FOR CONSIDERATION

September 22, 2021

TO:	The Board of Trustees
FROM:	Thomas Falcone
SUBJECT:	Consideration of Adoption of the Isaias Task Force Quarterly Report and Certain Implementation Plans

Requested Action

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

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 this Board meeting, the Board adopted various PIPs for the Task Force Recommendations and directed PSEG Long Island to resubmit certain PIPs to better address the Board's objectives.

Additionally, between December 2020 and this meeting, the Board adopted recommendations covering operational areas, including risk management, budgeting and reporting, real estate, asset management, inventory management, collections, affiliate services, strategic planning, information technology, small generator interconnection, and workforce management, among others (the "Management Recommendations").

In total, the Board has adopted 167 recommendations resulting in 146 PIPs, which are in various stages of implementation by PSEG Long Island. The Board has directed staff to submit quarterly

status updates on the implementation of each of these PIPs in the form of Quarterly Reports. The first Quarterly Report was adopted by the Board on June 23, 2021. The Quarterly Reports address the status of each recommendation based on PSEG Long Island's monthly status reporting to LIPA. The Reports also describe the status of LIPA's independent verification and validation of the remediation of each recommendation.

The Second Quarterly Report

The second Quarterly Report, attached hereto as <u>Exhibit "B"</u>, summarizes the status of each of the Task Force and Management Recommendations. The second Quarterly Report pays particular attention to describing the progress made since June 2021.

Discussion of Implementation Plans

In August, PSEG Long Island submitted revised PIPs for 5 of the 21 Task Force and Management recommendations open as of the last Quarterly Report. PSEG Long Island also submitted two deliverables for Task Force review, one PIP addressing three recommendations on strategic planning, and one PIP for two recommendations addressing Grid Resiliency.

The Task Force recommends the Board adopt three of the seven PIPs submitted by PSEG Long Island as attached hereto as **Exhibit "C"**.

PSEG Long Island has not yet submitted one Tier 2 PIP and did not submit 14 revised PIPs to address prior PIPs that the Board rejected in the December, February, March, and May meetings. These remaining plans should also be submitted. The remaining 18 PIPs shall be submitted by PSEG Long Island for staff review no later than October 10, 2021 for consideration at the Board's October 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"	Quarterly Report
Exhibit "C"	Implementation Plans

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, pursuant to Section 4.4(16), Rights and Responsibilities of LIPA, of the Amended and Restated Operations Services Agreement ("OSA"), LIPA, in part, has the right to "make recommendations to the Service Provider, in each case as may be reasonably necessary or appropriate to perform LIPA's oversight responsibilities and obligations with respect to the provision of Operations Services under this Agreement and as may otherwise be necessary or appropriate to comply with LIPA's legal, contractual and fiduciary obligations..."; 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 of the Board-adopted recommendations until all such recommendations have been completed; and

WHEREAS, on June 23, 2021, the Board adopted the first Quarterly Report; and

WHEREAS, LIPA Staff has submitted to the Board the second Quarterly Report along with three Implementation Plans recommended for the Board's approval; and

NOW, THEREFORE, BE IT RESOLVED, that the Board adopts the Quarterly Report; and

BE IT FURTHER RESOLVED the Board hereby adopts Implementation Plans for the Task Force and Management Recommendations attached hereto as **Exhibit "C"**; and

BE IT FURTHER RESOLVED, the Board hereby directs PSEG Long Island to amend the 18 remaining Implementation Plans to address the comments provided and resubmit such plans to for review on or before the Board's October 2021 meeting.

Dated: September 22, 2021

Exhibit "B"



Quarterly Report on Tropical Storm Isaias and Management Recommendations

September 22, 2021

For the Long Island Power Authority Board of Trustees

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EXECUTIVE SUMMARY

The Board of Trustees (Board) of the Long Island Power Authority (LIPA) has directed PSEG Long Island to file Project Implementation Plans (PIPs) to implement 167 recommendations to cure deficiencies in management, emergency management, information technology, and other operational areas. The PIPs define the objectives, deliverables, and scope of the remediation projects as well as the timeline of major milestones.

These 167 recommendations have resulted in 146 PIPs, including:

- 79 PIPs to address shortcomings that turned Tropical Storm Isaias into a hardship for Long Island and Rockaways electricity customers (the "Task Force Recommendations"); and
- 67 PIPs to correct other PSEG Long Island management deficiencies unrelated to the storm (the "Management Recommendations").

The Board has directed LIPA staff to monitor PSEG Long Island's execution of the PIPs, to independently verify and validate (IV&V) the remediation of each of the recommendations, and to report to the Board Quarterly on the status of each PIP until all such projects are complete.

This Quarterly Report is the second such report and summarizes the status of each PIP. The report separately describes the Task Force Recommendations and the Operational Recommendations, given the particular emphasis placed on defects that affect emergency response.

Update on Isaias Task Force Recommendations

The 85 Isaias Task Force recommendations resulted in 79 PIPs.

- 10 projects (13%) are either reportedly on schedule or already closed;
- 19 projects (24%) are reported completed by PSEG Long Island, without an acceptable PIP having been submitted to the Board. LIPA will independently assess whether the projects achieved the objectives of the Board recommendations;
- 44 projects (56%) are either delayed, no monthly status report was submitted by PSEG Long Island in either August or September, or PSEG Long Island has not yet submitted an acceptable PIP to address the Board's recommendations;
- 6 projects (8%) are deferred because PSEG Long Island asserts the recommendation is subject to ongoing contract negotiations.

Figure 1 below summarizes the status of the 79 outstanding implementation scopes.

FIGURE 1:

Status of the 79 Project Implementation Plans arising out of Isaias Task Force Recommendations

As of	On- Schedule	Delayed	No Status Reports ¹	No Approved PIPs	PIP is Deferred	Closed ²	Previously Completed ³	Total
Sept.	1	25	8	11	6	9	19	79
2021	(1%)	(32%)	(10%)	(14%)	(8%)	(11%)	(24%)	
June	4	19	10	16	9	2	19	79
2021	(5%)	(24%)	(13%)	(20%)	(11%)	(3%)	(24%)	

¹ In some cases, a status report may be absent because a PIP was submitted after the status report due date.

² Subject to IV&V by LIPA staff.

³ "Previously Completed" refer to recommendations for which PSEG Long Island represents that the work had already been completed and therefore a PIP was not submitted to the LIPA Board for consideration.

PSEG Long Island has made progress in closing Task Force projects this quarter. Still, the number of delayed projects has also increased, and almost half of the delayed projects have seen further schedule slippage since the last Quarterly Report in June. In some cases, the schedule variance has increased with every monthly status report submitted to LIPA.

It should be noted that delays are relative to the PIPs PSEG Long Island submitted to the Board to address each recommendation and the reported status is based on PSEG Long Island's monthly status reporting to LIPA. This reporting does not require subjective assessments by LIPA staff.

PSEG Long Island's implementation of the PIPs has fallen behind in several ways:

- There are many delays in completing the milestones called for in the PIPs, and some projects are getting further delayed over time.
- Monthly status reports are too often inconsistent, incomplete, delayed, or missing.
- In some areas, there is insufficient focus on functional and technical requirements and design efforts are contributing to the inability to maintain a schedule.

In addition to the monthly status reports provided by PSEG Long Island, LIPA staff also regularly meets with PSEG Long Island staff and consultants to monitor and assess progress on the PIPs.

Status of Remediation of the Communication and Outage Management Systems

The communications systems and Outage Management System (OMS) are in significantly better shape than during Tropical Storm Isaias. While additional progress has been made since the June Quarterly Report, and the telephony system is showing significant improvement, PSEG Long Island is still far from completing the necessary remediations.

PSEG Long Island remains on an out of date, out-of-general-use version of the OMS. Among other things, this system lacks the desired capabilities for important initiatives such as smart meter integration and the field mobile app for foreign crews. Business Continuity Plans (BCPs) to ensure critical operations in case of system failures are also still not satisfactory. These projects continue to be hampered by deficient planning, assessment, and design efforts, resulting in schedule delays, avoidable rework, and increased risk of customer-impacting system issues.

Since completion of the end-to-end system test of the communications and OMS version 5.5 systems in late May, PSEG Long Island and its consultants have shifted focus to redeploying the OMS version 6.7 that was in use during Tropical Storm Isaias. **To date, the cost of remediating the communications and OMS has exceeded \$30 million** (through August); however, OMS version 6.7 is not currently scheduled to be in production until November 2021.

It is essential that the OMS redeployment of version 6.7 continue to be addressed with both urgency and care. Regression and performance testing is planned for the coming weeks and will be critical to ensuring that this redeployment does not repeat the experience of the failed June 2020 OMS version 6.7 deployment, following which the OMS system experienced instability and performance issues and ultimately failed under the load of Isaias.

LIPA is continuing to conduct IV&V of the OMS version 5.5 end-to-end system test run by PSEG Long Island in late May, but has been hampered by PSEG Long Island's failure to provide requested documentation in a timely manner. For instance, a promised white paper from PSEG Long Island addressing the design parameters of the system's Enterprise System Bus (ESB) and observed data on queue depths was not provided for more than 10 weeks. Similarly, LIPA's requests to PSEG Long Island to provide the formatting information (meta-data) on the supplied log files have been repeatedly ignored.

Prior to the May 2020 end-to-end test, PSEG Long Island introduced an ESB system design change to filter out all repeat calls from the same customer, irrespective of digital channel, if the outage is already known to OMS via either SCADA reports or a prior customer contact. This dramatically reduced the incoming data load to the OMS during the end-to-end test, protecting the OMS from overloading. While this mitigates the risk of OMS performance issues, it has potentially broad impacts. It is not clear from the information provided to date that PSEG Long Island has fully considered permutations of circumstances to preclude possibilities of missed outage reports, and that the testing has been appropriately designed to comprehensively cover the relevant scenarios. Furthermore, this significant ESB design change was not disclosed to LIPA until after repeated inquiry about anomalies in the test results.

The Isaias Task Force has continued concerns about PSEG Long Island's over-reliance upon vendors; weak project management and oversight; and inadequate in-house technical expertise. As critical projects such as the OMS version 6.7 redeployment proceed, the Task Force is concerned that test plans and models may not be getting the level of thorough development and assessment required to ensure that potential impacts of system design changes are comprehensively addressed in testing.

A summary of the status of each of the Task Force PIPs is included in Section I.

Update on Management Recommendations

Beyond the Task Force recommendations, the LIPA Board has adopted 82 recommendations addressing deficiencies in 13 non-storm operational areas. These Management Recommendations are summarized in Figure 2.



FIGURE 2:

Management Recommendations By Area

The 82 Management Recommendations result in 67 PIPs, with some PIPs covering multiple recommendations. Most of the PIPs are still in the early stages of execution. Figure 3 summarizes the status of the 67 Management implementation scopes.

- 29 projects (43%) are either reportedly on schedule or already closed;
- 18 projects (27%) are either delayed or PSEG Long Island has not yet submitted an acceptable PIP to address the Board's recommendations;
- 20 projects (30%) are pending either because the PIP is not yet due or to provide LIPA and PSEG Long Island the opportunity to revise the PIP to better meet the Board's objectives.

FIGURE 3:

Status of Management Recommendation Project Implementation Plans

On Schedule	Delayed	PIP Not Accepted /Submitted	PIP is Pending /Not Yet Due/ Deferred	Closed ⁴	Total	
13 (19%)	11 (16%)	7 (10%)	20 (30%)	16 (24%)	67	

STATUS OF ISAIAS TASK FORCE RECOMMENDATIONS

On August 5, 2020, the day after Tropical Storm Isaias made landfall on Long Island, LIPA formed an Isaias Task Force to undertake a comprehensive and independent investigation into the failure of PSEG Long Island's communications and service restoration systems during the storm.

The Task Force issued two reports to the LIPA Board of Trustees and public following the storm — the <u>30-Day</u> and <u>90-Day Report</u>. The Task Force presented the 30-Day Report to the LIPA Board and public on September 23, 2020. Because of the urgency of the immediate threat of another major storm, the 30-Day Report focused on the failures of PSEG Long Island's information technology and communication systems and their proximate causes. The 90-Day Report, presented to the Board and public on November 18, 2020, expanded on the findings of the 30-Day Report and concluded that **systemic management shortcomings were the root cause of PSEG Long Island's failures during the storm. All of the failures could and should have been prevented by management.**

In its 30-Day and 90-Day Reports, the Isaias Task Force provided 85 recommendations for the Board's consideration that were designed to, among other things, (i) change management incentives and accountabilities; (ii) reform information technology and emergency management; and (iii) strengthen LIPA's oversight. The Board, in November 2020, directed PSEG Long Island to implement the Task Force Recommendations, including the creation of PIPs to remediate each finding.

In addition to the review and evaluation of the submitted PIPs, the Board also asked LIPA staff to actively monitor each implementation effort and to independently verify and validate the work product and the effectiveness of the remediations. The Board asked LIPA staff to provide Quarterly Reports that (i) summarize the current state of remediations of the key deficiencies identified in the 30-Day and 90-Day Reports; and (ii) describe project status on each PIP, including LIPA's evaluation of the progress being achieved, open issues and concerns, and other relevant information. This September 2021 Quarterly Report to the LIPA Board of Trustees is the second of a series of Quarterly Reports fulfilling this requirement.

Summary Status of Active ITF Project Implementation Plans

PSEG Long Island was asked to submit Monthly Project Status Reports to the Task Force for each of the adopted and open PIPs,⁵ tracking project progress against the schedules baselined in the approved implementation plans. Based on the most recent reporting by PSEG Long Island, submitted on September 10, 2021:

- •9 projects are reported as Closed as of this quarter signifying that all PIP items have been fulfilled (subject to LIPA verification);
- •1 project is reported as On-Schedule; and
- •25 projects are reported as Delayed.

In addition, LIPA notes that the following PIPs were not reviewed during this cycle for the reasons given below.

- •PSEG Long Island submitted no status reports on 4 projects.
- •4 projects did not receive status reporting from PSEG Long Island because they were moved to the active category after the most recent reporting due date.
- •PSEG Long Island identified 19 projects as Previously Completed signifying that the work had been completed without an approved PIP (subject to LIPA verification).
- PSEG Long Island has not submitted acceptable PIPs for 11 projects, and therefore there is not an agreed upon implementation plan to report status against. In some cases, LIPA's concerns with PSEG Long Island's proposed project plans have been unaddressed for as many as six months.
- •6 projects are deferred because PSEG Long Island asserts the recommendation is subject to ongoing contract negotiations.

The above statistics are based on PSEG Long Island's representation of the status of the PIPs. LIPA review of the detailed project deliverables indicates that some of the projects may have been prematurely closed. The actual number of delayed projects is likely greater.

Overall, progress has been made, and PSEG Long Island is better positioned for storms than it was during Tropical Storm Isaias. However, LIPA is concerned that risks remain that have not been fully mitigated. The pace of implementation of the recommendations is too slow and the focus is uneven, as evidenced by this Quarterly Report, which highlights the significant number of recommendations delayed beyond PSEG Long Island's own proposed timetables. For instance:

- Tier 1 Recommendation 4.14 advised PSEG Long Island to accelerate the deployment of the field mobile application for foreign crews and their crew guides to allow them to receive, update, and complete work assignments in the field. The field mobile application currently provides only one-way communication from the dispatcher to the field user and not two-way communication from the application back to the OMS/CAD (Computer Aided Dispatch) system. PSEG Long Island intends to develop the two-way integration for OMS version 6.7 but is still assessing options for architectural solution design, an effort that should have been completed a long time ago. Overall, this initiative has been plagued by a lack of thorough planning and design, resulting in schedule delays and avoidable rework, with the two-way integration now projected to be deployed in the second quarter of 2022.
- Several PIPs have had the solution deployed but remain open because deliverables and close-out artifacts are still pending, including fundamental artifacts such as design documents. In some cases, the projected end date is being extended with every monthly status report. These deliverables are by no means minor record-keeping artifacts that have no impact on the success of the project. To the contrary, rigorous planning and design is essential for changes to complex IT systems. The delays in submitting these essential artifacts are concerning, especially so because it is consistent with a broader pattern of insufficiently rigorous planning and design efforts.

Remediation efforts appear to have been hampered by the same management weaknesses that contributed to the failures during Isaias, with areas of concern including:

- Too many improvements continue to be driven by Task Force oversight instead of internal PSEG Long Island processes.
- Project Management continues to be weak.
- •Internal technical teams continue to lack key skill sets, leaving PSEG Long Island overly reliant on vendors.
- Lack of mature program management and project oversight processes, leading to uneven efforts across the organization and gaps in remediation efforts.

Current Status: Communications and Outage Management Systems

The well-documented failures of PSEG Long Island's communications systems and OMS had severe consequences for LIPA customers. The PSEG Long Island communications systems failed in almost every aspect of delivering a customer outage report to the PSEG Long Island OMS and communicating accurate information back to customers. The OMS also became dysfunctional due to a combination of the system load and unresolved defects. There are a variety of channels by which customers can give and receive outage information. The multiplicity of channels is intended to meet differing customer needs and preferences. However, each channel has underlying and unnecessary interconnections with other communication channels, causing failures in one to cascade into system-wide failures. These systems were not realistically stress tested and there was no provision for the contingency of communication failures.

Problems with PSEG Long Island's flawed communications and OMS were at the heart of its failed response to Tropical Storm Isaias. Proper technical remediation of these systems is a key component of future storm readiness of PSEG Long Island. **Success in this area is defined by:**

- Deployment of a stable, vendor-supported, industry-standard system that will provide the functionality demanded from an efficient and effective response plan.
- •A fully tested system that will perform efficiently and effectively under load scenarios predicted in this new climate-challenged world.
- Well-designed, reliable, and thoroughly exercised Business Continuity Plans (BCP) that can be put in motion if the primary systems fail.

Over the last twelve months, PSEG Long Island has been testing various fixes to its communications systems and OMS. LIPA's recommendations to PSEG Long Island had the following key requirements:

- Systematically analyze and test the failure modes of the system to identify the true root causes of the observed defects.
- •Ensure that test designs comprehensively and completely exercise all end-to-end processes (across each channel) as might be encountered in a future storm scenario like Isaias or worse.
- Focus on fixing OMS version 6.7 or later and not the now obsolete (and unsupported) version 5.5 of the system.
- Build robust BCPs as a contingency measure

PSEG Long Island has made progress on remediating the OMS, telephony, and associated systems, and they appear to be in significantly better shape than during Tropical Storm Isaias, especially the telephony system. However, we remain concerned about the pace of activities, the level of attention and thoroughness given to system and test design efforts, and the gaps in the implementation of the Task Force Recommendations.

PSEG Long Island is Operating on an Obsolete Version of its OMS

PSEG Long Island remains on version 5.5 of the OMS. **The 5.x generation of OMS was first introduced in 2013, and only two customers remain on this version level – PSE&G (in New Jersey) and PSEG Long Island**. The approximately 16 other utilities using the system are on versions 6.x, and the vendor is about to release version 7.0. The 5.x versions utilize now-outdated technology and require obsolete infrastructure. The vendor is no longer making enhancements or maintenance patches to 5.x versions and provides support to PSEG Long Island only on a break/fix basis under a special support contract with a limited number of hours. The PSEG Long Island deployment is running on an outdated operating environment without support and regular security patches, and a large part of the complex software subsystems relies on 7-year-old hardware. The system architecture, functional, and performance capabilities of version 5.5, for example, lacks built-in support for mobile applications for damage assessment. Version 6.7 also includes Smart Meter integration, enhanced Estimated Time of Restoration capabilities, and a web-based mobile client – features that are not available in the currently deployed version 5.5.

PSEG Long Island had previously upgraded the OMS from version 5.5 to version 6.7 in June 2020, but the system experienced instability and performance issues following the poorly implemented and tested upgrade, and ultimately failed completely under the load of Isaias. This led PSEG Long Island to revert to version 5.5 after the storm. PSEG Long Island's version 5.5 suffered similar issues as version 6.7 and through subsequent testing, we know that neither version 5.5 nor version 6.7 was configured by PSEG Long Island to appropriately manage Tropical Storm Isaias.

In addition to the inherent criticality of this initiative, several Task Force recommendations are dependent on the OMS, and consequently delays to this project cause cascading delays to multiple PIPs.

