QUARTERLY REPORT ON TROPICAL STORM ISAIAS AND MANAGEMENT RECOMMENDATIONS

MARCH 30, 2022

LIPA
Long Island Power Authority

OVERVIEW

- Quarterly Report provides the status of:

  - **78 Isaias Task Force** Project Implementation Plans (PIPs)

  - **69 Management PIPs** to correct other PSEG Long Island operational deficiencies

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

LIPA
Long Island Power Authority

Quarterly Report on Tropical Storm Isaias and Management Recommendations

March 30, 2022

For the Long Island Power Authority Board of Trustees
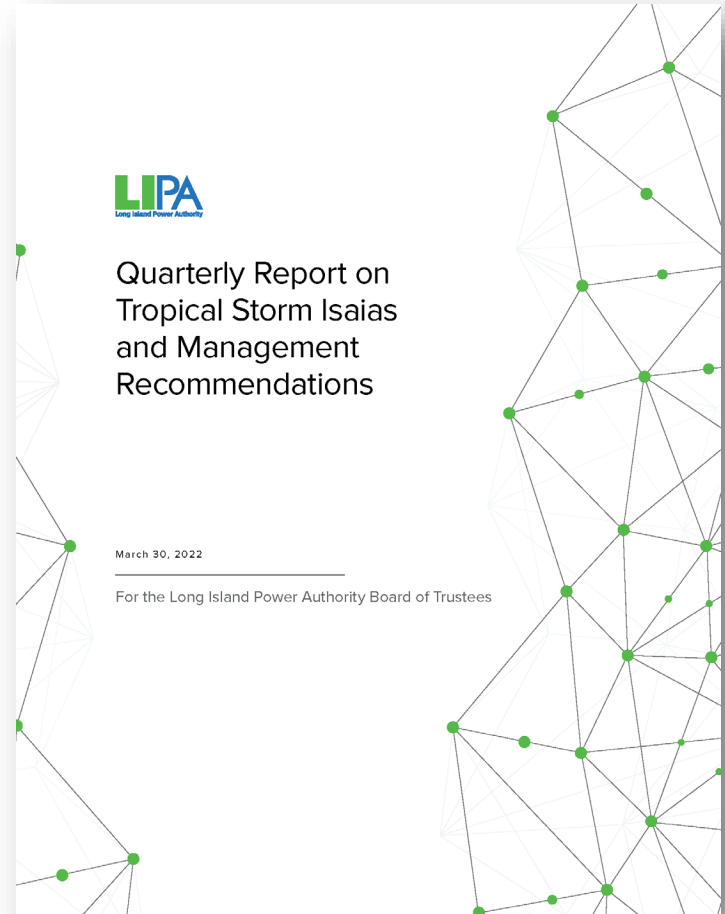
ISAIAS TASK FORCE PIP STATUS
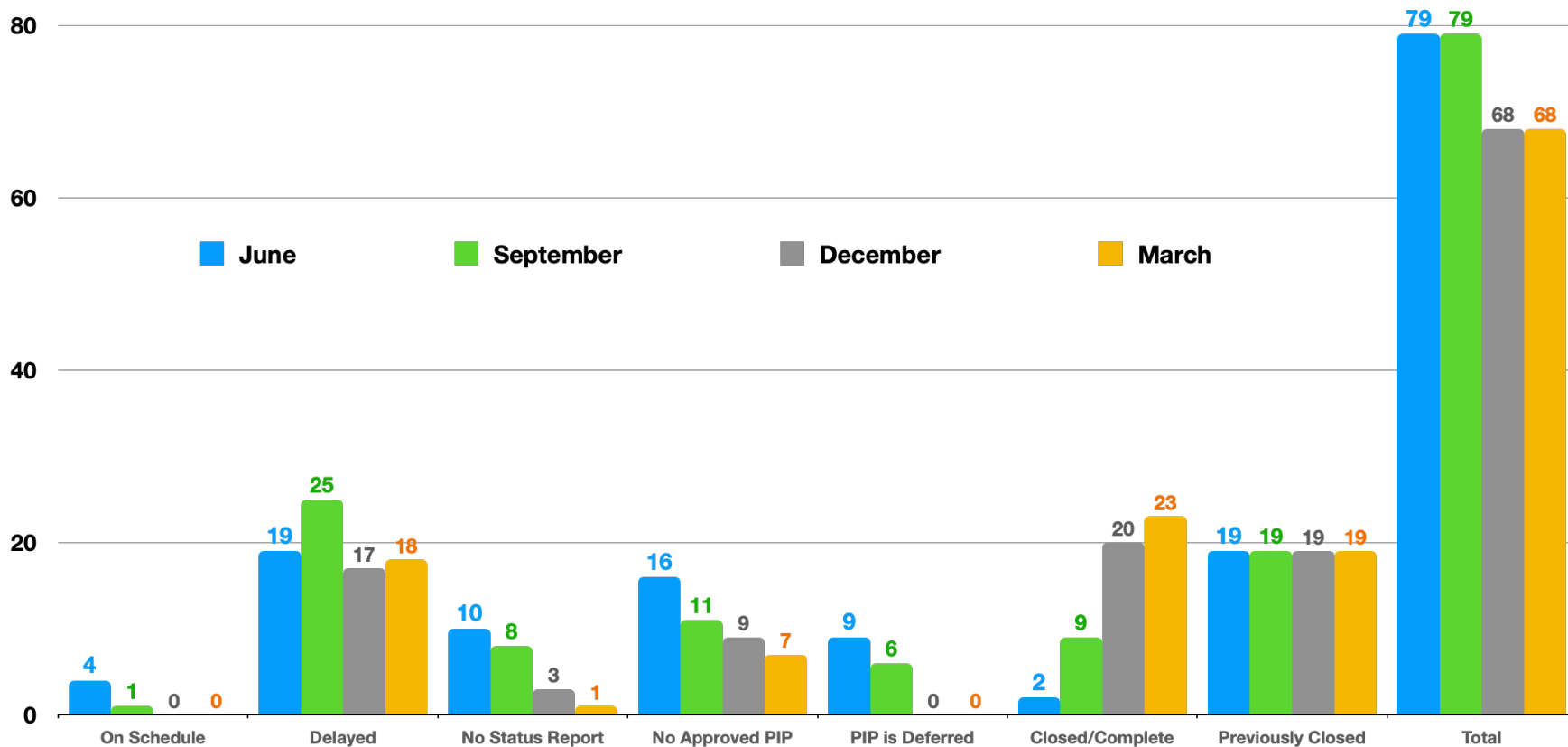
10 of the ITF Recommendations have now been incorporated into the OSA 2022 Performance Metrics with negotiated dates and targets; and will be reported in separate IV&V Quarterly Reports on PSEG Long Island's Performance Metric execution. These recommendations are not included in the statistics in this report.
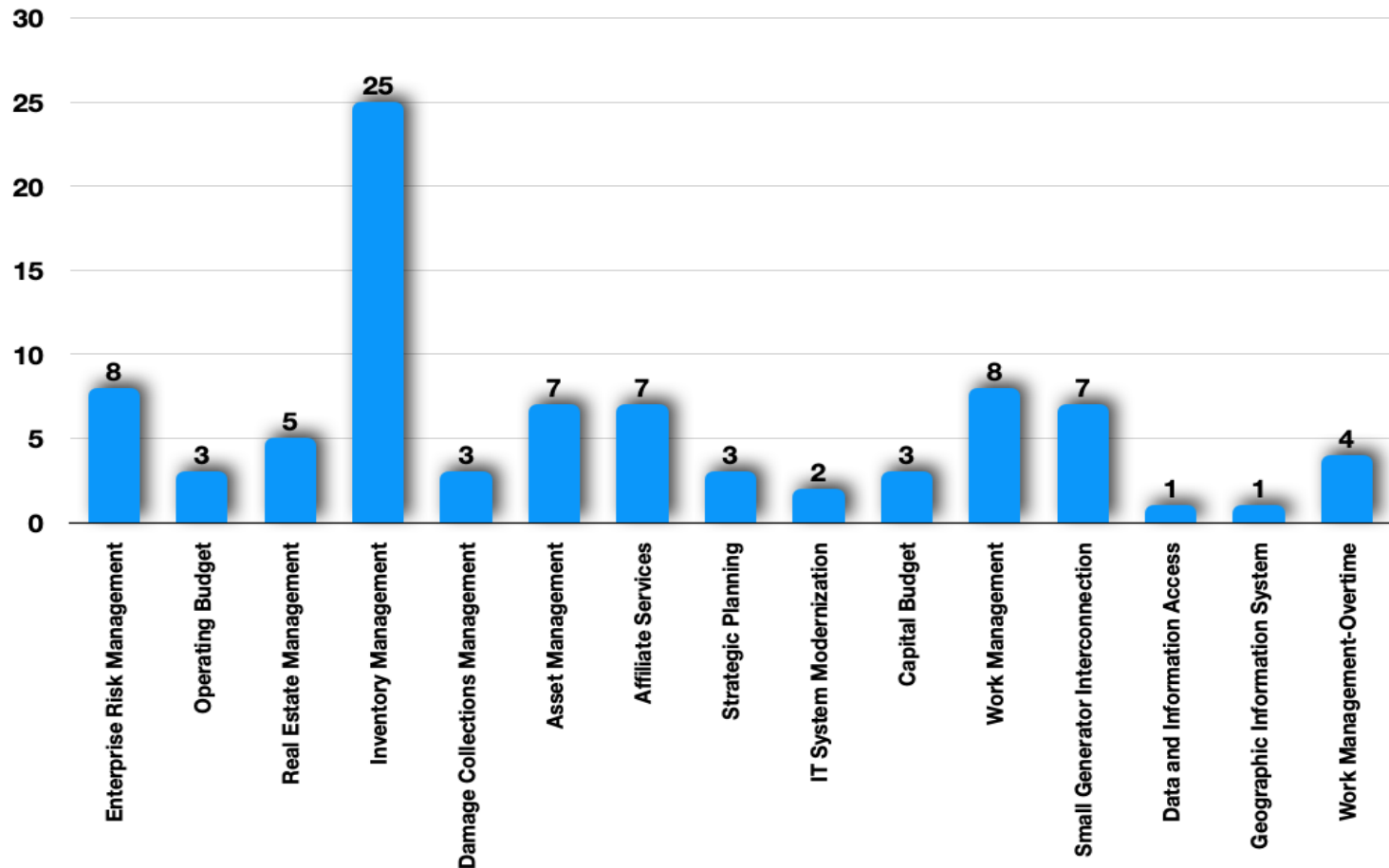
- LIPA received **5 PIPs** in January and March

