FOR CONSIDERATION
June 23, 2021

TO: The Board of Trustees

FROM: Thomas Falcone

SUBJECT: Consideration of Adoption of the Isaias Task Force Quarterly Report and Directing PSEG Long Island to Take Actions to Permit the Independent Verification and Validation of End-to-End Tests of the Communications and Outage Management Systems

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Requested Action

The Board of Trustees (the "Board") of the Long Island Power Authority ("LIPA") is requested to approve a resolution adopting the Isaias Task Force (the "Task Force") Quarterly Report (the "Quarterly Report") and directing PSEG Long Island to take actions to permit the independent verification and validation ("IV&V") of end-to-end tests of the communications and outage management systems ("OMS") as of May 28, 2021, which resolution is attached hereto as **Exhibit "A."**

Background

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

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

The Task Force presented a 30-Day Report to the Board on September 23, 2020 and a 90-Day Report to the Board on November 18, 2020.

As set forth in Appendix 2 and Appendix 3 of the 90-Day Report, the Task Force provided actionable recommendations for the Board's consideration (the "Task Force Recommendations").

Between November 2020 and this Board meeting, the Board has adopted various Project Implementation Plans ("PIPs") for the Task Force Recommendations and has directed the resubmission of other plans for Task Force Review.

Additionally, between December 2020 and this meeting, the Board adopted additional recommendations covering operational areas, including risk management, budgeting and reporting, real estate, asset management, inventory management, collections, affiliate services,

strategic planning, and information technology modernization. In total, the Board has adopted over 140 recommendations, which are in various stages of implementation by PSEG Long Island. The Board has required quarterly status updates on the implementation of each of these recommendations in the form of Quarterly Reports.

The Quarterly Report

The Quarterly Report, attached hereto as **Exhibit "B",** summarizes the status of each of the Isaias Task Force PIPs designed to correct the performance shortcomings that turned Tropical Storm Isaias into a hardship for Long Island and Rockaways electricity customers, as well as those PIPs adopted by the Board to correct other management deficiencies unrelated to the storm response.

The Quarterly Report also provides a "big picture" summary of the status of the PSEG Long Island communications and OMS systems, which failed during Isaias, worsening the impact of the tropical storm on customers and the public. As more particularly discussed in the Quarterly Report, a majority of the Isaias Task Force PIPs that were scoped were delayed, deferred, or were not resubmitted for LIPA Board approval and most of the recommendations addressing deficiencies in 11 non-storm operational and management areas are still in the early stages of execution.

Independent Verification and Validation of End-to-End Tests

On May 28, 2021, PSEG Long Island completed its most recent end-to-end system test of the communications and OMS systems, which it reports met its acceptance criteria. This is progress and systems are no doubt in better shape than last year.

Even with this progress, PSEG Long Island is far from completing the remediation of the failed systems. PSEG Long Island was unable to meet its own proposed project deadlines to implement OMS version 6.7 before this year's storm season and reverted to OMS version 5.5. The end-to-end test is of an out of date, out-of-general-use version of the OMS running on antiquated hardware. PSEG Long Island needs to move to a modern, supported system and test that.

In order to enable LIPA's IV&V, PSEG Long Island must preserve all of the test reports, test logs, and other test data from the May 28, 2021 end-to-end test of OMS version 5.5 and preserve a copy of the entire test environment as of May 28, 2021. Staff requests that the Board direct PSEG Long Island to take these actions.

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 "A"

RESOLUTION ADOPTING THE TASK FORCE QUARTERLY REPORT AND DIRECTING PSEG LONG TO TAKE ACTIONS TO PERMIT THE INDEPENDENT VERIFICATON AND VALIDATION OF END-TO-END TESTS OF THE COMMUNICATIONS AND OUTAGE MANAGEMENT SYSTEMS

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 requested written quarterly reports with additional findings, if any, and 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, LIPA Staff has submitted to the Board the first Quarterly Report; and

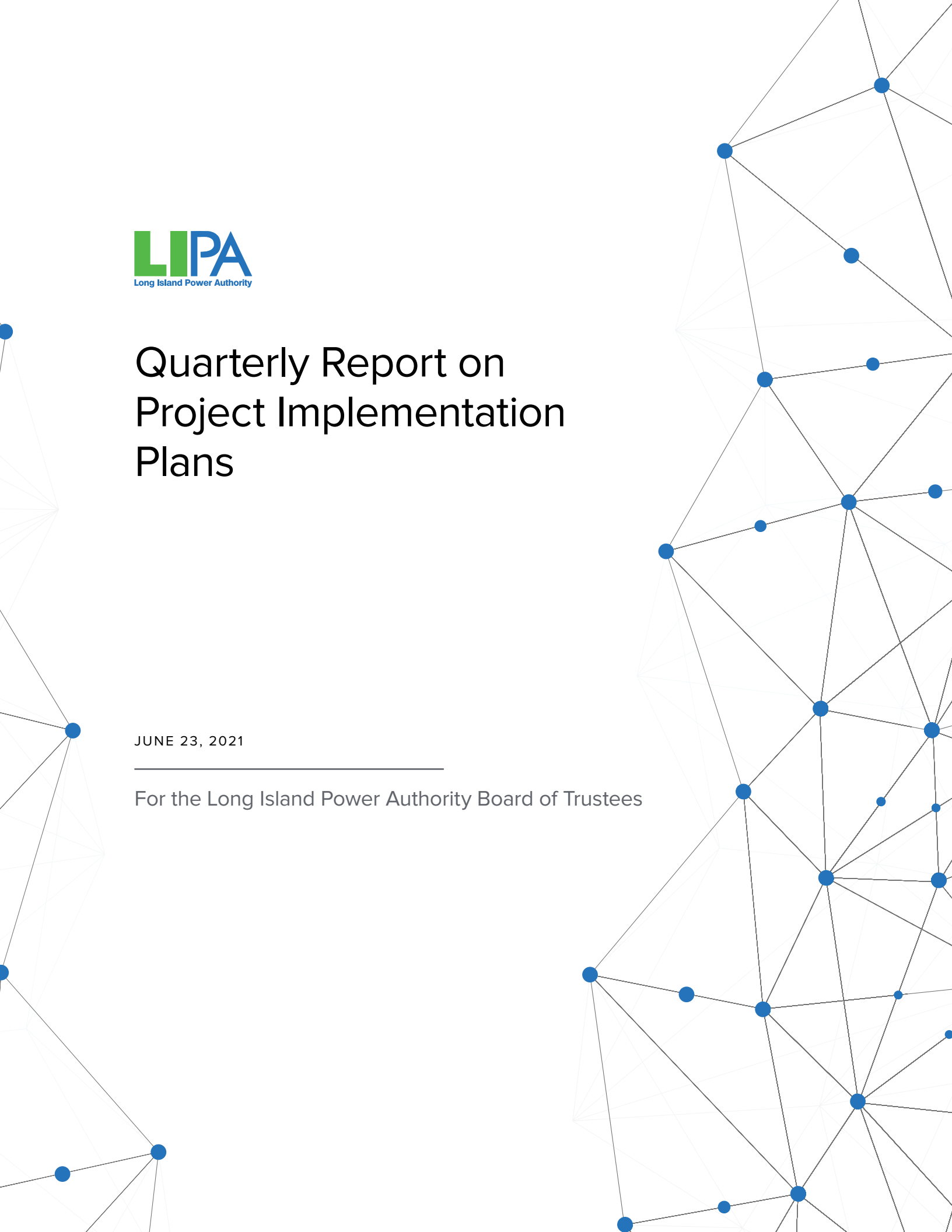
WHEREAS, on May 28, 2021, PSEG Long Island completed an end-to-end system test of the communications and OMS systems; and

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

BE IT FURTHER RESOLVED, that the Board hereby directs PSEG Long to preserve all of the test reports, test logs, and other test data from the May 28, 2021 end-to-end test of OMS version 5.5 and preserve the entire test environment as of May 28, 2021; and

BE IT FURTHER RESOLVED, that the Board hereby directs LIPA Staff to perform independent verification and validation of the May 28, 2021 end-to-end test.

Dated: June 23, 2021



Quarterly Report on Project Implementation Plans

JUNE 23, 2021

For the Long Island Power Authority Board of Trustees

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EXECUTIVE SUMMARY

This report by the Long Island Power Authority (LIPA) staff to its Board of Trustees (Board) provides:

1. A Quarterly Report on the status of each of the Isaias Task Force Project Implementation Plans (PIPs), designed to correct the performance shortcomings that turned Tropical Storm Isaias into a hardship for Long Island and Rockaways electricity customers, as well as those PIPs adopted by the Board to correct other management deficiencies unrelated to the storm response.
2. A "big picture" summary of the status of the PSEG Long Island communications and Outage Management System (OMS), which failed during Isaias, worsening the impact of the tropical storm on customers and the public.

Of the 79 Isaias Task Force PIPs that were scoped, many of them are delayed, deferred, or were not resubmitted for LIPA Board approval. The following table summarizes the status of the 79 outstanding implementation scopes arising out of LIPA Board recommendations:

FIGURE 1:
Status of the 79 Project Implementation Plans arising out of Isaias Task Force Recommendations

Delayed	On-Schedule	No Status Reports	No Approved PIPs	PIP is Deferred	Closed[1]	Previously Completed[1]	Total
19	4	10	16	9	2	19	79

PSEG Long Island's implementation of the PIPs have fallen behind in three ways:

1. There are many delays in completing the tasks called for in the PIPs.
2. There are still areas where PSEG Long Island has not provided acceptable PIPs.
3. For some PIPs, PSEG Long Island has not provided Status Reports.