PSEG Long Island Is Now Focused on the OMS Version 6.7 Re-Platforming Project

PSEG Long Island initially planned to deploy a remediated version 6.7 on new hardware prior to the 2021 Atlantic Hurricane season; but was unable to complete the project along their original proposed timeline. PSEG Long Island is now focused on the OMS re-platforming project and plans to deploy OMS version 6.7 in November, 2021. This project must be addressed with urgency without sacrificing rigor and care. PSEG Long Island must also strengthen its project management so that the 6.7 deployment schedule is not further delayed.

As regression and performance testing commences on the version 6.7 build, it is especially important that PSEG Long Island ensures that the test plans and scripts are comprehensive and well-designed, and that the schedule is maintained without impact to the quality of testing and other Quality Assurance/Quality Control measures. In addition to the application changes in this version and the deployment of new hardware platforms, PSEG Long Island has introduced several changes to the OMS and its interfaces as part of the post-Isaias remediation efforts. Failure to adequately account for the potential impacts of all changes in the test planning could lead to another botched upgrade and the associated risks of significant negative impacts on customers.

IV&V of the OMS Version 5.5 Performance Tests is in Progress

LIPA's Isaias Task Force continues to conduct IV&V of PSEG Long Island's May 2021 OMS version 5.5 Performance Tests. PSEG Long Island has submitted Test Execution Reports deeming the version 5.5 End-to-End Performance Test and the 24-Hour 90% Percent Customer Out OMS Test successful. While the results of the test are certainly positive and a welcome improvement over previous runs, the Task Force has identified some concerns, including:

- The End-to-End tests are not true end-to-end tests as the digital channels are not directly utilized. Instead, the output of the digital channels is simulated and fed directly into PSEG Long Island's systems instead of passing through the larger communications infrastructure. Additionally, the tests are missing the crucial element of unpredictability introduced by human actors interacting with the systems at scale.
- Concerns that the test design may not comprehensively cover the impact of implemented design changes; in particular, the Enterprise System Bus (ESB) filtering solution, as discussed below.
- The communications system was tested at midnight on a weekend instead of mid-week daytime peak hours.
- Other miscellaneous concerns such as with the state of logging and log files.

The Task Force is conducting additional reviews of the test design, test logs, and system configuration information. **These efforts have been hampered by PSEG Long Island's failure to provide requested documentation and information in a timely manner**. For instance, a promised white paper from PSEG Long Island addressing the design parameters of the system's ESB and observed data on queue depths was not provided for more than 10 weeks. Similarly, LIPA's requests to PSEG Long Island to provide the formatting information (meta-data) on the supplied log files have been repeatedly ignored.

Prior to the May 2021 end-to-end test, PSEG Long Island introduced an ESB system design change to filter out all repeat calls from the same customer, irrespective of digital channel, if the outage is already known to OMS via either SCADA or a prior customer contact. This dramatically reduced the incoming data load to the OMS during the end-to-end test, protecting the OMS from overloading. While this mitigates the risk of performance issues, it has potentially broad impacts. It is not clear from the information provided to date that PSEG Long Island has fully considered permutations of circumstances to preclude the possibility of missed outage reports, and that the testing has been appropriately designed to comprehensively cover all relevant scenarios. Furthermore, **this significant ESB design change was not disclosed to LIPA until after repeated inquiry about anomalies in the test results**.

Current Status: Business Continuity Plans

The 90-Day Report identified the lack of adequate BCPs as a significant management failure and recommended the development of comprehensive BCPs for all mission-critical systems and processes to enable graceful recovery from technology failures.

PSEG Long Island's initial responses to the recommendation were lacking. A major deficiency of the proposed contingency plan was that it focused on the last incidence of failure (OMS and telephony) and did not take a broader view of the potential failures of many other mission-critical systems. The organization and structural hierarchy of the plan was poorly framed, and LIPA provided specific recommendations to drive improvements.

PSEG Long Island has since made some progress. PSEG Long Island has submitted to LIPA a host of BCP "work-around" plans intended to document contingency procedures in case of failure of specific IT systems, and LIPA has provided feedback on about 80% of the submissions. A general shortcoming of the plans is that they tend to take an overly siloed technology-based approach that addresses failures of specific individual applications, but do not sufficiently consider and address potential real-world failure scenarios that are likely to see a series of interlinked and possibly cascading system failures. For example, while considering the possibility of a potential failure of the ESB system (which actually failed during Isaias), the conclusion was that there is no technical workaround for ESB failures and the issue has to be addressed through BCPs from the "business side". Yet, no "business side" BCP has been produced to address an ESB system failure.

While some progress has been made on the BCPs, there is still significant work to be done. The PIP for the BCP recommendation proposed an end date of July 31st and was accepted by the Board with a comment to expedite the schedule in light of hurricane season. PSEG Long Island has, however, been unable to complete the project in accordance with the original proposed schedule, let alone an expedited one. The projected end date was delayed to August 27th in June and has now been further extended to September 30th. We urge PSEG Long Island to proceed expeditiously.

Figures 4, 5 and 6 summarize the status of each Isaias Task Force Recommendation, including those that are active, closed, and lack an approved PIP, respectively.

FIGURE 4:

Summary of Active Isaias Task Force Project Implementation Plans

#	Tier	Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date	Status/Schedule Change Since 2021Q2 Report
3.2.1.3	1	Delayed	The existing infrastructure for handling calls within the PSEG Long Island Call Center should be upgraded to a more recent version. PSEG LI should modernize its call center infrastructure to a technology that uses the newer "SIP Trunking" technology.	PSEG LI reports that due to delays with ordering circuits and receiving hardware, project schedule has shifted from October to November for cutover. Over the coming month, this schedule will be reviewed against the schedule for OMS and potentially modified to minimize impacts due to change given the size and complexity of the two.	1/18/2021	7/9/2021	11/30/2021	Further schedule delays, with the projected end date now 11/30/2021 instead of the projected end date of 10/15/2021 reported in June
3.2.2.3	1	Delayed	Work with CGI to obtain and implement fixes for identified application defects, which could include upgrading to a more recent version of the OMS software.	PSEG LI is projecting an end date of 12/31/2021 for the upgrade to OMS v 6.7.8, consistent with the Q4 2021 estimate reported in June. Regression testing is planned for September through early October.	12/3/2020	3/18/2021	12/31/2021	None
3.2.2.5	1	Delayed	Automate monitoring of the OMS and CAD at the infrastructure level to detect infrastructure failures and give administrators an opportunity to restore normal operating conditions.	PSEG LI reports that components of DB monitoring have been ported to v6.7 (i.e. critical ORA errors), however there are some items (i.e. long-running queries) that are now completed in v5.5 but will require further development to port to v6.7.	11/23/2020	5/3/2021	11/10/2021	No date reported in June
3.2.2.7	1	Delayed (Reported On Schedule, but Delayed per PSEG LI dates)	Automate monitoring of inbound outage reports to the OMS, to be able to detect and eliminate erroneous reports that may arrive from any source.	PSEG LI reports that the async solution to remedy repetitive customer calls was moved into Production on June 1, 2021. This solution works by filtering out repeat calls from the same customer, irrespective of digital channel. PSEG LI considers this PIP to be 80% complete, pending testing results once ported to v6.7.	11/2/2020	5/3/2021	11/15/2021	No date reported in June
3.2.2.8	1	Delayed	Irrespective of whether the failure mode is corrected within the IVR, the OMS should have automated monitoring of data quality arriving from IVR to detect potentially duplicate or otherwise bad information.	PSEG LI is reporting that work is in progress for porting of the Splunk solution for OMS v 5.5 to v 6.7 after OMS production servers are available.	11/2/2020	5/3/2021	11/15/2021	No date reported in June

#	Tier	Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date	Status/Schedule Change Since 2021Q2 Report
3.2.2.9	1	Delayed	The IVR and OMS communication protocol should be reviewed in detail and redesigned so that all messages between the two components are agreed, understood, verified to be operational and tested against error conditions such as sending duplicate outage reports.	PSEG LI reports that all development and testing activities for this recommendation are complete and the solution was deployed to production on 6/29/21. However, the project is delayed as documents and close-out artifacts are still pending, including the Design Specification Document.	11/2/2020	5/11/2021	9/30/2021	Further schedule delay, with the projected end date now 9/30/2021 instead of the delayed projected end date of 6/30/2021 reported in June
3.2.4.3	1	Delayed	Introduce the capability to quickly decouple the web and mobile apps from the OMS, so that when unresponsiveness is detected, alternate messaging can be provided to the customer and the OMS can be relieved of incoming transactional pressure.	PSEG LI reports that the solution (ESB Async Queue and Stored Procedure) was deployed to production on 6/1/21 to dampen the load on OMS and incoming transactions; however, the project is delayed as PSEG LI is working on finalizing open deliverables and artifacts for submission by 9/17/21.		4/7/2021	9/17/2021	Further schedule delay, with the projected end date now 9/17/2021 instead of the delayed projected end date of 6/30/2021 reported in June
3.2.4.4	3	No Status Reported	Model storm scenarios and conduct thorough stress testing on the website for all customer journeys and ensure that the infrastructure has sufficient capacity for high activity periods	This PIP was previously rejected, and a revised PIP has now been accepted. PSEG LI reports that work on the project is complete, and the project will be marked complete once all deliverables are submitted.	1/25/2021	3/24/2021	NA	PIP was accepted

#	Tier	Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date	Status/Schedule Change Since 2021Q2 Report
4.01	3	Delayed	PSEG LI should develop and execute a comprehensive strategic technology plan for outage reporting and communications.	PSEG LI reports that this recommendation has been on pause to allow more focus on other priority digital recommendations. Initial documentation was started and will be finalized by projected end date of 12/17/2021.	1/4/2021	3/15/2021	12/17/2021	Further schedule delay, with the projected end date now 12/17/2021 instead of the delayed projected end date of 11/1/2021 reported in June
4.03	2	Delayed	For the long term, PSEG LI needs to strengthen its voice communications engineering and project management staff.	PSEG LI reports that the project start was delayed to mid-September 2021 due to resource constraints and competing priorities with other critical Storm Remediation activities.	7/12/2021	9/3/2021	12/30/2021	Further schedule delay, with the projected end date now 12/30/2021 instead of the delayed projected end date of 9/3/2021 reported in June
4.04 & 4.05	2	Delayed	Explore integrating the high-volume voice communications design into a more powerful all-encompassing call center design. Develop a more scalable Inbound Contact Center.	PSEG LI is currently executing the RFP phase for CCaaS (Call Center as a Service), evaluating proposals. A finalized project plan with committed dates will not be available until after the vendor selection process has concluded and that vendor or vendors have been on- boarded.	2/1/2021	4/1/2022	5/6/2022	None, schedule to be revised after vendor engagement
4.07	2	Delayed	Ensure that the Municipal Portal is more resilient and prepare a backup Mode of Operation in case of OMS failure.	Project is delayed due to additional security requirements that needed to be incorporated into the solution. PSEG LI has defined a path forward to deploy Kubra unencrypted solution in Q3 2021 with a temporary security waiver and meet the encryption requirement in 5/31/2022.	8/31/2020	8/16/2021	5/31/2022	Project is Delayed, with a projected end date of 5/31/22 instead of 8/16/21 as reported in June

#	Tier	Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date	Status/Schedule Change Since 2021Q2 Report
4.09	3	Delayed	Better prepare social media staff to handle barrage of posts using modern artificial intelligence tools.	PSEG LI reports that legal has finalized/ approved the revised High Risk IT Technology Solution Requirement Questionnaire which is the root cause for the delay from 6/30/2021 to 9/28/2021. Vendor renewal contract was completed on was completed on 6/29/2021 after delays due to corporate legal requirements.	1/19/2021	6/25/2021	9/28/2021	Further schedule delay, with the projected end date now 9/28/2021 instead of the delayed projected end date of 8/13/2021 reported in June
4.13	1	Delayed	After the OMS faults are diagnosed and repaired, thoroughly stress-test the CAD system and the ESB to ensure there are no independent defects affecting either system.	PSEG LI reports that OMS/CAD v6.7.8 performance testing is planned in September and October 2021.	1/7/2021	4/1/2021	12/31/2021	None
4.14	1	Delayed	Accelerate the deployment of the mobile application for foreign crews and/or their crew guides ensuring that procedures are integrated into the ERP.	Project is delayed, with a projected end date of 4/22/2021. PSEG LI reports that assessment of RPA-based solution options for the two-way integration between the FM app and OMS- CAD is in progress; additional information on the path forward with the RPA solution to be determined shortly.	10/1/2020	8/30/2021	4/29/2022	No projected end date reported in June
4.15	3	Delayed	Performance test OMS and "feeder" systems to establish peak capacity.	PSEG LI reports that the v 6.7 stress to failure test plan and strategy are to be developed. Per original implementation plan, test will be executed post Go-Live. No immediate future action is planned until performance test is completed on v 6.7.	1/13/2021	5/2/2021	3/31/2022	None

#	Tier	Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date	Status/Schedule Change Since 2021Q2 Report
4.17	1	Delayed (Reported On Schedule, but Delayed per PSEG LI dates)	Re-architect the inter-system message queuing applications for greater dynamic stability under highly demanding workloads.	PSEG LI reports that the Async Queue solution deployed to v 5.5 production on $6/1/21$ has completed post-release testing and is stable, with open deliverables and artifacts to be submitted to LIPA by 10/15/21. Projected end date has been adjusted for deliverable submission, however deployment of the solution to OMS v 6.7 per the PIP work plan is not addressed.	11/13/2020	7/9/2021	10/18/2021	Projected end date has been changed to 10/18/2021 from 6/1/2021
4.19	1	Delayed	As part of storm preparation ensure that all application errors and debug conditions have been cleared and the system is operating normally.	PSEG LI reports the project as completed, with the pre-storm checklist in use for v 5.5. The project will be marked Closed once the close- out artifacts are submitted.	1/7/2021	5/3/2021	8/3/2021	Work reported completed, status change pending submission of close-out artifacts
5.01	3	Delayed	Improve Emergency Planning governance so that utility-wide Emergency Training is under a single Emergency Planning Team and not dispersed among various departments.	PSEG LI reports the project completed as of 6/28/2021, with a new EP Training Governance Specialist Position filled, and the Governance ERIP to support the new role and governance process completed. The project will be marked Closed once the deliverables and close-out artifacts are submitted via designated channels. Still waiting for submission of close out documents as of 9/15/2021.	2/19/2021	4/12/2021	6/30/2021	Work reported completed, status change pending submission of close-out artifacts
5.02 & 5.03	3	Delayed	Develop more rigorous ERP training and exercises to (a) test decision making, decision paths, and how information passes between functions, and (b) exercise well- developed business continuity plans.	No status report was submitted in September. PSEG LI reported in August that the After- Action Review report for the Annual Tabletop Exercise was completed 8/3/21 and in review prior to submission, and training materials enhancements were in progress.	4/1/2021	6/30/2021	9/30/2021	No date reported in June

#	Tier	Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date	Status/Schedule Change Since 2021Q2 Report
5.04	3	Delayed	Create BCPs for all mission critical systems and processes.	PSEG LI reports that Repair and Recovery Plans for 36 remaining critical applications grouped into 21 Repair and Recovery plans and 10 exceptions are planned for completion to final draft by 9/30/2021.	2/26/2021	7/30/2021	9/30/2021	Further schedule delay, with the projected end date now 9/30/2021 instead of the delayed projected end date of 8/27/2021 reported in June
5.06	3	No Status Reported (Reported Closed in July, but pending deliverables)	The Task Force found the general structure of PSEG Long Island's ICS is consistent with the National Incident Management System (NIMS), however, failures of technology were exacerbated by lack of visibility and some adjustments to the ICS may have mitigated the situation. The goal of this plan is to improve visibility within ICS to issues relating to mission critical technology, such that these issues can be more effectively managed during an incident.	PSEG LI reports that the project was closed on 6/30/21, with the completion of ICS/Mission Critical System Plan training. LIPA will accept the project as Closed (pending IV&V) once the deliverables are submitted which is still pending as of 9/15/21.	3/1/2021	4/1/2021	6/30/2021	Work reported completed as of 6/30/2021. Status change pending submission of close-out artifacts
5.07	1	Delayed	Expand the Emergency Assistance Agreement with National Grid to include Generation employees.	PSEG LI reports that regarding the use of National Grid for additional Storm Services, a decision by National Grid has not been made as of 9/1/21; National Grids VP of Generation communicated via email on 9/1/21 acknowledging that National Grid Gas and Generation owes PSEG a response.	12/31/2020	2/15/2021	7/30/2021	Further delay; projected end date unknown

#	Tier	Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date	Status/Schedule Change Since 2021Q2 Report
5.09	3	No Status Reported	Work with off-island sustaining tree contractors to develop consistent work practices, especially for removal of trees from energized lines.	No status has been reported in the current and previous quarters.	3/1/2021	5/1/2021	NA	No Status Reported
5.11	1	No Status Reported	Create criteria to guide implementing circuit sweeps during long outages whenever customers have been out for more than 3-4 days, and enough line resources are available.	No status has been reported in the current and previous quarters.	1/19/2021	5/15/2021	NA	No Status Reported
5.12	3	Delayed	Improve training for RDAs including on BCPs. Prepare to implement RCA, when advantageous.	No status report was reported in September or August. PSEG LI reported in July that the project is complete pending VP approval as of 6/29/21. The project will be marked Closed once the close-out artifacts are submitted via designated channels.	1/20/2021	5/1/2021	6/29/2021	No date reported in June
5.13 5.4.3 5.4.4	3	Delayed (Reported On Schedule, but Delayed per PSEG LI dates)	Explore using National Grid resources and local electrician resources for emergencies. Work with National Grid and local electrical contractors to train a workforce to make repairs to low-voltage service drops.	PSEG LI reports that regarding the use of National Grid for additional Storm Services, a decision by National Grid has not been made as of 9/1/21. Regarding utilization of local electricians, PSEG LI has signed contracts to provide electricians with Haugland Energy, Hawkeye and Bancker Construction for Low Voltage resources.	unknown	8/1/2021	8/30/2021	Further delayed
5.14	3	No Status Report	Develop a backup plan for tiered restoration in large-scale events. Train and exercise for tiered restoration operations.	Previously reported Closed as of 6/16/2021 based on PSEG LI reporting. Moved back to Open status, pending submission of deliverables and close-out artifacts via designated channels.	unknown	3/5/2021	6/16/2021	Status changed from Closed to No Status report, pending official submission of close-out artifacts

#	Tier	Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date	Status/Schedule Change Since 2021Q2 Report
5.16	2	No Status Reported	Review restoration verification protocols under "no-OMS" scenarios and ensure that they function efficiently. Leverage the AMI data in OMS to efficiently identify nested outages (the AMI portion of this recommendation has been addressed in Project Plan 5.4.2)	No status has been reported in the current and previous quarters.	unknown	3/1/2021	NA	No Status Reported
5.17	2	On Schedule	Benchmark the PSEG Long Island process to maintain the LSE customer list to the best practices used by other New York utilities. Evaluate the success of the 2020 LSE recertification and implement corrective actions so that 95% or more of LSE customers re-certify their need and update their contact information each year.	PSEG LI reports that the project is On Schedule for completion by 10/31/2021.	12/11/2020	10/31/2021	10/31/2021	None

#	Tier	Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date	Status/Schedule Change Since 2021Q2 Report
5.4.1 & 5.4.5	3	No Status Report	Selective undergrounding of main or branch lines in areas with difficult access. Revisions to the current vegetation management program to shorten the 4-year cycle across the system or in selected areas with denser vegetation. This overall comprehensive project aims to address and improve the resiliency of the Long Island and Rockaways electrical infrastructure. This project will cover three main areas: 1) Transmission and Substations / Load Pockets - equipment and transmission system / load pocket reinforcements 2) Overhead circuits - Mainline and Branch line hardening, equipment upgrades (i.e., operationalize LT5H devices), and vegetation management practices updates 3) Selective Undergrounding	Evaluation of the PIP was previously postponed pending further storm hardening evaluation. A revised PIP was accepted by the Board at the September meeting.	3/29/2021	12/31/2025	NA	PIP was accepted