    - **3 PIPs: Recommended for Board Approval in March**
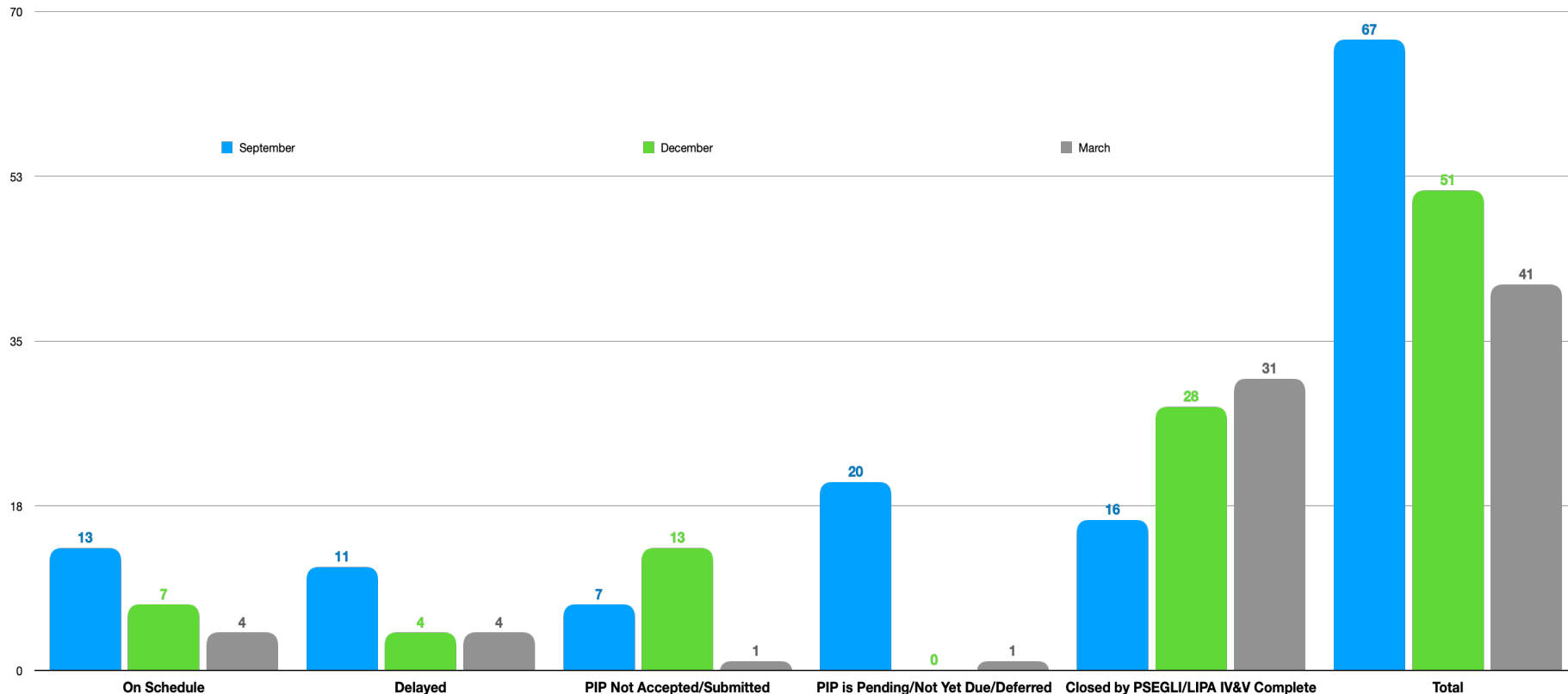
    - **2 PIPs: Under Review**

MANAGEMENT RECOMMENDATIONS

In addition to the 78 Isais Task Force projects, the LIPA Board adopted **87 Management Recommendations addressing deficiencies in 15 non-storm operational areas**

87 Management recommendations have resulted in **69** PIPs.

28 of the Management Recommendations have now been incorporated into the OSA 2022 Performance Metrics with negotiated dates and targets; and will be reported in separate IV&V Quarterly Reports on PSEG Long Island's Performance Metric execution. These recommendations are not included in the statistics in this report.