PSEG Long Island recently completed an end-to-end system test of the communications and OMS systems that it reports meet its acceptance criteria. This is progress and systems are no doubt in better shape than last year.

Even with this progress, PSEG Long Island is far from completing the remediation of the failed systems. PSEG Long Island was unable to meet its own proposed project deadlines to implement OMS version 6.7 before this year's storm season and reverted to OMS version 5.5. The end-to-end test is of an out of date, out-of-general-use version of the OMS running on antiquated hardware. PSEG Long Island needs to move to a modern, supported system and test it.

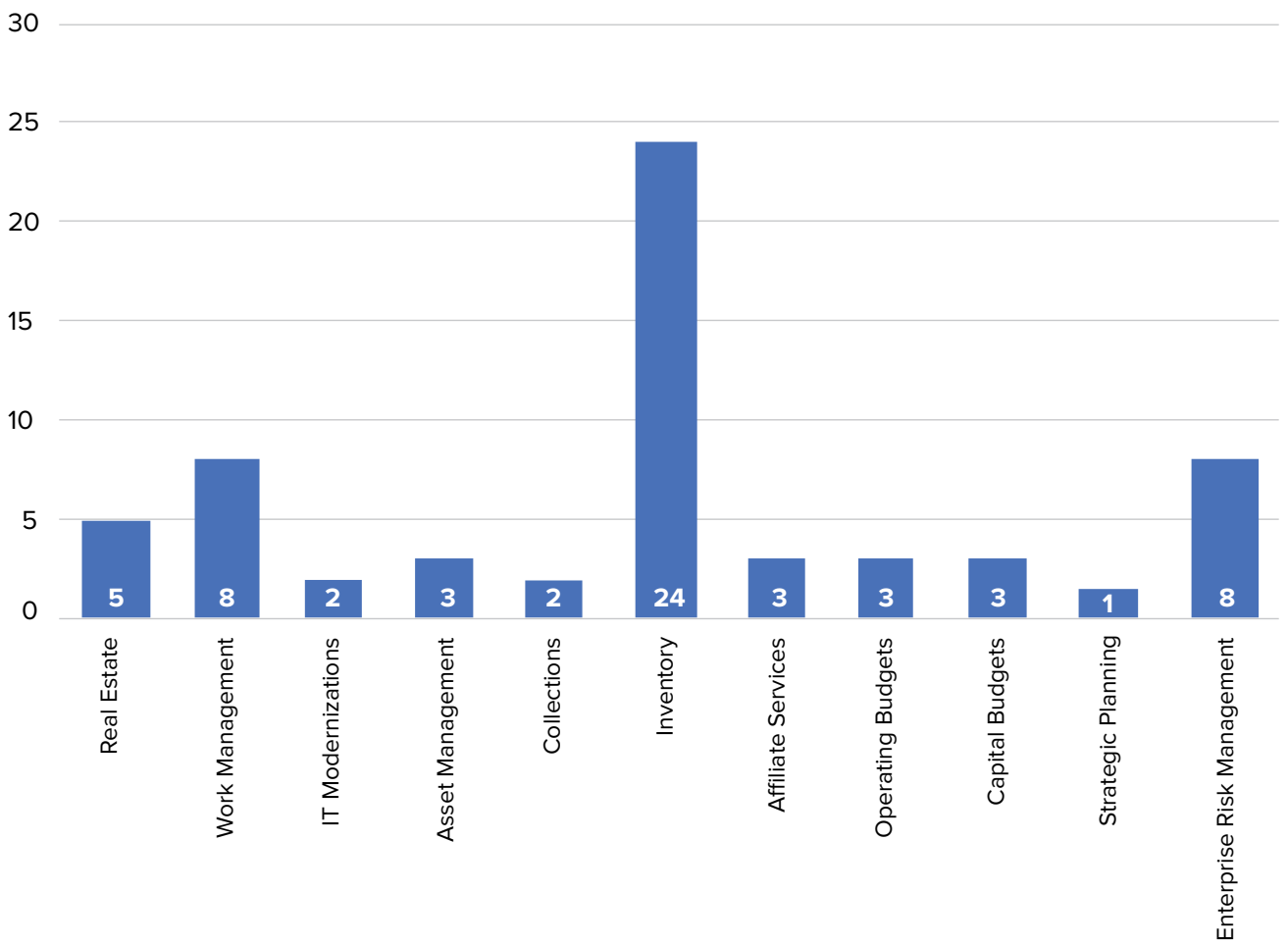
The Isaias Task Force (ITF or Task Force) has continued concerns about PSEG Long Island's over-reliance upon vendors; weak project management and oversight; and inadequate in-house technical expertise. Additionally, the ITF is concerned that in several instances, PSEG Long Island has not yet acted on recommendations by the LIPA Board to undertake specific PIPs to mitigate risks and remediate past failures.

When Isaias hit, PSEG Long Island simply did not have backup Business Continuity Plans (BCPs) to activate when the communications and OMS failed. The lack of effective BCPs remains a problem and attempts to create BCPs are at an early stage. BCP training to date has been at a basic instructional level.

[1] Subject to Independent Verification and Validation (IV&V) by LIPA's staff. "Previously Completed" are PIPs which PSEG Long Island asserts are complete but for which there is no Board-approved PIP.

In addition to the 79 Isaias Task Force PIPs, the LIPA Board has adopted 74 recommendations addressing deficiencies in 11 non-storm operational and management areas. The 74 recommendations have resulted in 62 PIPs. These are summarized in Figure 2. Most of these PIPs are still in the early stages of execution.

FIGURE 2:
Project Implementation Plans to Address Other Management Areas



SECTION 1

STATUS OF ISAIAS TASK FORCE FINDINGS AND 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 a series of two reports to the LIPA Board of Trustees and public following the storm, including a 30-Day and 90-Day Report. The Task Force presented the 30-Day Report to the 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 further 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 various recommendations for the Board's consideration that were designed to, among other things, (i) align management incentives and improve 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 for 85 actionable recommendations.

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 active PIP, including LIPA's evaluation of the progress being achieved, open issues and concerns, and other relevant information on each active project belonging to the initial ITF recommendations and subsequent non-ITF Board recommendations. This June 2021 Quarterly Report to the LIPA Board of Trustees is the first 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 35 adopted and open PIPs,**[2] tracking project progress against the schedules baselined in the approved implementation plans. **PSEG Long Island submitted June Status Reports for 25 of the 35 approved ITF PIPs**. Of these:

- **4 projects are identified by PSEG Long Island as On-Schedule.**
- **19 projects are identified by PSEG Long Island as Delayed.**
- **2 projects are identified by PSEG Long Island as Closed – signifying that all PIP items have been fulfilled and the project is closed subject to LIPA verification.**

[2] PSEG Long Island was requested to report only on the 35 open and active implementation plans.

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

- **10 projects did not receive status reporting from PSEG Long Island.**
- **19 projects are identified by PSEG Long Island as Previously Completed – signifying that the work had been completed without an approved PIP.**
- **16 projects did not have approved PIPs – LIPA did not request Status Reports on these.**
- **9 projects were deferred – because PSEG Long Island considered them contract negotiation items or because LIPA and PSEG Long Island mutually agreed to defer these items while discussions are ongoing to improve the PIP.**

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

In addition to the 35 Board-approved PIPs, **PSEG Long Island, as noted above, has failed to submit acceptable PIPs for 16 recommendations adopted by the LIPA Board. These PIPs are summarized in Appendix 4. In some cases, LIPA's concerns have been unaddressed for as many as six months.**

Overall, progress has been made, and PSEG Long Island is better positioned for storm season than it was at this time last year. However, LIPA is concerned that risks remain to customers that have not been adequately mitigated. The pace of implementation of the recommendations is too slow and the focus is uneven, as highlighted in this Quarterly Report, evidenced by the significant number of recommendations delayed beyond PSEG Long Island's own proposed timetables. There are also significant gaps in the implementation of Task Force Recommendations. For instance:

- To date, PSEG Long Island has not completed the "Daytime Stress Test" requested by LIPA per Tier 1 Recommendation 3.2.1.1, which would simulate real-life scenarios – calls originating from Long Island during regular business hours. PSEG Long Island's PIP for this recommendation have been rejected three times, and a revised plan has not been submitted.
- Tier 1 Recommendation 4.14 advised PSEG Long Island to accelerate the deployment of the field mobile application for foreign crews and/or 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. LIPA has emphasized the importance of having a fully functional app deployed before storm season. PSEG Long Island made the determination, against our advice, that the two-way integration would only be developed for OMS version 6.7 and not for OMS version 5.5. Deployment is now delayed until after storm season due to the delayed implementation of the OMS upgrade. Even more concerning, it appears that tasks that are not dependent on having an available OMS version 6.7 environment, such as business requirements validation and architectural solution design, are also well behind schedule.
- Tier 1 Recommendation 3.2.1.2 advised PSEG Long Island to improve the pre-storm planning process and include specific communication, coordination, and escalation with the communication service carriers before and during storms. The PIP, approved in December 2020, stated that PSEG Long Island would contract a dedicated specialist from Verizon by December 18, 2020. The June Project Status Report for this recommendation notes that a fully executed statement of work is pending from Procurement and identifies

June 18, 2021, as the Delivery Date for the written vendor agreement for contracting of the specialist – nine months from issuance of the recommendation.

