 10/15/21
Storm Monitoring Report [ESB, SCADA, OMS]	100%	Wed 9/1/21	Sat 1/29/22
Get Outage Reports	100%	Fri 10/1/21	Fri 12/31/21
Monitoring Testing	100%	Mon 8/16/21	Sat 1/29/22
Requirements Documentation, Mockup, and Sign Off	100%	Wed 9/15/21	Sat 1/29/22
6.7 Log Analysis	100%	Wed 8/18/21	Fri 12/31/21
6.7 Go Live (Migration to production)	**0%**	**Fri 2/5/22**	**Fri 2/18/22**
6.7 Post Production Support	0%	Fri 2/5/22	Fri 2/18/22
Splunk Technical Architecture	**100%**	**Mon 5/3/21**	**Sat 1/29/22**
Splunk Existing Feed - Review	100%	Mon 7/12/21	Fri 10/15/21
Splunk Existing Feed - Enhancements	100%	Mon 10/18/21	Thu 10/21/21
Cont. Architecture Review/Documentation	100%	Mon 5/3/21	Mon 1/17/22
Splunk Architecture Detailed Design	100%	Mon 5/3/21	Mon 6/7/21
Splunk Messaging/Email	100%	Tue 6/1/21	Tue 9/14/21

Splunk Admin/SSH Access	100%	Tue 6/1/21	Fri 7/30/21
Assist with New User Onboarding	100%	Fri 10/1/21	Sat 1/29/22
Splunk Admin Tools	100%	Mon 8/16/21	Mon 10/4/21
Additional Systems Monitoring	**100%**	**Mon 8/30/21**	**Sat 1/29/22**
Database	**100%**	**Mon 8/30/21**	**Fri 10/15/21**
OEM Critical Errors	100%	Mon 7/26/21	Mon 8/30/21
DR Database	100%	Mon 7/26/21	Mon 8/30/21
Long-Running Queries	100%	Mon 7/26/21	Fri 10/15/21
Tablespace Usage	100%	Mon 7/26/21	Mon 8/30/21
Monitoring Testing	100%	Mon 8/30/21	Fri 10/15/21
Digital Channels	**100%**	**Mon 8/30/21**	**Fri 10/15/21**
HVCA Outage Reports	100%	Mon 8/9/21	Fri 9/24/21
Mobile App Outage Reports	100%	Mon 8/9/21	Fri 9/24/21
Monitoring Testing	100%	Mon 8/30/21	Fri 10/15/21
ESB	**100%**	**Mon 8/30/21**	**Sat 1/29/22**
Actional Report Enhancements	100%	Mon 8/2/21	Sat 1/29/22
Monitoring Testing	100%	Mon 8/30/21	Sat 1/29/22
OMS-Infrastructure Monitoring	100%	**Mon 8/9/21**	**Sat 1/29/22**
Xymon Heartbeat Monitoring	100%	Mon 8/9/21	Sat 1/29/22
Change Management	**72%**	**Mon 8/2/21**	**Fri 2/18/22**
Stakeholder Analysis	100%	Mon 5/3/21	Mon 8/16/21
Stakeholder Analysis	100%	Mon 5/3/21	Mon 8/16/21
Change Impact Assessment	100%	Fri 7/23/21	Fri 10/15/21
Process Documentation for Splunk Alert/Dashboards	100%	Mon 5/3/21	Fri 1/21/22
Splunk Web Based Basic User Training	100%	Thu 4/1/21	Wed 9/1/21
Splunk Web Based Basic User Training	100%	Thu 4/1/21	Wed 9/1/21
Training Execution	50%	Thu 4/1/21	Fri 2/18/22
User Adoption – Track user #s and logins	75%	Mon 8/2/21	Fri 2/18/22

4.2. Risk Management Plan

Issues and risks will be identified by the PSEG LI Team and the PMO daily. These items will be logged in an issue/risk tracker. The information in the tracker will be reviewed by the steering committee each week. The steering committee will determine the appropriate actions (if necessary) to get the project on track. The issue/risk tracker will be used to track items to closure, identifying the resolution date and course of action taken.

The table below outlines the applicable risks and associated risk mitigations for the Outage Management System project.

Category	Project Risk	Mitigation
Resources	Resource constraints from OMS team due to competing projects.	Assign and commit enough business and IT resources and they are available to support this project. As necessary, hire contract resources to back fill normal job responsibilities

Resources	No holistic solution owner from PSEG LI to oversee entirety of solution	PSEG LI to designate a resource to be the holistic oversight for entire solution
Resources	Availability of resources due to other Storm duty priorities	Careful prioritization of projects with LIPA recommendations as top priority to complete all tasks/milestones on time.
Schedule / Cost	Contract negotiation could delay project due to multiple vendor partners involved for making changes to the entire architecture	PSEG LI to expedite contract approvals and determine if there are options for performing some work internally
Schedule / Cost	Vendor delays cause the schedule to shift and key project milestones are not able to be met on time	Work with the vendor to quickly resolve impediments.
Schedule / Cost	The activities outlined in the OMS project become more complex than anticipated	Review the additional work required to complete the project with the steering committee. Add the scope required complete the project to the implementation plan. Clearly identify the steps that will be taken to anticipate this complexity in future projects.
Schedule / Cost	All project activities are dependent on the successful receipt and installation of new hardware and application installation of OMS v6.7. If the hardware is delayed all project activities for this project will be impacted.	Closely monitor delivery of hardware and perform as many tasks as possible in parallel to mitigate any potential delays.
Program Management	Lack of Scope/Requirements control including changes needed to legacy IT systems	The project scope has been defined; clear change control processes will be established by the PMO to address requests for change.
Program Management	Additional recommendations for improvement are developed and will need to be added to this workstream	Additional recommendations that have activities like those addressed in this project will be identified and logically grouped within tracks. Resource requirements will be identified. Where necessary, contract resources will be hired to back fill normal job responsibilities
Resources	Availability of CGI resources to apply recommended changes to platform	Engage CGI early in detailed solutioning and clearly communicate requirements to CGI throughout development process
Resources	Effort confirmation based on detailed design may push out monitoring tool deployment	Align on high priority use cases/scenarios which will be incorporated into RTM

4.3. Issue Resolution Plan

Issues and risks will be identified by the PSEG LI Team and the PMO daily. These items will be logged in an issue/risk tracker. The information in the tracker will be reviewed by the steering committee each week. The steering committee will determine the appropriate actions (if necessary) to get the project on track. The issue/risk tracker will be used to track items to closure, identifying the resolution date and course of action taken.

4.4. LIPA Reporting Plan

Weekly status reports for all recommendations, containing project progress and documentation will be provided to LIPA by Zeeshan Sheikh, PSEG LI CIO (Interim).

5. Technical Execution Plan

5.1. Technical Approach

5.1.1 Current State Assessment

The project team has conducted an assessment of the current monitoring landscape at PSEG which yielded the findings described below. Logs are created from the source. ESB has actional monitoring. The project team will put in a solution which will read the logs coming from the mission critical application systems including CAD, OMS, and ESB:

Monitoring Type	Assessment	Applications/ Databases / Services Monitored	Parameters Monitored	Findings

ESB	Minor enhancements needed	All services running in ESB. Below are the key services related to OMS:
		• ManageTroubleTicket
		  • GetTroubleTicket
		  • SubmitTroubleTicket
		• PublishCustomerAccount
		• Incident (adaptoriFactorGetOutages)
		  • GetOutages
		  • GetMSTCTickets
		• PlannedOutage
		• SystemReliabilityProject
		• ManageCustomerAccount
			• Actional agents installed
			• Policies set up for API interactions to either designate warnings or alarms
			• Additional reports distributed 3x daily during
				• Actional reports are published on a frequent basis which capture transaction time, warnings, and alarms. (e.g.: alarms are set for transactions running over a certain duration)
				• Recurring errors are rolled up into error buckets
				• ESB application

		ManageIdentity	"blue sky" and hourly during storms (e.g., # transactions, response time)	containers are monitored using Sonic Management Console (SMC) however no Actional alarms/warnings are configured

OMS Application	Broad enhancements needed	• OMS Application Server
		• OMS Web Server
		• Workstation
		  • Incident Manager
		  • PGEO
		• PWeb
		• PField
		• CAD
			• N/A (Error logs are generated. However, no monitoring of error logs is in place)
			•
				• All OMS applications generate application logs
				• No monitoring or alerting in case of errors
				• Each application has multiple services. Each service generates its own log file. (E.g.: OMS Application server has services like DBNotif.exe, MapGen.exe. Each service has separate log files)

5.1.2 Approach to Address Gaps

- The monitoring solution will allow for configurable proactive alerts to be sent for OMS in case of response time exceeding threshold values
- Complete gap analysis and requirements gathering in detailed design workshops with relevant business groups by end of February to identify high priority requirements
- Review feasibility of incorporating these changes in time for v6.7.x go-live with PSEG, Xtensible, and CGI by mid-March
- Produce Requirements Traceability Matrix for Monitoring High-Priority OMS Business Transactions and send to LIPA for review by mid-March
- Evaluate, select, and procure monitoring tool by 26-March

- Provide detailed design to LIPA by end of March
- Review backlog items which can be addressed without monitoring tool. These will be incrementally released between March and April.
- The intent is to deploy a monitoring tool to detect failures and raise alerts for high-priority business transactions in time for the v.6.7.x go-live. (Refer to PIP 3.2.2.4 for detailed implementation plan for monitoring tool deployment.)
- The incremental releases and the new monitoring tool will be on v5.5.