- **PSEG Long Island deployed CGI Outage Management System v6.7.8 into production on February 6, 2022**

    - PSEG Long Island reported that the system is functioning as expected. Users have encountered 1 "critical" defect and a fix has been implemented as of 2/16/2022. We have requested that PSEG Long Island undertake a thorough Root Cause Analysis and provide LIPA their findings

    - This deployment consists of the latest broadly-deployed version of OMS and related CGI products

    - PSEG Long Island is yet to deploy the planned integration of AMI with OMS which now has a projected go-live date of April 2022. Until the AMI-OMS integration is properly implemented several important storm management/restoration feature will not be available to our customers

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

INDEPENDENT VERIFICATION AND VALIDATION

- **Now that OMS v 6.7.8 has been deployed, LIPA has kicked off Phase I of OMS IV&V using its rights under the revised contract**

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

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

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

BUSINESS CONTINUITY PLANS

- The 90-Day Report identified the **lack of adequate Business Continuity Plans** (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

- In response, PSEG Long Island submitted a "Restoration Contingency Plan for Critical System Failures." A major deficiency 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

- PSEG Long Island has performed:
    - A tabletop drill of OMS and telephony failures (January 2021)
    - A functional Exercise of BCP Work-Around (April 2021)
    - Emergency Scenario Exercises (May 2021)
    - The annual Hurricane Tabletop Exercise (June 2021)
    - Review sessions with LIPA on proposed work-arounds for system failures (continuing)

- While PSEG Long Island has made progress on the BCPs, there is still significant work to be done. LIPA continues to review PSEG Long Island system workarounds, provide feedback, and encourage PSEG Long Island to conduct real-world exercises; and has been assured that PSEG Long Island's 2022 workplan will continue to refine the BCPs and undertake real-world exercises that validate the plans.

Discussion

FOR CONSIDERATION
March 30, 2022

TO: The Board of Trustees

FROM: Thomas Falcone

SUBJECT: Consideration of Adoption of the Isaias Task Force Quarterly Report and Certain PSEG Long Island Project Implementation Plans

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Requested Action

The Board of Trustees (the "Board") is requested to approve a resolution adopting the fourth Quarterly Report on Tropical Storm Isaias and Management Recommendations (the "Quarterly Report") and certain PSEG Long Island Project Implementation Plans, 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 Isaias Task Force ("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"), which the Board adopted.

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

The Board directed PSEG Long Island to submit Project Implementation Plans (PIPs) for each recommendation to both ensure a common understanding of the objectives, scope, and deliverables of the recommendation and an agreed-upon timeline for implementation, from which to monitor progress. In total, the Board has adopted 172 recommendations resulting in 147 PIPs.

The Board directed LIPA staff to submit Quarterly Reports on the recommendations and their associated PIPs and to independently verify and validate PSEG Long Island's report results. The Board adopted the first Quarterly Report on June 23, 2021, the second Quarterly Report on September 22, 2021, and the third Quarterly Report on December 15, 2021. The Quarterly Reports address the status of each recommendation based on PSEG Long Island's monthly status reporting to LIPA. The reports also describe the status of LIPA's independent verification and validation of each recommendation.

The Fourth Quarterly Report

The fourth Quarterly Report, attached hereto as **Exhibit "B"**, summarizes the status of each of the Task Force and Management Recommendations. The Quarterly Report pays particular attention to describing the progress made since December 2021.

Discussion of Implementation Plans

In December and March, PSEG Long Island submitted revised PIPs for five open recommendations. Two of the five PIPs submitted by PSEG Long Island are still under review. The Task Force recommends the Board adopt three PIPs submitted by PSEG Long Island as attached hereto as **Exhibit "C"**. PSEG Long Island has not yet submitted revisions for one PIP rejected in June on Strategic Planning and four (4) Task Force recommendations. The Board directs PSEG Long Island to submit the five revised PIPs, addressing previously communicated concerns, no later than April 10, 2022, for consideration at the Board's May 18, 2022 meeting.

Recommendation

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

Attachments

Exhibit "A" Resolution
Exhibit "B" Quarterly Report
Exhibit "C" Project Implementation Plans

RESOLUTION ADOPTING THE ISAIAS TASK FORCE QUARTERLY REPORT AND CERTAIN PSEG LONG ISLAND PROJECT IMPLEMENTATION PLANS

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

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

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

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

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

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

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

WHEREAS, the Board has requested written Quarterly Reports with a comprehensive summary of the status of the remediation of all of the Board-adopted recommendations and LIPA's independent verification and validation of such remediations until all such recommendations have been completed, verified, and validated; and

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

WHEREAS, on September 22, 2021, the Board adopted the second Quarterly Report; and

WHEREAS, on December 15, 2021, the Board adopted the third Quarterly Report; and

WHEREAS, LIPA Staff has submitted to the Board the fourth Quarterly Report for the Board's approval; and

WHEREAS, LIPA Staff has also submitted to the Board three Project Implementation Plans recommended for the Board's approval.

NOW, THEREFORE, BE IT RESOLVED, that the Board adopts the Quarterly Report attached hereto as **<u>Exhibit "B"</u>**; and

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

Dated: March 30, 2022

LIPA
Long Island Power Authority

Quarterly Report on Tropical Storm Isaias and Management Recommendations

March 30, 2022

For the Long Island Power Authority Board of Trustees

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EXECUTIVE SUMMARY

The Board of Trustees (Board) of the Long Island Power Authority (LIPA) has directed PSEG Long Island to file Project Implementation Plans (PIPs) to implement 172 recommendations to cure deficiencies in management, emergency management, information technology, and other operational areas. The PIPs define the objectives, deliverables, and scope of the remediation projects as well as the major milestones.

These 172 recommendations have resulted in 147 PIPs, including:
- 78 PIPs to address shortcomings that turned Tropical Storm Isaias into a hardship for Long Island and Rockaways electricity customers (the "Task Force Recommendations"); and
- 69 PIPs to correct other PSEG Long Island management deficiencies and process improvements unrelated to the storm (the "Management Recommendations").

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

This Quarterly Report is the fourth such report and summarizes the status of each PIP. The report separately describes the Task Force Recommendations and the Management Recommendations, given the particular emphasis placed on defects that affect emergency response. Note that some of the PIPs have now been incorporated into Performance Metrics for 2022 under the Second Amended and Restated Operations Services Agreement (OSA) between LIPA and PSEG Long Island, with due dates that allow for performance measurement against achievable 2022 targets. Moving forward, recommendations that are fully addressed by 2022 Performance Metrics will be reported in separate IV&V Quarterly Reports on PSEG Long Island's Performance Metric execution.

Update on Isaias Task Force Recommendations

The 85 Isaias Task Force recommendations resulted in 78[1] PIPs, of which:
- 10 of the projects have now been incorporated into the OSA 2022 Performance Metrics with negotiated dates and targets; and will be reported on separately with respect to the terms of the relevant metrics. These projects are not included in the statistics in this report.
- 23 non-metric projects (34%) are either reportedly on schedule, closed by PSEG Long Island pending IV&V or have completed LIPA IV&V.
- 19 non-metric projects (28%) were previously reported closed by PSEG Long Island without a PIP submitted to the Board. LIPA will independently assess whether the projects achieved the objectives of the Board recommendations.
- 26 non-metric projects (38%) are either delayed, no monthly status report was submitted by PSEG Long Island in the quarterly reporting period (January – March), or PSEG Long Island has not yet submitted an acceptable PIP to address the Board's recommendations.

Table 1 summarizes the status of the 68 Non-Metric recommendations.

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[1] The number of projects requiring PIPs may vary over time as recommendations are combined or split into implementation projects.