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 and OMS had severe consequences for PSEG Long Island customers. The PSEG Long Island communications systems failed in almost every aspect of delivering customer outage reports 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 stress tested and there was no provision for the contingency of communication failures.

As indicated earlier, 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 nine months, PSEG Long Island has been testing various fixes to its communications systems and OMS. LIPA's recommendations to PSEG Long Island included 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 processe**s (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 Been Testing and Deploying an Obsolete Version of its OMS

At this time, PSEG Long Island is focused on testing and deploying version 5.5 of the OMS. Version 5.5 is no longer vendor-supported and has more limited capabilities than version 6.7.

The 5.x generation 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. The PSEG Long Island system is supported under a special support contract with the vendor with a limited number of hours.

The system architecture, functional, and performance capabilities of version 5.5 are limited compared to what is available in the updated 6.7 version. OMS 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.

Critically, PSEG Long Island's implementation of version 5.5 is also running on an outdated operating environment without support and regular security patches. **A large part of the complex software subsystems are relying on old hardware that has not been refreshed for many years.**

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.**

"Re-platforming" Strategy for OMS has Delayed Deployment of OMS Version 6.7 Beyond the Coming Storm Season

PSEG Long Island pursued a "re-platform" strategy to return to the latest OMS application version and planned to deploy a remediated version 6.7 on new hardware prior to the 2021 Atlantic Hurricane season. **PSEG Long Island was unable to complete this re-platforming schedule along their original proposed timeline. In May 2021, PSEG Long Island deferred the upgrade until after the 2021 storm season based on the project delays; but has not yet baselined a revised schedule for making OMS version 6.7 operational.** PSEG Long Island has since been focusing on remediation and end-to-end testing of version 5.5. The end-to-end testing should be aiming for a full-fledged, comprehensive performance test of all OMS and telephone components, including downstream and feeder systems, under peak Isaias-level loads.

While we do not wish to see PSEG Long Island repeat last year's mistake of prematurely rushing an upgrade of the OMS into production heading into storm season, remaining on version 5.5 carries its own costs and risks, and we are concerned that PSEG Long Island is not yet providing the level of focused and rigorous planning that is necessary to mitigate the negative impacts of the decision. **Had PSEG Long Island focused its efforts on identifying the root causes of failure in OMS version 6.7, as LIPA had repeatedly recommended, we believe that PSEG Long Island would be in a much better place today.** In addition to the risks inherent in an end-of-life application version, the delay of the OMS upgrade delays other critical projects such as Advanced Metering

Infrastructure (AMI) Integration and the Field Mobility Application. It is essential that the OMS upgrade continue to be pursued with urgency. Any further investments in version 5.5 beyond those necessary to remediate issues must be carefully considered, both to avoid waste and to prevent a dilution of focus from the upgrade.

Results from OMS Version 5.5 End-to-End Tests Appear to be Positive

PSEG Long Island has now implemented many of the remediations pursuant to the Task Force Recommendations in OMS version 5.5. Following a version 5.5 End-to-End Performance Test in April 2021 that the Task Force considered unsatisfactory, PSEG Long Island conducted another version 5.5 End-to-End Performance Test in late May 2021 and submitted Test Execution Reports to LIPA staff in June 2021.

LIPA representatives virtually observed this latest test and are reviewing the detailed test design, test plans, execution reports, and test logs. While the review is still ongoing, LIPA staff has brought forward to PSEG Long Island the following key concerns:

1. The performance of the system and observed data on queue depths in the system's Enterprise System Bus (ESB) is inconsistent with the design parameters of the ESB. PSEG Long Island has not explained this inconsistency. LIPA has asked for a white paper from PSEG Long Island addressing this apparent inconsistency.
2. The text messaging test protocols do not get end-to-end coverage as the messages are fed directly into PSEG Long Island's systems instead of passing through the larger communications infrastructure. This is a design flaw of PSEG Long Island's End-to-End test design, and we will be requesting modifications for future tests.
3. The communications system was tested at midnight on a weekend instead of mid-week peak daytime hours. LIPA has repeatedly raised this concern with PSEG Long Island and the response has always been that the Interactive Voice Response (IVR) vendor would not allow peak daytime tests. We have not seen sufficient evidence of PSEG Long Island exercising its leverage with the IVR vendor to find a solution.
4. Other miscellaneous concerns with the state of the log files still need to be resolved by PSEG Long Island.

LIPA will continue to conduct additional reviews of the test design, test logs, system configuration information, and undertake further IV&V testing of the modified systems to obtain additional assurance that the system performs as claimed. LIPA has asked PSEG Long Island to preserve the test environment (system clones and snapshots) so that LIPA can continue to conduct its independent review and testing with fidelity.

While LIPA will not be able to provide independent representation on the status of this test until its own reviews and IV&V tests are completed, PSEG Long Island, however, is representing that the end-to-end performance conducted on May 29, 2021, has met its success criteria and therefore passed. In fact, on June 3, 2021, PSEG Long Island published a press release declaring "successful test of outage management and telephony systems (have been) completed."

Communication Systems and OMS Performance has Gradually Improved over the Last 8 Months

Progress has been made on remediating the OMS, telephony, and associated systems, and they appear to be in significantly better shape than they were before when LIPA initiated its rigorous oversight of the implementation effort (which included meeting with PSEG Long Island several times a week). However, as discussed above, we remain concerned about the pace of activities, and the gaps in the implementation of the Task Force Recommendations.

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.

Business Continuity Plans are Still Narrowly Focused

PSEG Long Island's initial responses to the recommendation were lacking. PSEG Long Island submitted a "Restoration Contingency Plan for Critical System Failures" and subsequent updates thereof, to which LIPA provided extensive comments that have not yet been completely incorporated. 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's first attempt at testing the newly developed contingency plan was a tabletop drill of the OMS and telephony failures conducted in January 2021, which demonstrated that many manual workaround processes were not yet in place. Instructions provided by leaders were generic, and participants had a limited understanding of the overall process.

PSEG Long Island has since made some progress. PSEG Long Island has submitted to LIPA a host of Tier-1 BCP "work-around" plans intended to document contingency procedures in case of failure of specific IT systems. These documents are at an early stage of development, and LIPA continues to provide feedback to PSEG Long Island on these plans. A functional exercise was attempted in April 2021 that was informative but still fell short of expectations of a true functional exercise. LIPA has recommended that PSEG Long Island repeat its functional exercise with greater rigor and then develop a true full-scale exercise of its BCPs.

On May 27, 2021, PSEG Long Island conducted the third in a series of Emergency Scenario Exercises designed to test the utility's storm response readiness for the upcoming Atlantic Hurricane Season, which began on June 1. It included role-playing of the Emergency Response Executive Team in a storm simulation where certain critical system failures complicated the normally complex storm restoration effort. The exercise was designed to check the readiness and response of the Incident Command System (ICS) staff because several plans, policies, and procedures have changed after Tropical Storm Isaias. Overall, the exercise did not fully prepare participants for a general storm response, focusing only on an "Isaias type event."

During these Emergency Response Drills, it is customary to inject non-scripted scenarios to challenge the participants to respond to unexpected scenarios given the unpredictable nature of storms. The latest exercise attempted to demonstrate the abilities of participants in the ICS, but many injects were overly scripted and left the observer wondering if the participants were truly challenged.

PSEG Long Island conducted its 2021 Annual Hurricane Tabletop Exercise in June 2021, which LIPA staff attended as observers. The simulations and injects were somewhat predictable and did not significantly stress the decision making of leadership. For example, the "inject" that Hurricane Felecia had been downgraded from a category 2 to a category 1, was a "condition" and not an "inject" that tested leadership's decision making. LIPA has been consistently highlighting its concerns in these areas to PSEG Long Island management. While we have observed clear improvements over time, LIPA was expecting PSEG Long Island to be more proactive.

While progress has been made on the BCPs, there is still significant work to be done. PSEG Long Island reports the BCP project as Delayed, with a projected end date of August 27, 2021 instead of July 30, 2021. We urge PSEG Long Island to address LIPA's feedback with urgency.

Project Status for Adopted ITF PIPs

Adopted ITF PIPs and associated Project Status are detailed in the following appendices:

- **Appendix 1:** Summary of Project Status Reports for Adopted ITF PIPs (as of 6/20/2021)

  Appendix 1 summarizes the status of active PIPs for which PSEG Long Island submitted PIP Status Reports for June 2021.

- **Appendix 2:** Adopted ITF PIPs for which PIP Status Reports Were Not Submitted (as of 6/20/2021)

  Appendix 2 lists PIPs for which PSEG Long Island did not deliver a PIP Status Report as of 6/20/2021. Consequently, LIPA is unable to provide the Board with the current status of these initiatives. It is expected that the next Quarterly Report will provide a more comprehensive report.

- **Appendix 3:** Detailed Description of Active ITF Project Implementation Plans

  Appendix 3 provides a detailed description of active PIPs for which detailed progress reports were submitted by PSEG Long Island.

- **Appendix 4:** ITF Recommendations for Which PSEG Long Island Has Not Submitted Acceptable Project Implementation Plans

  Appendix 4 lists the Task Force Recommendations for which PSEG Long Island has not yet submitted acceptable PIPs to the Board of Trustees.