#	Tier	Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date	Status/Schedule Change Since 2021Q2 Report
5.4.2	1	Delayed	Accelerating the deployment of smart meters and 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. (Recommendation was split into 5.4.2a AMI Deployment and 5.4.2b AMI Integration and Operation with OMS.)	PSEG LI reports that the project schedule has been shifted to align with the OMS v 6.7 re-platform, with a projected end date of 2/23/2022 to allow for a period of parallel operations after OMS v 6.7 go-live. Note - The target for 5.4.2a to complete 95% of meter deployment by September 2021 is on schedule, but no PSR was submitted. No revised PIP submitted for 5.4.2b	1/4/2021	8/6/2021	2/23/2022	No date reported in June

FIGURE 5:

Summary of Closed Isaias Task Force Project Implementation Plans

#	Tier	Status	Recommendation	Status Comments	Start Date	Planned End Date	Projected End Date	Close-Out Artifact Submission Date	Changes This Reporting Period
3.2.1.2	1	Closed	Improve the pre-storm planning process and include specific communication, coordination, and escalation with the communication service carriers and the HVCA provider before and during the storm.	PSEG LI reported this project as closed in June with an end date of 2/15/2021; however, deliverables, close out and artifacts documents were outstanding. These have now been submitted.	11/17/2020	12/22/2020	8/13/2021	8/20/2021	Close-out artifacts submitted. Status changed from Delayed to Closed (pending IV&V)
3.2.1.5	1	Closed	PSEG LI should develop appropriate capacity monitoring and management processes to support evidence-based demand forecasting and capacity planning.	The proposed PIP for this recommendation has been rejected, most recently in March. PSEG LI considers the project complete and has submitted close-out artifacts, which LIPA has accepted for IV&V.	12/4/2020	NA (no approved PIP)	8/13/2021	8/20/2021	Close-out artifacts submitted. Status changed from No Accepted PIP to Closed (pending IV&V)
3.21.6	1	Closed	PSEG LI should review the service operation process between PSEG LI and Verizon to understand how the major issues as identified are handled.	PSEG LI reported this project as closed in June with an end date of 2/15/2021; however, deliverables, close out and artifacts documents were outstanding. These have now been submitted.	9/10/2020	1/19/2021	8/6/2021	8/20/2021	Close-out artifacts submitted. Status changed from Delayed to Closed (pending IV&V)

#	Tier	Status	Recommendation	Status Comments	Start Date	Planned End Date	Projected End Date	Close-Out Artifact Submission Date	Changes This Reporting Period
3.2.3.1	1	Closed	At the beginning of storm planning and throughout the storm, designate a system data administrator dedicated to monitor, on a continuous basis, the timeliness, accuracy, and integrity of the information coming from OMS to Kubra.	PSEG LI reported that the documentation was planned to be reviewed by stakeholders and submitted to LIPA by 10/5/21; but subsequently submitted the artifact.	12/1/2020	3/22/2021	9/17/2021	9/17/2021	Close-out artifacts submitted. Status changed from Delayed to Closed (pending IV&V)
3.2.4.1	3	Closed	Review the storm-oriented customer journey maps implemented within the mobile and web-apps so that customer transactions are directed to the externally hosted infrastructure rapidly.	This PIP was previously rejected. A revised PIP has now been accepted, and PSEG LI has submitted close-out artifacts, which LIPA has accepted for IV&V.	1/11/2021	9/2/2021	9/17/2021	9/17/2021	PIP was accepted and close- out artifacts submitted. Status changed from Re-submit PIP to Closed (pending IV&V)
3.2.5.3	2	Closed	PSEG LI should also work to install end-to-end quality control measures for communication of ETRs. Consistency across communications channels is critical in developing confidence in the restoration effort.	No status reports have been submitted. Close-out artifacts were submitted in August 2021 and accepted for IV&V review.	unknown	3/31/2021	3/31/2021	8/20/2021	Close-out artifacts submitted. Status changed from No Status Report to Closed (pending IV&V)

#	Tier	Status	Recommendation	Status Comments	Start Date	Planned End Date	Projected End Date	Close-Out Artifact Submission Date	Changes This Reporting Period
4.08	2	Closed	Execute a communications plan with local emergency and municipal response officials to confirm municipalities' knowledge of the Municipal Portal and describe efforts to fix its operation from what they experienced during Isaias.	No status report was submitted in September. PSEG LI considers the project Closed and submitted artifacts in August. The August status report listed the project as On Schedule with a projected end date of 12/31/2021, but also removed the remaining task, an open period for any requested trainings, out of project scope. LIPA will need to review this change. Communications were completed and six training sessions were held, with the last training on July 20, 2021.	1/4/2021	12/31/2021	7/20/2021	8/20/2021	Status changed from On Schedule to Closed (pending IV&V)
4.16		Closed	Install standby hardware resources for use during peak demand.	The proposed PIP for this recommendation has been rejected, most recently in March. PSEG LI considers the project complete and has submitted close-out artifacts, which LIPA has accepted for IV&V.	NA (no approved PIP)	NA (no approved PIP)	8/20/2021	8/20/2021	Close-out artifacts submitted. Status changed from No Accepted PIP to Closed (pending IV&V)
5.15	1	Closed	Create an ETR Manager position with staff to monitor OMS systems and ETR quality. The ETR Manager should report to the planning chief within the ICS.	No status has been reported in the current and previous quarters, but the ETR Manager position was created, and the position filled. The manager has been active in a number of storms in 2021.	12/21/2020	2/22/2021	-	-	Status changed from No Status Report to Closed (pending IV&V)

FIGURE 6:

Isaias Task Force Recommendations Without Approved Project Implementation Plans

#	Tier	Recommendation
3.2.1.1	1	PSEG Long Island should complete implementing the planned telecommunication design changes and conduct additional capacity testing as soon as possible.
3.2.2.4	1	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.
4.10	3	Implement a solution that allows the OMS to decouple customer reporting from field management activities.
4.12	1	Systematically test the OMS system to ensure that concrete root causes are identified and remedied. If the errors are due to system defects, then demand accountability from the system vendor for timely fixes. Ensure that root causes, not just symptoms, are addressed.
4.18	1	Monitor application performance and error logs of all mission critical application systems, such as OMS, CAD, SCADA, ESB, etc.
4.21	2	Complete the integration of the MDMS and OMS to report the meters' power restoration events.
5.08	3	Institute a program to train National Grid Gas and Generation resources to support damage assessment and materials handling work during major storms.
5.10	3	Undertake a thorough review of damage assessment crew management processes and especially performance shortcomings during Isaias. Ensure that the damage assessment protocols are optimized and that they leverage modern field management technology (e.g. mobility app).
5.4.2b	1	Accelerating the deployment of smart meters and 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. (Recommendation was split into 5.4.2a AMI Deployment and 5.4.2b AMI Integration and Operation with OMS. PIP for 5.4.2b is pending resubmission.)
6.01	1	PSEG should review the Isaias Task Force's 90-day Report and issue a CATRR (Causal Analysis Team Review Report) that fully addresses the root causes of its failed storm response, including management shortcomings documented in this Report. PSEG should implement an improved after-action analysis process for future storms that has greater rigor.
7.04	3	Initiate programs to develop stronger project management capability in PSEG Long Island's IT practice areas.

SECTION 2 STATUS OF MANAGEMENT RECOMMENDATIONS

The LIPA Board has adopted 82 recommendations to address known management deficiencies in 13 PSEG Long Island operational areas beyond the scope covered by the Isaias Task Force reports, as shown in Figure 7. Most of these deficiencies have been longstanding and raised with PSEG Long Island management previously both by LIPA and in Department of Public Service Management and Operations Audits.

FIGURE 7:

LIPA Board Management Recommendations

8	3	5	25	3	7	7	3	2	3	8	7	1
Enterprise Risk Management	Operating Budget	Real Estate	Inventory Management	Collections Management	Asset Management	Affiliate Services	Strategic Planning	IT System Modernization	Capital Budget	Work Management	Small Generator Interconnection	Data and Information Access

These 82 recommendations have resulted in 67 PIPs to address the operational findings. Figure 8 summarizes the status of the Board's review of these PIPs.

FIGURE 8:

Status of Project Implementation Plans for LIPA Board Management Recommendations

(As of September 202	21)
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			Complete &	In	Rejected a	nd Outstandir	ng	Plans
Findings	Adopted	Total #	Under Review	Progress	May	August	Deferred	Due
Risk Management	12/16/20	8	4	4	-	-	-	-
Operating Budget	12/16/20	3	1	2	-	-	-	-
Real Estate Management	1/27/21	5	-	5	-	-	-	-
Inventory Management	2/24/21	23	10	7	6	-	-	6
Collections Management	2/24/21	2	1	1	-	-	-	-
Asset Management	3/29/21	3	-	1	-	-	1	2
Affiliate Services	3/29/21	3	-	3	-	-	-	-
Strategic Planning	4/28/21	1	-	-	-	1	-	1
IT System Modernization	4/28/21	2	-	-	-	-	-	2
Capital Budget	5/19/21	1	-	1	-	-	-	-
Work Management	5/23/21	8	-	-	-	-	-	8
Small Generator Interconnection	8/11/21	7	-	-	-	-	-	7
Data and Information	8/11/21	1	-	-	-	-	1	1
Total		67	16	24	6	1	2	27

- •24 PSEG Long Island PIPs have been accepted by the LIPA Board and are in various stages of execution:
- •7 PSEG Long Island PIPs were found to have deficiencies in achieving the objectives of the recommendation, and PSEG Long Island has been asked to submit revised PIPs that are responsive to LIPA's concerns.
- •27 PIPs have not yet been submitted for the Board's review, are expected to be submitted to the Board by its October Board meeting.
- •2 PIPs were deferred mutually by LIPA and PSEG Long Island while discussions are ongoing to improve the PIPs.
- •16 recommendations are complete and pending LIPA review.

Each of the recommendations is summarized in the discussion below. Many of the PIPs are still in the early stages of execution. We discuss progress in implementing the PIPs only in those where that applies.

Risk Management

Since 2015, LIPA and PSEG Long Island have worked collaboratively to develop and implement an effective Enterprise Risk Management (ERM) Program to identify, assess, and manage the most significant risks to LIPA and its customers.

In 2019 and 2020, LIPA saw a notable decline in the level of transparency and collaboration from the management of PSEG Long Island in the ERM Program and inaccurate ratings by PSEG Long Island of certain key risks (i.e., the OMS and other key IT risks). The development, implementation, and monitoring of mitigation strategies and actions was also less than satisfactory. To address these issues, LIPA Staff proposed the following eight recommendations to improve the ERM Program, which were adopted by the LIPA Board in December 2020.

#	Reported Status	Recommendation	Status Summary	Planned End Date
ERM-1	Closed	Include LIPA subject matter experts (SMEs) and ERM team members in all risk discussions	PIP approved 1/27/2021. IT sessions were significantly delayed, review held 7/14/21.	5/30/2021
ERM-2	Closed	Designate management-level owners for each risk mitigation strategy and related management action plan	PIP approved 1/27/2021. All risks have designated mitigation owners. Last review held 7/14 with IT.	6/01/2021
ERM-3	Closed	Establish a joint Microsoft SharePoint Extranet site so that risk information, including risk assessment, deep dive analysis, mitigation strategies, current status of implementation plans, and annual reports can be accessed in real-time by LIPA SMEs	PIP approved 1/27/2021. Complete.	12/02/2020

ERM-4	Closed	Produce an annual ERM report, providing a complete aggregation of all risks, effectiveness of mitigation actions for high-priority risks, areas of weakness/need improvement, and general observations, by June 1 of each year	PIP approved 2/24/2021. Risk report was due June 1, provided June 25 and presented to LIPA senior management on July 19 after significant revision.	6/30/2021
ERM-5	Delayed	Perform a deep dive analysis on high- priority risks including what mitigation actions have been implemented, those underway, planned, and areas of deficiency	PIP approved 2/24/2021. One risk review complete and two additional scheduled for 2021. Calendar for 2022 risk discussions delayed and awaiting PSEG LI approval.	7/30/2021
ERM-6	On Schedule	Develop a risk correlation matrix to better understand end-to-end impacts and the risks that are interrelated (especially for major storms) to better inform needed mitigation strategies	PIP approved 1/27/2021. LIPA ERM Team developed framework and completed proof of concept; PSEG LI to utilize framework on an agreed upon risk prior to PIP being closed.	12/31/2021
ERM-7	On Schedule	Provide risk training to all SMEs participating in the annual risk assessment process so that the expectations and value of the process are better understood by the participants	PIP approved 1/27/2021. Awaiting training materials for review by LIPA ERM. Formal training to all stakeholders involved in the risk assessment process expected to be facilitated in Q4 of 2021.	12/31/2021
ERM-8	Open	Develop a process so that if a high-risk event or condition is identified by LIPA, PSEG Long Island, or PSEG personnel (i.e., when OMS was failing days before the storm) such event or condition (i) immediately triggers a risk review by the LIPA and PSEG Long Island ERM teams, and (ii) is elevated to both LIPA and PSEG Long Island management.	PIP approved 2/24/2021. Process developed to escalate, perform review, and elevate the discussion to LIPA and PSEG Long Island Management. Concept presented and approved in 3/24 Risk Management Committee, Corporate Communication disseminated 5/06 to all PSEG LI employees on importance; 5/12 VP received information for discussion with managers and supervisors and will be ongoing discussion point for RMC meetings. LIPA ERM is finalizing IV&V on the escalation process and communication proposed.	4/30/2021

Over the past eight months, PSEG Long Island has made progress in addressing many of the deficiencies identified in the eight ERM recommendations. Specifically, the PSEG Long Island ERM team has completed ERM Recommendations 1, 2, 3, and 4. As a result of ERM-1 and ERM-2, there has been an improvement in the level of detail provided in the risk discussions and increased accountability by PSEG Long Island SMEs in managing their risks.

Related to ERM-2, PSEG Long Island has designated management-level owners for each risk mitigation strategy. LIPA will continue to work with PSEG Long Island to identify the appropriate level of detail for risks and to improve the tracking of the effectiveness of mitigation actions. Work is underway for improving the mitigation tracker, and LIPA will monitor closely the reporting of mitigation actions to ensure PSEG Long Island implements best practices.

With the completion of ERM-3 access to real time information and the quality of information reported there has seen progress, however, quality control remains an issue and LIPA ERM has requested PSEG Long Island review the quality of the content with a closer eye to ensure information is concise and accurate.

For ERM-4, PSEG Long Island ERM presented the annual report to LIPA senior management on July 19, 2021.

The annual report and presentation was delayed to address due to substantive concerns that LIPA expressed about the level of information provided in draft reports. The final product contained useful information and provoked meaningful discussion on the most significant risks identified by PSEG Long Island. LIPA will be following up with PSEG Long Island to make additional improvement in the planning and execution of the ERM assessment process in the 2022 risk assessment cycle, specifically, in the development of risk descriptions, the level of detail documented, the description and tracking of mitigation activities, and a more stringent review of the impact and likelihood for risks, especially known failures over the past 12 months (i.e., the OMS and customer communications systems).

Additionally, over the 2021 risk assessment cycle, PSEG Long Island ERM did not follow the timeline developed or the process for risk profile reviews agreed upon in December 2020 before the assessment cycle began. This lack of adherence to the process was discussed multiple times with inadequate remedial actions taken. PSEG Long Island ERM would benefit from adhering to a detailed project timeline for the assessment process.

Both LIPA and PSEG Long Island share the goal of developing and piloting a risk correlation framework (ERM-6) to identify end-to-end risk impacts to inform mitigation strategies. LIPA ERM developed the risk correlation framework and presented a proof of concept in late July that was well-received. The next step will involve PSEG Long Island ERM identifying a risk and utilizing the same process to highlight risk interdependencies, associated mitigation actions, and identified improvements.

PSEG Long Island included high-level risk training information in the 2021 risk assessment working sessions (ERM-7); however, no formalized training plans or documents have been presented to LIPA ERM to date. PSEG Long Island has committed to developing and holding formalized ERM training for all relevant personnel prior to the commencement of the 2022 risk assessment process. LIPA ERM is awaiting formal training documents for review and training sessions to be scheduled. While communication is ongoing regarding this recommendation, concern is mounting on the ability for PSEG Long Island to develop and schedule training materials as Q4 is approaching and no formal information has been provided.

For ERM-8, the risk escalation process has been developed and was distributed to all PSEG Long Island employees in May. Additional information was provided to PSEG Long Island Vice Presidents to communicate with managers and supervisors to increase awareness on the importance of escalating identified issues. LIPA is in the process of verifying the adequacy of the escalation process developed by PSEG Long Island. LIPA ERM recognizes it will take time to adopt the process across the organization and the effectiveness will be evaluated on an ongoing basis.

Overall, PSEG Long Island seems committed to improving the ERM Program and has made progress since the eight recommendations were approved and adopted by the LIPA Board in December 2020. However, additional improvement is required to meet LIPA's expectations.

Operating Budgets

The Board adopted recommendations to improve the Operating Budget Process on December 16, 2020 to ensure that comprehensive information is available to both LIPA and PSEG Long Island in a timely manner to support decision-making. This requires increased transparency, accountability, and documentation. Further, improvements are necessary to align budget planning with the development and review of operational work plans.

LIPA requested that PSEG Long Island develop PIPs for OBD-2 and 3. LIPA staff developed the PIP for OBD-1. PSEG Long Island submitted the two PIP proposals in January 2021, and LIPA submitted the proposals to the Board at the February 2021 meeting. The three PIPs were approved by the Board on February 24, 2021.

#	Reported Status	Recommendation	Status Summary	Planned End Date
OBD-1	On Schedule	LIPA will initiate the development of a new budget system to provide for improved documentation, centralized budget calculations, data analytics and forecasting capabilities, and budget control.	 PIP approved 2/24/2021 for Implementation Enterprise Planning and Budgeting System to enable transparent and comprehensive budget planning, development, and management for LIPA and PSEG Long Island. This project is led by the LIPA team. The current phase of the project is well on track, which includes: Acquisition and Project Management Services Development of Business Requirements and Traceability Matrix (RTM). Market research on Technology Solutions. Completing Fit-Gap Analysis Acquisition of Technology Platform and implementation services. 	Phase 0 – 2022 Q3 Phase 1 – 2023 Q3 Phase 2 – 2024 Q2
OBD-2	Closed	PSEG Long Island will develop Budget Briefing Books as part of the budget development process. The Budget Briefing Books will document and explain work plans and the proposed resource allocation at department levels.	PIP approved 2/24/2021. Budget briefing books for 2022 Budget were provided timely by July 31, 2021.	July 2021
OBD-3	Closed	LIPA is requiring PSEG Long Island to provide explanations on the reallocation of funds within the Operations & Maintenance Budget.	PIP approved 2/24/2021. Reallocation forms have been provided for activities whereby projected year-end variances are expected to be in excess of the agreed upon threshold in the PIP.	April 2021

To meet the requirements of OBD-2, PSEG Long Island developed Budget Briefing Books to support selected 2021 department budgets in detail, focusing on one department in each PSEG Long Island Vice President area. This effort was expanded to all departments for the 2022 Budget development process. Budget Briefing Books for the 2022 budget were provided to LIPA as required by July 31, 2021. Overall, the Budget Briefing Books provided an improved level of transparency and detail; however, further improvements are necessary in documenting, in particular, new resource requests and aligning operational work plans and budgets.

With respect to OBD-3, PSEG Long Island developed a Reallocation Explanation template. The first reallocation explanation was due in April 2021. Two reallocation template forms have been provided to LIPA to date. The PIP reflected phasing in the threshold for reporting a reallocation over a three-year period to provide PSEG Long Island with additional time to refine internal budget processes and practices:

- Effective 2021 Actual spending and/or forecasted year-end results that causes a year-end aggregate variance to budget at the Vice President level of the lesser of \$5.0 million or 5 percent of the annual budget
- Effective 2022 Actual spending and/or forecasted year-end results that causes a year-end aggregate variance to budget at the Director level of 10 percent of the annual budget and greater than \$500k
- Effective 2023 Actual spending and/or forecasted year-end results that causes a year-end aggregate variance to budget at the Director level of 5 percent of the annual budget and greater than \$500k

Real Estate Management

PSEG Long Island is responsible for real estate management, easements, leases and agreements, pole attachments, joint use agreements, and telecommunications for the provision of electric service.