FIGURE 1:
Status of (Non-Metric) Project Implementation Plans for the Isaias Task Force Recommendations

As of	On-Schedule	Delayed[2]	No Status Reports[3]	No Approved PIP[4,5]	PIP is Deferred	Closed/ Complete[6]	Previously Closed[6,7]	Total[8]
Mar. 2022	0 (0%)	18 (26%)	1 (1%)	7 (10%)	0 (0%)	23 (34%)	19 (28%)	68
Dec. 2021	0 (0%)	17 (25%)	3 (4%)	9 (13%)	0 (0%)	20 (29%)	19 (28%)	68
Sept. 2021	1 (1%)	25 (32%)	8 (10%)	11 (14%)	6 (8%)	9 (11%)	19 (24%)	79
June 2021	4 (5%)	19 (24%)	10 (13%)	16 (20%)	9 (11%)	2 (3%)	19 (24%)	79

[2] Counts from December 2021 on exclude five recommendations that are incorporated into OSA 2022 Performance Metrics.
[3] In some cases, a status report may be absent because a PIP was submitted or accepted after the status report due date.
[4] Counts from December 2021 on exclude four recommendations that are incorporated into OSA 2022 Performance Metrics.
[5] Three of these PIPs have been submitted and are under review.
[6] Closed projects are subject to IV&V by LIPA staff.
[7] "Previously Closed" refer to recommendations for which PSEG Long Island represented that the work had already been completed prior to institution of the PIP process, and therefore a PIP was not submitted to the LIPA Board for consideration.
[8] Counts from December 2021 on exclude recommendations that are incorporated into OSA 2022 Performance Metrics.

PSEG Long Island has made progress with Task Force recommendations this quarter. However, all active projects are delayed, and most of the delayed projects have seen further schedule slippage since the previous Quarterly Report.

It should be noted that delays are relative to the PIPs PSEG Long Island submitted to the Board to address each recommendation and the reported status is based on PSEG Long Island's monthly status reporting to LIPA. In addition to the monthly status reports provided by PSEG Long Island, LIPA staff also regularly meets with PSEG Long Island staff and consultants to monitor and assess progress on the PIPs.

PSEG Long Island's implementation of the PIPs has fallen short in several ways:
- There are delays in completing the milestones called for in the PIPs, and some projects are getting further delayed over time.
- Monthly status reports are inconsistent, incomplete, delayed, or missing.
- Deliverable and artifact submissions are too often delayed, incomplete, or suffer from quality control issues, resulting in avoidable delays and net wasted effort.

Status of Remediation of the Communication and Outage Management Systems

The communications systems and Outage Management System (OMS) are in significantly better shape than during Tropical Storm Isaias. However, remediations of the systems are not yet complete, and some critical projects continue to experience further schedule slippage.

In February 2022, PSEG Long Island deployed a remediated OMS v 6.7.8 on new hardware. Prior to the deployment of OMS v 6.7.8, which is the latest broadly deployed version of OMS and related CGI products, PSEG Long Island was operating OMS v 5.5, an out of date, out-of-general-use version of the OMS, on obsolete infrastructure. PSEG Long Island had initially planned to deploy the remediated re-platformed v 6.7 prior to

the 2021 Atlantic Hurricane season in June 2021; but was unable to complete the project along their original proposed timeline. PSEG Long Island has reported that the deployment was successful, with the system largely functioning as expected.

Now that OMS v 6.7.8 has been deployed, LIPA has kicked off Phase I of the OMS IV&V initiative, which consists of initiation, shakedown, and functional checkout of the deployed system. Maintaining LIPA's IV&V schedule is dependent on urgent and prompt cooperation from PSEG Long Island.

While the deployment of OMS v 6.7.8 is a significant step forward, some critical projects remain delayed, including the planned integration of AMI with OMS and the deployment of an upgraded call center facility.

The Isaias Task Force has continued concerns about PSEG Long Island's over-reliance on vendors; lack of mature program management and project oversight processes; and inadequate in-house technical expertise. Improvements in certain of these areas have been included in 2022 Performance Metrics. In December 2021, LIPA also provided funding for a PSEG Long Island IT re-organization that establishes several new Director-level management positions, consistent with the new OSA, which requires a dedicated PSEG Long Island Chief Information Officer and a full complement of staffing dedicated to LIPA operations. PSEG Long Island reports that it has begun recruitment for these new positions.

A summary of the status of each of the Task Force PIPs is included in Section 1.

Update on Management Recommendations

Beyond the Task Force recommendations, the LIPA Board has adopted 87 recommendations addressing deficiencies in 15 non-storm operational areas. These Management Recommendations are summarized in Figure 2.

FIGURE 2:
Management Recommendations By Area
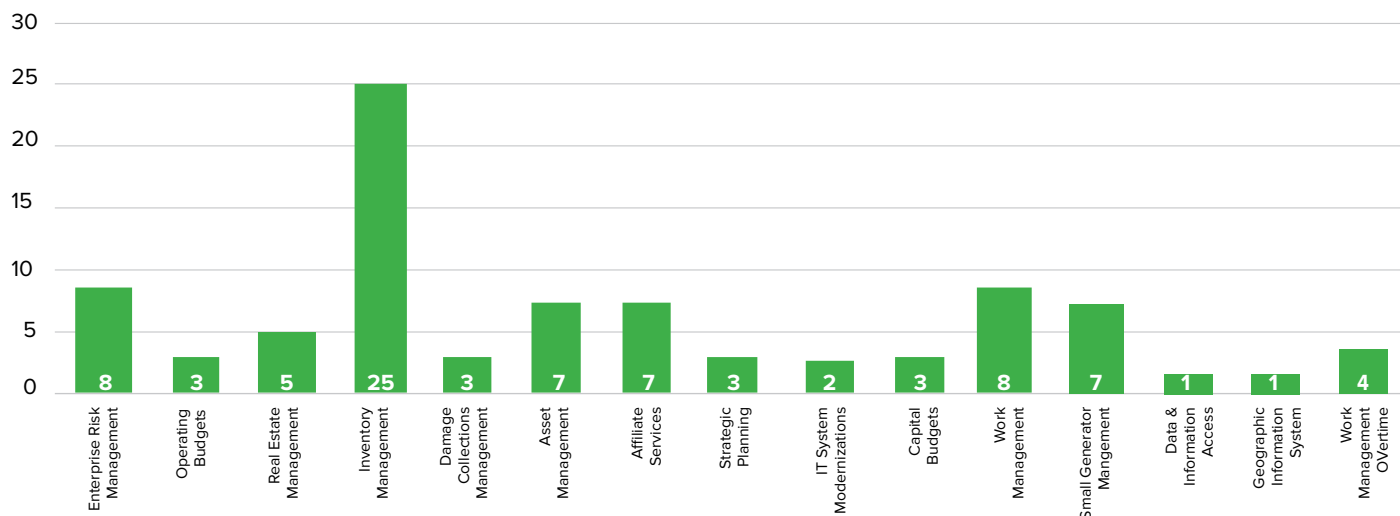
The 87 Management Recommendations resulted in 69 PIPs, with some PIPs covering multiple recommendations.

28 of the Management Recommendations have now been incorporated into the OSA 2022 Performance Metrics with negotiated dates and targets; and will be reported in separate IV&V Quarterly Reports on PSEG Long Island's Performance Metric execution. These recommendations are not included in the statistics in this report.

Figure 3 summarizes the status of the 41 non-Metric Management PIPs.

- 35 projects (85%) are either reportedly on schedule, closed pending IV&V, or have completed LIPA IV&V.
- 5 projects (12%) are either delayed or PSEG Long Island has not yet submitted an acceptable PIP to address the Board's recommendations.
- 1 PIP (2%) is not yet due.