SECTION 2

REVIEW OF LIPA STAFF OPERATIONAL RECOMMENDATIONS

The LIPA staff has brought forth operational recommendations for the consideration of the LIPA Board to address known management deficiencies in PSEG Long Island operational areas beyond the scope covered by the Isaias Task Force reports. **The majority 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. In total, **the LIPA staff has brought forth 74 recommendations addressing significant known PSEG Long Island management deficiencies as described in the table below:**

Real Estate	Work Management	IT Modernizations	Asset Management	Damage	Inventory	Affiliate	Operating Budgets	Capital Budgets	Strategic Planning	Enterprise Risk Management
5	**8**	**2**	**7**	**3**	**25**	**7**	**3**	**3**	**3**	**8**

These 74 recommendations have resulted in 62 PIPs to address the operational findings. Figure 2 summarizes the status of the Board's review of these PIPs.

FIGURE 2:
Status of Project Implementation Plans for LIPA Board Recommendations

Findings	Adopted	Total #	Complete & Under Review	In Progress	Plans Rejected & Outstanding	Plans Due
Risk Management	12/16/20	8	4	4	-	-
Operating Budget	12/16/20	3	-	3	-	-
Real Estate Management	1/27/21	5	-	5	-	-
Inventory Management	2/24/21	24	1	17	6	6
Collections Management	2/24/21	2	-	2	-	-
Asset Management	3/29/21	3	-	1	-	2
Affiliate Services	3/29/21	3	-	3	-	-
Strategic Planning	4/28/21	1	-	-	-	1
IT System Modernization	4/28/21	2	-	-	-	2
Capital Budget	5/19/21	3	-	-	-	3
Work Management	6/23/21	8	-	-	-	8
Total		62	5	35	6	22

- **35 PSEG Long Island PIPs have been accepted** by the LIPA Board and are in various stages of execution.
- **6 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.
- **22 PIPs have not yet been submitted for the Board's review**, and are expected to be submitted to the Board by its September Board meeting.

Each of the recommendations is summarized in the discussion below. Most 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.

Over the past two years, LIPA has seen 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 have also been 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 (LIPA considers only partially completed)	Include LIPA subject matter experts (SMEs) and ERM team members in all risk discussions	PIP approved 1/27/2021. Risk discussions with PSEG LI IT delayed and LIPA SMEs have been excluded.	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. Awaiting review of IT risk profile; all other risks include owners per mitigation action item.	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. Site established in November 2020 by LIPA ERM personnel.	12/02/2020
ERM-4	Delayed	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 due June 1, delayed. Initial draft did not include the level of detailed information agreed to. Report nearly complete and awaiting final LIPA approval.	6/30/2021

ERM-5	On Schedule	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. Calendar for risk discussions will be agreed upon post approval and review of the annual report. Deep dive currently underway for the first discussion of 2021.	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 has taken the lead on this initiative; framework has been developed and proof of concept underway.	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. Formal training to all stakeholders involved in the risk assessment process expected to be facilitated in Q3/Q4 of 2021.	12/31/2021
ERM-8	Closed	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.	4/30/2021

Over the past five months, PSEG Long Island has made progress in addressing several of the deficiencies identified in the eight ERM recommendations. Specifically, the PSEG Long Island ERM team has completed ERM-1, 2, and 3. 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. However, considerable improvement is still needed in identifying the appropriate level of detail for risks and tracking the effectiveness of mitigation actions.

Although LIPA SMEs have been included in the bulk of risk discussions (ERM-1), an issue remains with PSEG Long Island's IT department providing timely and transparent access to risk information. **Risk discussions with the IT department have been significantly delayed and both LIPA ERM and SMEs have been excluded from these conversations.**

Additional improvements are needed in the planning and execution of the ERM assessment process, specifically, in the development of risk descriptions, the level of detail documented, 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).

Over the 2021 risk assessment cycle, PSEG Long Island ERM has not followed 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.

The establishment of the joint SharePoint (ERM-3) has reduced version control issues and created a central

repository of risk information that both LIPA and PSEG Long Island can access in real-time.

Regarding ERM-4, PSEG Long Island ERM is working to develop the annual ERM report, which was due June 1, as well as a calendar for high-priority risk discussions, which will be updated to reflect the schedule for the following 18 months after the annual report has been completed and approved. While a framework for the annual report was developed and an initial draft provided, it did not contain all the information agreed to in the framework and lacked certain substantive information necessary to meet LIPA's expectations. The review process for department risk profiles was delayed and the quality of information included was not sufficient and required significant revisions. To date, LIPA ERM has not approved any of the PSEG Long Island risk profiles. LIPA ERM will continue to work with PSEG Long Island ERM to develop an annual report that contains a comprehensive, substantive, and digestible summary of the greatest risks facing LIPA and the mitigation strategies in place to address them.

Both LIPA and PSEG Long Island share the goal of developing and piloting a risk correlation framework (ERM-6) to identify end-to-end impacts to inform mitigation strategies. LIPA ERM has taken the lead on this project given PSEG Long Island ERM's current focus on completing the risk assessments, developing the annual report, and making progress on the other seven recommendations. This recommendation is underway, and an initial proof of concept is expected to be presented to LIPA leadership in June.

PSEG Long Island has provided impromptu risk training and refreshers (ERM-7) throughout the 2021 risk assessment process; however, no formalized training plans or documents have been presented to LIPA to date. PSEG Long Island has committed to developing and holding formalized ERM trainings for all relevant personnel prior to the commencement of the 2022 risk assessment process. No concerns exist currently in PSEG Long Island's ability to provide ERM training to all participants of the ERM risk assessment process.

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. 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, there is still significant improvement to be made for the program to meet LIPA's expectations.

Operating Budgets

LIPA continuously reviews process improvements related to budget development and monitoring. In December 2020, LIPA staff recommended three improvements 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, LIPA seeks to improve the alignment of budget planning with the development and review of operational work plans. The Board adopted the below Operating Budget Process Improvement Recommendations on December 16, 2020.

LIPA requested that PSEG Long Island develop PIPs for OBD-2 and 3. LIPA staff developed a 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 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. LIPA staff serves as project lead. Project is on schedule.	Phase 0 – 2022 Q3 Phase 1 – 2021 Q3 Phase 2 – 2024 Q2
OBD-2	On Schedule	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 due July 31, 2021.	July 2021
OBD-3	On Schedule	LIPA is requiring PSEG Long Island to provide explanations on the reallocation of funds within the Operations & Maintenance Budget.	PIP approved 2/24/2021. Projected year-end variances for the March and April year-to-date reports did not exceed the threshold in the PIP. Therefore, no explanation report has yet been required to be submitted.	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 will be expanded to all departments for the 2022 Budget development process. Budget Briefing Books for the 2022 budget are due to LIPA by July 31, 2021.

With respect to OBD-3, PSEG Long Island developed a Reallocation Explanation template. The first reallocation explanation was due in April 2021. However, as the threshold for reallocation was not exceeded in April or May 2021, PSEG Long Island has yet to file its first reallocation explanations to LIPA. 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 (including billing and collection for pole attachment fees, as well as maintaining a complete inventory of the type and location of each attachment and plans for revenue optimization), 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 have not appreciably advanced, having 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 require 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 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.

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.

#	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 PSEG Long Island plans to onboard consultant by 6/30/2021.	Q4 2021
RE-02 (10.01)	On Schedule	Develop a comprehensive and formal strategy for the development of a new PTCC and Alternate Control Center	PIP approved May 19, 2021. PSEG Long Island reports that an offer was made but did not result in a successful property acquisition.	Q1 2024
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 determines property needs requirements. 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 initiate 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 RFP for the Records Management consultant is underway with the bids due on June 4, 2021.	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 are actively working on the knowledge/training documentation for the specific positions.	7/31/2021

To address these concerns, on January 27, 2021, the Board adopted the above 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.

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 performance-based 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.
    - □ 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.
    - 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.
    - 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 24 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.

#	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.	-
IMR-02 (GMIT2)	Delayed	Lack of Visibility & Formalized Communication	PIP accepted 4/28/2021. Delayed due to unexpected staffing shortages	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.	-
IMR-04 (GMIT4)	Delayed	Opportunities to Improve and Formalize Training	Vendors have been identified and are in discussion with procurement to discuss scope and pricing. PSEG Long Island indicates this will be a single source award in order to meet all deliverables of this 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.	7/31/2021
IMR-06 (GMIT6)	PIP Rejected	Confirm detailed Business Continuity Plan and Fail-Over Preparations	No approved PIP. PSEG proposal too narrowly focused and does not fully address recommendation.	-
IMR-07 (WM1)	PIP rejected	Barcoding technology is not utilized in material handling	Combined with GMIT-01	-
IMR-08 (WM2)	PIP Rejected	Exception Reporting	No approved PIP. PSEG project plan is too lengthy.	-
IMR-09 (WM3)	On Schedule	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.	8/27/2021
IMR-10 (WM4)	On Schedule	Formalize Quality Hold and Returns Locations are Present	PIP accepted 4/28/2021. A disciplined supplier return 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.	5/17/2021

IMR-11 (WM5)	Complete	Create Bin location in SAP is not restricted	PIP accepted 4/28/2021. PSEG reports complete. LIPA has not yet verified completion.	3/20/2021
IMR-12 (WM6)	On Schedule	Risk of Crew-based Pilferage, Misuse, Mis-picked Inventory in a Self-Serve Environment	PIP accepted 4/28/2021. Deliverables will be reviewed with PSEG-LI on 6/30/21 status meeting.	6/30/2021
IMR-13 (IM1)	On Schedule	Formalize and Communicate Storm Inventory Strategy	PIP accepted 4/28/2021. PSEG departments have collaborated to develop recommended storm inventory levels. The recommended levels will be shared with LIPA at the first bi-monthly PSEGLI/LIPA inventory management meeting.	7/16/2021
IMR-14 (IM2)	On Schedule	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 6/21/2021. A draft N+2 to 12 month forecast tool has been developed and is being vetted internally.	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.	-
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 aren't expected to be in place until August 2021.	6/30/2021
IMR-17 (IM5)	On Schedule	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.	6/30/2021
IMR-18 (IM6)	On Schedule	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, is expected to be completed by the project planned end date of 7/15/2021.	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 temporarily delayed due to unexpected vacancies in critical staffing positions in April (Mgr.- M&L and an Analyst).	6/7/2021