Beginning in mid-2019, LIPA, PSEG Long Island, and National Grid discussed the potential reconfiguration of certain properties and facilities that were part of the 1998 merger, when LIPA acquired the Long Island Lighting Company as a wholly-owned subsidiary of the Authority. Both PSEG Long Island and National Grid also expressed interest in separating certain operational facilities. Finally, as a parallel effort, PSEG Long Island has been looking for a location for a new Primary Transmission Control Center (PTCC). All these workstreams are necessary efforts for LIPA's ongoing operations.

These efforts stalled at different stages due to challenges at arriving at concrete valuations for properties that LIPA co-occupies, the piecemeal approach utilized by PSEG Long Island to plan for consolidation of these properties, and lost bids for some properties considered for the PTCC.

These efforts required greater focus and a more organized management approach, including timelines and deliverables, to address LIPA's ongoing concerns in a comprehensive and timely manner, including a comprehensive evaluation of LIPA's real estate needs prior to a year-end 2021 early termination right on certain leased facilities. Specifically, this effort requires a comprehensive look at the facilities currently owned and leased by LIPA and the space needs of the employee population at these locations, especially in a post-COVID work environment.

To address these concerns, on January 27, 2021, the Board adopted the below five recommendations. The Board requested that PSEG Long Island prepare PIPs for these recommendations no later than February 8, 2021. On February 24, 2021, the Board rejected the first iteration of these PIPs and directed PSEG Long Island to revise them consistent with LIPA Staff comments. Based upon LIPA Staff comments, PSEG Long Island resubmitted the PIPs for the Board's consideration at the May 2021 meeting. Progress on implementing these PIPs is described in the table.
This effort is critical to ensuring an accurate and comprehensive understanding of LIPA's real property and facility assets and will ensure that LIPA and PSEG Long Island are focusing their efforts on the long-term viability of the LIPA real estate portfolio in a manner that is best suited for the workforce and provides the highest value to our customers. Given that these PIPs relate to long term strategy planning for LIPA's real estate portfolio, LIPA continues to take an active oversight role, and is part of the discussions with PSEG Long Island consultants in progressing these PIPs toward completion.

#	Reported Status	Recommendation	Status Summary	Planned End Date
RE-01 (10.04)	On Schedule	Develop a long-term strategy for LIPA's real estate and facility assets, including a post-COVID-19 space needs analysis	PIP approved May 19, 2021. Consultant has been selected and work is ongoing in advance of a year- end lease termination option.	Q4 2021
RE-02 (10.01)	Delayed	Develop a comprehensive and formal strategy for the development of a new PTCC and Alternate Control Center	PIP approved May 19, 2021. The PTCC project is dependent upon finding a suitable 8-10+ acre property on Long Island. Although a suitable property was located in February 2021, in April 2021 PSEG LI was notified they were not selected for the property. Realtors continue to search for suitable properties to meet PTCC operational requirements. The milestone in selecting a property by year end is at risk.	Q1 2028
RE-03 (10.02)	Delayed	Develop a joint strategy with National Grid for separation of existing operations centers, including, among others, those located at Hicksville, Riverhead, Roslyn, and Hewlett	 PIP approved May 19, 2021. The following milestones are at risk: 1. PSEG LI determination of property needs requirements is ongoing, but this milestone is now anticipated to be completed by the end of October. 2. PSEG Long Island and National Grid develop and agree upon a property acquisition methodology (Appraisals, Broker Opinion of Value) 3. Develop existing property segmentation plans with National Grid based on PSEGLI space requirements to support Operations and/or review alternate properties for purchase. 4. Determine purchase/ relocate/lease consolidation for properties to meet identified operational needs. 5. Corporate Real Estate initiates property search, as may be required. 	Q4 2021
RE-04 (10.03)	On Schedule	Hire an outside consultant to perform a comprehensive review of the existing real property records to confirm accuracy, identify gaps, and make recommendations or process improvements	PIP approved May 19, 2021. The Records Management vendor has been selected and kick off meeting scheduled.	Q2 2022
RE-05 (10.05)	On Schedule	Develop a succession plan for current long-serving PSEG Long Island real estate professionals to ensure knowledge capture and transfer	PIP approved May 19, 2021. The respective departments completed training documentation of the positions and met with respective Directors and Vice Presidents. LIPA to review and discuss with PSEG Long Island the deliverables.	7/31/2021

Inventory Management

PSEG Long Island is responsible for "Inventory Control," including (a) maintaining an inventory of equipment, spare parts, materials, and supplies and maintaining and documenting an inventory control program; (b) complying with the inventory policy provided in the Operations Manual; (c) purchasing, maintaining, and storing inventory in a manner consistent with the System Policies and Procedures; and (d) completing, on an agreed-upon cycle count basis, a physical inventory of the equipment, spare parts, materials and supplies, and reconciling the same with the inventory assets carried on the balance sheet and providing the information to LIPA.

In December 2017, LIPA engaged an outside consultant to perform a review of inventory controls during storm events. The review included:

- Evaluation of existing policies, procedures, and guidelines in place for the request and issuance of materials/ equipment from storerooms under conditions of high activity (i.e., storms).
- Understanding the systems or tools utilized in the process including tracking, approving and/or reporting mechanisms used for materials/equipment distribution; and
- Assessing the return of materials/equipment to storerooms after the storm event including, but not limited to monitoring processes over the expected return of materials and Key Performance Indicators in place, effectiveness of policies and procedures, and cost recording/record-keeping implications if unused materials/equipment are not returned, but then used in a non-storm event.

The consultant for the December 2017 review presented 11 findings with 14 recommendations.

In 2020, LIPA engaged another consultant to confirm that the 2017 recommendations had been implemented and to conduct a broader assessment of PSEG Long Island's inventory management practices. The 2020 consultant's assessment included a review of the efficiency and effectiveness of warehouse and inventory management practices, how the practices benchmark against industry standards, and where there are opportunities to improve performance. The assessment was conducted from November 2020 through January 2021 and included evaluating current inventory operations and processes, identifying current state gaps, assessing the readiness of storm response, and developing recommendations.

The 2020 consultant confirmed that the 2017 recommendations had all been implemented but reported 25 additional findings (collectively, the Inventory Management Recommendations) among the areas of general management, information technology, warehouse management, inventory management, and procurement practices. The findings and remediations are summarized as follows:

- PSEG Long Island struggles with maintaining inventory turn targets and thereby has inflated the working capital required to run the business. PSEG Long Island does not have inventory turn targets aligned with industry practice and that consider the related financial and storm fulfillment considerations.
 - PSEG Long Island must present a sensitivity analysis illustrating the tradeoffs for working capital requirements versus storm readiness. Future vendor contractual language must include performancebased incentive / dis-incentives based on inventory turn target attainment with some number of limited stockouts.
- •PSEG Long Island cannot generate written / system generated, repeatable reports with fundamental supply chain information in a formalized cadence.
 - o PSEG Long Island must schedule monthly and quarterly meetings with a formalized agreed upon list

of reports to review objectives, performance-to-date, and action plans with standard key performance indicators, such as: Stockout Performance, Backorders, Service-Levels, Forecast Accuracy, Stocking Levels, Days of Supply, Inventory Financial Valuations, Supplier on-time delivery, and SAP transactional exception "Grief Reports."

- PSEG Long Island currently has a roadmap in "stage 0" to improve IT systems. However, foundational capabilities, such as bar-coding, do not function and managerial reporting capability is marginal and not supportive of transparent communication.
- PSEG Long Island does not utilize common algorithms to set min/max cycle stocking targets. From conversations, min/max stocking targets rarely, if ever, change during the year, though no information is available to quantitatively verify this statement. A formalized consolidated demand forecast is not available. There is a storm safety stock concept limited to ~150 of 7,000 part numbers, and PSEG Long Island has been unable to communicate to LIPA the methodology for calculating these stocking levels. Based on the review, it does not appear that inventory levels increase during storm season and decline during the non-storm season. Further, PSEG Long Island has only one vendor with a storm supply clause. PSEG Long Island has not utilized "storm supply" clauses to bring in materials from a supplier.
 - o PSEG Long Island must provide a more dynamic/agile inventory strategy that is analytically based with increased documentation and clear reporting to assist with LIPA oversight.
- PSEG Long Island struggles with demand aggregation from engineering, contractors, and field crews. This, in turn, causes inflated inventory levels to account for demand variability as well as increased manual efforts by supply planners to verify demand prior to the creation and release of Purchase Orders.
 - o PSEG Long Island must maintain a forecast, report upon the changes in the forecast and causality, and take remedial actions with groups and personnel as needed.
- PSEG Long Island has made strides in improving warehouse execution, specifically in the Hicksville location. However, there remain several smaller opportunities for improvement related to signage, location management, and process management.

On February 24, 2021, the Board adopted 25 recommendations to address the findings related to inventory management. On April 9, 2021, PSEG Long Island submitted 23 PIPs for LIPA review. The Board adopted 15 of the PIPs, as identified in the table below, and asked for eight PIPs to be resubmitted in advance of the Board's May meeting with LIPA's concerns addressed.

On May 6, 2021, PSEG Long Island submitted three additional PIPs. PSEG Long Island also indicated that they would not resubmit any PIPs related to SAP but rather would continue to meet with LIPA to discuss these recommendations in the context of the Board's recommendation to replace the current SAP Enterprise Resource Planning System. LIPA staff expressed their reservations to this approach as nearly all recommendations can be accommodated using simpler reporting and analysis tools or third-party applications plugged into existing systems rather than waiting for a multi-year plan to replace the SAP system. LIPA continues to urge PSEG Long Island to revise its technical approach and resubmit these PIPs to realize the benefits of the Board's recommendations for customers in a timely manner.

On May 19, 2021, the Board adopted two additional PIPs, as indicated in the table below. PSEG Long Island has not resubmitted the remaining PIPs to address LIPA's comments.

#	Reported Status	Recommendation	Status Summary	Planned End Date
IMR-01 (GMIT1)	PIP Rejected	SAP System is Not Innovating with the Business	No approved PIP. PIP needs to demonstrate a commitment to utilizing barcoding to enhance inventory management. Barcoding system can be implemented without major system upgrades. This recommendation was combined with IMR-07 (WM-1). No revision has been submitted to date.	-
IMR-02 (GMIT2)	On-going	Lack of Visibility & Formalized Communication	PIP accepted 4/28/2021. Reports shared and reviewed at the first bi-monthly PSEGLI/ LIPA inventory management meeting held on 6/30/21. Agreed to review a subset of the existing reports at future bi-monthly meetings. The subset of reports was discussed and reviewed at the August meeting which was held on September 1 due to scheduling conflicts.	12/22/2021
IMR-03 (GMIT3)	PIP Rejected	Lack of Standard Reporting Functionality	No approved PIP. PSEG proposal is both too time consuming and overly costly. No revision has been submitted to date.	-
IMR-04 (GMIT4)	Delayed	Opportunities to Improve and Formalize Training	PIP accepted 4/28/2021. Three (3) Vendors identified, however, PSEG Long Island states there is no current O&M funding to proceed with the plan. PSEG Long Island indicates an alternative internally developed employee refresher training program has been assigned to all employees for completion by the end of September 2021. LIPA will review at the next bi-monthly meeting and make recommendations about possibly revising the PIP.	11/19/2021
IMR-05 (GMIT5)	No PIP Submitted	Perform performance testing to validate the ability of the SAP system to support high volume transactions during a storm	No PIP submitted.	-
IMR-06 (GMIT6)	PIP Rejected	Confirm detailed Business Continuity Plan and Fail-Over Preparations	No approved PIP. A revised PIP dated 7/29/21 is being discussed.	-
IMR-07 (WM1)	Combined	Barcoding technology is not utilized in material handling	No PIP submitted. This PIP was combined with IMR-01 (GMIT1) which was rejected.	-
IMR-08 (WM2)	PIP Rejected	Exception Reporting	No approved PIP. PSEG project plan is too lengthy. No revision has been submitted to date.	-
IMR-09 (WM3)	Complete	Lack of Formal Location Signage at Service Centers	PIP accepted 4/28/2021. New signage, labeling machines and labels have been purchased. Internal labor has been actively labeling all inside and outside bin locations. All signage has been installed.	8/27/2021

IMR-10 (WM4)	On Schedule	Formalize Quality Hold and Returns Locations are Present	PIP accepted 4/28/2021. A disciplined supplier returns and quality hold process with clearly defined physical and SAP Bin locations is complete. Four SAP Bins have been created. Physical space within the Hicksville warehouse receiving area has been allocated and delineated with yellow floor striping. 4 milestones have been completed and were verified at the bi-monthly meeting held 9/1/21.	5/17/2021
IMR-11 (WM5)	Complete	Create Bin location in SAP is not restricted	PIP accepted 4/28/2021. PSEG Long Island reports complete. LIPA verified completion at 6/30/21 bi-monthly meeting.	3/20/2021
IMR-12 (WM6)	Complete	Risk of crew-based pilferage, misuse, mispicked inventory in a self-serve environment	PIP accepted 4/28/2021. Deliverables were reviewed with PSEG Long Island at the 6/30/21 status meeting. LIPA verified all 4 milestones were complete.	6/30/2021
IMR-13 (IM1)	Complete	Formalize and Communicate Storm Inventory Strategy	PIP accepted 4/28/2021. PSEG Long Island departments have collaborated to develop recommended storm inventory levels. The recommended levels were shared and discussed with LIPA and verified complete at the 9/1/21 bi- monthly meeting.	7/16/2021
IMR-14 (IM2)	Complete	Accountable Parties at an Executive Level do not Meet in a Formal and Routine Manner	PIP accepted 4/28/2021. Quarterly D&OP inventory forecast meetings scheduled for 6/30/2021. A draft N+2 to 12 month forecast tool has been developed and is being vetted internally. Verified complete at the 9/1/21 bi-monthly meeting.	6/30/2021
IMR-15 (IM3)	PIP Rejected	Some portion of fundamental inventory metrics to control the business are not available	No approved PIP. PSEG proposal is very general with most dates TBD. No revision has been submitted to date.	-
IMR-16 (IM4)	Delayed	Workorder Demand, Requisitions and Maintenance BOMs for Material Order is Considered to be Inaccurate	PIP accepted 4/28/2021. In April, critical vacancies in the M&L organization (Mgr M&L and Analyst positions) put additional demands on the management team resulting in certain tasks not being completed on time. Both vacant positions are actively being filled. However, new hires were not in place as of the 9/1/21 bi-monthly meeting.	6/30/2021
IMR-17 (IM5)	Delayed	Demand Forecast is not Consolidated and Reviewable in a Drill Down Manner	PIP accepted 4/28/2021. Creating a historical forecast spreadsheet with 3 years data and project plan input method. Incorporated accuracy measurement analytics and 2020 actual project data in the spreadsheet. This will be reviewed at the October 2021 bi-monthly meeting.	6/30/2021

IMR-18 (IM6)	Delayed	Inventory Policies, do not Formally Incorporate the Concept of Safety Stock	PIP accepted 4/28/2021. Determined the Safety Stock calculation scope and methodology and included same in Inventory Reorder and Stocking Strategy Policy MM-001, dated 4-6-2021. Adding the plan to the inventory control reorder desk guide LI-DG-REORDER was delayed, however, it was expected to be completed by the project planned end date of 7/15/2021. Information was shared at the 9/1/21 bi-monthly meeting. Additional milestones to be completed by October meeting.	7/15/2021
IMR-19 (IM7)	Delayed	Minimum/ Maximum Stocking Levels are Formulated based on Experiential Knowledge	PIP accepted 4/28/2021. Developed methodology for Min/Max creation and validation process. Adding the methodology to desk guide LI-DG-REORDER and capturing the components of min/max changes is delayed due to unexpected vacancies in critical staffing positions in April (Mgr M&L and an Analyst).	6/7/2021
IMR-20 (IM8)	Combined with SP1 (IMR-24)	Inventory Policies do not Incorporate "Storm" Clauses (which guarantee supply during critical periods) within Supplier Contracts	PIP approved 5/19/2021.	6/30/2022
IMR-21 (IM9)	Complete	Inventory Policies are Reviewed and Potentially Changed 1 x Per Year	PIP accepted 4/28/2021. Inventory Reorder and Stocking Strategy Policy MM-001 was completed 4/6/2021. Outstanding milestones reviewed and accepted by LIPA at 9/1/21 bi-monthly meeting.	6/30/2021
IMR-22 (IM10)	Closed (Pending LIPA Verification)	Limited Stock Rotation Regimen	PIP accepted 4/28/2021. Implemented a FIFO (First In First Out) inventory rotation process where applicable. Revised warehouse mapping and configuration to accommodate inventory rotation. Internal picking orders are directed to the oldest material first. Materials with multiple bin locations are set up with three or more bins. Bins are configured as primary, secondary, and overflow. Picks are directed to primary, when the primary is depleted the material from the secondary in rotated to the primary bin. When the secondary bin is depleted, material is rotated from the overflow bin to the secondary. Newly received material is placed in the overflow bin. Material with one bin location, picking is done from the front and newer material is placed to the rear of the shelf. Larger material is handled the same way within the yard compounds. LIPA has not verified completion.	6/4/2021
IMR-23 (IM11)	Closed (Pending LIPA Verification)	Limited ability to Track PPE, Consumables, and Tools Spend	PIP accepted 4/28/2021. A monthly PPE, consumables and tool issuance report has been created and is reviewed by Materials & Logistics management. LIPA has not verified completion.	6/30/2021

IMR-24 (SP1)	Delayed	Nearly no usage of "storm" clauses in vendor contracts	PIP approved 5/19/2021. A preliminary report of critical inventory requirements based on historical storm activity and engineering considerations has been developed under the IM1 PIP and is pending approval. Preliminary discussions have been held with vendors to determine costs and ability to store storm inventory. A cost-benefit analysis has begun including a series of internal reviews of onsite non- labor carrying costs. LIPA has not verified completion of plan milestones.	6/30/2022
IMR-25 (SP2)	Complete	No EDI / VMI	PIP approved 5/19/2021. A memo summarizing the potential use of PSEG's EDI transactions for PSEG Long Island was submitted on 06/01/2021 to LIPA. This memo addressed LIPA's request following submission of the SP2 plan.	10/31/2022

Collections Management

In 2017 and 2018, LIPA expressed its concerns to PSEG Long Island's collections department related to issues surrounding non-product billings and miscellaneous receivables. LIPA asked for efforts to address the increasing receivable balances related to billings for damage done to LIPA's system, which is managed by PSEG Long Island through its Damage Tracking System (DTS). At the time, PSEG Long Island accounting recorded a 33 percent reserve for accounting purposes as the collection of these receivables was uncertain. The low realization rate represents a burden on LIPA's customers. Furthermore, reports provided monthly on miscellaneous receivables should be more detailed and streamlined.

On February 24, 2021, the LIPA Board adopted three recommendations related to DTS charges and other nonproduct billings. DTS-1 and DTS-3 were consolidated into a single PIP, which was approved at the May 19, 2021 meeting. The status of each recommendation is summarized in the table below.

#	Reported Status	Recommendation	Status Summary	Planned End Date
DTS-1	On Schedule	Materially improve the DTS billing and collections process, including through a review and analysis of the current end-to-end process.	PIP approved on May 19, 2021. Process review & benchmarking completed. Collection & reporting enhancements completed. Remaining open item is finalizing billing enhancements & reporting.	9/30/2021
DTS-2	Closed	Provide access to the DebtNext platform to one LIPA user, who should be able to view transactions and run all reports.	LIPA personnel have access to PSEG Long Island DebtNext platform.	-
DTS-3	Combined w DTS-1	Improve the billing and collections process for miscellaneous non-utility billings, including delivering improved reports to LIPA.	Combined with DTS-1.	-

LIPA and PSEG Long Island meet monthly to review progress and provide information as scheduled in PIP. PSEG Long Island and LIPA have agreed on key performance metrics and improved reporting for collections. PSEG Long Island has implemented several collection process improvements, including enhanced reporting and onboarding a second outside counsel with 30-day collection reporting. Billing key performance metrics, reporting and process improvements to reduce billing cycle time are expected to be delivered in September.

Asset Management

PSEG Long Island operates and maintains approximately 15,000 miles of transmission and distribution (T&D) assets owned by LIPA. A well-functioning asset management program reduces cost to customers and increases reliability by guiding investment and maintenance decisions. Modern asset management systems are integrated with work management practices and are a core utility function.