FIGURE 3:
Status of (Non-Metric) Project Implementation Plans for Management Recommendations

As of	On Schedule	Delayed	PIP Not Accepted / Submitted	PIP is Pending / Not Yet Due / Deferred	Closed by PSEGLI[9] / LIPA IV&V Complete	Total[10]
Mar. 2022	4 (10%)	4 (10%)	1 (2%)	1 (2%)	31 (76%)	41
Dec. 2021	7 (14%)	4 (8%)	13 (25%)	0 (0%)	28 (55%)	51
Sept. 2021	13 (19%)	11 (16%)	7 (10%)	20 (30%)	16 (24%)	67

[9] Subject to IV&V by LIPA staff.

[10] Counts from December 2021 on exclude recommendations that are incorporated into OSA 2022 Performance Metrics

The Management Recommendations were adopted from December 2020 on, with new recommendations added as needed, whereas the Task Force Recommendations were adopted in September 2020 and November 2020. A summary of each of the non-metric Management PIPs is included in Section 2.

SECTION 1

STATUS OF ISAIAS TASK FORCE RECOMMENDATIONS

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

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

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

In addition to the review and evaluation of the submitted PIPs, the Board also asked LIPA staff to actively monitor each implementation effort and independently verify and validate the work product and the effectiveness of the remediations. The Board asked LIPA staff to provide Quarterly Reports that (i) summarize the current state of remediations of the key deficiencies identified in the 30-Day and 90-Day Reports; and (ii) describe project status on each PIP, including LIPA's evaluation of the progress being achieved, open issues and concerns, and other relevant information. This March 2022 Quarterly Report to the Board is the fourth of a series of Quarterly Reports fulfilling these requirements.

Summary Status of Active Isaias Task Force Project Implementation Plans

PSEG Long Island was asked to submit monthly Project Status Reports to the Task Force for each of the adopted and open PIPs[11], tracking project progress against the schedules baselined in the approved implementation plans. Based on the most recent reporting by PSEG Long Island, submitted on March 10, 2022:
- 23 projects are reported as Closed by PSEG Long Island (subject to LIPA IV&V) or Complete (i.e., post-LIPA IV&V), including 3 closed or completed in this reporting period.
- 18 projects are reported as Delayed.

In addition, LIPA notes that the following PIPs were not reviewed during this cycle for the reasons given below.
- PSEG Long Island identified 19 projects as Previously Closed – signifying that the work had been completed without an approved PIP. These projects remain subject to LIPA IV&V.
- PSEG Long Island has not submitted acceptable PIPs for 7 projects, and therefore there is not an agreed-upon implementation plan to report status against. In some cases, LIPA's concerns with PSEG Long Island's

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

proposed project plans have been unaddressed for as many as six months.

- PSEG Long Island submitted no status report on 1 project, as the PIP was accepted after the most recent reporting due date.
- 10 of the recommendations have now been incorporated into the OSA Performance Metrics for 2022, with negotiated due dates and targets that allow for performance measurement against achievable 2022 targets; moving forward, they will be reported in separate IV&V Quarterly Reports on PSEG Long Island's Performance Metric execution.

The above statistics are based on PSEG Long Island's representation of the status of the PIPs; subsequent detailed LIPA review of project deliverables may determine that some projects were prematurely closed.

Overall, progress has been made, and PSEG Long Island is better positioned for storms than it was during Tropical Storm Isaias. However, while there has been improvement, remediation efforts appear to have been hampered by the same management weaknesses that contributed to the failures during Isaias, including a lack of mature program management and project oversight processes leading to uneven efforts across the organization and gaps in remediation efforts. As evidenced by this Quarterly Report, a significant number of recommendations are delayed beyond PSEG Long Island's own proposed timetables.

Improvements in certain of these areas have been included in the 2022 Performance Metrics. In December 2021, LIPA also provided funding for a PSEG Long Island IT re-organization that establishes several new Director-level management positions, consistent with the new OSA, which requires a dedicated PSEG Long Island Chief Information Officer and a full complement of staffing dedicated to LIPA operations. PSEG Long Island reports that it has begun recruitment for these new positions.

Current Status: Communications and Outage Management Systems

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

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

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

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

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

PSEG Long Island has made progress on remediating the OMS, telephony, and associated systems, and they appear to be in significantly better shape than during Tropical Storm Isaias. However, remediations of the systems are not yet complete, and we have continued concerns about the pace of activities, the level of attention and thoroughness given to system and test design efforts, and the gaps in the implementation of the Task Force Recommendations.

PSEG Long Island Deployed OMS v 6.7.8 in February 2022

PSEG Long Island deployed a remediated OMS v 6.7.8 with new hardware on February 6, 2022. Prior to that, PSEG Long Island was operating OMS v 5.5, an out of date, out-of-general-use version of the OMS running on obsolete infrastructure. PSEG Long Island had initially planned to deploy the remediated re-platformed v 6.7 in June 2021, prior to the 2021 Atlantic Hurricane season; but was unable to complete the project along their original proposed timeline.

PSEG Long Island has reported that the deployment, which consists of the latest broadly deployed version of OMS and related CGI products, is successful, with the system largely functioning as expected. However, one critical (Priority 1) defect was identified shortly after the go-live. While a temporary workaround was promptly implemented and PSEG Long Island worked with the vendor (CGI) to obtain and deploy a fix soon after, the existence of the issue raises source control and change management concerns as it appears to have been introduced after completion of regression testing. We have requested that PSEG Long Island undertake a thorough Root Cause Analysis and provide LIPA with their findings. PSEG Long Island is also working to obtain fixes from CGI for a number of other lower priority issues.

IV&V of the OMS v 6.7.8 Has Commenced

Now that OMS v 6.7.8 has been deployed, LIPA has kicked off Phase I of the OMS IV&V initiative. Phase I consists of initiation, shakedown, and functional checkout of the deployed system. It includes the following:

- Knowledge transfer from PSEG Long Island and third-party contractors.
- Project initiation tasks (planning, project management, securing resources).
- Review of final design specifications, configuration reviews, and interface implementations.
- Standing-up of the test environment and testing infrastructure.
- Undertaking initial functional tests to ensure that OMS v 6.7 complies with functional requirements.
- Development of Phase 2 plans for further functional testing and performance reviews.

Results for Phase 1 of the IV&V will be reported to the Board by July 2022. However, LIPA's IV&V schedule depends on urgent cooperation from PSEG Long Island. PSEG Long Island's ability to promptly deliver on LIPA's IV&V asks will be critical to maintaining the schedule.

Communication and OMS Remediation Is Not Yet Complete

PSEG Long Island has yet to deploy AMI's planned integration with OMS, which now has a projected go-live date of April 29, 2022. Until the AMI-OMS integration is properly implemented, several important storm management/restoration features will not be available to Long Island and Rockaways customers. Additionally, the deployment of an upgraded call center facility continues to be further delayed. These projects were incorporated into PSEG Long Island's 2022 contractual performance measures and will be reported on in more detail as part of quarterly OSA 2022 Performance Metrics reporting.