IMR-20 (IM8)	Status not provided	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)	On Schedule	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.	6/30/2021
IMR-22 (IM10)	Closed	Limited Stock Rotation Regimen	PIP accepted 4/28/2021. Implemented a FIFO (First In Frist Out) inventory rotation process where applicable. Revised warehouse mapping and configuration to accommodate inventory rotation. Internal picking orders are directed to 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	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)	Closed	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 final approval at the 6/30/2021 PSEGLI/LIPA bi-monthly Inventory Management meeting. 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.	6/30/2022
IMR-25 (SP2)	On Schedule	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 a 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 non-product 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.	9/30/2021
DTS-2	On Schedule	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 (waiting for IT provisioning).	-
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.	-

PSEG Long Island provided a status update on the DTS PIP to LIPA on May 20, 2021. PSEG Long Island completed a benchmarking survey of other regional utilities to compare to PSEG Long Island processes. LIPA and PSEG Long Island meet monthly to review progress and provide information as scheduled in PIP. At the next meeting, PSEG Long Island will provide suggested key performance metrics, improved reporting, and a review of the end-to-end process with recommended improvements.

Asset Management

PSEG Long Island operates and maintains approximately 15,000 miles of transmission and distribution (T&D) assets owned by LIPA. Asset management is a core utility responsibility.

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 (EM-1 through EM-5). On March 29, 2021, the Board adopted two additional recommendations (EM-6 and EM-7). On May 19, 2021, the Board adopted a consolidated PIP from PSEG Long Island to address EM-1 through EM-5. PSEG Long Island has not yet submitted PIPs for EM-6 and EM-7. The status of each recommendation is summarized in the table below.

#	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. PSEG Long Island is working with its consultant (UMS) to finalize the roadmap for ISO 55000 compliance. Due on 6/30/21. The 2020 YE Reliability Report is being drafted and is on target for its 6/30/21 deliverable date.	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.	-
AM-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.	-
AM-07	PIP Not Submitted	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 not submitted a PIP for this recommendation.	-

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 accurately 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 74 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 little accounting detail on most of the affiliate costs.

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, LIPA is submitting these PIPs for the Board's review and approval 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 2022 annual budget development process. 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.	PIP submitted to Board for review and approval at June 23, 2021 Board meeting.	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.	PIP submitted to Board for review and approval at June 23, 2021 Board meeting.	3/1/2023
AS-03	Delayed	LIPA requires PSEG Long Island immediately request approval for hiring Servo employees, pursuant to its contractual obligations.	PIP adopted May 19, 2021. PSEG Long Island legal department is discussing this issue with LIPA legal department.	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 as productive as they could have been because of a lack of support by PSEG Long Island leadership. This is a symptom of the agency problem LIPA has highlighted in the past – a party contracted to perform a task for a pre-determined period and with largely fixed compensation has limited incentive to plan long-term.

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, as shown in the table below. This process will encourage greater transparency to LIPA's Board, 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. LIPA has reviewed the PIP and will suggest revisions to meet the intent of the Board. The revised PIP is expected to be presented to the Board at its September 2021 meeting.

#	Reported Status	Recommendation	Status Summary	Planned End Date
SP-1	PIP Rejected	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.	PIP submitted to Board for review and approval at June 23, 2021 Board meeting. Staff recommends deferring consideration until a revised PIP can be presented at the September 2021 meeting.	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, although whether any savings was realized is open to question. 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' ever-changing 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 and was scheduled to provide PIPs for consideration by the Board at its June 2021 meeting.

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.

PSEG Long Island has responded with a PIP that recognized the need to submit Project Justification Description forms to LIPA but proposed an alternative method for addressing projects in a preliminary stage of development as well as changes to project scopes, schedules, and budgets. LIPA and PSEG Long Island held a joint meeting to review the proposal and will continue to work to resolve the open issues.

#	Reported Status	Recommendation	Status Summary	Planned End Date
CB-01	PIP Rejected	**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 Budget. **New Projects or Changes in Project Scopes Between 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.	PSEG Long Island submitted a PIP for the Board's consideration at its June 2021 meeting. LIPA staff has provided feedback to better align the PIP with the Board's expectations.	-

CB-02	PIP Rejected	**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.	PSEG Long Island submitted a PIP for the Board's consideration at its June 2021 meeting. LIPA staff has provided feedback to better align the PIP with the Board's expectations.	-
CB-03	PIP Rejected	**Capital Budget Carryover:** 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.	PSEG Long Island submitted a PIP for the Board's consideration at its June 2021 meeting. LIPA staff has provided feedback to better align the PIP with the Board's expectations.	-

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. The recommendations were adopted by the Board.

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 September 2021 meeting.

#	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.	PIP due September 2021.	-
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.	PIP due September 2021.	-

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.	PIP due September 2021.	-
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.	PIP due September 2021.	-
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 to the new EAMS. To be completed by December 30, 2022.	PIP due September 2021.	-
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.	PIP due September 2021.	-
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.	PIP due September 2021.	-
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.	PIP due September 2021.	-

APPENDIX 1:

Summary of Project Status Reports on ITF Project Implementation Plans (as of 6/20/2021)

The following table summarizes the status of active Project Implementation Plans on PSEG Long Island submitted PIP Status Reports

Status Report	Tier	Reported Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date
3.2.1.2 PIP Monthly Status	1	Reported Closed; LIPA considers Delayed	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 reports the project closed as of 2/15/2021; with deliverables, close out and artifacts documents to be submitted to LIPA shortly. LIPA will consider the project closed when all said documents are submitted and approved.	11/17/2020	12/22/2020	2/15/2021
3.2.1.3 PIP Monthly Status	1	Delayed	The existing infrastructure for handling calls within the PSEG Long Island Call Center should be upgraded to a more recent version. PSEG Long Island should modernize its call center infrastructure to a technology that uses the newer "SIP Trunking" technology.	Project is delayed, with the schedule to be re-baselined for an October 2021 (post storm season) go live. The projected end date is now 10/15/2021 instead of 7/9/2021.	1/18/2021	7/9/2021	10/15/2021
3.2.1.6 PIP Monthly Status	1	Reported Closed; LIPA considers Delayed	PSEG Long Island should review the service operation process between PSEG Long Island and Verizon to understand how the major issues as identified are handled.	PSEG LI reports the project closed as of 2/15/2021; with deliverables, close out and artifacts documents to be submitted to LIPA shortly. LIPA will consider the project closed when all said documents are submitted and approved.	9/10/2020	1/19/2021	2/12/2021
3.2.2.3 PIP Monthly Status	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.	Project is delayed, with the 6.7 upgrade deferred to post-storm season. The projected end date is now Q4 2021 (Q1 2022 Fallback) instead of 3/18/2021. PSEG LI reports that they worked with CGI and decided to upgrade to a higher release of OMS/CAD – 6.7.8 – which addresses most of the warranty issues left from the last 6.7.4 upgrade and includes the latest 6.7.7 functionality.	12/3/2020	3/18/2021	Q4 2021 (Q1 2022 Fallback)

3.2.2.5 PIP Monthly Status	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.	Project is delayed, with the projected end date now TBD instead of 5/3/2021. PSEG LI reports that Infrastructure and Network monitoring in 6.7 are complete, but some components of DB monitoring in v6.7 require further development.	11/23/2020	5/3/2021	TBD
3.2.2.7 PIP Monthly Status	1	Delayed	Automate monitoring of inbound outage reports to the OMS, to be able to detect and eliminate erroneous reports that may arrive from any source.	Project is delayed, with the projected end date now N/A instead of 5/3/2021. PSEGLI reports that the solution was moved into Production on June 1, 2021 and they consider the PIP to be 100% complete but have marked as 50% since the solution needs to be tested with version 6.7 in the fall.	11/2/2020	5/3/2021	N/A
3.2.2.8 PIP Monthly Status	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.	Project is delayed, with the projected end date now TBD instead of 5/3/2021. PSEG LI reports that a Splunk solution has been deployed to v5.5 production; deployment to v6.7 is pending.	11/2/2020	5/3/2021	TBD
3.2.2.9 PIP Monthly Status	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.	Project is delayed, with the projected end date now 6/30/2021 instead of 5/11/2021. PSEG LI reports that all development and testing activities for this recommendation are complete and the deployment date has been confirmed for 6/15/21. Additional documentation needs to be submitted to close out the recommendation.	11/2/2020	5/11/2021	6/30/2021
3.2.3.1 PIP Monthly Status	1	Delayed	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.	Project is delayed, with the projected end date now 6/30/2021 instead of 3/22/2021. PSEG LI reports that this recommendation has been on pause to allow more focus on other priority digital recommendations. Initial documentation has been completed and additional revisions will be required prior to completing this effort.	12/1/2020	3/22/2021	6/30/2021