5.1.3 Proposed Storm Season Fixes

The project team has aligned with PSEG LI stakeholders, CGI, and Xtensible on the below list of fixes which, based on current assessment, should be able to be delivered in time for storm season:

ESB	Set up alerts on Actional Management Server when there are errors on the containers.
	Refine existing set of rules to help filter out" static". For example, it may not make sense to send an email for every response time alarm.
OMS/CAD Applications	Analyze current log files to understand if following metrics can be captured for key high volume business processes. Transaction name, Execution Time, Success (Y/N), Error counts. (This analysis will be input to requirements for monitoring solution using tool.)
	Enable Heartbeat monitoring for all services (extend this monitoring solution to all front-end applications e.g., MyAccount and Municipal Portal & Outage Map)
	Tool evaluation (e.g., Splunk) to read log files and generate error alerts, real-time monitoring, reports

5.1.4 Configuration of Applications:

For any changes to configuration of applications, the vendor has been contacted and internal infrastructure will be adjusted accordingly. Testing will be executed to verify changes are working as intended.

5.1.5 Configuration of Monitoring application:

The workplan has been developed to include an evaluation of commercial off the shelf applications to assess best-in-class tools for application monitoring. Selection and procurement of a monitoring tool will follow PSEG LI standard procedures. Test plans will be developed to validate the configuration and verify that all required operational parameters are monitored and that thresholds and tolerances are correctly configured in the application.

Testing will be performed on v6.7 to verify the monitoring functions are working as intended. Once the accepted, the monitoring application will be migrated into the production environment followed by verification and acceptance by IT and operational organizations.

5.2. Quality Assurance Plan

5.2.1 QA Methodology:

1. The team will adhere to the PSEG's IT standards for the deployment of this project.
2. PSEG LI IT SharePoint will be used as the document repository.
3. The deliverables will follow the following QA processes:
    a. Team lead review and signoff
    b. Peer Review (PSEG)
    c. Subject Matter Advisor Review as necessary
    d. PSEG Signoff by PSEGLI CIO and President & COO of PSEGLI
    e. Independent Verification and Validation by LIPA CIO

5.3. Documentation Plan

Throughout the project lifecycle the implementation team will document and deliver the key deliverables as listed above in Section 2. The due date of each deliverable will be based off the Project Schedule as outlined in Section 4.1. A final Project Closure Document will be delivered once all LIPA Recommendations in this implementation plan are completed.

Project Artifacts	Description
Requirements Traceability Matrix	Documentation of the project requirements and related artifacts
Test Strategy & Plans	Test cases & test data are meeting the design requirements
Test Execution Results	Test results indicate the design requirements accomplished.
Operational / Standard Operating Procedure Document	Production Support team including all applicable Production Acceptance, SAP Change Management and IT Change Management documentation and approvals
Go-Live Confirmation Document	The application has been put into production environment and the Company's end users can access and use the application and its functionality as designed

Revision History

Name	Date	Reason for Changes	Version
Phillip Vallejo	12/9/2020	initial draft	1.0 draft 1
Phillip Vallejo	1/12/2021	Solution updated to Out of Box Software	1.1
Laura Salgado/Brenda Mokua	2/11/2021	Added section to address LIPA feedback, modified Project Definition, Project	2.0 draft 1

		Deliverables, Dependencies, Risk Management Plan, Project Plan, and Technical Execution Plan	
Kirankumar Ramayanam	2/17/2021	Reviewed and comments added	2.0 draft 2
Laura Salgado	2/17/2021	Updated in line with comments and updated project plan	2.0 draft 3
Laura Salgado	2/18/2021	Updated project plan for 5/3 go-live	2.0 draft 4
Laura Salgado	2/19/2021	Updated feedback/history section to reference attached "OMS Holistic Monitoring" slide deck	2.0 draft 5
Vishnu Reddy	12/7/2021	Updated Project Plan	3.0 draft 1
Terry Zasio Josh Galloway	12/9/2021	Updated Project Plan	3.0 draft 2
Brenda Mokua	12/14/2021	Updated Org Chart	3.0 draft 3
Brenda Mokua	12/15/2021	Updated PIP History	3.0 draft 4
Terry Zasio Josh Galloway	1/4/2022	Updated Project Deliverables Updated Project Plan	3.0 draft 5
Vishnu Reddy	2/2/2022	Updated Project Plan	4.0 draft 1

PSEG Long Island
Project Implementation Plan

for

Isaias Task Force Recommendation Implementations

Project Title: Integration and Operation of AMI with OMS

Recommendation No.:

LIPA ID	Recommendation
5.4.2	Accelerating the full integration of smart meters with OMS so that outage reports will be available to OMS more rapidly and embedded outages (i.e., small-scale outages downstream of larger-scale outages) will be more readily identified, thus enhancing the efficiency of job dispatch.
4.20	Accelerate the testing and integration of AMI data to the OMS system.
4.21	Complete the integration of the MDMS and OMS to report the meters' power restoration events.

PIP History, Feedback and Actions

On January 26th, LIPA provided feedback on the submitted Tier 1 and Tier 2 implementation plans. On February 2nd PSEG-LI provided documented responses to the feedback from LIPA for all rejected IT implementation plans. PSEG-LI and LIPA met to discuss the specific feedback and proposed path forward for this Implementation plan in a meeting on 2/09/2021. The below are the PSEG-LI responses to the feedback. In the meeting PSEG-LI and LIPA discussed the feedback. No agreement was reached in the meeting, LIPA requested that we provide supporting data, rationale and updates to the Project implementations plans. LIPA stated they would take the feedback and input into consideration in reviewing the plans.

LIPA Response #1: *We do not see the justification for linking this project with OMS fixes and thereby delaying project execution. Please provide a detailed project schedule by subtasks and accelerate project completion based on removing the dependency of OMS 6.7 fixes. Please also describe the scope of implementation by requirements or features to be implemented.*

PSEG Long Island Actions:

- The start date of the project was moved from March to January (project kick-off was 1/4/21) and go-live date pulled forward (from October to August)
- A detailed project schedule was submitted outlining the entire project lifecycle
- Use cases describing the functionality being deployed were included in the resubmission of the implementation plan

LIPA Response #2: *The revised plan is non-responsive to the Board's adopted recommendation. It does not fully address the objection raised in the earlier PIP submittal. Please provide updated detailed project schedule by subtasks and accelerate project completion based on removing dependency of OMS 6.7 fixes. Please also describe the scope of implementation by requirements or features to be implemented.*

PSEG Long Island Actions:

- Project team performed a deep dive schedule "What If" analysis of switching courses and implementing integrations on OMS v5.5. Analysis resulted in a potential go-live date of early to mid-June which is after target OMS 6.7 go-live date. Primary drivers of June date are –
    - Development/Testing required to implement changes/learnings from 2020 parallel operations
        - Additional development required to throttle the number of single outages coming into OMS
        - Ability to deactivate the AMI interface upstream of OMS
- AMI-OMS Implementation Plan review with LIPA held on 2/9/21
    - LIPA asked if the AMI-OMS integration team could revisit the schedule to try to pull in the date
        - Go-Live date pulled forward by 1 week (parallel operations reduced from 25 days to 20 days)
    - Requirements Traceability Matrix sent to LIPA on 2/10

On September 13th, LIPA and PSEG-LI had a meeting to discuss various recommendations, including 5.4.2. During the meeting, LIPA requested additional supporting documentation for the recommendation. PSEG-LI provided the required files on September 28th to move the recommendation from rejected to accepted. On November 23rd, LIPA had a meeting with

PSEG-LI to discuss rejected PIPs and LIPA provided further comments. Below is a summary of the meeting, LIPA comments, and PSEG-LI actions.