Current Status: Business Continuity Plans

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

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

PSEG Long Island has since made progress, though there is still substantial work to be done. PSEG Long Island has submitted to LIPA a host of BCP "work-around" plans intended to document contingency procedures in case of failure of specific IT systems, as well as limited revisions in response to LIPA feedback. A second review cycle is currently in progress. **A general shortcoming of the plans has been that they tend to take an overly siloed technology-based approach that address failures of specific individual applications, but do not sufficiently consider and address potential real-world failure scenarios that are likely to see a series of interlinked and possibly cascading system failures. It is also evident that LIPA's prior feedback has not been adequately considered in subsequent revisions of the plans**. LIPA has discussed these concerns with PSEG Long Island, and it has been assured that PSEG Long Island will continue to refine the BCPs and undertake real-world exercises that validate the plans.

Current Status: Isaias Task Force Recommendations

Figures 4, 5 and 6 summarize the status of each Isaias Task Force Recommendation, including those that are active, closed, and lack an approved PIP, respectively. Active recommendations that have been incorporated into the OSA 2022 Performance Metrics are listed in the tables for reference, but are not counted in statistics and will be reported in separate IV&V Quarterly Reports on PSEG Long Island's Performance Metric execution.

FIGURE 4:
Summary of <u>Active</u> Isaias Task Force Project Implementation Plans

#	Tier	Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date	Status/Schedule Change Since 2021Q4 Report
3.2.1.1	1	Delayed (Reported Closed, but pending acceptable deliverables)	PSEG Long Island should complete implementing the planned telecommunication design changes and conduct additional capacity testing as soon as possible.	This PIP was previously rejected, and a revised PIP has now been accepted contingent on PSEG LI accepting LIPA redlines and comments. PSEG LI has submitted a close-out report with final deliverables, which LIPA has deemed insufficient. LIPA will keep the project open until acceptable deliverables are submitted.	11/6/2020	2/12/2021	TBD	PIP was accepted with LIPA redlines and comments. Status changed from No Accepted PIP to Delayed.
3.2.1.3	1	Delayed	The existing infrastructure for handling calls within the PSEG Long Island Call Center should be upgraded to a more recent version. PSEG LI should modernize its call center infrastructure to a technology that uses the newer "SIP Trunking" technology.	PSEG LI reports that the project has experienced delays due to increased environmental complexity over initial estimates as well as delays with resource allocations, with current cutover dates projected for the second quarter of 2022.	1/18/2021	7/9/2021	6/30/2022	Further schedule delays, with the projected end date now 6/30/2022 instead of the delayed projected end date of 3/17/2022 reported in December.
3.2.2.3	1	NA (2022 OSA Metric)	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.	Metric projects will be covered in separate quarterly reports.				
3.2.2.4	1	NA (2022 OSA Metric)	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.	Metric projects will be covered in separate quarterly reports.				

#	Tier	Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date	Status/Schedule Change Since 2021Q4 Report
3.2.2.5	1	Delayed	Automate monitoring of the OMS and CAD at the infrastructure level to detect infrastructure failures and give administrators an opportunity to restore normal operating conditions.	PSEG LI is still reporting in March that the project is In Progress with a projected end date of 2/11/22. PSEG LI reports that components of DB monitoring have been ported to v6.7 (i.e., critical ORA errors), however, there are some items (i.e., long-running queries) that are now completed in v5.5 but will require further development to port to v6.7. Infrastructure monitoring in Xymon and network monitoring in Solar Winds have been configured for v6.7.	11/23/2020	5/3/2021	2/11/2022	Further schedule delays, with the projected end date now reported as 2/11/2022 instead of the projected end date of 1/31/2022 reported in December.
3.2.2.7	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.	PSEG LI is still reporting in March that the project is In Progress with a projected end date of 2/11/22. The async solution to remedy repetitive customer calls was moved into OMS v5.5 Production on June 1, 2021. The latest release works by filtering out calls beyond one per customer, irrespective of digital channel.	11/2/2020	5/3/2021	2/11/2022	Further schedule delays, with the projected end date now reported as 2/11/2022 instead of the projected end date of 1/31/2022 reported in December.
3.2.2.8	1	Delayed	Irrespective of whether the failure mode is corrected within the IVR, the OMS should have automated monitoring of data quality arriving from IVR to detect potentially duplicate or otherwise bad information.	PSEG LI is still reporting in March that the project is In Progress with a projected end date of 2/18/22. PSEG LI reports that all the Dashboards and Alerts are successfully migrated to 6.7 Production, and training recordings for OMS and NOC are in progress.	11/2/2020	5/3/2021	2/18/2022	Further schedule delays, with the projected end date now reported as 2/18/2022 instead of the projected end date of 1/31/2022 reported in December.
3.2.4.3	1	Delayed (Reported Closed, but pending deliverables)	Introduce the capability to quickly decouple the web and mobile apps from the OMS, so that when unresponsiveness is detected, alternate messaging can be provided to the customer and the OMS can be relieved of incoming transactional pressure.	PSEG LI reports that the project close-out deliverables were submitted on 12/2/2021. As previously noted, the submitted deliverables are for OMS V5.5. The project will be marked Closed once deliverables are submitted for OMS V6.7 deployment.		4/7/2021	11/12/221	The solution should now have been deployed to OMS V6.7.8. LIPA is still awaiting submission of OMS V6.7 deliverables.

#	Tier	Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date	Status/Schedule Change Since 2021Q4 Report
4.01	3	NA (2022 OSA Metric)	PSEG Long Island should develop and execute a comprehensive strategic technology plan for outage reporting and communications.	Metric projects will be covered in separate quarterly reports.				
4.03	2	Delayed	For the long term, PSEG Long Island needs to strengthen its voice communications engineering and project management staff.	PSEG LI reports that the project start is delayed due to competing priorities that include the Contact Center Upgrade, SIP Migration as well as supporting priority efforts related to the OMS upgrade and Digital Channels deployment.	7/12/2021	9/3/2021	6/30/2022	Further schedule delay, with the projected end date now 6/30/2022 instead of the delayed projected end date of 2/25/2022 reported in December.
4.04 & 4.05	2	Delayed	Explore integrating the high-volume voice communications design into a more powerful all-encompassing call center design. Develop a more scalable Inbound Contact Center.	PSEG LI reports a projected end date of 1/31/2023.	2/1/2021	4/1/2022	1/31/2023	Projected End Date changed from TBD to 1/31/2023.
4.07	2	Delayed	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 Kubra unencrypted solution was deployed 2/15/2022, after being thoroughly tested in the 6.7.8 environment. An updated version to meet the encryption requirement will be completed and deployed by 5/31/2022.	8/31/2020	8/16/2021	5/31/2022	None
4.09	3	Delayed	Better prepare social media staff to handle barrage of posts using modern artificial intelligence tools.	PSEG LI reports the project as completed as of 10/05/2021. The project will be marked Closed (pending IV&V) once all deliverables and close-out artifacts have been submitted.	1/19/2021	6/25/2021	10/5/2021	Work reported completed as of 10/5/2021. Status change pending submission of close-out artifacts and deliverables.