3.2.4.3 PIP Monthly Status	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.	Project is delayed, with the projected end date now 6/30/2021 instead of 4/7/2021. PSEG LI reports that the initial solution was deployed to production on 6/1/21; PSEGLI is working on additional enhancements to improve the customer messaging in additional scenarios and to complete open deliverables.	1/6/2021	4/7/2021	6/30/2021
4.01 PIP Monthly Status	3	Delayed	PSEG Long Island should develop and execute a comprehensive strategic technology plan for outage reporting and communications.	Project is delayed, with the projected end date now 11/1/2021 instead of 3/15/2021. PSEG LI reports that this recommendation has been on pause to allow more focus on other priority digital recommendations. Initial documentation has been completed and additional revisions will be required prior to completing this effort.	1/4/2021	3/15/2021	11/1/2021
4.03 PIP Monthly Status	2	Delayed	For the long term, PSEG Long Island needs to strengthen its voice communications engineering and project management staff.	Project is delayed, with the projected end date now 9/3/2021. PSEG LI reports that project start was delayed to 7/2021 to allow for critical cure activities to conclude. This decision was made due to a heavy dependence on team resources for this activity that were unavailable due to higher priority projects related to storm.	7/12/2021	9/3/2021?	9/3/2021
4.04 PIP Monthly Status	2	Delayed	Explore integrating the high-volume voice communications design into a more powerful all-encompassing call center design.	Project is delayed, with the projected end date now 5/6/2022 instead of 4/1/2022. PSEG LI reports that assessment and RFP development project has been completed, and PSEGLI is preparing to issue RFP to vendors per normal procurement channels.	2/1/2021	4/1/2022	5/6/2022

4.05 PIP Monthly Status	2	Delayed	Explore integrating the high-volume voice communications design into a more powerful all-encompassing call center design.	Recommendation 4.05 is combined with recommendation 4.04. Project is delayed, with the projected end date now 5/6/2022 instead of 4/1/2022. PSEG LI reports that assessment and RFP development project has been completed, and PSEGLI is preparing to issue RFP to vendors per normal procurement channels.	2/1/2021	4/1/2022	5/6/2022
4.07 PIP Monthly Status	2	On Schedule (LIPA needs to review scope change)	Ensure that the Municipal Portal is more resilient and prepare a backup Mode of Operation in case of OMS failure.	PSEG LI reports that the project is On Schedule. PSEG LI states that the caching component of the PIP was not pursued further as the conversion of webservices to file based for Kubra effectively eliminates the need for caching, as a result of which several milestone tasks are marked as canceled. LIPA will need to review and approve documentation of this proposed change.	8/31/2020	8/16/2021	8/16/2021
4.08 PIP Monthly Status MuniPortal	2	On Schedule	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.	PSEG LI reports that the project is On Schedule. The External Affairs team has confirmed over 90% of municipalities have received the communications email. Six training sessions were scheduled and five trainings have been held, with the remaining training on July 20, 2021.	1/4/2021	12/31/2021	12/31/2021
4.09 PIP Monthly StatusSocial Media Automation	3	Delayed	Better prepare social media staff to handle barrage of posts using modern artificial intelligence tools.	Project is delayed due to a new Cyber Security Questionnaire IT requirement that was not accounted for in original schedule. It is currently under review and will be completed by 6/29/2021.	1/19/2021	6/25/2021	8/13/2021

4.13 PIP Monthly Status	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.	Project is delayed, with the projected end date now Q4 2021 (Q1 2022 Fallback) instead of 4/1/2021. PSEG LI reports that the stress/ End-to-End test was completed for V5.5 on May 28 and all solutions were moved into Production on June 1, 2021. PSEG LI is planning the same test on 6.7 as part of the readiness for Go-Live.	1/7/2021	4/1/2021	Q4 2021 (Q1 2022 Fallback)
4.14 PIP Monthly Status	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 the projected end date now TBD, contingent on the timeline of OMS-CAD v.6.7, instead of 8/30/2021. PSEG LI reports that work in progress includes validating business requirements, discovery and analysis for streamlining the middleware infrastructure, and discovery for back-end architecture design options.	10/1/2020	8/30/2021	TBD
4.15 PIP Monthly Status	3	Delayed	Performance test OMS and “feeder” systems to establish peak capacity.	Project is delayed, with the projected end date now Q1 2022 instead of 5/2/2021. PSEG LI reports that 6.7 stress to failure test plan and strategy are to be developed. Per original implementation plan, test will be executed post Go-Live.	1/13/2021	5/2/2021	Q1 2022
4.17 PIP Monthly Status	1	Reported On Schedule; LIPA considers Delayed	Re-architect the inter-system message queuing applications for greater dynamic stability under highly demanding workloads.	PPSEG LI reports that the project is On Schedule, with an end date of 6/1/2021 based on deployment of the Async Queue solution to v5.5 Production. However, the PIP work plan includes deployment of the solution to v6.7 as well as v5.5. Project Status needs to be revised to incorporate the entire work plan. Additionally, the Project End Date should encompass completion of all tasks and deliverables, and not just solution deployment.	11/13/2020	7/9/2021	6/1/2021

4.19 PIP Monthly Status	1	Delayed	As part of storm preparation ensure that all application error and debug conditions have been cleared and the system is operating normally.	Project is delayed, with the projected end date now Q4 2021 instead of 5/3/2021. PSEG LI indicates that v5.5 deliverables will be completed in Q2 2021, with v6.7 updates as part of 6.7 Go-Live readiness.	1/7/2021	5/3/2021	Q4 2021
5.04 PIP Monthly Status Template 6-16-21 (002)	3	Delayed	Create BCPs for all mission critical systems and processes.	Project is delayed, with the projected end date now 8/27/2021 instead of 7/30/2021. PSEG LI reports that LIPA feedback on the 84 submitted workarounds is under review, and repair and recovery plans are in progress.	2/26/2021	7/30/2021	8/27/2021
5.14 PIP Monthly Status Template -Tiered restoration	3	Closed	Develop a backup plan for tiered restoration in large-scale events. Train and exercise for tiered restoration operations.	PSEG LI reports that the project is closed as of 6/16/2021, with deliverables submitted and accepted by LIPA.	unknown	3/5/2021	6/16/2021
5.17 PIP Monthly Status - Benchmark LSE	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	TBD
5.4.2 PIP Monthly Status	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.	Project is delayed, with the projected end date now TBD instead of 8/6/2021. PSEG LI states that due to the delay of OMS 6.7.X to Q4 2021 the AMI-OMS integration will also be delayed; and a new project plan for OMS 6.7 and AMI-OMS 6.7.x is currently being developed.	1/4/2021	8/6/2021	TBD

5.01 PIP Monthly Status - Emergency Training Centralization	3	Status Report Rejected (Reported On Schedule; Delayed per PIP schedule but the PIP has not been accepted)	Improve Emergency Planning governance so that utility-wide Emergency Training is under a single Emergency Planning Team and not dispersed among various departments.	LIPA reports that the project is On Schedule, based on a Planned End Date of 6/30/2021. However, the last submitted PIP, with a planned end date of 4/12/2021, was rejected in March. This Status Report will be considered Rejected.	2/19/2021	4/12/2021	6/28/2021

APPENDIX 2:

Adopted ITF PIPs for which PIP Status Reports Were Not Submitted (as of 6/20/2021)

The following table lists PIPs for which PSEG Long Island did not deliver a PIP Status Report (as of 6/20/2021). Consequently, LIPA is unable to provide the Board with the current status of these initiatives. It is expected that the next Quarterly Report will provide a more comprehensive report.

Rec. No.	Tier	Project Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date
3.2.5.3	2	TBD	PSEG Long Island 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.	TBD – Status Report Pending		3/31/2021	TBD
5.02	3	TBD	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.	TBD – Status Report Pending	4/1/2021	6/30/2021	TBD
5.06	3	TBD	Modify the Incident Command Structure to provide better visibility to the performance of mission critical technology.	TBD – Status Report Pending	3/1/2021	4/1/2021	TBD
5.07	1	TBD	Expand the Emergency Assistance Agreement with National Grid to include Generation employees.	TBD – Status Report Pending	12/31/2020	2/15/2021	TBD
5.09	3	TBD	Work with off-island sustaining tree contractors to develop consistent work practices, especially for removal of trees from energized lines.	TBD – Status Report Pending	3/1/2021	5/1/2021	TBD

5.11	3	TBD	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.	TBD – Status Report Pending	1/19/2021	5/15/2021	TBD
5.12	3	TBD	Improve training for RDAs including on BCPs. Prepare to implement RCA, when advantageous.	TBD – Status Report Pending	1/20/2021	5/1/2021	TBD
5.13	3	TBD	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.	TBD – Status Report Pending		8/1/2021	TBD
5.15	1	TBD	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.	TBD – Status Report Pending	12/21/2020	2/22/2021	TBD
5.16	2	TBD	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.	TBD – Status Report Pending		3/1/2021	TBD

APPENDIX 3:

Detailed Description of Active ITF Project Implementation Plans

Customer Communications and Outage Management

Voice Calls/Telephony Networks

Finding

Much of the inbound voice (telephony) infrastructure failed or was overloaded. Consequently, many customers call to report outages or receive status updates were not successful in the first three days of the storm.