LIPA Response September 13:

- *Submit the following documents to LIPA:*
  - *RTM*
  - *Design Document*
  - *Test plan*
  - *Test strategy*
  - *Outline of milestones for AMI project plan.*

PSEG Long Island Actions:

- Submitted the following documents on 9/28/21
  - SIT Test Cases
  - UAT Test Cases
  - AMI-OMS Integration Master Solution Design
  - AMI-OMS Integration Revised Critical Path
  - AMI-OMS Integration SIT-UAT Test Plan
  - AMI-OMS Integration Test Strategy

LIPA Response November 23:

- *Deep dive requested*

PSEG Long Island Actions:

- AMI-OMS Integration Deep Dive held with LIPA on 1/14/22

LIPA Response January 23:

1. **Outage detection and verification:** AMI meters send last gasp messages when power is lost, notifying OMS that an outage has occurred. In addition to current customer outage reporting channels, AMI will become an additional customer channel for outage notification to customers and will automatically create outage ticket which will include outage start time without manual intervention. OMS will provide real-time updates to AMI of planned outages, including the planned date start time and end time for all meters within the defined outage to filter the AMI Lost notifications effectively. Planned outage reporting is suppressed to OMS to avoid unnecessary requests.

2. **Restoration management:** OMS will automatically receive near real-time AMI updates at a defined interval but no less than 15 minutes about power that has been restored and will close the associated OMS order without manual intervention by operators. OMS shall have the ability to perform individual and batch pings for all meters by transformer, circuit, and outage incident (job) with automatic update of outage ticket status based on ping results to confirm the customer is restored. Batch responses are timely and acknowledged as completed by the response for procedural follow-up. AMI system will have the appropriate information to support the backup in the absence of OMS.

3. **Identify and track momentary outages:** AMI integrated with OMS will allow operators to gain advanced visibility to certain outage conditions and allow for more proactive resolution. OMS will also enable better identification and tracking of momentary outages. The system will be designed to log momentary outages that were not sent to OMS for proactive troubleshooting. All outages reported in AMI over 5 minutes are reported to OMS.

4. **Enhance efficiency of job dispatch:** Outage reports will be made available to OMS through integration. The CGI AMI interface will allow for the creation of outages on the following additional devices: circuit, transformer, and branch. Processes and procedures will be developed, and operators will be trained to ensure quicker identification of embedded outages and additional device reporting so that crews are dispatched more efficiently.

5. **Outage and Restoration data:** OMS will receive, and record AMI dates and times related to power lost and power restored. Performance metrics will be based on AMI data as it relates to times when power outages started and ended.

6. **Outage Communication:** AMI data will be used for proactive and reactive communication to customers through the current and future customer channels. Customer communication contact and customer contact logging will be maintained in Kubra, OMS, and the customer system. This dependency is required for the outage communication improvement PIP in section 3.

Additional required project deliverables: not in the current submission:

7. Release schedule and projected content of each release
8. Requirements Traceability matrix (RTM) & solution design for LIPA approval
9. All user acceptance (UAT) and System Integration Test (SIT_ plans, as well as test/use cases, are provided to LIPA for approval. Test case results are available for LIPA for review & audit.
10. Updated business processes, procedures, and policies related to the associated changes detailed in the PIP.
11. Business policy and when and how the P5 filter is used and the associated communication to impacted PSEGLI & LIPA parties so they are aware of how the data is being adjusted.
12. Roadmap of how enhanced AMI data will be utilized and incorporated into the OMS to improve personalized proactive customer communications and channels

PSEG Long Island Actions:

1. **Outage detection and verification:** The above statements (#1) are correct. AMI-OMS Day 1 functionality will automatically create outage tickets containing the start time received from the Power Outage Notification (PON) without manual intervention. OMS will provide real-time updates to planned outages (Start and End times) for all meters within the planned outage footprint. Additionally, the planned outages will be filtered at the MDMS (Anticipated Outage Table) to prevent unnecessary requests.

2. **Restoration management:** The above statements are correct. Power Restoration Notifications (PRN) are received near real as meters are energized. OMS will have the capability day 1 to automatically update/close jobs as meters are energized. PSEG's current threshold for energizing a job is when 100% of the meters report back energized. This percentage threshold is a configurable parameter in OMS. Additionally, PSEG does have the ability to batch ping meters.

3. **Identify and track momentary outages:** AMI data is available today at the MDMS for the identification and tracking of momentary outages. However, there is not a current process in place for conducting this investigation. The initial threshold for the start of

parallel operations for determining a momentary outage will be set at 6 minutes in MDMS. Actual system performance, network delay and additional analysis may result in an increase of this threshold. Any changes will be communicated to LIPA. *Note – Momentary outages are filtered at the MDMS and do not progress to the OMS. Investigation is outside the scope of the AMI-OMS integration effort. The momentary outages are available via the MDMS and are also sent to Data Lake.*

4. **Enhance efficiency of job dispatch:** This functionality/process is available Day 1. Embedded outages are handled when the job is energized, and certain meters show no power through outage verification process. When a crew energizes a transformer, fuse, or mainline outage, all devices are batch pinged at the following levels by circuit, transformer, and branch, and any embedded outages are identified using this process.

5. **Outage and Restoration Data*:*** AMI data is used by the operations and reliability group today for performance metrics although the process is outside of the OMS. When the AMI-OMS interface is live the data is available within the OMS for the calculation of performance metrics.

6. **Outage Communication:** Outage communications (including AMI) will be communicated to LIPA in the strategic technology plan for outage reporting and communication (PIP 4.01). It is understood that outage and restore data will be maintained in the systems to ensure AMI source data could be used in outage communication.

7. The final roadmap detailing the proposed release schedule and contents of those releases is to be delivered on 3/4/22. The deliverable has been added to section 2. Clarification – All functionality describe in this PIP will be available Day 1. A future release roadmap will be delivered on 3/4/22 describing target dates for future functionality and/or additional processes to supplement current functionality.

8. The requirements traceability matrix is complete and has been added as a deliverable in section 2. The deliverable was sent to LIPA on 3/8/21. Project team will resubmit the RTM.

9. All (UAT) and System Integration Test (SIT_ plans, as well as test/use cases have been submitted to LIPA on 9/28/21. Project team will resubmit the documents.

10. Business Process documentation is complete and has been added as a deliverable in section 2. The project team will submit the documentation to LIPA. There are no anticipated changes to the documentation based on the feedback received.

11. The project team will provide the appropriate documentation to LIPA on how the P5 Filter is designed and used.

12. Reference PSEG LI action #7. The final roadmap detailing the proposed release schedule and contents of those releases is to be delivered on 3/4/22.

1. Project Definition

Integrate the Outage Management System (OMS) with AMI and operate in an integrated OMS environment.

Leveraging AMI outage data and integrating with OMS will result in quicker outage detection, more efficient restoration, fewer truck rolls, and improved customer satisfaction.

This project will deliver a successful integration of systems and operationalization of an integrated environment of OMS and AMI through:

- Design, development, and testing.
- Understanding system and business impacts of integration through parallel operations.
- Training and change management; and
- Review of operational readiness to support a successful transition from the parallel operating environment to operations.

The full End to End integration of AMI with OMS will be achieved through a series of releases. As integration commences, the teams will produce an initial AMI integration roadmap laying out the proposed release schedule and contents of each release. As additional insights are gained through testing and parallel operations, the roadmap will stand as and living document which will be further refined and socialized with all pertinent parties.

1.1. Project Objectives:

The objective of this project is to integrate and operationalize outage detection and restoration information provided from PSEG Long Island's installed AMI meters.

Based on LIPA recommendation 5.4.2, and to accelerate the integration timeline, PSEG Long Island has begun working on an implementation plan to complete the integration in a multi release approach. The multi release approach will allow some benefits of the integrations to be realized as quickly as possible, while minimizing risk to the systems and business, and continuing to make technological and business changes so to continue increasing benefits reaped.