#	Tier	Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date	Status/Schedule Change Since 2021Q4 Report
4.10	3	No Status Reported	Implement a solution that allows the OMS to decouple customer reporting from field management activities.	No status reports have been submitted. This PIP was previously rejected, and a revised PIP has now been accepted. We understand the solution to have been implemented as part of the OMS v 6.7 deployment, however, close-out artifacts are pending.	11/13/2020	2/6/2022	unknown	PIP was accepted. Status changed from No Accepted PIP to No Status Reported.
4.13	1	NA (2022 OSA Metric)	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.	Metric projects will be covered in separate quarterly reports.				
4.14	1	NA (2022 OSA Metric)	Accelerate the deployment of the mobile application for foreign crews and/or their crew guides ensuring that procedures are integrated into the ERP.	Metric projects will be covered in separate quarterly reports.				
4.15	3	NA (2022 OSA Metric)	Performance test OMS and "feeder" systems to establish peak capacity.	Metric projects will be covered in separate quarterly reports.				
4.18	1	NA (2022 OSA Metric)	Monitor application performance and error logs of all mission critical application systems, such as OMS, CAD, SCADA, ESB, etc.	Metric projects will be covered in separate quarterly reports.				
4.19	1	Delayed (Reported Closed, but pending deliverables)	As part of storm preparation ensure that all application errors and debug conditions have been cleared and the system is operating normally.	PSEG LI reported the project as completed, with the pre-storm checklist in use for OMS v 5.5 and the close-out artifacts submitted 9/17/2021. However, no artifacts have been submitted for OMS v6.7, and PSEG LI still reports that clean-up for the re-platformed 6.7.8 is pending. The project will be marked Closed once the artifacts and deliverables for OMS v 6.7.8 are submitted.	1/7/2021	5/3/2021	8/3/2021	None (work reported completed, status change pending submission of close-out artifacts).

#	Tier	Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date	Status/Schedule Change Since 2021Q4 Report
5.02 & 5.03	3	Delayed (Reported Closed, but pending deliverables)	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.	PSEG LI reported the project completed as of 12/01/2021. The project will be marked Closed (pending IV&V) once all close-out artifacts and deliverables have been submitted via designated channels.	4/1/2021	6/30/2021	12/1/2021	None (Work reported completed as of 12/1/2021. Status change pending submission of close-out artifacts and deliverables).
5.04	3	Delayed (Reported Closed, but pending acceptable deliverables)	Create BCPs for all mission critical systems and processes.	PSEG LI reports the project closed based on the determination that all critical system Repair and Recovery plans were submitted on 10/12/2021. However, LIPA considers the materials submitted to date insufficient, and will keep the project open until the concerns that have been communicated to PSEG LI are addressed.	2/26/2021	7/30/2021	unknown (reported as 6/25/21)	None (Work reported completed as of 10/12/2021. LIPA is keeping the project open until submission of acceptable deliverables and close-out artifacts.)
5.07	1	Delayed (PSEG reported Closed)	Expand the Emergency Assistance Agreement with National Grid to include Generation employees.	PSEG LI states it has made numerous documented attempts to obtain a decision from National Grid. Review with National Grid management indicates a willingness to expand the emergency assistance agreement.	12/31/2020	2/15/2021	unknown	None
5.08	3	Delayed (PSEG reported Closed)	Institute a program to train National Grid Gas and Generation resources to support damage assessment and materials handling work during major storms.	PSEG LI states it has made numerous documented attempts to obtain a decision from National Grid. Review with National Grid management indicates a willingness to expand the emergency assistance agreement.	Unknown	4/2/2021	unknown	None

#	Tier	Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date	Status/Schedule Change Since 2021Q4 Report
5.10 & 5.4.6	3	Delayed (Reported Closed, but pending deliverables/ close-out artifacts)	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).	LIPA has not been able to verify that this project should be closed. PSEGLI to provide detailed report of actions taken to address damage assessment using internal and external forces.	Unknown	7/2/2022	NA	Status changed from No Status Reported to Delayed (Reported Closed, LIPA is keeping project open until submission/verification of deliverables and close-out of artifacts.)
5.13 5.4.3 5.4.4	3	Delayed (PSEG reported Closed)	Explore using National Grid resources and local electrician resources for emergencies. Work with National Grid and local electrical contractors to train a workforce to make repairs to low-voltage service drops.	PSEG LI states it has made numerous attempts to obtain a decision from National Grid. Review with National Grid management indicates a willingness to expand the emergency assistance agreement. Regarding the use of local electricians, PSEG LI has contracted for local electrician resources. PSEGLI has 5 contracts at present with local electrical contractor for 137 FTEs. IBEW has indicated local journeyman line workers may also be available for low-voltage repairs with training.	unknown	8/1/2021	1/7/2022	None
5.17	2	Delayed (Reported Closed, but pending acceptance of final deliverables)	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 the project closed; however, as noted in the status report, LIPA and PSEG LI are still discussing edits to the Final Review document.	12/11/2020	10/31/2021	10/31/2021	None (PSEG LI reports as closed, status change pending acceptance of final close-out artifacts and deliverables)

#	Tier	Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date	Status/Schedule Change Since 2021Q4 Report
5.4.1 & 5.4.5	3	NA (2022 OSA Metric)	Selective undergrounding of main or branch lines in areas with difficult access Revisions to the current vegetation management program to shorten the 4-year cycle across the system or in selected areas with denser vegetation. This overall comprehensive project aims to address and improve the resiliency of the Long Island and Rockaways electrical infrastructure. This project will cover three main areas: 1) Transmission and Substations / Load Pockets - equipment and transmission system / load pocket reinforcements 2) Overhead circuits - Mainline and Branch line hardening, equipment upgrades (i.e., operationalize LT5H devices), and vegetation management practices updates 3) Selective Undergrounding	Metric projects will be covered in separate quarterly reports.				

#	Tier	Status	Recommendation	Status Summary	Start Date	Planned End Date	Projected End Date	Status/Schedule Change Since 2021Q23 Report
5.4.2b & 4.21	1	NA (2022 OSA Metric)	Accelerate 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. Complete the integration of the MDMS and OMS to report the meters' power restoration events. (Recommendation was split into 5.4.2a AMI Deployment and 5.4.2b AMI Integration and Operation with OMS.)	Metric projects will be covered in separate quarterly reports.				

FIGURE 5:
Summary of <u>Closed/Completed</u> Isaias Task Force Project Implementation Plans[12]

#	Tier	Status	Recommendation	Status Comments	Start Date	Planned End Date	Actual End Date	Close-Out Artifact Submission Date	Changes This Reporting Period
3.2.1.2	1	Closed	Improve the pre-storm planning process and include specific communication, coordination, and escalation with the communication service carriers and the HVCA provider before and during the storm.	Closed 2021Q3	11/17/2020	12/22/2020	8/13/2021	8/20/2021	None
3.2.1.5	1	Closed	PSEG Long Island should develop appropriate capacity monitoring and management processes to support evidence-based demand forecasting and capacity planning.	Closed 2021Q3	12/4/2020	NA (no approved PIP)	8/13/2021	8/20/2021	None
3.2.1.6	1	Closed	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.	Closed 2021Q3	9/10/2020	1/19/2021	8/6/2021	8/20/2021	None
3.2.2.9	1	Closed	The IVR and OMS communication protocol should be reviewed in detail and redesigned so that all messages between the two components are agreed, understood, verified to be operational and tested against error conditions such as sending duplicate outage reports.	PSEG LI reports that the recommendation has now been fully tested and deployed in the 6.7.8 environment. The solution was deployed to OMS v5.5 Production on 6/29/21.	11/2/2020	5/11/2021	2/6/2022	2/11/2022	Close-out artifacts submitted. Status changed from Delayed to Closed (pending IV&V).

[12] Closed projects are subject to IV&V by LIPA staff. Completed projects have been accepted by LIPA as complete.