In 2020, LIPA hired the Woodhouse Partnership (TPWL), a firm with international expertise in asset management across many sectors, including the utility sector, to evaluate PSEG Long Island's asset management programs and policies. This review followed findings of significant weaknesses in National Grid's and PSEG Long Island's management, respectively, of LIPA's assets in 2013 and 2018 by the New York State Department of Public Service (DPS) in Management and Operations Audits, which PSEG Long Island was responsible for remedying. TPWL evaluated PSEG Long Island's asset management practices and processes relative to International Standards Organization (ISO) 55001 requirements. On a scale of zero (innocent) to four (beyond ISO), with three being "competent," TPWL rated PSEG Long Island's Asset Management program between zero (innocent) and two (developing) on each of the 27 program components prescribed by ISO.

The systems currently supporting PSEG Long Island's management and maintenance functions are fragmented and siloed and do not lend themselves to a comprehensive enterprise-wide understanding of system assets. Asset data is spread out between various departmental data systems with limited data quality assurance. These fragmented systems impede the effective implementation of data-driven asset management programs. The Computerized Maintenance Management System (CMMS) upgrade that PSEG Long Island is planning to implement is only a partial step and a modern, integrated Enterprise Asset Management System (EAMS) is needed to fully realize the potential benefits of modern asset management techniques.

Additionally, over the past several years, PSEG Long Island has implemented policies and procedures to strengthen Property, Plant and Equipment (PP&E) records, beginning with a project to improve record-keeping related to sub-station assets and a separate project for "outside plant" (i.e., the poles, wires and associated equipment). While PSEG Long Island has made improvements, a recent physical survey of select circuits including over 5,000 poles across the service territory indicates that additional work remains. For example, the selected survey found a discrepancy of 35 percent between records and the physical inventory of Third-Party Attachments. With regards to Asset Collection (i.e., capacitors, protective devices, fuses, riser switches, and transformers), the physical inventory in one town found 24 more transformers than the 27 shown in the mapping system. Additionally, with regards to the identification of double wood poles, the physical inventory identified 170 locations while the statewide notification system (i.e., National Joint Utilities Notification System) had 73. These discrepancies indicated the need for a comprehensive inventory of PP&E records.

On February 24, 2021, the Board adopted five recommendations to address the findings related to PSEG Long Island's asset management program (AM-1 through AM-5). On March 29, 2021, the Board adopted two additional recommendations (AM-6 and AM-7). On May 19, 2021, the Board adopted a consolidated PIP from PSEG Long Island to address AM-1 through AM-5.

LIPA recently received PSEG Long Island's proposed Implementation Plans for developing an Asset Management program complying with the ISO-55000 framework. The proposed implementation plan entails significant investment commitments from LIPA. It is also evident that there is a disconnect between the business-side of the asset management team and the technology staff that would be responsible for the Enterprise Asset Management System (EAMS). LIPA staff and consultants are currently reviewing these plans to align the plans more closely to LIPA's objectives

#	Reported Status	Recommendation	Status Summary	Planned End Date
AM-01	On Schedule	Adopt the ISO Asset Management Framework – adopt the principles and standards prescribed by ISO 55000 and 55001 as an asset management framework and develop a three-year roadmap with milestones and steps toward a maturity goal of three by the end of 2023.	PIP approved 5/19/2021. PSEGLI has developed an Asset Management Framework Implementation Plan / Roadmap and draft Asset Management Policies. These and other deliverables are being reviewed by LIPA.	12/31/2023
AM-02	Combined with AM-01	Annual Reliability Assessment of Plant Asset Performance – within 90 days of each year-end, PSEG Long Island should perform and report results of an annual reliability assessment of plant asset performance. The report must include a plan and timeline to address identified deficiencies.	PIP consolidated with AM-01.	-
АМ-03	Combined with AM-01	Develop Asset Management Plans – complete the development of asset management plans for transmission, distribution, and substation infrastructure (preventative maintenance, upgrade/replacement of transformer, breaker, switchgear, poles, underground cable, switches (ASU), capacitor, etc.) with annual reviews and three-year comprehensive updates.	PIP consolidated with AM-01.	-
AM-04	Combined with AM-01	Capture Additional Data into the Computerized Maintenance Management System – Complete the development of the CMMS in accordance with the 2013 and 2018 Management and Operations Audit Recommendations and then expand data capture to include all T&D assets.	PIP consolidated with AM-01.	-
AM-05	Combined with AM-01	Strategic Asset Management Plan (SAMP) – Develop a SAMP that binds the work activities, investment commitments, and decision making through an overarching framework that would be explained and communicated throughout the organization.	PIP consolidated with AM-01.	-

AM-06	PIP Not Submitted	Implement an Enterprise Asset Management System. Expand the scope and objectives of the planned CMMS upgrade to include a full-fledged EAMS with capabilities in maintenance management, a full-featured asset database that can accommodate all utility operational assets, comprehensive asset health monitoring, and predictive maintenance capabilities. This system should be the system of record for maintaining all operational asset data, including data for all plant assets and all field/ network assets. This integrated enterprise system should provide the baseline for improving our capabilities in a data-driven, risk-based program for asset management decisions and move the utility towards a preventive and predictive approach for managing assets. The system development plan should align with PSEG Long Island's SAMP. The new system should replace the limited, home- grown, custom CMMS and integrate asset life-cycle management, predictive maintenance, asset risk analysis, and other key asset management functions. Phase 1 of this system to go-live no later than December 30, 2022.	PSEG Long Island has not submitted a PIP for this recommendation.	-
АМ-07	Deferred	Conduct a System-Wide Physical Inventory of Outside Plant Assets. PSEG Long Island should engage an outside firm to perform a system-wide physical inventory of outside plant assets for completion within three years. The physical inventory should collect detailed data on all significant physical assets belonging to the network, including poles, pole attachments, transformers, switches, line characteristics, and line-attached devices. The data developed in this physical assessment should align with asset data models in the Enterprise Asset Management System (see Recommendation No. 6). PSEG Long Island should also consider collecting relevant condition data during the physical inspection to the extent feasible.	PSEG Long Island has submitted a draft PIP for this recommendation. LIPA is working with PSEG-LI to align this draft PIP more closely to LIPA objectives and expects to present this PIP for Board Adoption at its October meeting.	-

Affiliate Services

The use of PSEG subsidiaries as "affiliates" to perform services for PSEG Long Island is permitted under the terms of the Amended and Restated Operations Services Agreement. Affiliate costs are charged to PSEG Long Island and therefore paid by LIPA. The services that PSEG Long Island typically uses affiliates to perform include IT system support, IT project support, Human Resources, Procurement, Treasury, and Legal Services.

The current procedures relating to the use of affiliates do not provide LIPA with sufficient detail to determine whether the use of such affiliates is the most economic approach and in the best interest of LIPA's customers.

LIPA reimbursed PSEG Long Island a total of \$23 million for affiliate-related services in 2020. Furthermore, \$17 million, or 75 percent of the total affiliate costs, were allocated based on a formula that assigns Long Island a percentage of PSEG's aggregated "pooled" costs across its operating companies. As a result, LIPA has minimal detail on affiliate costs and the actual services provided to support LIPA operations.

Lastly, affiliate costs typically come with a premium due to facility, support, and administrative overhead costs being added to direct labor costs. A "fully-loaded" affiliate cost is typically higher than the cost of PSEG Long Island in-house personnel.

To improve oversight of PSEG Services Corporation affiliate charges and services funded by LIPA, and gain a

better understanding of transactional charges, the Board adopted the below three recommendations on March 29, 2021.

On April 16, 2021, PSEG Long Island submitted to LIPA Staff three proposed PIPs to address the recommendations. PSEG Long Island agreed with the premise of the LIPA recommendations, however, proposed a PIP that delayed providing LIPA much of the requested information until 2022. While LIPA could accept a phased-in plan for AS-01, the PIP related to cost substantiation should start immediately with the key cost areas addressed in the early stages of the plan.

Leading up to the May Board meeting, PSEG Long Island submitted draft PIPs for the three affiliate cost recommendations. However, LIPA Staff was not able to accept the plans for AS-01 and AS-02 and required PSEG Long Island to modify the plans, especially in terms of schedule and clarity. At the May 19, 2021, Board meeting, the Board adopted the PIP for AS-03.

On June 15, 2021, PSEG Long Island provided LIPA with updated PIPs for AS-01 and AS-02. The updated plans addressed LIPA's concerns. As such, the Board adopted these PIPs at its June 23, 2021, meeting.

#	Reported Status	Recommendation	Status Summary	Planned End Date
AS-01	On Schedule	Enhanced Affiliate Budget Transparency. PSEG Long Island should prepare cost and benefit justifications for affiliate use as part of the annual budget development process in 2022. PSEG should minimize the use of transactional cost allocations and review the basis of allocating a percentage of its costs to Long Island customers to ensure that LIPA is not subsidizing New Jersey services. PSEG should document the specific IT projects affiliates perform. PSEG's budget submission should provide supporting documentation reflecting the calculation of activity/billing hourly rates.	Board adopted PIP at the June 23, 2021, meeting. LIPA and PSEG have been holding regular meetings to discuss information available to meet this requirement.	9/30/2023
AS-02	On Schedule	Enhanced Affiliate Actual Cost Transparency. PSEG must provide LIPA with a quarterly affiliate report detailing actual use of affiliates as compared to budget, including variance explanations. PSEG should provide detailed support for affiliate positions billed at a level equivalent to one full-time position.	Board adopted PIP at June 23, 2021 meeting. LIPA and PSEG have been meeting regularly to discuss format and additional data to meet this PIP. First quarterly report is due to LIPA for the 9/30/2021 quarter.	3/1/2023
AS-03	Delayed	LIPA requires PSEG Long Island immediately request approval for hiring ServCo employees, pursuant to its contractual obligations.	Board adopted PIP at May 19, 2021. LIPA and PSEG Long Island need to implement a "contract administration manual" to formalize the approval process.	5/15/2021

Strategic Planning

Long-term strategic planning is an essential element of utility governance and management. Strategic planning provides for proper setting of objectives, prioritization of projects, alignment among stakeholders, and accountability for promised results. Good strategic planning requires long-range plans for each key area of the business and a process for coordinating long-range plans with shorter-term work plans and associated budgets.

LIPA has tried in the past, most recently in the summer of 2019, to collaborate with PSEG Long Island on strategic planning initiatives, but those efforts were largely unsuccessful. Although PSEG Long Island leaders participated in several meetings with LIPA to discuss strategic planning issues, those meetings were ultimately not productive because of a lack of support by PSEG Long Island leadership.

On April 29, 2021, the LIPA Board adopted a recommendation to develop five-year roadmaps as a tool to improve PSEG Long Island's strategic planning processes, encourage more long-term thinking about the management of LIPA's assets, and align PSEG Long Island's budget submissions with long-range plans and short-term work plans. This process will result in greater alignment of management and budgets with the LIPA Board's objectives, better value to LIPA's customers, and accountability of PSEG Long Island management for promised results.

PSEG Long Island submitted a PIP to address the Board's recommendation to LIPA staff on June 3, 2021. In July, LIPA suggested significant revisions to meet the intent of the Board and clarify timelines and deliverables. PSEG Long Island has not yet provided a revised draft that substantively addresses LIPA's revisions or the Board's recommendations.

While awaiting PSEG Long Island's PIP and participation in this process, the LIPA Board has begun reviewing LIPA's strategic direction and LIPA management has begun the planning process to create long-range plans for each business area to meet the timelines of the Board recommendation.

#	Reported Status	Recommendation	Status Summary	Planned End Date
SP-1	PIP Delayed	Initiate development of five-year roadmaps for the transmission and distribution (T&D), information technology (IT), and customer service functions, in a format mutually agreed to by LIPA and PSEG Long Island, to be completed by March 31, 2022, and used as guidance for the 2023 Budget. The five-year roadmaps should evaluate the current state, which includes consideration of their top enterprise operations risks, and articulates an end state vision, and identify the projects necessary to close the gap. The end state vision for the functions should take into account industry trends and customer needs and should align with the strategic direction articulated in the policies adopted for the utility by the LIPA Board. The roadmap should also include (i) a cost-benefit analysis for each project; (ii) identify the schedule for and sequencing of projects; (iii) dependency on or interaction with projects initiated by other departments; and (iv) budget requirements for project implementation and operations. The roadmap should include Project Implementation Plans (PIPs) with greater detail for each of the projects. Beginning in April 2022, commence development of five-year roadmaps for PSEG Long Island's remaining seven key functions (i.e. power supply, clean energy programs, business services, human resources, procurement, external affairs, communications, and legal) to be completed by March 31, 2023. Thereafter, the five-year departmental roadmaps should be updated on a biennial cycle. Roadmaps will be reviewed with, and approved by, the Board as guidance documents for future budget requests. Projects identified on the roadmaps with budgetary implications will be included in the Budget Plan for each year.	PSEG Long Island submitted a draft PIP in June 2021. LIPA provided significant revisions in July 2021. PSEG Long Island has yet to provide a substantively revised draft.	3/31/2023

Information Technology System Modernization

Modern IT systems are crucial to improving operational efficiency, reliability, and customer satisfaction to support the Board's vision of a clean, lean, and customer-first utility. IT is the soft infrastructure in utilities, providing the connectivity and harnessing data-derived intelligence to benefit customers.

IT investments should be approached in a similar manner as investments in physical infrastructure. The Board's Strategic Planning recommendations address the importance and need for long-term IT plans, which will identify opportunities for technology investments to support strategic objectives. LIPA has additionally identified two critical IT system priorities where planning should begin prior to the completion of the medium-term Strategic Planning process: the Enterprise Resource Planning (ERP) system and the Customer Accounting System (CAS).

ERP refers to a type of software that organizations use to manage day-to-day business activities such as accounting, reporting, human resources, procurement, and other operational functions. SAP is the integrated business software PSEG Long Island uses to coordinate these various aspects of LIPA's business. In 2014, PSEG expanded its existing SAP system to include PSEG Long Island rather than building a stand-alone ERP system for LIPA's operations. This action was taken for purported savings to LIPA's customers (limited or no savings was likely realized). The legacy PSEG ERP implementation is at the end of its lifecycle and is due for an upgrade.

Additionally, LIPA's business model was designed to change service providers without significant business interruption. PSEG Long Island's SAP implementation is intricately intertwined with its setup for other PSEG business units. Consequently, using the PSEG corporate ERP raises the complexity, cost, and time required to change service providers, if necessary, and reduces the ability of LIPA to exercise its oversight rights, as PSEG Long Island limits LIPA's oversight of its corporate systems.

LIPA's CAS, which manages customer billing and other related customer information, was implemented in 1975 when the Long Island Lighting Company, as an investor-owned utility, operated the electric transmission and distribution system. Over the years, the system has become more complex and intractable, requiring workarounds to meet changing bill formats, urgent customer needs, and regulatory requirements. The utility industry has already moved away from outdated Cobalt-based systems due to the shortage of programming expertise in this antiquated language and the lack of flexibility and agility to respond to customers' everchanging needs. Because the current system is unable to retain key data attributes and program functions required to meet customer needs, PSEG Long Island is forced to add new interfaces or manual workarounds that increase complexity and put system stability at risk.

In 2013, PSEG Long Island concurred that the CAS replacement was in LIPA customers' best interest and recommended this initiative to LIPA as part of the transition from National Grid. This recommendation was based on a lack of agility of the existing CAS, cost, and the shrinking availability of skills to maintain the legacy system. Their evaluation report concluded that "PSEG Long Island will be able to greatly reduce ongoing operating costs and achieve very rapid paybacks even while factoring in substantial investments of time and expense in the migration process." In 2016, PSEG Long Island declined to proceed with the CAS replacement without offering a detailed analysis. LIPA believes that further delays in CAS replacement will result in higher costs, system errors, slower delivery, and lower functionality, as articulated in PSEG Long Island's 2013 analysis.

Both the ERP and CAS systems need upgrades to modern versions that provide all the functions needed to best serve LIPA's customers and avoid the inherent risks of running antiquated IT systems. Replacement of such critical systems comes with significant costs and operational risks. Therefore, it requires thorough planning and testing to ensure a successful implementation and minimize disruptions to utility operations and service to

customers.

This effort is critical to ensure that LIPA's customer information and financial systems are robust and reliable, effectively and efficiently respond to changes in customer needs and the regulatory environment, and provide the greatest value for money to Long Island electric customers.

These systems do not operate in a vacuum, and replacement is a multi-year project. The planning process needs to identify all related systems impacted by the replacements, the proper sequencing of activities, required resources, potential roadblocks, and other operational considerations, including financial impacts, cost-control measures, and enterprise risk management.

On April 28, 2021, the Board adopted a recommendation asking for PIPs for the replacement of the ERP and CAS. PSEG Long Island should immediately initiate planning to modernize the existing ERP and CAS systems with a clear delivery timeline. Any replacement effort should recognize that LIPA's business model is designed to change service providers without significant business interruption and ensure that new systems are separate and independently operable from PSEG's enterprise systems.

PSEG Long Island was asked to present PIPs for the Board's consideration at its June 2021 meeting. PSEG Long Island has not yet submitted PIPs for either system.

#	Reported Status	Recommendation	Status Summary	Planned End Date
ITSM-01	PIP Not Submitted	Plan for Replacement of Enterprise Resource Planning System	PSEG Long Island has not submitted a PIP for this recommendation.	-
ITSM-02	PIP Not Submitted	Plan for the Replacement of the Customer Information System	PSEG Long Island has not submitted a PIP for this recommendation.	-

Capital Budgets

LIPA and PSEG Long Island have made progress on improving the Operating Budget development and oversight process in accordance with the recommendations adopted by the Board on December 16, 2020. However, the Operating Budget only captures half the financial picture. In 2021, PSEG Long Island is budgeted to spend \$727 million on capital projects. This spending targets critical investments in system reliability, technology, infrastructure upgrades, and load growth requirements. The existing Capital Budget development and project oversight process shares many of the same weaknesses as the Operating Budget process.

The main result of these weaknesses is that PSEG Long Island's requests for Capital Budgets are routinely more than the funds expended. In addition, there is a high level of variance between the funds requested for the year by project and category as compared to those expended, with the result of large shifts between projects and categories of spending from those planned and approved by the Board. This leads to a loss of accountability for project delivery and controls, as well as can result in higher borrowing costs for customers. As an example, the table below shows the original Board-approved Capital Budget for each year since 2014 as compared to the funds spent.

Year	Budget (\$M)	Actual (\$M)	Variance (\$M)
2015	\$577	\$375	\$202
2016	\$644	\$524	\$120
2017	\$670	\$658	\$12
2018	\$695	\$591	\$104
2019	\$815	\$690	\$125
2020	\$785	\$753	\$32

Note: Does not reflect Capital Budget amendments, which are principally to roll over unspent funds.

Prior Department of Public Service Management and Operations Audits have pointed to needed reforms in capital project optimization, capital project estimating, risk and contingency management, project management performance reporting, the definition and quantification of work standards, and other areas that contribute to the development and management of capital projects and the Capital Budget. PSEG Long Island has implemented improvements in many of these areas, while some still require greater effort. An improved process governing capital project and Capital Budget review and approval, including managing changes during the year, will enhance transparency and accountability of customer funds and ensure adequate information flow to LIPA to conduct oversight on behalf of our customers.

On May 19, 2021, LIPA's Board adopted a resolution approving three recommendations developed by LIPA to improve the Capital Budget development and monitoring process. PSEG Long Island is to implement the Capital Project and Budget Development and Monitoring Process Improvement Recommendations effective with the 2022 Budget.

The recommendations are intended to increase the transparency and oversight of the Capital Budget and capital projects by requiring PSEG Long Island to submit to LIPA a complete Project Justification Description form outlining the project scope, schedule, cost information, and benefits. Further, the recommendations would establish a process for addressing projects that were in a preliminary stage of development as well as providing for updates to LIPA on project and Capital Budget changes.

The LIPA Board adopted a PIP at its August 11, 2021 meeting to address the recommendations. LIPA and PSEG Long Island continue to hold joint meetings to begin the work required on deliverables for the Capital Budgeting PIP, including reviewing working examples to ensure all scenarios are captured for LIPA analysis and review.