1.2. Project End State and Success Criteria:

A successful project end state for PSEG Long Island and its key stakeholders (LIPA, DPS, and customers) will be an AMI system, successfully and automatically reporting outages to the OMS v.6.7 production environment in near real time; PSEG Long Island will be able to use, analyze, and act on outage and restoration notifications to more swiftly restore power to customers and to reduce "no trouble found" truck rolls; and PSEG Long Island will leverage AMI-OMS integration to increase customer satisfaction and increase operational efficiency by providing better information to customers and having greater insights of outage information to dispatch restoration crews.

1.3. Project Scope:

With efforts toward full deployment of AMI meters continuing in parallel, PSEG Long Island is working to leverage outage data more fully from smart meters by integrating OMS with AMI. OMS integration with AMI will enable:

1. **Outage detection and verification:** AMI meters send last gasp messages when power is lost, notifying OMS that an outage has occurred. In addition to current customer outage reporting channels, AMI will become an additional customer channel for outage notification to customers and will automatically create outage ticket which will include outage start time without manual intervention. OMS will provide real-time updates to AMI of planned outages, including the planned date start time and end time for all meters within the defined outage to filter the AMI Lost notifications effectively. Planned outage reporting is suppressed to OMS to avoid unnecessary requests.

2. **Restoration management:** OMS will automatically receive near real-time AMI updates at a defined interval but no less than 15 minutes about power that has been restored and will close the associated OMS order without manual intervention by operators. OMS shall have the ability to perform individual and batch pings for all meters by transformer, circuit, and outage incident (job) with automatic update of outage ticket status based on ping results to confirm the customer is restored. Batch responses are timely and acknowledged as completed by the response for procedural follow-up. AMI system will have the appropriate information to support the backup in the absence of OMS.

3. **Identify and track momentary outages:** AMI integrated with OMS will allow operators to gain advanced visibility to certain outage conditions and allow for more proactive resolution. OMS will also enable better identification and tracking of momentary outages. The system will be designed to log momentary outages that were not sent to OMS for proactive troubleshooting. All outages reported in AMI over 6 minutes are reported to OMS.
4. **Enhance efficiency of job dispatch:** Enhance efficiency of job dispatch: Outage reports will be made available to OMS through integration. The CGI AMI interface will allow for the creation of outages on the following additional devices: circuit, transformer, and branch. Processes and procedures will be developed, and operators will be trained to ensure quicker identification of embedded outages and additional device reporting so that crews are dispatched more efficiently.

5. **Outage and Restoration data:** Outage and Restoration data: OMS will receive, and record AMI dates and times related to power lost and power restored. Performance metrics will be based on AMI data (when available) as it relates to times when power outages started and ended.

6. **Outage Communication:** Outage communications (including AMI) will be communicated to LIPA in the strategic technology plan for outage reporting and communication (PIP 4.01). It is understood that outage and restore data will be maintained in the systems to ensure AMI source data could be used in outage communication.

1.4. AMI Integration Functionality:

The following table illustrates the use cases the AMI integration team is targeting to deliver as a part of the initial integration (Release 1). The AMI Integration Roadmap (defined above in Section 1) will continually be developed to evaluate the timing and contents of future releases.

Use Case	Scope and Benefit(s)	Availability
Manual Pinging of Meters directly from OMS	Operators will be able to manually ping meters directly from OMS (Incident Manager/Geo Map) to validate outages and restorations. Can ping single meters and in batch - Reduce customer calls - Reduce Ok on Arrivals (No trouble found)	Release 1
Identification of Embedded Outages	The ability to ping meters behind an outage that has been aggregated to a higher-level device including but not limited to circuit, feeder, transformer, and branch with a rapid response (e.g., transformer or feeder). - Reduce customer calls - Fewer truck rolls - Improved customer experience	Release 1
Identification of mainline single-phase damage.	Losing a phase on a 3-phase circuit can be problematic. The ability to make fast identifications provides the following benefits: - Better damage location information to aid in quicker restoration. - More accurate information leading to restoration efficiencies - Benefit to multi-phase primary/branch line outages (fuse did not blow). - More accurate customer communications - Reduction in OK on Arrival jobs. - Use of AMI information over time will allow for corrections of discrepancies within GIS/OMS data.	Release 1
Automatic energizing of jobs in OMS	Utilizing PRN's, the OMS will be able to automatically update jobs as energized. - Increased operator efficiency - More accurate outage information in the system	Release 1

2. Project Deliverables:

Deliverable	Delivery Date
1. AMI Integration Roadmap – Initial	January 29, 2021
2. Detailed Design	March 5, 2021
3. Requirements Traceability Matrix	March 8, 2021
4. Test Strategy and Approach	March 19, 2021
5. Business Process, procedures, and policy Documentation	March 9, 2021
6. System Integration Test Plan	April 16, 2021

7. User Acceptance Test Plan	May 14, 2021
8. Parallel Operations Plan	October 14, 2021
9. Training Materials Complete	February 25, 2022
10. AMI Integration Roadmap – Final Version	March 7, 2022
11. Operationalization of AMI to OMS Integrations – Release 1	March 15, 2022
12. Project Closeout Complete (Project close-out Artifacts)	March 31, 2022

2.1. Assumptions, Dependencies, and Constraints

2.1.1 Assumptions:

- AMI/OMS integration will be achieved over multiple releases to expedite initial benefits while minimizing risk:
  - The contents of this implementation plan describe what is being targeted for the initial release
  - A living roadmap document will be created/maintained to further define subsequent releases
- Plan, Analyze and Design work for integration with OMS v 6.7 officially kicked off on 1/4/21 however activities such as build, configuration etc. are dependent on working OMS 6.7 environment(s).
- An environment is considered available when it is stable, operational, and not being utilized for other projects/recommendations.
- AMI/OMS integration will allow closed-loop communications, through integration with notification platform(s) with customers. Communication contacts and results will be logged in OMS and the Customer System.
- AMI notifications will be tested end to end (including outages being available via all pertinent digital channels) on the re-platformed test environment prior to go-live.

2.1.2 Dependencies:

- Multiple environments in OMS v.6.7 are available to utilize to achieve integration (test, training, and production environments).
- The AMI integration implementation timeline is dependent on the OMS 6.7 implementation timeline.
  - If any portion of the OMS 6.7 timeline slips the AMI integration timeline will need to adjust accordingly.

2.1.3 Constraints:

- The number of qualified resources with subject matter expertise.
- Dedicated IT and OMS resources are required.
- Availability of vendor resources to provide application updates and support testing activities.

- Additional desired functionality and/or enhancements are limited to the vendor capabilities and release schedule

3. Project Structure:

3.1. Internal Project Organization

The AMI Team and Testing Team along with support from various vendors will implement the AMI project.

Role	Name	Responsibilities
Leadership	PSEG LI CIO – Greg Filipkowski Exec Dir, Special Proj – David Lyons	• Ensure work streams adhere to guiding principles as defined by project leadership • Manage issues and decision making • Remove obstacles that impede the success of the overall project Providing strategic guidance • Challenge the project team where appropriate • Approve procurement of external parties (as needed)
Steering Committee	Dan Eichhorn (Chair) Zeeshan Sheikh Michael Sullivan Rick Walden	• Champion the PSEG Long Island AMI-OMS Integration initiative • Ensure project activities remained aligned with the guiding principles as defined • Provide guidance and input on key project decisions • Challenge the project team where appropriate • Approve major changes to the project's scope, objectives, timelines, costs, etc. • Act as the decision maker for team issues requiring escalation • Remove institutional barriers if they arise by serving as a project advocate
Workstream Lead	Chad Worthington (ACN)	• Reporting overall status of the project to Managers • Identifying and escalating resource issues • Provide, Coordinate, and Document project documentation and deliverables • Manage resources, schedule, issues, risks and change requests • Provide subject matter expertise to the project • Assess user Impact Analysis • Facilitate workshops
Project Support	Edien Gonzalez (ACN) Jay Sarvaiya (ACN)	• Process and training material development • Test plan development support • Parallel operations setup and support • Test execution support and tracking • Integration roadmap development and support
Technical Architect	Kiran Ramayanam Pedro Miraldo	• Support build/test/deploy activities • Set up environment • Assist in the configuration of the digital channels • Coordinate development activities • Provide technical Design • Act as testing lead • Manage transfer of Environments
Business Lead	Paul Mattera	• Provide process development expertise, requirements definition, functional design • Act as key decision maker representing T&D Operations interests • Make recommendation to exit parallel operations • Provide recommendation to enter full production, and responsible for successful operations per project scope
Test Lead	Miguel Ramos (ACN)	• Test script development • Test script execution for assembly / unit test • Test execution

Subject Matter Advisors	Doug Lauer	• Subject Matter support with:
		  ◦ Technical Architecture
		  ◦ Build/Test/Deploy activities
		  ◦ Test strategy development

3.2. Other Stakeholders

Identify other internal and external project stakeholders who are not specifically members of the project team.