Recommendations

Number	3.2.1.2
Recommendation	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.
Details	PSEGLI must ensure that Verizon technical support is on stand-by during a storm and Verizon representatives are included in the storm management call bridge.
Deliverables	• Updated emergency response plan (ERP) • Written vendor agreements
End State	Improved pre-storm planning process is documented in ERP and exercised. Agreements with vendors are in place with documented procedures.
Tier	1
Status	Accepted
PSEGLI Staff	Irving Landesbaum
Start Date	17-Nov-2020
Planned End Date	22-Dec-2020
Projected End Date	15-Feb-2021

Number	3.2.1.3
Recommendation	The existing infrastructure for handling calls within the PSEGLI Call Center should be upgraded to a more recent version. PSEGLI should modernize its call center infrastructure to a technology that uses the newer SIP Trunking technology.
Details	SIP Trunking technology will circumvent many of the current capacity limitations inherent in a traditional voice telephony (PBX) design and will additionally make the system more scalable and elastic for future expansions.

Deliverables	• SIP migration project plan • Requirements traceability matrix (RTM) • SIP low-level technical design • Test plan and results
End State	Upgraded and modernized Call Center is deployed and in production.
Tier	1
Status	Accepted
PSEGLI Staff	Irving Landesbaum
Start Date	18-Jan-2021
Planned End Date	09-Jul-2021
Projected End Date	15-Oct-2021

Number	3.2.1.6
Recommendation	PSEGLI should review the service operation process between PSEGLI and Verizon to understand how the identified major issues are handled.
Details	A formal service level agreement (SLA) and performance-based stipulations in PSEGLI's contract with Verizon and other telecommunications carriers should appropriately reflect the importance of PSEGLI's communication needs to the community.
Deliverables	• Operational procedures documentation
End State	Process for periodic review of service operation between PSEGLI and Verizon established. Roles and responsibilities assigned.
Tier	1
Status	Accepted
PSEGLI Staff	Irving Landesbaum
Start Date	10-Sep-2020
Planned End Date	19-Jan-2021
Projected End Date	12-Feb-2021

Outage Management System

Finding

The OMS experienced multiple issues with the high volume of data, rendering it effectively nonfunctional at times, and negatively impacting all communication channels and field activities.

Recommendations

Number	3.2.2.3
Recommendation	Work with CGI to obtain and implement fixes for identified application defects.
Details	Possibly upgrade to a more recent version of the OMS software.
Deliverables	• Install infrastructure Document technical architecture • Performance tests • Go/no go decision to migrate to version 6.7 • Completed root cause analysis; remediated recommended application performance items, deployed and tested system hardware, acceptance test package
End State	Application defects in OMS have been identified and fixes obtained, tested, and deployed.
Tier	1
Status	Accepted
PSEGLI Staff	Kirankumar Ramayanam
Start Date	03-Dec-2020
Planned End Date	18-Mar-2021
Projected End Date	Q4 21

Number	3.2.2.5
Recommendation	Automate monitoring of the OMS and CAD at the infrastructure level.
Details	Ability to detect infrastructure failures and give administrators an opportunity to restore normal operating conditions.
Deliverables	• Standard operating procedure • Pre-storm checklist • IT runbook updates • Port to version 6.7
End State	Deployed automated infrastructure level monitoring of OMS and CAD performance allowing administrators to take action in case of infrastructure failures.
Tier	1
Status	Accepted
PSEGLI Staff	Edi Sierra
Start Date	23-Nov-2020
Planned End Date	03-May-2021
Projected End Date	03-May-2021

Number	3.2.2.7
Recommendation	Automate monitoring of inbound outage reports to OMS.
Details	Ability to detect and eliminate erroneous reports that may arrive from any source.
Deliverables	• Requirements traceability matrix • Standard operating procedure/pre-storm checklist/IT runbook updates • Training for dispatchers on new business process • OMS version 6.7 go-live
End State	Deployed automated monitoring of inbound outage reports to the OMS allowing administrators to detect and eliminate erroneous reports from any source.
Tier	1
Status	Accepted
PSEGLI Staff	Edi Sierra
Start Date	02-Nov-2020
Planned End Date	03-May-2021
Projected End Date	03-May-2021

Number	3.2.2.8
Recommendation	Irrespective of whether the failure mode is corrected within the IVR, OMS should have automated quality monitoring of data arriving from IVR.
Details	Ability to detect potentially duplicate or otherwise bad information.
Deliverables	• Requirements traceability matrix • Procurement of monitoring tool • Detailed design • Standard operating procedure/pre-storm checklist/IT runbook updates • OMS version 6.7 go-live
End State	Deployed automated monitoring of data quality from the IVR to OMS allowing action to be taken in case of duplicate or otherwise bad information.
Tier	1
Status	Accepted
PSEGLI Staff	Edi Sierra
Start Date	02-Nov-2020
Planned End Date	03-May-2021
Projected End Date	03-May-2021

Number	3.2.2.9
Recommendation	Review and redesign IVR and OMS communication protocol.
Details	Ensure 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.
Deliverables	• Tested and deployed updated IVR and OMS protocols
End State	Duplicate outage reports are gracefully handled.
Tier	1
Status	Accepted
PSEGLI Staff	Srinivas Santhanam
Start Date	02-Nov-2020
Planned End Date	03-May-2021
Projected End Date	03-May-2021

Messaging, Outage Map, and Municipal Portal

Finding

Failures of PSEGLI's OMS prevented some customer text messages from being processed, the Outage Map from refreshing in a timely manner, and the Municipal Portal from being fully effective.

Recommendations

Number	3.2.3.1
Recommendation	Designate a system data administrator at the beginning of storm planning and throughout the storm to monitor on a continuous basis the timeliness, accuracy, and integrity of the information from OMS to Kubra.
Details	This recommendation has been on pause to allow more focus on other priority digital recommendations. Initial documentation has been completed and additional revisions will be required prior to completing this effort.
Deliverables	• Kubra systems data administrator role, process, and procedure documentation, including training and designation plans.
End State	System data administrator(s) trained. Roles and responsibilities defined. Processes and procedures for monitoring and corrective or preventive actions developed, documented, and tested, including for alternative data source and Outage Map adjustments.
Tier	1
Status	Complete per PSEGLI
PSEGLI Staff	Srinivas Santhanam
Start Date	01-Dec-2020
Planned End Date	22-Mar-2021
Projected End Date	30-Jun-2021

Website and Mobile App

Finding

Failures of PSEGLI's OMS as well as overloading of the MyAccount website infrastructure prevented customers from communicating with PSEGLI through MyAccount or through their mobile app during the initial two days of the storm.

Recommendations

Number	3.2.4.3
Recommendation	Introduce the capability to quickly decouple the web and mobile apps from OMS.
Details	In case of unresponsiveness, alternate messaging can be provided to the customer and OMS can be relieved of incoming transactional pressure.
Deliverables	• Functional/technical designs and testing – OMS reporting database/new stored procedure/outage hub view/replication plans • Process steps for operationalizing the solution • All configuration items in CDBM
End State	Web and mobile apps are functional in the absence of OMS. Outage reports are directed to an alternative data sink which can be consumed by alternate and deferred pathways.
Tier	1
Status	Accepted
PSEGLI Staff	Srinivas Santhanam
Start Date	06-Jan-2021
Planned End Date	07-Apr-2021
Projected End Date	30-Jun-2021

Emergency Response Planning, Storm Management, and Storm Restoration

Finding

The widespread failure of PSEGLI's phone system and digital channels left customers unable to report their outage or receive status updates.

Recommendations

Number	4.01
Recommendation	PSEGLI should develop and execute a comprehensive strategic technology plan for outage reporting and communications.
Details	This recommendation is currently on pause to allow more focus on other priority digital recommendations. Initial documentation has been completed and additional revisions will be required prior to completing this effort.
Deliverables	• Strategy documentation template • Document end-to-end storm restoration processes • Strategy documents • Holistic and integrated vision and end-state for PSEGLI business and users
End State	Development and implementation of outage technology plan.
Tier	3
Status	Pending
PSEGLI Staff	Srinivas Santhanam
Start Date	02-Nov-2020
Planned End Date	11-May-2021
Projected End Date	30-Jun-2021

Number	4.03
Recommendation	For the long term, PSEGLI to strengthen its voice communications engineering and project management staff.
Details	In addition to implementing the interim solutions to give near term improvements on the risk of blocked lines and busy signals, we recommend as part of PSEGLI's strategic planning, they consider other comprehensive telephony architecture solutions that give the future capacity, flexibility, and elasticity they will need. In the following section, we recommend that PSEGLI totally re-engineer their call center to a modern design. The high-volume voice solution should be part of that overall design rather than a separate solution.
Deliverables	• Gap analysis and recommendations • Improvement roadmap • PSEGLI staff job descriptions and position requirements/qualifications • Recruitment plan • Staff positions filled
End State	PSEGLI has staff with expert-level knowledge of modern voice communications engineering including telephony technology (PSTN and IP), voice/data networks, modern elastic cloud-based call centers, and voice communications security. PSEGLI has experienced project management staff with a track record of driving complex multi-vendor IT projects to completion.