#	Reported Status	Recommendation	Status Summary	Planned End Date
CB-01	On Schedule	Capital Project and Budget Review and Approval Process Complete Project Justification Descriptions: For a project to be considered by the Board for inclusion in the LIPA Board-Adopted Consolidated Budget, which includes the PSEG Long Island Capital Budget as well as the balance of the 8-Year Capital Plan, LIPA's Chief Executive Officer or their designee ("CEO"), must first have reviewed and approved a Project Justification Description ("PJD") containing the project level information detailed in Section 4.13 (A) of the OSA. Preliminary Project Justification Descriptions: If PSEG Long Island is unable to provide a full and complete PJD prior to consideration of the PSEG Long Island Capital Budget by the LIPA Board, PSEG Long Island may submit a preliminary PJD as part of its Capital Budget request. Based on its sole judgment regarding the completeness of the PJD, LIPA's CEO may recommend to the Board that the project be included in the LIPA Consolidated Capital Budget on a contingent basis, therefore outside of the PSEG Long Island Capital Budgets: In the event PSEG Long Island proposes to add a new project to the PSEG Long Island Capital Budget portion of the Board- approved LIPA Consolidated Budget, or in the event of a material change in project scope from that was previously reviewed and approved, PSEG Long Island will need to submit a new PJD to LIPA's CEO for review in accordance with the process outlined above regarding the consideration of a project for inclusion in the current year LIPA approved Consolidated Budget and 8-year Plan.	Board adopted PIP at August 11, 2021 meeting. PSEG Long Island has substantially provided PJDs for the 2022 Budget cycle. LIPA is currently in the review step.	4/1/2022

CB-02	On Schedule	Capital Budget Changes and Reallocations Annual Project Justification Description Updates: PSEG Long Island should provide LIPA with annual updates to PJDs highlighting changes from the prior PJD and reflecting the current cost estimates, including R&C, schedule, and scope details as part of the annual budget process. For multi-year projects that have progressed through more advanced project design stages since the prior budget (e.g. order of magnitude, conceptual estimate, design estimate, definitive estimate), the PJD and budget request should reflect an updated R&C estimate. Capital Budget Reallocation Explanations: To fulfill PSEG Long Island's obligation to consult with LIPA prior to reallocating budgeted funds, PSEG Long Island must submit to LIPA's CEO a Capital Budget Reallocation Explanation form, in a format requested by LIPA, when proposing to reallocate funds within the adopted Capital Budget when projected year-end spending at the project level is forecasted to result in a variance to the Annual Budget for that project equal to or greater than 10% and \$0.5 million.	PIP combined with CB-01	
СВ-03	On Schedule	Carryover Projects: If a Capital Project funded within the Adopted LIPA Consolidated Capital Budget is delayed into the subsequent year's Capital Budget, PSEG Long Island must identify the change in the project schedule and propose to carryover the approved Capital Budget funds from the current adopted Capital Budget to the proposed Capital Budget as part of the next year's Capital Budget adoption process. LIPA CEO shall not recommend to the Board the re-funding of a project scope that was re-scheduled from a prior budget year if the funding was not carried over from the prior year.	PIP combined with CB-01	-

Work Management

The Department of Public Service and its consultant, NorthStar Consulting Group (NorthStar), submitted Management and Operations audits of LIPA and its service providers in 2013 and 2018 that included recommendations to improve work management.

In 2020, PSEG Long Island engaged a third-party consultant to assess PSEG Long Island's work management operations and progress toward addressing the findings in the NorthStar reports. Upon extensive review, the third-party consultant recommended ten initiatives to strengthen business capabilities and address the NorthStar recommendations. The ten initiatives were intended to benefit LIPA customers by progressing in seven key outcome areas:

- Productivity improvement in work execution
- More efficient deployment of capital
- Reduced compliance backlog
- Improved safety
- Higher customer satisfaction
- Improved stakeholder management/relations
- Execution of higher priority work

Certain of the third-party consultant recommendations complement recommendations already adopted by LIPA's Board, such as those related to Asset Management.

At the Board's June 23, 2021, meeting, LIPA staff recommended that the Board adopt the below additional Work Management Recommendations based on the third-party consultant findings and LIPA Staff observations and request PIPs from PSEG Long Island management to address these findings by the Board's October 2021 meeting.

After the Board's adoption of the Work Management recommendations, LIPA's Internal Audit department completed a work management audit with additional material findings in this area. These additional findings will be reflected in the PIP brought to the LIPA Board for approval.

#	Reported Status	Recommendation	Status Summary	Planned End Date
WM-01	PIP Not Yet Due	Develop best practice-based work management processes – On March 29, 2021, the LIPA Board passed a resolution directing PSEG Long Island to develop an integrated enterprise asset management system ("EAMS"), the first phase of which would go-live no later than December 30, 2022. Concurrent with this implementation, PSEG Long Island should focus on improving business processes and work practices so that all asset-related work is orchestrated, managed, executed, and controlled using the EAMS system. These improved business processes and management controls should be developed such that they can become integrated with and available for use during the first phase of the EAMS deployment no later than December 30, 2022.	Board to review PIP at October meeting.	-

WM-02	PIP Not Yet Due	Develop processes and systems to improve planning and tracking of work – Improve the management and organization of project Work Breakdown Structures (WBS) to the appropriate granularity and ensure that labor and other resources are tracked to the WBS elements for both operating and capital projects. To be completed by June 30, 2022.	Board to review PIP at October meeting.	-
WM-03	PIP Not Yet Due	Improve and standardize estimating, Compatible Unit Estimates (CUE), and task list management – Improve the accuracy of estimating via a consistent process and use of reusable planning artifacts with standard times (i.e. CUEs and task lists) for all work types. To be completed by June 30, 2022.		-
WM-04	PIP Not Yet Due	Implement Aligned Annual Work Plan and Short-Term Scheduling/ Dispatch – Implement annual project/work planning-scheduling and short- term scheduling aligned with the organization's EAMS solution. Centralize high-level scheduling and yard-level short-term work-week scheduling and dispatch with multi-week scheduling and visibility. To be completed by June 30, 2022.	Board to review PIP at October meeting.	-
WM-05	PIP Not Yet Due	Enable Mobile and Field Management –Improve the use of mobile devices and ergonomic transaction design to enhance field management of work and data collection and integrate the same into the new EAMS. To be completed by December 30, 2022.		-
WM-06	PIP Not Yet Due	Improve Work Management Metrics – Improve Key Performance Indicator/ metric definition and dashboards/reporting for work management visibility and performance improvement. To be completed by January 31, 2022.	Board to review PIP at October meeting.	-
WM-07	PIP Not Yet Due	Clarify and Rationalize Work Management Roles – Map future state of work management processes to standardize PSEG Long Island work management roles/positions (e.g. planner, scheduler, work coordinator, router) and implement across yards. To be completed by June 30, 2022.		-
WM-08	PIP Not Yet Due	Implement Work Prioritization Principles – Develop key principles for work prioritization and scheduling/rescheduling. Clarify process and decision rights for developing an annual schedule and adjusting the schedule. To be completed by December 31, 2021.	Board to review PIP at October meeting.	-

Small Generator Interconnection Procedures

In April 2021, LIPA engaged a third-party consultant to assess PSEG Long Island's Smart Grid Small Generator Interconnection Procedure (SGIP) management practices, benchmark those practices against industry standards and identify opportunities to improve performance. The SGIP affects interconnection requests of up to 10 megawatts (i.e. primarily solar). The assessment examined the strengths and weaknesses of the interconnection process and how easy it is to do business with PSEG Long Island.

In August 2021, the Board of Trustees adopted seven recommendations to strengthen the SGIP business practices and benefit LIPA customers based on the findings of the assessment. The Board requested Project Implementation Plans from PSEG Long Island for each recommendation for the Board's consideration no later than at its November 2021 meeting.

#	Reported Status	Recommendation	Status Summary	Planned End Date
SG-01	PIP Not Yet Due	Independent Review of Escalated Cases: Currently the PSEG Long Island Interconnection Ombudsperson is the Manager of the interconnection department. PSEG Long Island should ensure an independent review of escalated interconnection cases by changing the organizational placement of the Interconnection Ombudsperson.	Board to review PIP at November meeting.	-
SG-02	PIP Not Yet Due	Improve Customer Experience: PSEG Long Island's SGIP portal currently provides status updates as projects move through the different phases of the SGIP. PSEG Long Island should leverage the portal to provide proactive emails and updates on upcoming activities that require coordination between PSEG Long Island and the customer such as meter installation.	Board to review PIP at November meeting.	-
SG-03	PIP Not Yet Due	Provide new channels for online payment options: PSEG Long Island should allow customers to provide payment quicker and eliminate delays associated with mailing a check or checks expiring before they can be cashed.		-
SG-04	PIP Not Yet Due	Evaluate interconnection project cost sharing options: PSEG Long Island should develop a method to equitably share costs for network upgrades to replace the current process for charging the customer that pushes the capacity over the limit for a circuit. PSEG Long Island should determine a method that is consistent with other New York utilities.		-
SG-05	PIP Not Yet Due	Integrate the Interconnection Online Portal: PSEG Long Island should advance the integration of the interconnectional portal with its enterprise systems to improve the system implementation and build an analytics platform to automate the technical screening process.	Board to review PIP at November meeting.	-

SG-06	PIP Not Yet Due	Leverage AMI technology to monitor system performance: PSEG Long Island should leverage AMI technology to monitor actual DER production and alert customers if their systems are not performing as expected.	Board to review PIP at November meeting.	-
SG-07	PIP Not Yet Due	Leverage the PSEG Long Island Interconnection Working Group: PSEG Long Island should prioritize upgrades or modifications to the SGIP with the developers who are participants of the Interconnection Working Group. The IWG meeting is a collaborative effort bringing the Utility and Developer professionals together to identify technical and procedural improvements to the interconnection process. Many developers work with different utilities across North America and are a channel to identify improvement opportunities that have been successful elsewhere.	Board to review PIP at November meeting.	-

Data and Information Access

During the past several years, LIPA has had the ability to access PSEG Long Island systems on an as-requested basis. However, the usefulness of such access provisions has been limited by the complexity of the access procedures, availability of user training, and organization of system data.

The Amended and Restated Operations Services Agreement ("OSA") between LIPA and PSEG Long Island stipulates that "Service Provider shall establish and maintain an information system to record, provide and, to the extent practicable, provide real time retrieval for LIPA's review and copying of T&D System operating and financial data, including all information necessary to verify calculations made pursuant to this Agreement. Such information shall include information about the T&D System (including information in physical formats such as diagrams, flow charts, and schematics related to the T&D System), reports (and all supporting data) regarding the performance of the T&D System, and information regarding management (including planning, design, engineering, operation, maintenance, and customer contact) of the T&D System (collectively, 'System Information')".

Furthermore, the term-sheet between PSEG Long Island and LIPA dated June 26, 2021 provides, among other things, that: "Prior to the separation of the IT systems, the Service Provider will provide LIPA and its representatives and consultants with the same access, including the same real-time access, where applicable, as the Service Provider and its Affiliates have to all information technology systems and processes that are utilized in whole or in part to serve LIPA, as well as to all of the financial-, customer-, and T&D system-related data, information and reports residing therein and accessible there through."

Modern data warehouse systems serving enterprise data are characterized by an enterprise-wide data dictionary, a central repository of enterprise data, and meaningful organization of enterprise data suitable for decision-making and performance monitoring. Additionally, data lakes facilitate access to semi-structured and unstructured data as well as raw data from structured databases for in-depth analysis.

A Standardized Data Access Platform consisting of a data warehouse and a data lake would provide effective centralized access to organization-wide data that would facilitate PSEG Long Island's management decision-making capability as well as LIPA and Department of Public Service oversight.

In August 2022, the Board directed PSEG Long Island to develop a PIP with the objective of deploying a Standardized Data Access Platform consisting of an enterprise-wide data warehouse, a broader data lake, and provisioning and development of tools to support reporting and analytics. The Standardized Data Access Platform will provide PSEG Long Island management, LIPA, and the DPS seamless and effective access to PSEG Long Island financial, operational, and performance data. This data repository will contain structured data from

PSEG Long Island's financial and operational systems and will be equipped with suitable tools to facilitate query, reporting, and analyses of data from the entire spectrum of data sources without the users needing to manage connections to different source systems.

PSEG Long Island was directed to deliver the PIP no later than September 10, 2021 with the objective of a production Phase I system to be delivered no later than December 31, 2022. LIPA has reviewed the PIP submitted by PSEG Long Island and recommended deferring consideration of the project plan to the October Board meeting so that it can be improved to better meet the objectives of the Board's recommendations.

#	Reported Status	Recommendation	Status Summary	Planned End Date
DIA-01	Deferred	 Develop a Standardized Data Access Platform consisting of an enterprise- wide data warehouse, a broader data lake, and provisioning and development of tools to support reporting and analytics. Phase I of the implementation should, at a minimum, incorporate data from the following source systems: SAP, Outage Management System/Pragma CAD (OMS/pCAD), Advanced Metering Infrastructure (AMI) and Customer Information and Billing System (CAS). Phase II should, as a minimum, include data from Asset Management, Energy Management System (EMS), Distribution Management System (DMS) and Supervisory Control and Data Acquisition (SCADA). 	PIP deferred to October meeting to better align with LIPA's objectives.	-



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PSEG Long Island

Project Implementation Plan

For Isaias Task Force Recommendation Implementations

Recommendation No. 3.2.4.1

Project Title: Review the storm-oriented customer journey maps implemented within the mobile and web-apps so that customer transactions are directed to the externally hosted infrastructure rapidly

LIPA Response February 19th:

The purpose of this recommendation was to review the storm-oriented customer journey maps and find opportunities for streamlining them such that the net outcome is a faster operation of apps for storm-related cases. The PIP defers this whole evaluation and potential changes to the journey maps and its potential streamlining to PIP for recommendation 3.2.4.4, which does not address this adequately.

PSEG Long Island Actions:

- During a conference call with LIPA on Monday, March 8, 2021 regarding clarification on project plan 4.10, PSEG LI asked LIPA's option about moving out 2 project plans (3.2.4.1 and 4.01) till after storm season and LIPA requested that we update the project plan with our reasoning and they will review our submission.
- For storm season, PSEG-LI is focused on redesign that improves performance at peak load of customer journey maps within the digital channels. Any digital channel that does not meet the performance criteria in project plan 4.15 will be remediated before storm season if possible. For example we have identified a limitation of MyAccount and are suggesting a "storm/page" to improve the performance for the customer.
- Full redesign of the user experience would be a long term activity and will be done injunction with the project plan 4.01

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1. Project Definition

PSEG Long Island provides multiple digital channels to customers and stakeholders for both routine and storm and outage related communications. Routine communications include account, billing, and energy usage information; storm and outage communications include downed wire and outage reporting, customer status and estimated restoration times, overall system status and service restoration activities, and pre-storm notifications.

The Digital Channels project goal is to improve the performance and reliability of the digital channels that are used in correspondence to PSEG LI's customer base. The objectives of the project are to improve the existing infrastructure and applications used to communicate with PSEG LI customers in both the short and long term. The team is intent on verifying a prudent utility solution is in place for future storm communications. Success criteria of the project includes meeting milestones, deliverables and test requirements when performing individual and holistic stress tests on the customer communication channels.

Any mention of the "Digital Channels" in this document refers to the channels below.

- Kubra Notifi
- PSEG LI Mobile App
- IVR
- HVCA (High Volume Call App)
- PSEG public website
- MyAccount Customer Portal
- Alexa/Google

1.1. Project Purpose, Objectives, and Success Criteria

1.1.1 Project Objectives:

The objectives of the project are:

- 1. Review the customer journey maps that PSEG LI customers can take to report outages or request outage status on the web
- 2. Verify if any efficiencies can be gained by modifying the journey maps
- 3. Implement improvements to the customer journey maps, see Rec 3.2.4.4 for additional detail

1.1.2. Project End State and Success Criteria:

A review of the storm-oriented customer journey maps is completed to ensure customer transactions are directed to the externally hosted infrastructure rapidly.

2. Project Deliverables:

Deliverable	Delivery Date	Comments
Journey Map Review Document	Wednesday 3/17/21	Review of customer journey maps within mobile and web apps under storm scenarios.

Journey Map Recommendation	Friday 8/20/21	Recommendation for more rapidly directing customer transactions to externally hosted infrastructure based on review of customer journey maps.
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2.1. Assumptions, Dependencies, and Constraints

2.1.1 Assumptions:

- For the project plan below, we assume no changes are needed to customer journey maps. This plan only covers the review portion. PIP for recommendation 3.2.4.4 covers any updates to customer journeys and subsequent testing.
- PSEG LI has the necessary resources in place from an internal and third-party standpoint to complete all of the objectives/recommendations including implementation work as needed
- For this recommendation, the journey map review will focus on the PSEG LI public website and the mobile app

2.1.2 Dependencies:

• Implementation of changes to customer journeys (if needed) will be dependent on availability of mobile app and web support developers at PSEG

2.1.3 Constraints:

- Competing projects at PSEG LI could affect delivery timelines
- Storm season will be a priority for PSEG LI resources who will be unavailable when performing storm roles or resolving current production issues

3. Project Structure

3.1. Internal Project Organization

The Digital Channels Team and Testing Team along with vendor support from Kubra, Intrado, and Cognizant will implement the Digital Channels project. The chart below shows the internal project organization and the groups responsible for the Digital Channels project:



3.1.1 Roles and Responsibilities :

Roles and responsibilities for the Digital Channels Enhancement project are outlined in the table below:

Role	Name	Responsibilities
Steering Committee	Dan Eichhorn Zeeshan Sheikh	 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 if and when they arise by serving as a project advocate

Leadership	PSEG LI CIO	• Ensuring workstreams adhere to guiding principles as
	David	defined by project leadership
	Lyons (Interim)	 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)
Advisory Committee	John O'Connell	• Support Project Director in delivering project on time and
Members	Rick Walden	on budget
	Susanne Brienza	 Providing guidance and input on key project decisions
		• Assisting in the procurement of external parties (as needed)
		• Removing obstacles that impede the success of the overall
		project
		 Providing subject matter expertise to the project
		Challenging the project team where appropriate
Digital Channel Lead	Srinivas Santhanam	• 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 HVCA IVR
		vendor, Outage Map vendor and Xtensible Team
		• Providing sign off for deliverables that require business
		input/acceptance
		• Delivering the Digital Channels project on time and on
		budget
Project Manager	Nate White (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
Technical Architect	Pedro Miraldo	 Supporting Build/Test/Deploy Activities
		• Environment setup
		• Assist in the configuration of the Digital Channels
		Coordinating Development activities
		Technical Design
		Testing Lead
		Transfer of Environments
Business Lead	Nayan Parikh	• Process development, requirements definition, functional
		design
		Technical Design
		Supporting vendor questions and workshops
		Testing Execution
Test Lead	Sikder Islam	Test Script Development
		Test Script Execution for Assembly / Unit Test
		Test Execution

Environment Lead	Anish Thomas	Technical Design developmentEnvironment design support
Test Project Manager	Priyesh Doshi	 Reporting overall testing status of the project to Stakeholders and Program Leadership Identifying and escalating resource issues Developing Testing Dashboard to accurately display current test execution Manage resources, schedule, issues, risks and change requests Providing testing subject matter expertise to the project Defect Management

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

LIPA ID	Туре	Task Name	Current Status	% Complete	Target Start Date	Target Finish Date
3.2.4.1	Recommendation	Review the storm-oriented customer journey maps implemented within the mobile and web-apps so that customer transactions are directed to the externally hosted infrastructure rapidly.	In Progress	37%	Mon 1/11/21	Thu 9/2/2021
3.2.4.1	Subtask	LIPA Clarification Meeting on recommendation	Complete	100%	Mon 1/11/21	Mon 1/11/21
3.2.4.1	Subtask	Build out project plan based on clarification	Complete	100%	Tue 1/19/21	Thu 1/21/21
3.2.4.1	Subtask	Obtain journey maps from PSEG and vendors	Complete	100%	Mon 2/8/21	Wed 2/10/21
3.2.4.1	Subtask	Review customer journey maps	In Progress	25%	Tue 3/9/21	Wed 3/17/21
3.2.4.1	Subtask	Document journey map review and changes if needed	Not Started	0%	Thu 3/18/21	Tue 6/15/21
3.2.4.1	Subtask	Review current state documentation w/PSEG	Not Started	0%	Wed 6/16/21	Wed 6/23/21

3.2.4.1	Subtask	Assess project status and dependencies for continuation of project implementation	Not Started	0%	Thu 6/24/21	Wed 6/31/21
3.2.4.1	Subtask	Update and review documentation with PSEG	Not Started	0%	Thu 7/1/2021	Fri 8/20/2021
3.2.4.1	Subtask	Create artifact documentation and review with LIPA	Not Started	0%	Mon 8/23/2021	Thu 9/2/2021

4.2. Risk Management Plan

The table below outlines the applicable risks and associated risk mitigations for the Digital Channels project.