Identification of other internal and external project stakeholders is shown below*:*

Organization/Team	Name	Responsibilities
Long Island Power Authority	Mujib Lodhi	• Overall oversight of the entire project portfolio
Department of Public Service	Joseph Suich, Kevin Wisely	• Overall oversight of the entire project portfolio

4. Project Plan

- Detailed AMI project plan can be referenced in the integrated project plan.

4.1. Risk Management Plan

The table below outlines the applicable risks and associated risk mitigations for the AMI Integration project

Category	Project Risk	Mitigation
Technology/ Schedule	AMI Integration has the potential to place a heavy strain on an OMS (especially in storm situations)	Close coordination and methodical planning of system performance and stress testing. The design to include ability to easily turn off the integrations not only in the OMS but also at an integration point(s) prior to AMI data reaching OMS.
Resources	IT/OMS resources will be utilized on competing projects	Dedicated full time project resources and team will be assigned to the project. Management will ensure minimal transition of resources, and if transitions of resources are unavoidable, will provide sufficient time for knowledge transfer.
Resources	Vendor resources will be utilized on competing projects	SOW will capture requirements for resource availability. Vendor resource plan must align with overall project plan and resource plan, to ensure alignment. Strong Procurement and SLT involvement.
Schedule	Issues discovered during testing and/or Parallel Operations in OMS v.6.7 could add to timeline or require system enhancements.	Could potentially impact production Go-Live date. Decisions will be made to minimize impact to milestone dates and deliverables. Decisions will be reviewed per Issue Resolution Plan below (4.3).
Schedule	Competing projects will require the same OMS environment(s) for project and training purposes.	A single point of contact from IT will be assigned responsibility for managing all the OMS environments. This point of contact will manage availability for the environment. Utilize alternate (development or training) environment as recommended by IT point of contact.
Schedule	Storm season could potentially impact go-live date. This functionality would	Project team will begin monitoring the forecast well in advance and consult with leadership on any potential

	not be implemented during a storm (or potential storm).	adverse weather. A go no/go call will be made at least 1 week in advance of scheduled go-live date.
Schedule / Resources	Significant resource time required for updating outage processes and creating/delivering adequate training.	Develop a comprehensive process and change management plan with resource requirements and schedule required activities well in advance. Engage leadership as required when resource constraints are problematic.

4.2. Issue Resolution Plan

Issues and risks will be identified by the PSEG Long Island Team and the Project Management Office (PMO) daily. These items will be logged in an issue/risk tracker. The information in the tracker will be reviewed by the steering committee each week. The steering committee will determine the appropriate actions (if necessary) to get the project on track. The issue/risk tracker will be used to track items to closure, identifying the resolution date and course of action taken.

In addition, project status will be discussed monthly at the Utility 2.0 Status Meeting – which includes attendance of senior leaders from all areas of the Company including this project's Executive Sponsors. The project status is captured in a high-level dashboard and thoroughly discussed by project leads.

4.3. LIPA Reporting Plan

Weekly status reports for all recommendations, containing project progress and documentation will be provided to LIPA by Zeeshan Sheikh (Interim).

5. Technical Execution Plan

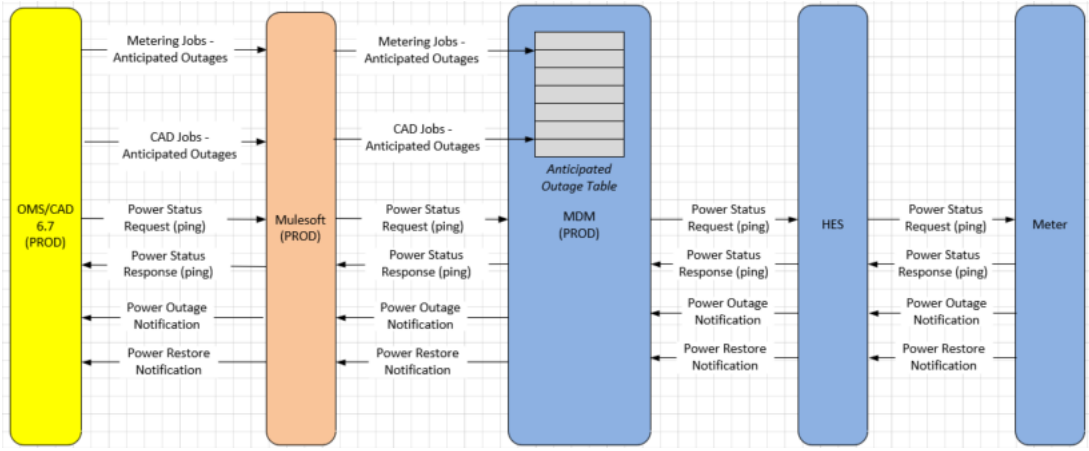
5.1. Technical Approach

5.1.1 Configuration of Applications:

For any changes to configuration of systems and applications, the vendor will be contacted when needed and internal infrastructure will be adjusted accordingly. Testing will be executed to ensure changes are working as intended.

5.1.2 Changes to webservices:

Changes to existing CGI webservices or new webservices will be developed on the preferred development platform at PSEG Long Island. Code will be reviewed, and unit tested prior to deploying code to the test environment. SAT and SIT testing will occur in the test environment to ensure functionality is working as intended.



5.2. Quality Assurance Plan

The team will adhere to the PSEG Long Island's IT standards for the deployment of this project. PSEG Long Island IT SharePoint will be used as the document repository.

An individual test plan will be created for this recommendation and will include the following: Scope of testing, Test Criteria, Tests to be performed *(e.g.: Functional, Acceptance, Regression, Performance Testing, End to end).*

Test plan and test results will be shared with LIPA upon completion.

As the dependency states above (section 2.1.2) the AMI integration work track is heavily dependent on the OMS 6.7 implementation. This is especially true with regards to testing and the teams will need to coordinate closely to ensure no adverse impacts result from the AMI integration *(e.g., Stress Testing the OMS with a full AMI load)*.

5.3. Documentation Plan

Throughout the project lifecycle the implementation team will document and deliver the key deliverables as listed above in Section 2. The due date of each deliverable will be based off the Project Schedule as outlined in Section 4.1. A final Project Closure Document will be delivered once all LIPA Recommendations in this implementation plan are completed.

Project Artifacts	Description
Integration Roadmap	Living document outlining the timing and content of releases to achieve benefits from integrations
Test Strategy and Plan(s)	Test cases & test data are meeting the design requirements
Operational Readiness – Parallel Ops	A runbook describing the entry and exit criteria for parallel operations and methods for executing on the use cases as well as measuring success.
Training Materials	Materials for training users of the system for testing, parallel operations, and go-live

Technical Architecture	Technical Architecture Diagram describing integrations

Revision History

Name	Date	Reason for Changes	Version
Jennifer Popkin	12/02/20	Initial draft	1.0 draft 1
Jennifer Popkin	12/04/20	Revised draft	1.0 draft 2
Jennifer Popkin	12/10/20	Revised Draft 2	1.0 draft 3
Chad Worthington	01/06/21	Initial draft	2.0 draft 1
Jennifer Popkin	01/07/21	Revised draft	2.0 draft 2
Chad Worthington	1/8/21	Revised draft	2.0 draft 3
Chad Worthington	2/12/21	Initial draft	3.0 draft 1
Chad Worthington	12/1/21	Initial draft	4.0 draft 1
Brenda Mokua	12/14/2021	Updated Org Chart	4.0 draft 2
Chad Worthington	1/5/2021	Updated Deliverables Section	4.0 draft 2
Chad Worthington	2/2/2022	LIPA comments addressed	4.0 draft 3

PSEG Long Island

Project Implementation Plan

for

LIPA Board Adopted Recommendations

Project Title: GIS Upgrade - LI

Table of Contents

1. Program and Project Definition

PSEG Long Island will implement a *'GIS – Long Term Plan, Architecture and Technology Stack Upgrade'* Project which seeks to improve PSEG Long Island's ability to leverage GIS as a platform across the enterprise in a manner that optimizes business value, and advances PSEGLI's geospatial infrastructure and data & design capabilities to support concurrent investment in operational technology. The program and project together will develop a GIS Long Term Roadmap, develop an overall long-term GIS architecture with high availability and failover, and upgrade the existing Esri-based enterprise GIS solution, enhance tools, operations, and sharing of data by improving business process and data governance.