Tier	2
Status	Accepted
PSEGLI Staff	Irving Landesbaum
Start Date	12-Jul-2021
Planned End Date	03-Sep-2021
Projected End Date	03-Sep-2021

Number	4.04
Recommendation	Explore integrating the high-volume voice communications design into a more powerful all-encompassing call center design.
Details	Complete assessment and issue RFPs to vendors.
Deliverables	• Requirement traceability matrix (RTM) • Solution design and systems specifications • System procurement and detailed implementation plan • CCaaS environment build • System delivery and production
End State	PSEGLI has a call center with a simplified, highly scalable on demand, distributed architecture to ensure resiliency to deliver both normal IVR and call center functions. Ideally, one system should accommodate normal blue-sky loads and on-demand very high-volume Isaias-type loads.
Tier	2
Status	Accepted
PSEGLI Staff	Irving Landesbaum
Start Date	01-Feb-2021
Planned End Date	01-Apr-2022
Projected End Date	06-May-2022

Number	4.05
Recommendation	Develop a more scalable Inbound Contact Center.
Details	Design an integrated calling system with improved outbound communications capable of handling larger volumes of calls. Take proactive steps to regain customer confidence in digital channels.
Deliverables	• Requirement traceability matrix (RTM) • Solution design and systems specifications • System procurement and detailed implementation plan • CCaaS environment build • System delivery and production
End State	Current Cisco/Nuance/Nice Contact Center upgraded to current-version software. Upgrade to SIP technology for expanded capability and calls received using VOIP/SIP technology.
Tier	2
Status	Accepted

PSEGLI Staff	Irving Landesbaum
Start Date	01-Feb-2021
Planned End Date	01-Apr-2022
Projected End Date	06-May-2022

Number	4.07
Recommendation	Ensure that the Municipal Portal is more resilient and prepare a backup Mode of Operation in case of OMS failure. Prepare a backup Mode of Operation in case of OMS failure and test Kubra file-based conversion.
Details	Municipal Portal which either implements request buffering or an alternate way to work asynchronously with the OMS to guarantee timely response in such a way that the end users never experience a slow portal.
Deliverables	• Detailed roadmap and implementation plan • Caching design for outage map and Municipal Portal • Changes to comply to Kubra and non-Kubra file-based format
End State	The Municipal Portal performs in a responsive manner with maximum response time for outage reporting and requests for status updates limited to known time value in seconds and not minutes. In the event an OMS failure occurs or if the OMS response time exceeds the Municipal Portal's maximum response time, the system informs appropriate personnel who can then take action to configure the system to switch to backup Mode of Operation which does not rely on OMS while its operation is being restored. The backup Mode of Operation may have limited functionality but must include appropriate activation and deactivation processes accompanied by appropriate customer communication and notifications. OMS failures due to message overload should (in the long term) be addressed by architectural changes through asynchronous buffering.
Tier	2
Status	Accepted
PSEGLI Staff	Srinivas Santhanam
Start Date	31-Aug-2020
Planned End Date	16-Aug-2021
Projected End Date	16-Aug-2021

Number	4.13
Recommendation	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.
Details	The mobile application was conceived to enable foreign crews to receive, update, and complete work assignments, thus making it a critical component for an effective large-scale restoration. Yet, while PSEGLI earned a performance incentive for initially developing the application, there has not been sufficient urgency to deploy this across PSEGLI. It needs to be thoroughly tested at “Sandy plus” scale, using the restoration procedures used on a major event, and procedures should be fully documented in the ERP and tested during exercises.

Deliverables	• Infrastructure installed • Document technical architecture • Go/No Go to execute 12-hour performance test • System passes 12-hour performance test • Go/no-go decision to migrate to version 6.7 • Completed root cause analysis • Remediated recommended application performance items • Deployed and tested system hardware • Acceptance test package
End State	CAD and ESB are stress tested against the repaired OMS system and all tests pass established acceptance criteria.
Tier	1
Status	Accepted
PSEGLI Staff	Kirankumar Ramayanam
Start Date	07-Jan-2021
Planned End Date	01-Apr-2022
Projected End Date	Q4 21

Number	4.15
Recommendation	Performance test OMS and feeder systems to establish peak capacity.
Details	While establishing software performance limitations, PSEGLI IT management should also aim to understand the OMS sensitivity to the addition of hardware resources.
Deliverables	• OMS version 5.5 feeder test plan • OMS version 5.5 individual feeder performance baseline results • OMS version 6.7 feeder test plan, incorporate findings from 5.5 testing • Results documenting peak capacity of OMS version 6.7 ecosystem to address storm conditions
End State	Standby resources should be provisioned for deployment during extreme storm events.
Tier	3
Status	Accepted
PSEGLI Staff	Kirankumar Ramayanam
Start Date	13-Jan-2021
Planned End Date	02-May-2022
Projected End Date	Q1 2022

Number	4.17
Recommendation	Re-architect inter-system message queuing applications for greater stability under highly demanding workloads.
Details	• Work with various sub-systems providers such as Intrado, Kubra, CGI, OSI, Mobile Application vendor etc. to implement timeout thresholds that dynamically self-adjust. • Work with the above vendors to make their products work asynchronously such that the need for such timeout values goes away. Most modern, high volume systems (Facebook, LinkedIn, etc.) work asynchronously to give the best user experience possible without overwhelming the backend systems. The load on the OMS during storm situations resembles that of a high-volume system and hence such an approach would certainly help. • Implement either a queue-based system or an alternate throttle enabled way for submitting requests to the OMS.
Deliverables	• To be proposed architecture • Detailed roadmap and implementation plan • Functional design – ESB queueing layer and flow control • Technical design – ESB queueing layer • All configuration items in CMDB
End State	Queuing messages in the ESB are set up as asynchronous.
Tier	1
Status	Accepted
PSEGLI Staff	Srinivas Santhanam
Start Date	13-Nov-2020
Planned End Date	09-Jul-2021
Projected End Date	01-Jun-2021

Number	4.19
Recommendation	As part of storm preparation ensure that all application error and debug conditions have been cleared and the system is operating normally.
Details	Configure and test re-platformed OMS version 6.7.
Deliverables	• Pre-storm checklist with procedures for error and debugging conditions
End State	Policy reviewed and documented in IT runbook and in ERP.
Tier	1
Status	Accepted
PSEGLI Staff	Kirankumar Ramayanam
Start Date	07-Jan-2021
Planned End Date	03-May-2021
Projected End Date	Q4 21

Storm Resiliency

Number	5.4.2
Recommendation	Accelerate deployment of smart meters and full OMS integration.
Details	Ensure outage reports are available to OMS more rapidly and embedded outages (small-scale outages downstream of large-scale) are more readily identified to enhance job dispatch efficiency.
Deliverables	• AMI integration roadmap • Operationalization of AMI to OMS integrations
End State	AMI-OMS integration.
Tier	1
Status	Accepted
PSEGLI Staff	Srinivas Santhanam
Start Date	04-Jan-2021
Planned End Date	06-Aug-2021
Projected End Date	06-Aug-2021

APPENDIX 4:

ITF Recommendations for Which PSEG Long Island Has Not Submitted Acceptable Project Implementation Plans

3.2.1.1	PSEG Long Island should complete implementing the planned telecommunication design changes and conduct additional capacity testing as soon as possible.
3.2.1.5	PSEG Long Island should develop appropriate capacity monitoring and management processes to support evidence-based demand forecasting and capacity planning.
3.2.2.4	Automate monitoring of OMS and CAD performance at the application level to detect application failures and give administrators an opportunity to adjust the configuration settings that affect performance.
3.2.4.1	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.
3.2.4.4	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.
4.01	PSEG Long Island should develop and execute a comprehensive strategic technology plan for outage reporting and communications.
4.10	Implement a solution that allows the OMS to decouple customer reporting from field management activities.
4.12	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.
4.16	Install standby hardware resources for use during peak demand.
4.18	Monitor application performance and error logs of all mission critical application systems, such as OMS, CAD, SCADA, ESB, etc.
4.21	Complete the integration of the MDMS and OMS to report the meters' power restoration events.
5.05	Establish a Crisis Management Team made up of PSEG Long Island and LIPA executives to ensure focus on Long Island operations and sufficient information flow to LIPA to conduct oversight. [DEFERRED upon PSEG Long Island Request]
5.08	Institute a program to train National Grid Gas and Generation resources to support damage assessment and materials handling work during major storms.
5.10	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).
5.4.1	Selective undergrounding of main or branch lines in areas with difficult access. [DEFERRED upon mutual agreement PSEG Long Island and LIPA]
5.4.2b	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. (PIP was split)
5.4.5	Revisions to the current vegetation management program to shorten the 4-year cycle across the system or in selected areas with denser vegetation. [DEFERRED upon mutual agreement PSEG Long Island and LIPA]
6.01	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.
7.01	Appoint a dedicated “turnaround” CIO at PSEG Long Island. [DEFERRED upon PSEG Long Island Request]
7.02	Appoint a dedicated CISO at PSEG Long Island. [DEFERRED upon PSEG Long Island Request]

7.03	Centralize Long Island IT under one enterprise PSEG Long IT organization with separate LIPA IT systems from those in New Jersey. [DEFERRED upon PSEG Long Island Request]
7.04	Initiate programs to develop stronger project management capability in PSEG Long Island's IT practice areas.
7.05	LIPA and PSEG Long Island need to restructure their contract to provide holistic accountability to the LIPA Board of Trustees and Long Island customers. Absent such changes, LIPA should consider termination of the contract. [DEFERRED upon PSEG Long Island Request]
7.06	Appoint a dedicated PSEG Long Island Vice President for Emergency Management. PSEG Long Island staff should actively engage in best practice peer groups on a wide range of important topics, including emergency planning and management. PSEG Long Island staff should not be reliant on their Newark counterparts to share such practices. [DEFERRED upon PSEG Long Island Request]
7.07	The OSA contract between LIPA and PSEG Long Island needs to be restructured to eliminate matrix management structures, ensure accountability to Long Island operations, and provide full and complete transparency to LIPA in its oversight function. [DEFERRED upon PSEG Long Island Request]

LIPA
Long Island Power Authority

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