Category	Project Risk	Mitigation
Resources	Resource constraints from Digital team due to competing projects.	Assign and commit business and IT resources and verify 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	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 Digital Channels 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	Lack of scope/requirements control is the leading cause of budget and schedule overruns for this scale of project. It will be critical to closely define project scope/requirements, quickly clarify any uncertainties as they arise, and escalate as required. Any changes in scope/requirements must be agreed-to by the executive steering committee.
Program Management	Additional recommendations for improvement are developed and will need to be added to this workstream	Additional recommendations that have activities similar to 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

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.

5. Technical Execution Plan

5.1. Technical Approach

5.1.1 Configuration of Applications:

Configuration changes will be made (if needed) to any applications pending review of customer journey maps. These changes are estimated in the PIP for recommendation 3.2.4.4. and 4.01

5.1.2 Changes to webservices:

Configuration changes will be made (if needed) to any webservices pending review of customer journey maps. These changes are estimated in the PIP for recommendation 3.2.4.4. and 4.01

5.2. Quality Assurance Plan

5.2.1 QA Methodology:

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

- The deliverables will follow the following QA processes:
 - Team lead review and signoff
 - Peer Review (PSEG)
 - Subject Matter Advisor Review as necessary
 - PSEG Signoff by PSEGLI CIO and President & COO of PSEGLI
 - o Independent Verification and Validation by LIPA CIO
- An individual test plan will be created, and for this recommendation it 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 signed off by PSEGLI CIO and President & COO of PSEGLI, and shared with LIPA upon completion

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.

Artifact	Description
Customer Journey Map Document	Review of customer journey maps within mobile and web apps under storm scenarios. Review will inform recommendation to more rapidly direct customer transactions to externally hosted infrastructure.
Journey Map Recommendation	Recommendation for more rapidly directing customer transactions to externally hosted infrastructure based on review of customer journey maps on mobile and web apps in storm scenarios.

Revision History

Name	Date	Reason for Changes	Version
Alex Kniazev/ Shirley Blankson	1/25/21	Initial draft	1.0
David Lyons	3/9/21	Updated to address LIPA's comments and new timeline assumptions	1.1

PSEG Long Island

Project Implementation Plan

For Isaias Task Force Recommendation Implementations

Recommendation No. 3.2.4.4

Project Title: Model storm scenarios and conduct thorough stress testing on the website for all customer journeys and ensure that the infrastructure has sufficient capacity for high activity periods

LIPA Response February 19th:

The PIP deliverables do not include a Customer Journey Model. There is no task identified for addressing the recommendation 3.2.4.1 for reviewing the customer journey maps and exploring opportunities for streamlining them and making appropriate programming and/or configuration changes.

Since the plan does not allow for exploring changes to the Customer Journey Maps, it fails to address one of the primary goals associated with recommendations 3.2.4.1 and 3.3.4.4

PSEG Long Island Actions:

- PSEG LI will address the stress testing of the digital channels in our E2E testing approach. See project plan 4.15 which has been accepted.
- For storm season, PSEG-LI is focused on redesign that improves performance at peak load of Customer Journey Maps within the digital channels. For example we have identified a limitation of MyAccount and are suggesting a "storm/page" to improve the performance for the customer. If PSEG LI finds similar issues during our E2E testing, we will address them as needed.
- The stream lining of the Customer journey maps will occur in the project plan 4.01 which is a longer term project.
- PSEG LI suggests we close this implementation plan as it is covered in 4.15 and 4.01

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1. Project Definition

PSEG Long Island provides multiple digital channels to customers and stakeholders for both routine and storm and outage related communications. Routine communications include account, billing, and energy usage information; storm and outage communications include downed wire and outage reporting, customer status and estimated restoration times, overall system status and service restoration activities, and pre-storm notifications.

The Digital Channels project goal is to improve the performance and reliability of the digital channels that are used in correspondence to PSEG LI's customer base. The objectives of the project are to improve the existing infrastructure and applications used to communicate with PSEG LI customers in both the short and long term. The team is intent on verifying a prudent utility solution is in place for future storm communications. Success criteria of the project includes meeting milestones, deliverables and test requirements when performing individual and holistic stress tests on the customer communication channels.

Any mention of the "Digital Channels" in this document refers to the channels below.

- Kubra Notifi
- PSEG LI Mobile App
- IVR
- HVCA (High Volume Call App)
- PSEG public website
- MyAccount Customer Portal
- Alexa/Google

1.1. Project Purpose, Objectives, and Success Criteria

1.1.1 Project Objectives:

The objectives of the project are:

- 1. Model storm stress testing on the PSEG website for all customer journeys
- 2. Verify all digital channels at PSEG LI have contingencies and improvements in place such that they are capable of handling outage reports and outage status requests from customers for any near-term upcoming storms

1.1.2 Project End State and Success Criteria:

A model is created for stress testing all customer journey scenarios for Digital Channels. The model will also be tested to ensure Digital Channels are capable of handling reporting and requests during storms.

2. Project Deliverables:

Deliverable	Delivery Date	Comments
Stress test Customer Journey maps within the digital channels.	3/23/21	Test digital channels based on documented test scenarios and scripts from workplan (see 4.15)
Documentation on stress testing for model storm scenarios for PSEG public website	3/23/21	Final documentation after testing is complete and necessary updates are made to resolve defects.

2.1. Assumptions, Dependencies, and Constraints

2.1.1 Assumptions:

- PSEG LI has the necessary resources in place from an internal and third-party standpoint to complete all the objectives/recommendations including implementation work as needed
- PSEG LI will use the current test environment to performance test the website customer journeys
- These testing activities will correspond to the end to end testing activities planned for the overall program
- Any updates found to the customer journeys from the customer journey walkthrough will be further incorporated into the schedule
- Load runner or a similar program will be used to simulate customer traffic on the website

2.1.2 Dependencies:

- Digital team is dependent on program to set up and run through the end to end testing with the website stress test included
- Dependent on PSEG LI contract for load runner licenses

2.1.3 Constraints:

- Competing projects at PSEG LI could affect delivery timelines
- Storm season will be a priority for PSEG LI resources who will be unavailable when performing storm roles or resolving current production issues

3. Project Structure

3.1. Internal Project Organization

The Digital Channels Team, Testing Team along with vendor support from Kubra, Intrado, and Cognizant will implement the Digital Channels project. The chart below shows the internal project organization and the groups responsible for the Digital Channels project:



3.1.1 Roles and Responsibilities :

Roles and responsibilities for the Digital Channels Enhancement project are outlined in the table below:

Role	Name	Responsibilities
Steering Committee	Dan Eichhorn Zeeshan Sheikh	 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 if and when they arise by serving as a project advocate
Leadership	PSEG LI CIO – David Lyons (Interim)	 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
	L 1 0/0 11	• Approve procurement of external parties (as needed)
Advisory Committee Members	John O'Connell Rick Walden Susanne Brienza	 Support Project Director in delivering project on time and on budget Providing guidance and input on key project decisions Assisting in the procurement of external parties (as needed) Removing obstacles that impede the success of the overall project Providing subject matter expertise to the project Challenging the project team where appropriate
Digital Channel Lead	Srinivas Santhanam	 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 HVCA IVR vendor, Outage Map vendor and Xtensible Team Providing sign off for deliverables that require business input/acceptance Delivering the Digital Channels project on time and on budget
Project Manager	Nate White (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
Technical Architect	Pedro Miraldo	 Supporting Build/Test/Deploy Activities Environment setup Assist in the configuration of the Digital Channels Coordinating Development activities Technical Design Testing Lead Transfer of Environments
Business Lead	Nayan Parikh	 Process development, requirements definition, functional design Technical Design Supporting vendor questions and workshops Testing Execution
Test Lead	Sikder Islam	 Test Script Development Test Script Execution for Assembly / Unit Test Test Execution
Environment Lead	Anish Thomas	 Technical Design development Environment design support

Test Project Manager	Priyesh Doshi	 Reporting overall testing status of Stakeholders and Program Leader Identifying and escalating resource Developing Testing Dashboard to test execution 	the project to ship e issues accurately display current
		 Manage resources, schedule, issue requests 	es, risks and change
		• Providing testing subject matter e	xpertise to the project
		Defect Management	

3.2. Other Stakeholders

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

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

4. Project Plan

4.1. 3.2.4.4 Project Work Plan

LIPA ID	Туре	Task Name	Current Status	% Complete	Target Start Date	Target Finish Date
3.2.4.4	Recommendation	Model storm scenarios and conduct thorough stress testing on the website for all customer journeys and ensure that the infrastructure has sufficient capacity for high activity periods	In Progress	19%	Mon 1/25/21	Wed 3/24/21
3.2.4.4	Subtask	Confirm dates for full end-end test of PSEG public website	Complete	100%	Mon 1/25/21	Wed 02/03/21
3.2.4.4	Subtask	Confirm load runner can walk through customer journey maps on website	Not Started	0%	Tue 3/16/21	Wed 3/24/21
3.2.4.4	Task	Confirm load testing solution capable of stressing PSEG website	Complete	100%	Mon 1/25/21	Mon 2/4/21
3.2.4.4	Subtask	Confirm environments for web testing	Complete	100%	Thu 1/25/21	Mon 2/4/21

3.2.4.4	Subtask	Document test scenarios and scripts for load testing PSEG public website based on customer journey maps	Not Started	0%	Tue 3/16/21	Mon 3/22/21
3.2.4.4	Task	MyAccount tuning and test	In Progress	12%	Fri 2/12/21	Mon 3/1/21
3.2.4.4	Subtask	Design	In Progress	25%	Fri 2/12/21	Fri 3/12/21
3.2.4.4	Subtask	Development	Not Started	0%	Mon 3/15/21	Tue 3/16/21
3.2.4.4	Subtask	Testing	Not Started	0%	Wed 3/17/21	Tue 3/23/21
3.2.4.4	Task	MyAccount redesign and test	Not Started	0%	Mon 3/1/21	Tue 3/16/21
3.2.4.4	Subtask	Design	Not Started	0%	Mon 3/1/21	Fri 3/12/21
3.2.4.4	Subtask	Development	Not Started	0%	Mon 3/15/21	Tue 3/16/21
3.2.4.4	Subtask	Proposed	Not Started	0%	Wed 3/17/21	Tue 3/23/21
3.2.4.4	Milestone	MS: Testing Complete – Documentation Provided	Not Started	0%	Tue 3/23/21	Tue 3/23/21
3.2.4.4	Subtask	Cutover to production with updates (if needed)	Not Started	0%	Wed 3/24/21	Wed 3/24/21
3.2.4.4	Milestone	Deploy changes (if needed to production environment)	Not Started	0%	Wed 3/24/21	Wed 3/24/21

4.2. Risk Management Plan

The table below outlines the applicable risks and associated risk mitigations for the Digital Channels project.

Category	Project Risk	Mitigation
Resources	Resource constraints from Digital team due to competing projects.	Assign and commit business and IT resources and verify 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	Contract negotiation could delay project due to multiple vendor partners	PSEG LI to expedite contract approvals and determine if there are options for performing some work internally

	involved for making changes to the entire architecture	
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 Digital Channels 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	Lack of scope/requirements control is the leading cause of budget and schedule overruns for this scale of project. It will be critical to closely define project scope/requirements, quickly clarify any uncertainties as they arise, and escalate as required. Any changes in scope/requirements must be agreed-to by the executive steering committee.
Program Management	Additional recommendations for improvement are developed and will need to be added to this workstream	Additional recommendations that have activities similar to 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

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.

5. Technical Execution Plan

5.1. Technical Approach

5.1.1 Configuration of Applications:

At this time, there are no configuration changes planned for any applications related to the website. If stress testing uncovers issues, configurations will be updated (if needed) and a retest will be performed.

5.1.2 Changes to webservices:

At this time, there are no changes planned to any webservices. If stress testing uncovers issues with webservices related to providing information for the public facing PSEG LI website, activities will be planned to update the webservices for retest.

5.2. Quality Assurance Plan

5.2.1 QA Methodology:

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

- The deliverables will follow the following QA processes:
 - Team lead review and signoff
 - Peer Review (PSEG)
 - Subject Matter Advisor Review as necessary
 - PSEG Signoff by PSEGLI CIO and President & COO of PSEGLI
 - Independent Verification and Validation by LIPA CIO
- An individual test plan will be created, and for this recommendation it 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 signed off by PSEG LI CIO and President & COO of PSEG LI, and shared with LIPA upon completion

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
Final Testing Documentation	Final documentation after testing is complete and necessary updates have been made to resolve defects discovered during stress tests

Revision History

Name	Date	Reason for Changes	Version
Alexander Kniazev/ Shirley Blankson	1/25/21	Initial draft	1.0
David Lyons	3/9/21	Updated to address LIPA's comments and new timeline assumptions	1.1

PSEG Long Island Project Implementation Plan

For

Isaias Task Force Recommendation Implementations

Project Title: Long Island - Grid Resiliency Improvement Program

Recommendation Nos. 5.4.1 and 5.4.5

LIPA ID	Report	Task Force recommendations directly addressed in this plan
Combines 5.4.1, 5.4.5	30 Day Report	Combines PIPs 5.4.1, 5.4.5, as well as other resiliency initiatives under one integrated, cohesive plan.

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1. Project Definition

This project plan combines the previously separate PIP 5.4.1 (Selective Undergrounding), PIP 5.4.5 (Revisions to the 4-year tree trim cycle), as well as additional storm hardening initiatives.

The objective of this overall comprehensive project is to address and improve the resiliency of the Long Island and Rockaways electrical infrastructure. This project will cover three main areas:

- 1. Transmission and Substations / Load Pockets equipment and transmission system / load pocket reinforcements
- 2. Overhead circuits Mainline and Branch line hardening, equipment upgrades (i.e. operationalize LT5H devices), and vegetation management practices updates
- 3. Selective Undergrounding

Within each of the three areas, subsequent projects will be identified to harden that portion of the electrical grid, mitigate and prevent certain types of damage, and commission and operationalize technology to allow PSEG Long Island to automatically isolate, sectionalize and restore power. This project will also establish the impact of each of the components on the system restoration curve and outline the timeframes and high-level budgets required for each of the three areas.

1.1. Project Purpose, Objectives, and Success Criteria

Project Objectives

This project seeks to present a coordinated plan for improving grid resiliency for the LIPA service territory with the objective of (1) reducing the initial impact of a large storm event, (2) accelerating restoration after a large event, and (3) reducing the length of the longest-outage customers (i.e. clipping the restoration tail).

This project will:

- 1. Define scopes of work,
- 2. Quantify the high level impacts the project will have on the restoration curve,
- 3. Develop high level budgets and schedules,
- 4. Identify pilots programs (and anticipated lessons learned),
- 5. Identify PSEG Long Island storm restoration process impacts, and
- 6. Coordinate the various parts of the plans, and seek to align their individual project scopes, schedules, and to the extent possible, budgets to achieve maximum impact to the major event restoration curve, while minimizing impact to overall operational, accounting, and IT processes and budgets.

Project component	Target Objective (subject to budgets / updates)
Transmission & Substation Load pocket resolution (Planning studies)	Harden / reinforce / upgrade feeds to substations to improve station resiliency. 2022: complete design and project authorization for Smithtown load pocket (7 substations), and prioritize storm hardening of remaining 8 major load pockets. 2023: complete construction for load pocket identified in 2022, and complete storm hardening (i.e. single supply hardening) PJDs for 8 load pockets (45 substations) to help prioritize budget constraints.

Table 1 Target Objectives by Year

Project	Target Objective (subject to budgets / updates)								
component	Currently underway: Smithtown load pocket (7 substations) construction to be completed								
	per PJD.								
	1								
	Milestones:								
	Jan 31, 2022 – Prioritize high level proposals (which will include schedules and cost estimates) to harden remaining 8 load pockets.								
	August 31, 2022 – PJDs for remaining 8 load pockets, and identify candidate for 2023 pro								
	start. Construction for load pockets identified in 2023 per PJD and budget constraints.								
	Impact to restoration survey very minutes per sirguit (on everyge)								
	Note: Impact to restoration curve: to be available by 12/31/2021								
Vegetation	Develop and execute Vegetation Management Work Plans / Budgets for 2022 and 2023 to:								
Management	1) Use vegetation intelligence including but not limited to vegetation species, growth								
	rate, and location.								
	schedules and cost estimates).								
	3) Identify circuit list for trimming each year (minimum of 225 circuits per year, or								
	about ¹ / ₄ of total circuit miles, including schedules and cost estimates).								
	4) Identify at least 12,000 hazard trees to be removed each year (including locations, schedules, and cost estimates)								
	solicitues, and cost estimates).								
	2023: Evaluate impacts (including analysis of tree species, growth rates, locations, etc.) and								
	benefits of a more frequent trim cycle and reflect in 2023 Vegetation Management Work Plan								
	/ Budget.								
	Impact to restoration curve: xxx minutes per circuit under current scope (on average) Note: Impact to restoration curve to be available by 12/31/2021 for current scope								
	Currently underway: TTS to first device hazardous tree identification for on cycle trim								
	circuits.								
	Milestones:								
	1) Identify TTS circuits (which will include schedules and cost estimates) to be completed for								
	2022. Work execution for identified 2022 circuit list (~225 circuits, or about 1/4 of total								
	circuit miles) to be completed by 12/31/2022. Units and miles will be determined by budget								
	constraints.								
	cost estimates). Work executed for identified hazard trees to be removed in 2022 by								
	12/31/2022. Number of trees will be vendor pricing and budget dependent.								
	August 31, 2022								
August 51, 2022 – 1) Identify circuits (which will include schedules and cost estimates) to be come									
	2023. Work execution for identified 2023 circuit list (\sim 1/4 of total system) to be completed by								
	12/31/2023.								
	2) Define plan to remove 12,000 hazard trees in 2023 (number, locations, schedules, and cost estimates). Work execution for identified 2023 hazard trees to be completed by $12/21/2023$								
Number of trees will be vendor pricing and budget dependent.									

¹ See technical approach.