1.1 Program and Project Purpose, Objectives, and Success Criteria,

Program Objective:

- GIS Long-Term Strategic Plan and Roadmap

Project Objectives: The Project objectives are to ensure that:

- GIS business applications can be delivered across the enterprise cohesively and efficiently, in a manner that optimizes business value.
- PSEG LI is able to leverage the potential of GIS as a foundational platform to optimize utility operations and improve decision-making via geospatial-data-derived information and insights.
- The GIS technology stack is deployed in accordance with an overall long-term GIS architecture that provides for a reliable, robust, resilient and secure system.
- The GIS technology stack is modernized, with all components within their active service life and under general support from the product vendor.

Program End State and Success Criteria*:* The program will be considered complete when:
A comprehensive GIS Long-Term Strategic Plan and Roadmap has been developed and approved by LIPA that provides a clear roadmap for leveraging GIS across the enterprise in a manner that optimizes business value, and that at a minimum:

i) Assesses and identifies the business objectives, opportunities, and priorities across the enterprise lines-of-business processes and systems, including SCADA, Enterprise Asset Management, Advanced Distribution Management Systems, Distributed Energy Resource Management Systems and Customer Information Systems; and
ii) Evaluates the technology marketplace and develops a comprehensive ecosystem plan that considers the core platform and associated infrastructure; business application development toolsets and approaches; and third-party integration products and services; and
iii) Identifies available or potential data sets and any associated data management or integration issues; and
iv) Addresses process and resource requirements; and
v) Addresses LIPA and DPS requirements.

Project End State and Success Criteria*:* The project will be considered complete when:

1) An overall GIS long-term architecture with high availability and failover has been developed and implemented.
2) The technology stack has been modernized, including:
    i) The current end-of-life infrastructure and operating system has been replaced with new on premise hardware and software.
    ii) The backend databases have been migrated from Oracle11g/Oracle 12c to the latest release of Microsoft SQL server.
    iii) The editor application software has been upgraded from ArcFM desktop version 10.2.1d to the latest ArcFM desktop version 10.8.1.
    iv) The ESRI/GIS software has been updated to a fully supported version.
    v) The new PROD, TEST, and DR server environments are fully functional.
    vi) All GIS Data and Applications, maps, backend database, etc. have been migrated to the new platform, with the exception of the low-priority/low-impact New Reporting and Address Validation applications[1].
3) The upgraded, comprehensively tested and documented system(s) has been fully deployed in production.

2. Program Deliverables:

Deliverable	Delivery Date	Comments
GIS Long-Term Strategic Plan and Roadmap	07/2022	As described under Program End State

3. Project Deliverables:

Deliverable	Delivery Date	Comments
Overall GIS long-term architecture	04/2022	As described under Project End State
Detailed Functional and Technical Requirements	04//2022	
Detailed Project Plan	04/2022	
Organizational Change Management (OCM) plan and documentation	04/2022	
Requirements Traceability Matrix	07/2022	Requirement tracking to map requirements to software functionality including testing. This includes the mapping of business requirement/Use Case/Test Scenario/Test Case/Test Result (Pass/Fail)
Development Environment Factory Acceptance Testing (FAT) and System Testing (SAT) artifacts	07/2022	All deliverables specified in the Quality Assurance Section applicable to FAT and SAT

[1] The low-priority/low-impact New Reporting and Address Validation applications have been approved by LIPA for a 2023 migration.

GIS Test Strategy Approach	09/2022	Document describing the test plan approach. Will cover phases of testing such as FAT, SIT, SAT and UAT. Describes what is being tested, entrance and exit criteria, tools to be used in testing, defect management and Consultant software release acceptance.
Quality Management Plan	09/2022	An outline of the tasks and techniques employed by the engagement to confirm delivery of expected requirements to the client.
Test Environment System Integration Testing (SIT), System Performance Testing and User Acceptance Testing (UAT) (> 95% pass rate) artifacts	10/2022	All deliverables specified in the Quality Assurance Section applicable to SIT, System Performance Testing and UAT
Detailed Cutover Plan	11/2022	
Fully tested, documented and deployed system, with all configuration items in CMDB, and scope delivered	12/2022	
Detailed design and specifications of final deployed system, including Architecture Diagram and updated hardware and infrastructure specifications, covering all environments.	12/2022	
Project Closeout Report	03/2023	At completion of Post Go-Live 90-day Warranty Period

3.1. Assumptions, Dependencies, and Constraints

Assumptions:

- Internal or contractor resources are available to perform hardware installations for DR/Test/PROD environments.
- Business resources are available and engaged during the discovery workshops, training, user acceptance testing activities.
- The GIS Upgrade program objective and deliverables are aligned with GIS - Upgrade project objective and deliverables however they will be managed separately.

Dependencies:

- LIPA approval of project implementation plan.

Constraints:

- To ensure that the Outage Management system (OMS) is not impacted during the LI critical storm period the GIS Upgrade – LI Go-Live cannot occur during the months June, July, August and September.

4. Project Structure

4.1. Internal Project Organization

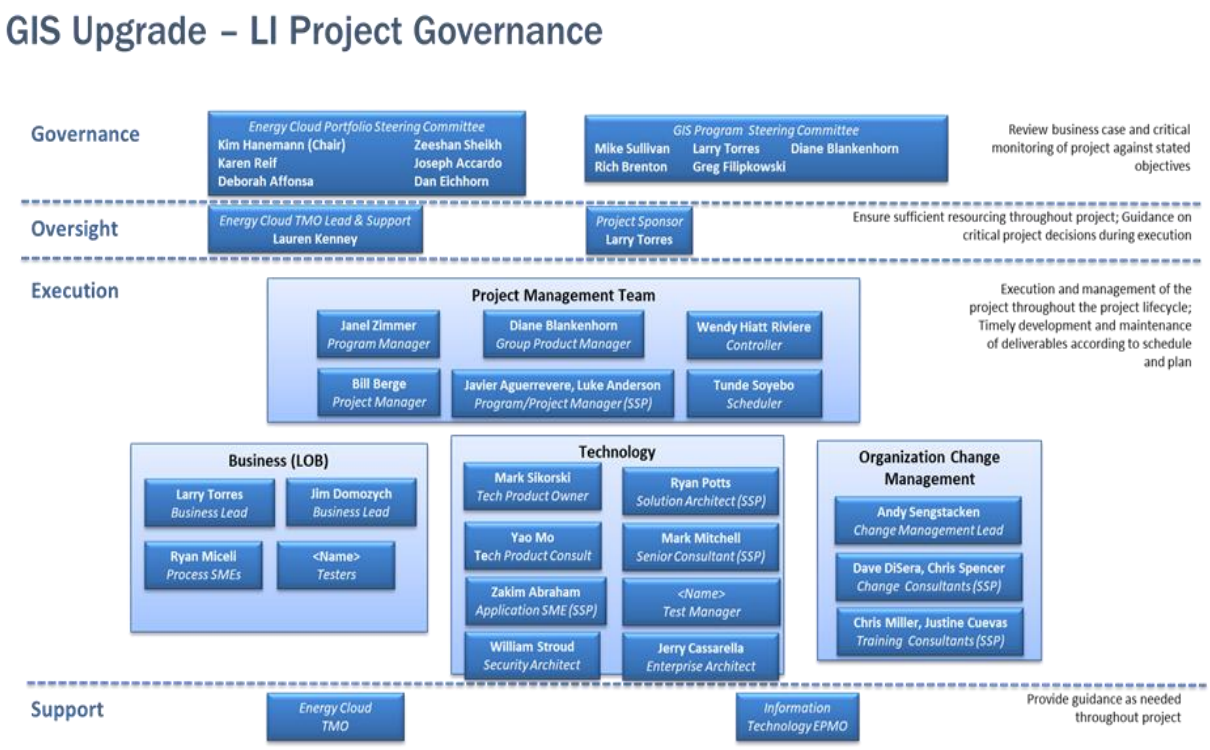
Role	Responsibilities
Executive Business Sponsor Larry Torres	• Provide strategic direction and governance
Executive IT Sponsor Greg Filipkowski	• Manage issues and decision making • Remove obstacles that impede the success of the overall project • Provide strategic guidance • Challenge the project team where appropriate • Approve procurement of external parties (as needed)
Project Sponsor Diane Blankenhorn	• Establish guiding principles for the project • Provide guidance and input on key project decisions • Monitor completion of activities • Challenge the project team where appropriate • Approve major changes to the project's scope, objectives, timelines, costs, etc. • Act as the decision maker for issues requiring escalation • Remove institutional barriers if and when they arise by serving as a project advocate
IT Project Lead Mark Sikorski	• Drive work stream tasks and deliver recommendations for Solution Design Specification • Provide input on requirement / design • Coordinate Business Resources to support the project • Key Point of contact to for questions from the vendor • Provide sign off for deliverables that require business input/acceptance • Deliver the project on time and on budget
Project Manager Bill Berge	• Provide overall project management • Act as single point of accountability for the project and its personnel • Report project status to the Product Manager using standard templates • Review Technical and Execution deliverables and provide guidance to the project team • Development and implementation of applicable deliverables • Identify, leverage, evaluate and incorporate approved best practices from all projects into the overall GIS Upgrade Program
Business Lead Jim Domozych	• Business process development, requirements definition • Reporting requirements, guidance and validation • Testing Execution

4.2. Other Stakeholders

The other key stakeholders involved in the execution of this plan are:

- LIPA
- LIPA Board of Trustees
- IT and T&D Operations SME's
- IT EPMO and Energy Cloud Portfolio TMO
- Solution Integrator – SSP Innovations

4.3. Governance Model



5. Project Plan

5.1. Project Work Plan

Project Milestone	Delivery Date
Project Kickoff and Planning	09/2021
Discovery Workshops and Design	03/2022
Infrastructure Build	04/2022
GIS Software Installs - All Environments	06/2022
Development Environment Build and Data Migration	06/2022
Factory Acceptance Test (FAT) and System Acceptance Test (SAT)	07/2022
Test Environment Build and Data Migration	09/2022
System Integration Test (SIT) and User Acceptance Test (UAT)	10/2022
Prod and DR Build	11/2022
Go-Live	12/2022
Post Go-Live - Warranty Support	03/2023

5.2. Risk Management Plan

This project will follow the risk management process identified in the IT EPMO Risk-Issue-Change Management Playbook. Qualitative and Quantitative risk assessments will be performed with the project stakeholders and risk information will be entered and maintained in ServiceNow as well as a RAID Log.

High Rank Risks

Category	Project Risk	Mitigation
Resource	PSEG LI availability of Network/Infrastructure team to install Servers due to competing projects	Secure Contractor resources when required
Financial	Infrastructure hardware and software costs are higher than planned due to pandemic shortages, and potential cost impact caused by accelerating the go-live date	Review project budget and gain approval from URB, if necessary

5.3. Issue Resolution Plan

This project will follow the Issue management process identified in the IT EPMO Risk-Issue-Change Management Playbook. When project issues are identified, they will be logged in a RAID Log. The RAID Log will be used to track items to closure and include details such as the issue owner, resolution date and mitigation strategy.

5.4. LIPA Reporting Plan

This project will follow the status reporting process identified in the IT EPMO Project Status Reporting Playbook. Bi-weekly status reports are created by the PM and the IT EPMO will perform monthly portfolio health dashboard reporting.

6. Technical Execution Plan

6.1. Technical Approach

< Provide a description of the planned Technical Approach for the Long-Term Architecture and the Technology Stack Modernization initiatives, including, at a minimum –

- *Current System Composition-* ***Identified in the <Current GIS LI Server Architecture Diagram as of 10-2021.ppt> document***
    - Existing environments
    - Infrastructure components (hardware, server-side software, etc.) for each environment.
    - Data stores
    - COTS software components (core and optional systems/modules/applications/etc.) -
    - Custom implementations/solutions (business implementations, custom applications, maps, integrations, interfaces, etc.) – ***Identified in the <PSEG LI 10.8.1 Custom Code Review Upgrade_v1.0.doc> Document***

- External System Dependencies and Impacts are identified in in the ***<PSEG LI System Architecture Design v1.2.doc> Document.***

- System Assessment – ***Identified in the <PSEG LI System Architecture Design v1.2.doc> Document.***
    - System Lifecycle Management considerations- ***Identified in the <PSEG LI LCP Timeline – GIS (LI)_Q1_2022.ppt> and <GIS Upgrade Key Decisions 03-22-2021v1.ppt> documents***
        - Components at or nearing end-of-life
        - Component compatibility constraints
    - System Resiliency Considerations
        - High availability and failover requirements/drivers
    - System Security Considerations, if applicable
        - Security requirements or considerations relevant to the initiatives
    - Custom component/business implementations assessment – criticality, usage levels, etc. – ***Identified in the <PSEG LI 10.8.1 Custom Code Review Upgrade_v1.0.doc> Document***
    - Other current issues/drivers, if applicable

- Preliminary Analysis and Planning
    - Upgrade Path ***– Identified in the <GIS Upgrade Key Decisions 03-22-2021v1.ppt> and <PSEG LI GIS Roadmap and Product Lifecyle_08_20_2021.pdf> Documents***
        - Available upgrade paths (available COTS software versions and paths from current to later versions)
        - Planned upgrade path
        - Analysis of available paths and rationale for selecting the planned path
    - Infrastructure Replacement *Plans* - ***Identified in the <GIS Upgrade Key Decisions 03-22-2021v1.ppt> Document***
        - Potential options (cloud vs. on-premise, physical vs. virtual, etc.)
        - Planned replacement options
        - Analysis of options and rationale for the selected plan
    - Database Platform Plans - ***Identified in the <GIS Upgrade Key Decisions 03-22-2021v1.ppt> Document***
        - Potential options (no change, upgrade current platform, migrate to alternate platform)
        - Planned option (that is, migration to MS SQL Server)
        - Analysis of options and rationale for the selected plan
        - Sequencing and Prioritization Plans – ***Identified in the <PSEG LI 10.8.1 Custom Code Review Upgrade_v1.0.doc> document***

          Any plans for sequencing or prioritization of COTS and custom software components, driven by technical constraints or business needs
- Planned Implementation Approach
    - *Planned Upgrade Environments* – ***Identified in the <PSEG LI System Architecture Design v1.2.doc> Document****.*
    - Configuration Management Approach
        - **Provide a disciplined and documented establishment of configuration items and control changes to them.**
        - **Ensure proposed changes are adequately assessed and responded to.**
        - **Ensure changes are approved by the appropriate organizations.**
        - **Prevent unauthorized changes from affecting the project.**
        - **Accomplish the timely and accurate incorporation of approved changes.**
        - **Ensure that accurate technical documentation is available to develop and maintain project outputs and deliverables.**
    - Data Migration and Management Approach
        - **The Approach will include**
            - **Identify the data format, location and sensitivity**
            - **Develop data migration plan and scripts**
            - **Backup the data**
            - **Perform the data migration**

- **Test the migrated data**

- **There will be multiple data migrations. one for each of the Test cycles.**
  - **FAT – Data migration to occur and be tested at the vendor site**
  - **SAT, SIT, UAT - On Premise data migration and testing**
  - **Production - On Premise data migration and "smoke" preliminary testing**

- Cutover Approach (high-level)
  - **Develop a detailed cutover plan including entry and exit criteria**
  - **Educate the team and external parties on the specifics of cutover**
  - **Test the cutover plan before Go-Live**
  - **Confirm Go-Live Readiness**
  - **Perform a controlled release**
- Rollback Approach (high-level)
  - **Develop a detailed rollback plan including entry and exit criteria**
  - **Educate the team and external parties on the specifics of the rollback plan**
  - **Test the rollback plan before Go-Live**