Project component	Target Objective (subject to budgets / updates)
component	3) Conduct study and make recommendations to update trim cycle frequencies (based on locations, species, growth rates, and other factors studied), as well as consider expanding TTS to beyond the first protective device to all of main line.
LT5H	 2021 – 2023: Install and commission 454 (154 installation and commissioning in 2021, and 300 installation and commissioning in 2022-2023) ASUV to reach system "saturation" (e.g. less than 500 customers behind ASUV devices), and operationalize 656 ASUVs already deployed in the field (upgrade / bring communications to enable these deployed devices to operate as SCADA switches). 2021: Phase I will enable deployed devices on 2 circuits to function as reclosers (ASUV as tripping device on main lines, comprising of 2 devices). 2021 – Phase I will also include operationalize 2-5 single phase tripping (on three phase device) on branch lines for 2 circuits (new devices to be deployed). 2022: Take lessons from Phases I to enable single phase reclose (e.g. Triple/Single) for capable three phase devices. 2022 – 2030: Phase II will enable all overhead circuits to have ASUV devices to function as reclosers, expected completion 2030. Annually, deploy and commission 150 new devices, and coordination of all convertible ASUVs on 100 circuits to be done. Identify changes to and create updates to impacted operational processes as well as training requirements. Impact to restoration curve: xxx minutes per ASUV installed (on average)
	Impact to restoration curve: xxx minutes per ASUV operationalized as reclosers (on average) Note: Impact to restoration curve to be available by 12/31/2021
	Currently underway: deployment of 154 reclosers on (on 101 circuits) in 2021, Phase I for mainline device coordination (2-5 circuits), and Phase I for branch line device deployment and coordination (2-5) circuits.
	Milestones: January 31, 2022 – Identify installation locations, schedules and cost estimates for 150 ASUVs to be deployed for 2022. Schedules and cost estimates for operationalizing all convertible ASUVs (e.g. ASUVs functioning as tripping devices) for 10 circuits (number of circuits to be firmed up after initial lessons learned from 2 circuit / 2 ASUV deployment) for 2022. Schedules for process and training updates. Work execution for identified 2022 list to be completed by 12/31/2022. Number of units will be budget dependent.
	August 31, 2022 – Identify installation locations, schedules, cost estimates, and create PJDs for 150 ASUVs to be deployed for 2023 to reach LT5H deployment goal. Identify installation locations, schedules, cost estimates, and create PJDs for operationalizing all convertible ASUVs (e.g. ASUVs functioning as tripping devices) provisionally for 10 circuits for 2023 (number of circuits to be firmed up after initial lessons learned from 2 circuit / 2 ASUV deployment). Develop long term plan to activate ASUVs to be operationalized as tripping devices starting in 2023. Work execution for identified 2023 list to be completed by 12/31/2023. Number of units will be budget dependent.
PowerOn! (OH	2022: harden 44 circuits (~65 miles) under existing scope, pending PJD and budget.
Hardening –	Impact to restoration curves
current standard)	xxx minutes per circuit hardened under existing scope (on average) Note: Impact to restoration curve to be available by 12/31/2021
	Currently underway: 1026 miles (343 circuits) already hardened under FEMA and by end of 2021 an additional 167 miles (69 circuits) hardened under PowerOn!;
	Milestones:

Project component	Target Objective (subject to budgets / updates)
	November 30, 2021 – Award contracts to 2 construction contractors for 2022 PowerOn! Work.
	January 31, 2022 – Identify installation locations, schedules, and costs estimates and PJDs for hardening 44 circuits (under the existing scope) to be completed 2022. Work execution for identified 2022 circuits to be completed by 12/31/2022. Total circuit and mileage to be completed based on PJD and budget constraints
OH Hardening – main line (under new standard)	 2021: Complete new standard design for OH hardening (main line and branch line), including materials used, construction methods and installation standard updates, identify impacts on existing work practices, training updates required, and purchase specifications. 2021: Develop budget estimates and prioritize work to be carried out in 2022-2026 2022: harden 44 circuits / 65 miles (using PowerOn! Budgeted funding). Use of new standard subject to conversation and coordination with other groups. 2023 – 2026: Carry out planned construction work of 67 circuits / 167 miles of main line, budget dependent, per PJD.
	Impact on restoration curve: xxx minutes per circuit hardened (on average) Note: Impact to restoration curve to be available by 12/31/2021
	Milestones : November 15, 2021 – final decision on new hardening standard; consult with LIPA on recommendations
	December 31, 2021 – Identify impacted construction, installation specifications and methods to be updated. Identify updates needed for work practices, training, and purchase specifications. Identify work for 2023 to be designed in 2022.
	August 31, 2022 – Identify installation locations, schedules, cost estimates, and create PJDs for main line circuits to be hardened (under new scope) for 2023. Work execution for identified 2023 list to be completed by PJD, subject to budget.
OH Hardening – branch line	2021: Develop budget estimates and prioritize work to be carried out in 2022-2026 2023 – 2026: Carry out planned construction work of 48 circuits / 173 miles of branch line, budget dependent, per PJD.
	Impact to restoration curve: xxx minutes per circuit hardened under new scope (on average)
	Note: Impact to restoration curve to be available by 12/31/2021
	Milestones: August 31, 2022 – Identify installation locations, schedules, cost estimates, and create PJDs for branch line circuits to be hardened (under new scope) for 2023. Work execution for identified 2023 list to be completed by PJD, subject to budget.
Undergrounding Pilot for Rear- Lot Lines	The aim of this pilot program will be to convert rear-lot overhead lines to underground. The pilot will explore different construction methods / designs (which includes: trenching vs. boring, undergrounding entire service vs. leaving pole to house service drop as is, and various meter pan connection methods). The pilot will apply lessons learned to form recommendations for a future undergrounding or hardening programs.
	 2021: Identify prioritized areas to underground, start customer engagement, complete standard engineering and designs, and obtain easements. Pilot designs will consider various installation / connection methods. 2022: Continue customer outreach, easements, and begin installation / start construction on pilot circuit(s)

Project component	Target Objective (subject to budgets / updates)		
	Impact to restoration curve: xxx minutes per circuit undergrounded (on average) Note: Impact to restoration curve to be available by 12/31/2021		
	Currently underway: prioritization of areas, customer engagement and outreach		
	Milestones: March 31, 2022 – Provide high-level engineering, design, schedule and cost estimates for an Underground Pilot for rear-lot services. Develop customer engagement plans, and start obtaining easements. Prepare PJD for 2022 pilot program (4 locations), with construction to start late 2022 pending easement and engineering design completions.		
	August 31, 2022 – develop the next set of targeted rear-lot service installation locations, schedules, cost estimates, and create PJDs for further undergrounding work.		

Project Success Criteria:

Project success will be defined as:

- 1. Develop a list of high level, coordinated projects with associated costs and schedules that will positively impact the major storm restoration curve,
- 2. Identify processes and systems that will likely be needed to implement the identified projects, and
- 3. Develop a repeatable methodology to evaluate the impact of various resiliency projects on the overall restoration curve so as to prioritize investments, and
- 4. Quantified resiliency improvement benefits for the proposed programs.

The project end state occurs when resiliency program plans are developed (scopes, budgets, impacts to the restoration curves identified and schedules / timelines identified) and identified work has been successfully carried out.

2. Project Deliverables:

- 2022 Vegetation management work plan
- 2022 Storm hardening work plan
- Transmission / Substation Load pockets project(s) scopes of work, budgets, impacts to restoration curve, schedules for engineering and design, and construction timelines.
- LT5H program detailed Phase I plans to coordinate field ASUVs with station relays and breakers to enable field devices to act as reclosers, and operationalize devices in fully automated restoration schemes without operator intervention. Plans (scope, cost, and schedule) to incorporate lessons learned from Phase I program to all of Long Island service area (Phase II). Develop Phase I and Phase II impacts on restoration curve. Further apply lessons learned from LT5H Phase I to coordinate triple/single reclosers in field to allow for single phase operations on branch lines.
- PowerOn! Remainder of program scope (e.g. circuits per year), budget, schedules, and restoration curve impacts.
- Overhead Mainline Hardening standard design (e.g. conductor type, pole attachment method), cost estimates (e.g. cost per mile), prioritized circuits / areas, and impacts to restoration curve. This will include evaluation and adoption of new construction standards and installation methods for covered insulators and insulated cables.
- Overhead Branch Line Hardening standardized design, cost estimates, prioritized areas / circuits, and impacts to restoration curve.

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- Undergrounding Branch Line Pilot undergrounding designs, restoration curve impacts, cost estimates, schedules, customer engagement plans, and prioritization criteria to expand program.
- Vegetation program updated trimming standards, and different trim cycle frequency options are studied and evaluated for effectiveness. TTS to first protective device plan (circuits by year) for on-cycle trim work. 2023 recommendations for updated trim cycles based on factors such as locations, species, and growth rates.
- Restoration curve estimates for each program (including evaluation of new program scopes) and program optimization across transmission / substation load pockets, LT5H, Overhead (main line and branch), undergrounding, and vegetation.

2.1. Assumptions, Dependencies, and Constraints

Assumptions:

- No two storms are exactly the same and will not impact in the LIPA electrical system in the same way. For purposes of understanding the impact of various projects considered, the assumption is impacts on a storm that is similar to Isaias.
- 2022 Capital and O&M budget targets will be determined by October 2021. Any reallocations or additions may be considered after the January 31, 2022 deliverables are submitted and plans finalized. 2023 and onwards budgets are not set, and different components of this plan will provide options for Capital and O&M budget estimates and how the options will impact restoration curves beginning with the 2023 Budgets.
- PowerOn! Program will be completed by 2022 and form the basis for the mainline hardening project. System hardening will continue under the main line and branch line overhead hardening program from 2023 onwards.
- Vegetation management changes (e.g. hazardous tree removals, trim to sky) are already underway. Trim to Sky (TTS) clearance is already being carried out (between the substation and the first protective device as a part of the currently planned on trim cycle circuits). TTS to the first protective device is expected to be completed by 2025 by incorporating into 4 year cycle to minimize O&M impacts. Customer complaints and concerns can be addressed and will not interfere with the implementation of the TTS, hazard tree removals, or update trim cycle frequency aspects of updated vegetation management. Funding will drive TTS program scope to increase to balance of mainline.
- LT5H is expecting to install 738 devices by 2023. Total devices on system as of 8/18/2021 is 2,551 (G&W ASUV's 1,484, S&C Scada Mate 1,067). At the completion of the LT5H program in 2023, there will be a total of 3,005 devices installed in the field, which translates to an average of 380 customers per protective device installed. Phase I will be the coordination of a select number devices deployed to be coordinated with their associated substation relays / breakers, and other downstream devices. The findings and lessons learned from Phase I will be used to scale implementation of recloser functionality for the 1,800 devices that can be coordinated across system in Phase II. A long term plan to address the ASUVs to be converted into reclosing devices will be completed in 2022.

Dependencies:

- Underground pilot may not be able to break ground before successful customer engagement has been done.
- Emergency Preparedness group and Operations will need to decide how / when to switch to circuit sweep mode, and update all necessary plans, documents, and necessary regulatory filings (e.g. Emergency Response Plan).

• Trainings for LT5H device installation, programming and coordination, as well as use of covered conductor or aerial cable will developed and carried out, and will not be the limiting step in carrying forward the OH construction plans.

3. Project Structure

3.1. Internal Project Organization

Given the scope of this PIP there will be a number of parallel teams working on various aspects of the initiatives. The overall team make-up will include the following:

Overall Oversight of PIP Program and Progress

The Reliability organization will gather information from the teams outlined below through biweekly meetings to consolidate an overall update to the PIP. Reliability will meet with LIPA biweekly on progress and provide monthly PIP status report submissions. Reliability will also submit close-out document on each major milestone completed in a LIPA provided format.

Transmission and Substation Evaluation

Cross-functional team including Reliability, Engineering, Transmission Operations, Projects and Construction to evaluate load transmission pockets. The team will develop scope, costs, schedules and benefits for solutions for evaluation. Lead organization for the Transmission and Substation Evaluation will be Reliability. Reliability will determine the impact of the identified scopes of work on the restoration curve.

<u>LT5H</u>

The ongoing installation of ASUV's as part of the LT5H will be performed by Electric T&D Operations along with Telecom as part of the capital program. Reliability coordinates bi-weekly meetings where installation and commissioning of ASUV's are reported. Phase I for ASUV tripping will required technical input from T&D Operations Substation department for new relay settings and changes to both breaker and ASUV's. Electric T&D Operations will be involved to ensure the appropriate procedures are in place for new processes. Reliability will coordinate with Electric T&D Operations on Phase I results as part of a bi-weekly the bi-weekly meetings. T&D Operations and Telecoms will be the lead organization for installation and field communications, T&D Operations Substations department will be the lead organization for relay and breaker settings and protection coordination, and T&D Operations will be the lead Organization for identifying and updating work practice changes. Reliability will determine the impact of the identified scopes of work on the restoration curve.

Vegetation Management

The Manager of Vegetation Management will coordinate the execution of the additional vegetation work as part of the annual vegetation program. Reliability will work directly with the Vegetation Management team to evaluate the effectiveness of these programs. The two teams

will also develop the proposal for any changes to the cycle frequency. Reliability will coordinate with Vegetation Management on program progress as part the bi-weekly reliability meetings. Reliability will determine the impact of the identified scopes of work on the restoration curve.

Overhead Hardening

Execution of the current PowerOn! program and any future OH hardening programs will be managed and executed by the Projects and Construction organization already in place.

The evaluation of design standards will be performed by a cross functional team including Reliability, Asset Strategy (Materials and Standards), T&D Operations and Line Academy. Any new material identified (i.e. spacer cable) will require interaction with Procurement. Reliability will determine the impact of the identified scopes of work on the restoration curve.

Underground Pilot

Team to evaluate this effort will include Projects and Construction, T&D Operations, External Affairs, Real Estate, Asset Strategy (Materials and Standards) and Reliability. Ultimate execution of some portions of the plan may require contractors to support customer agreements, engineering and field installation. Reliability will determine the impact of the identified scopes of work on the restoration curve.

Other Stakeholders:

• LIPA

This team would also need the ongoing support for the duration of the project from:

- Senior Leadership
- Legal
- Procurement
- Non-Utility Billing
- Mapping
- Electric Engineering & Resources / NJUNS
- Electric Asset Strategy
- Electric T&D Operations
- Projects and Construction
- Finance / Accounting Services
- Major Accounts
- External Affairs
- IS (System Records Updates)
- Investment Delivery & Assurance

4. Project Plan

4.1. Project Work Plan

Task	Owner	Current Status	Target Start Date	Target End Date
Transmission & Substation Load pocket resolution (Planning studies)	Reliability	In Progress	3/29/2021	8/31/2022
Transmission & Substation load pocket impact on restoration curve	Reliability	In Progress	9/10/2021	12/31/2021
LT5H device field installation and commissioning completion	Reliability	In Progress	1/1/2019	12/31/2023
LT5H mainline device coordination – as tripping devices Phase I	Reliability Dist Automation	In Progress	5/1/2021	12/31/2021
LT5H single phase branch line devices as tripping devices Phase I	Reliability Dist Automation	In Progress	1/1/2021	12/31/2021
LT5H impact on restoration curve	Reliability	In Progress	9/10/2021	12/31/2021
LT5H long term plan to operationalize as tripping devices between 2023 and 2030	Reliability	Not Started	1/1/2022	8/31/2022
Vegetation management – TTS, first device	Vegetation Mark Cerqueira	In progress	6/1/2021	12/31/2025
Vegetation management – TTS all mainline analysis and funding study	Vegetation Mark Cerqueira	Cost benefit analysis pending TTS to first device results	1/1/2022	8/31/2022
Vegetation management – Hazardous tree removals	Vegetation Mark Cerqueira	In progress	6/1/2021	12/31/2025
Vegetation management – Cycle frequency update	Vegetation Mark Cerqueira	In Progress	8/1/2021	8/31/2022
Vegetation management impact on restoration curve	Reliability	In Progress	9/10/2021	12/31/2021
PowerOn!/OH Hardening program	Craig Watkins	In Progress	1/1/2020	12/31/2022
OH hardening – mainline standard design (spacer) decision	Mike Sullivan	In Progress	7/1/2021	11/15/2021
OH hardening – main line – identify locations, schedules, cost estimates and create PJDs for 2023	Reliability	In Progress (proposal complete)	2/1/2021	8/31/2022
OH hardening – branch line standard design	Materials and Standards	In Progress	4/1/2021	10/15/2021
OH Hardening design (mainline and branch line) impact on restoration curve	Reliability	In Progress	9/10/2021	12/31/2021

Task	Owner	Current Status	Target Start Date	Target End Date
OH hardening – branch line – identify locations, schedules, cost estimates and create PJDs for 2023	Reliability	In Progress (proposal complete)	2/1/2021	8/31/2022
Underground pilot – high-level engineering, designs, schedule and cost estimates for pilot program (4 sites). Construction to start late 2022	Project Management	Not Started	9/1/2021	1/31/2022
Underground pilot customer engagement including outreach and starting easement acquisition			1/1/2022	12/31/2022
Underground pilot impact on restoration curve	Reliability	In Progress	9/10/2021	12/31/2021
Utilize restoration curves by program to evaluate and optimize future program and budget requests across Transmission & Substation Load pocket, LT5H, Vegetation management, OH hardening, and Underground programs	Reliability	In Progress	9/10/2021	12/31/2021

4.2. Risk Management Plan

Project Risk	Mitigation
Funding Levels for Different Aspects of Program	Ongoing engagement with Capital and O&M program development with both PSEGLI and LIPA stakeholders to evaluate investment levels and optimize restoration curve impacts to deliver the greatest value to customers.

4.1. Issue Resolution Plan

Ongoing meetings with LIPA staff will continue to address the various aspects of the program and any issues identified will be discussed and resolved at these meetings. Where issues cannot be resolved, the Reliability team will facilitate discussions with the appropriate PSEGLI personnel to resolve the issue.

4.2. LIPA Reporting Plan

Biweekly meetings on progress and monthly PIP status report submissions. Submit close-out document on each major milestone completed in a LIPA provided format.

5. Technical Execution Plan

5.1. Technical Approach

The overall technical approach for this project is driven by analyzing the storm restoration curves to improve customer experiences by seeking infrastructure and work process improvements to prevent certain outages from occurring in the first place and to shorten restoration times of outages that do occur. To do so, the restoration curve was divided into three stages, with programs targeting each stage to drive customer experience improvements as shown in Figure 1 below. Stage A during restorations mainly consists of assessing damage, prioritizing restoration work, coordinating with local agencies to clear roads, and working on the transmission system to re-energize any adversely impacted system supplies. Stage B typically consists of work to restore the primary portions of circuits. Stage C, or the tail of the restoration, typically consists of slower, lower restoration impact work (e.g. lower customers restored per ticket / outage restoration job)



Figure 1: Restoration Curve and Aspirational Resiliency Improvement Objectives

Each of the following projects are designed to address one or more of the Stages covered in Figure 1, and are all designed to impact at least one of the stages of the restoration curve. For the purposes of this document, the underlying assumption for storm restoration improvements is a scenario that an identical to Tropical Storm Isaias were to impact Long Island in the same exact fashion. The improvements outlined and calculated is based on projected improvements over actual Tropical Storm Isaias response times. Finally, this work identified in the PIP is expected to take a number of years to complete. The calculations are made assuming the entirety of the identified scopes are complete.

Transmission and Substation Evaluation

Load pockets were identified using outage history and input from Transmission Operations. The concept will be to identify the most cost effective project that gives the highest probability to either eliminate outages or significantly improve the ability to restore lines. Outage history, circuit and station configuration and customers served will all go into the data collected and be part of the decision making process.

<u>LT5H</u>

Reliability will perform the evaluation of locations for new ASUV installations. These locations will be reviewed by Distribution automation to ensure the proposed locations can be covered by current radio coverage with priority to units that can be commissioned sooner. The design and installation will be performed by Electric T&D Operations. Pilot circuits for ASUV automation and ASUV Branch line installations will be identified with input from Reliability and Substation Engineering. The installations will be performed by Electric T&D Operations. Operations and Reliability will monitor these locations for device operations to confirm performance.

Vegetation Management

The Trim to Sky and Hazard Tree programs will be implemented as part of the normal cycle trim program to minimize incremental costs associated with these programs. The Hazard Tree program for Transmission will be performed in conjunction with the system flights performed twice annually and will be more aggressive in the removal of vegetation along the ROW. Evaluation of changing the cycle trim program will include the collection of historical tree performance for all circuits along with circuit demographics including mileage, customers served, vegetation species, growth rate. Circuits will be prioritized based on this data analysis to produce a list of circuits where possible cycle trim would be advantageous as well as circuits where possible increase may have limited impact.

Overhead Hardening

Execution of the current PowerOn! program and any future OH hardening programs will be managed and executed by the Projects and Construction organization already in place.

The evaluation of design standards will be performed by a cross functional team including Reliability, Asset Strategy (Materials and Standards), T&D Operations and Line Academy. Data collected and recommendations will reviewed with LIPA staff to confirm decisions.

Underground Pilot

Team to evaluate this effort will include Projects and Construction, T&D Operations, External Affairs, Real Estate, Asset Strategy (Materials and Standards) and Reliability. Due to the complications of this new program, this will be develop a more detailed plan to execute this pilot.

5.2. Quality Assurance Plan

TBD – Plans will be developed by the specific program areas.

5.3. Documentation Plan

The main document deliverables for this PIP are as follows:

Program	Documentation
Transmission and Substation Evaluation	SOS files for the proposed Transmission projects
LT5H	Evaluation of ASUV Pilot Program
Vegetation Management	Recommendation for Program Cycle Changes
Overhead Hardening	Evaluation of Overhead Design Standard for Storm Hardening
Underground Hardening	Evaluation of Underground Pilot
Service Teams	Service Team Process Document
Emergency Restoration Patrols	Evaluation of Circuit Patrol Process

Revision History

Name	Date	Reason for Changes	Version
UPDATE	9/17/2021	initial draft	1.0 draft 1