6.2. Quality Assurance Plan

Project Quality & Acceptance Testing – PSEGLI along with the Solution Integrator (SI) will perform the following quality Assurance testing

a) **Factory Acceptance Test** - This testing will include all PSEGLI ESRI and Schneider Electric developed customizations. PSEGLI expects all P1 and P2 defects to be resolved. If no issues are identified in compliance with the revised and approved Master Test plan(s), acceptance testing will be considered complete.

b) **System Testing (SAT)** - Upon completion of Factory Acceptance testing, and installation of all code or data changes required to resolve all P1 and P2 defects identified as part of FAT, PSEGLI and SI will jointly test the developed system to verify it functions in accordance with the approved Master Test Plan(s).

c) **System Integration Testing (SIT)** - SIT is defined as a joint effort between CONSULTANT and PSEGLI to test and validate all interfaces between the GIS and related systems. This will demonstrate that the system is fully deployed and functional, prior to User Acceptance Testing (UAT). PSEGLI will lead the SIT effort and the SIT Plan will be developed by the SI with input from PSEGLI. PSEGLI will have final approval of the SIT plan and will direct and lead all testing efforts.

d) **User Acceptance Testing (UAT)** - UAT is defined as PSEGLI running the test plan and scripts in the PSEGLI environment and SI correcting any issues that are found within the deployment other than the interfaces which will be PSEGLI's responsibility. This will demonstrate that the system is fully deployed and ready for production use. PSEGLI will lead the UAT effort and the UAT Plan will be developed by the PSEGLI with input from the SI. PSEGLI will have final approval of the UAT plan and will direct and lead all testing efforts.

e) Performance testing and Stress testing will be conducted by the SI.

f) **Disaster Recovery & High Availability and Failover** –

- Set up DR and HA environment and implement fail over
- Set acceptance criteria for DR - RPO and RTO metrics for failover and failback
- Production and DR to be built to be in sync at database, application and file level

g) Mock Go-Live Execution

h) Go Live Rollback plan

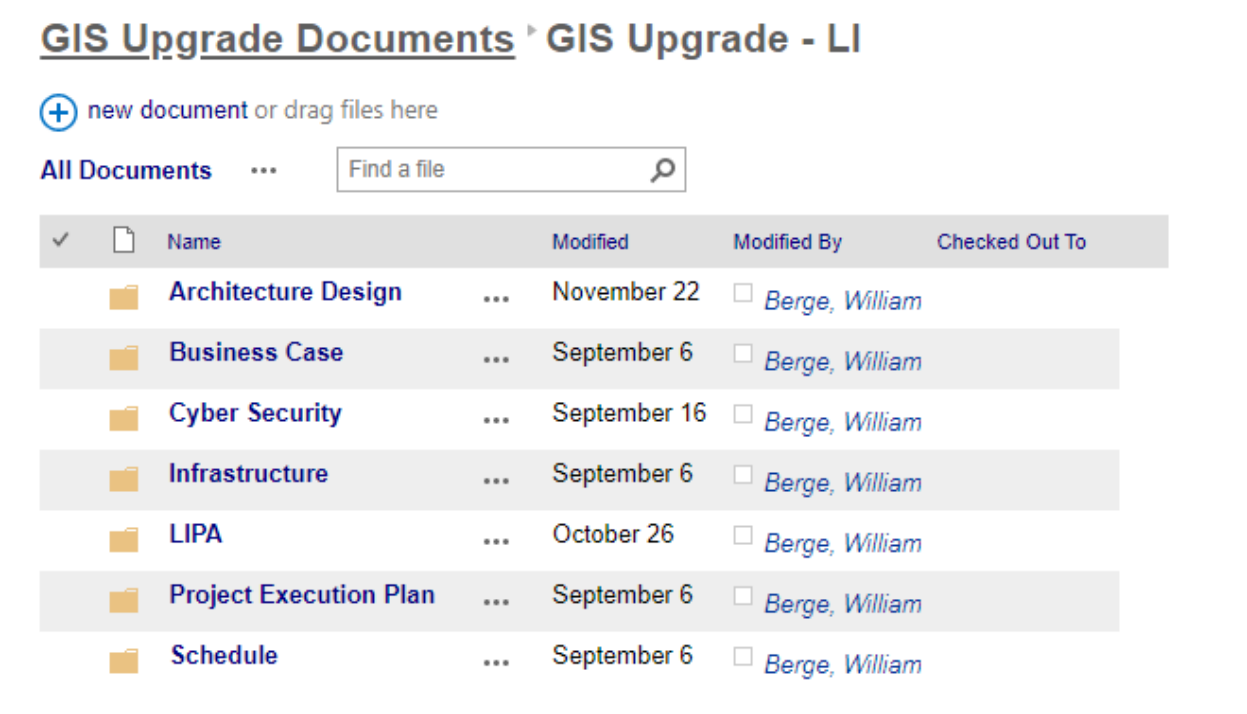
Deliverables Expected:

Deliverable	Deliverable Description
GIS Test Strategy Approach	Document describing the test plan approach. Will cover phases of testing such as FAT, SIT, SAT and UAT. Describes what is being tested, entrance and exit criteria, tools to be used in testing, defect management and Consultant software release acceptance.
Quality Management Plan	An outline of the tasks and techniques employed by the engagement to confirm delivery of expected requirements to the client.
Requirements Traceability Matrix	Requirement tracking to map requirements to software functionality including testing. This includes the mapping of business requirement/Use Case/Test Scenario/Test Case/Test Result (Pass/Fail)
Test Scenarios	Test Scenarios are high-level descriptions of functional and technical areas to be tested. Scenarios can be further broken down into sub-scenarios as required, until detailed, testable conditions and expected results can be determined.
Test Scripts with Conditions, Prerequisites and Expected Results (includes integration and End to End scripts)	A test script identifies the steps that a tester must follow to complete testing (e.g., test the conditions), and each usually describes a test cycle. Test scripts also include the data that is used for testing. Each step of a test script has an associated test condition that can be traced back to a requirement item.
Test Results/Artifacts	The output, screen capture or evidence of executing the test scripts.
Test Closure Memo	The Test Closure Memo documents the major tasks that have been performed to verify that adequate hand-over (e.g., environment clean-up, fulfillment of exit criteria, hand-over meetings) has been completed and serves as a summary for important information related to the test (e.g., important Service Requests (SRs), defects, change controls, metrics, document inventory). The Test Closure Memo also includes conclusions on the test stage to help facilitate continuous improvement of the testing process. A Test Closure Memo will be created for each of the following test phases: SAT, SIT, UAT.
Test Summary Status Report	Report which summarizes the testing status with percentage of test case executed with passed/failed status of each script and defect status. Produces daily and weekly reports in each testing phase.
Test plan – SIT	Document the approach, tools, SLAs and data required for the testing phase. Will incorporate SSP's ESRI specific deliverable and GSI deliverable.
Test plan - UAT	Document the approach, tools, SLAs and data required for the testing phase.

	Test plan - Unit/Regression Testing	Document the approach, tools, SLAs and data required for the testing phase.
	Test plan – Performance/Stress Testing	Document the approach, tools, SLAs and data required for the testing phase.
	Test plan – Technical	Document the approach, tools, SLAs and data required for the testing phase.
	Mock Deployment Plan & Execution	Execute Mock Deployment on Test Environment and identify areas for improvement for Go-Live.

6.3. Document Management Plan

Project documents are to be stored on the GIS Upgrade SharePoint site



Revision History

Name	Date	Reason for Changes	Version
Mark Sikorski	11/22/2021	Initial Draft	v.01
Bill Berge	11/24/2021	Updated draft with added content.	v.02
Bill Berge	11/29/2021	Updated the timeline with an alternate approach	v.03
Bill Berge	02/02/2022	Updated in response to LIPA redline	v.04

External Documents Referenced

<Current GIS LI Server Architecture Diagram as of 10-2021.ppt>
<GIS Upgrade Key Decisions 03-22-2021v1.ppt >
<PSEG LI 10.8.1 Custom Code Review Upgrade_v1.0.doc >
<PSEG LI GIS Roadmap and Product Lifecyle_08_20_2021.pdf >
<PSEG LI LCP Timeline – GIS (LI)_Q1_2022.ppt >
<PSEG LI System Architecture Design v1.2.doc >