#	Tier	Status	Recommendation	Status Comments	Start Date	Planned End Date	Actual End Date	Close-Out Artifact Submission Date	Changes This Reporting Period
3.2.3.1	1	Closed	At the beginning of storm planning and throughout the storm, designate a system data administrator dedicated to monitor, on a continuous basis, the timeliness, accuracy, and integrity of the information coming from OMS to Kubra.	Closed 2021Q3	12/1/2020	3/22/2021	9/17/2021	9/17/2021	None
3.2.4.1	3	Closed	Review the storm-oriented customer journey maps implemented within the mobile and web-apps so that customer transactions are directed to the externally hosted infrastructure rapidly.	Closed 2021Q3	1/11/2021	9/2/2021	9/17/2021	9/17/2021	None
3.2.4.4	3	Closed	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.	OMS V6.7 testing has been completed. The deliverables and close-out artifacts were submitted on 2/11/22 and accepted for IV&V.	1/25/2021	3/24/2021	2/6/2022	2/11/2022	Close-out artifacts submitted. Status changed from Delayed to Closed (pending IV&V).
3.2.5.3	2	Closed	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.	Closed 2021Q3	unknown	3/31/2021	3/31/2021	8/20/2021	None
4.08	2	Closed	Execute a communications plan with local emergency and municipal response officials to confirm municipalities' knowledge of the Municipal Portal and describe efforts to fix its operation from what they experienced during Isaias.	Closed 2021Q3	1/4/2021	12/31/2021	7/20/2021	8/20/2021	None
4.16		Closed	Install standby hardware resources for use during peak demand.	Closed 2021Q3	NA (no approved PIP)	NA (no approved PIP)	8/20/2021	8/20/2021	None

#	Tier	Status	Recommendation	Status Comments	Start Date	Planned End Date	Actual End Date	Close-Out Artifact Submission Date	Changes This Reporting Period
4.17	1	Closed	Re-architect the inter-system message queuing applications for greater dynamic stability under highly demanding workloads.	PSEG LI reports that the Async Queue solution was tested functionally and under load in OMS v6.7.8, deployed to OMS v 6.7.8 production on 2/7/22, and completed post-release testing and is stable. The deliverables and close-out artifacts were submitted on 3/9/22 and accepted for IV&V.	11/13/2020	7/9/2021	2/15/2022	3/9/2022	Close-out artifacts submitted. Status changed from Delayed to Closed (pending IV&V).
5.01	3	Closed	Improve Emergency Planning governance so that utility-wide Emergency Training is under a single Emergency Planning Team and not dispersed among various departments.	Closed 2021Q4	2/19/2021	4/12/2021	6/28/2021	10/25/2021	None
5.06	3	Closed	Modify the Incident Command Structure to provide better visibility to the performance of mission critical technology.	Closed 2021Q4 Recent storm incident records indicate that the PSEG-LI Incident Reporting procedures may not have been followed. LIPA will be conducting IV&V of the ICS training.	3/1/2021	4/1/2021	6/30/2021	10/25/2021	None

#	Tier	Status	Recommendation	Status Comments	Start Date	Planned End Date	Actual End Date	Close-Out Artifact Submission Date	Changes This Reporting Period
5.09	3	Closed	Work with off-island sustaining tree contractors to develop consistent work practices, especially for removal of trees from energized lines.	Closed 2021Q4	3/1/2021	5/1/2021	4/30/2021	10/25/2021	None (LIPA IV&V ongoing in safety assessment currently underway.)
5.11	1	Closed	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.	Closed 2021Q4	1/19/2021	5/15/2021	5/14/2021	10/25/2021	None
5.12	3	Closed	Improve training for RDAs including on BCPs. Prepare to implement RCA, when advantageous.	Closed 2021Q4 LIPA will IV&V RDA/RCA training.	1/20/2021	5/1/2021	6/30/2021	10/25/2021	None
5.14	2	Closed	Develop a backup plan for tiered restoration in large-scale events. Train and exercise for tiered restoration operations.	Closed 2021Q4 LIPA will IV&V training in 2022 PSEG LI exercises.	unknown	3/5/2021	6/16/2021	10/25/2021	None
5.15	1	Closed	Create an ETR Manager position with staff to monitor OMS systems and ETR quality. The ETR Manager should report to the planning chief within the ICS.	Closed 2021Q3	12/21/2020	2/22/2021	-	-	None
5.16	2	Closed	Review restoration verification protocols under "no-OMS" scenarios and ensure that they function efficiently. Leverage the AMI data in OMS to efficiently identify nested outages (the AMI portion of this recommendation has been addressed in Project Plan 5.4.2)	Closed 2021Q4	unknown	3/1/2021	3/1/2021	10/25/2021	None

#	Tier	Status	Recommendation	Status Comments	Start Date	Planned End Date	Actual End Date	Close-Out Artifact Submission Date	Changes This Reporting Period
5.4.2a	1	Closed	Accelerate the deployment of smart meters and the full integration of smart meters with OMS so that outage reports will be available to OMS more rapidly and embedded outages (i.e., small-scale outages downstream of larger-scale outages) will be more readily identified, thus enhancing the efficiency of job dispatch. (Recommendation was split into 5.4.2a AMI Deployment and 5.4.2b AMI Integration and Operation with OMS).	Closed 2021Q4	1/4/2021	8/30/2021			None
7.01	1	Completed	Appoint a dedicated "turnaround" CIO at PSEG Long Island.	Closed 2021Q3		03/31/2021	5/3/2021	8/20/2021	Status changed from Closed to Completed
7.05	3	Completed	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 the contract.	The recommendation is addressed by the Second Amended and Restated Operations Services Agreement (OSA) and is Completed.	-	12/15/2021	12/15/2021	NA	Status changed from Closed (pending OSA approval) to Completed
7.07	3	Completed	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.	The recommendation is addressed by the Second Amended and Restated Operations Services Agreement (OSA) and is Completed.	-	12/15/2021	12/15/2021	NA	Status changed from Closed (pending OSA approval) to Completed

FIGURE 6:
Isaias Task Force Recommendations Without Approved Project Implementation Plans

#	Tier	Recommendation
4.12	1	Systematically test the OMS system to ensure that concrete root causes are identified and remedied. If the errors are due to system defects, then demand accountability from the system vendor for timely fixes. Ensure that root causes, not just symptoms, are addressed.
5.05[13]	1	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.
6.01[14]	1	PSEG should review the Isaias Task Force's 90-day Report and issue a CATRR (Causal Analysis Team Review Report) that fully addresses the root causes of its failed storm response, including management shortcomings documented in this Report. PSEG should implement an improved after-action analysis process for future storms that has greater rigor.
7.02[15]	2	Appoint a dedicated CISO at PSEG Long Island.
7.03a	3	Centralize Long Island IT under one enterprise PSEG Long IT organization.
7.03b[16] 2022 OSA Metric	3	Separate LIPA IT systems from those in New Jersey.
7.04	3	Initiate programs to develop stronger project management capability in PSEG Long Island's IT practice areas.
7.06[17]	3	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.

[13] PIP submitted and under review.
[14] PIP submitted and under review.
[15] PIP submitted and under review. LIPA has provided comments to a CISO job description and is waiting for PSEG LI's response.
[16] Listed for reference. The Second Amended and Restated OSA has a system separation process to begin upon contract approval by the Office of the State Comptroller.
[17] PIP submitted and under review. LIPA has provided comments to a Senior Director of Emergency Management job description and is waiting for PSEG LI's response.

SECTION 2

STATUS OF MANAGEMENT RECOMMENDATIONS

The LIPA Board has adopted 87 recommendations to address known management deficiencies in 15 PSEG Long Island operational areas beyond the scope covered by the Isaias Task Force reports, as shown in Figure 7. Many of these deficiencies are longstanding and have been raised with PSEG Long Island management previously both by LIPA and in Department of Public Service Management and Operations Audits.

FIGURE 7:
LIPA Board Management Recommendations
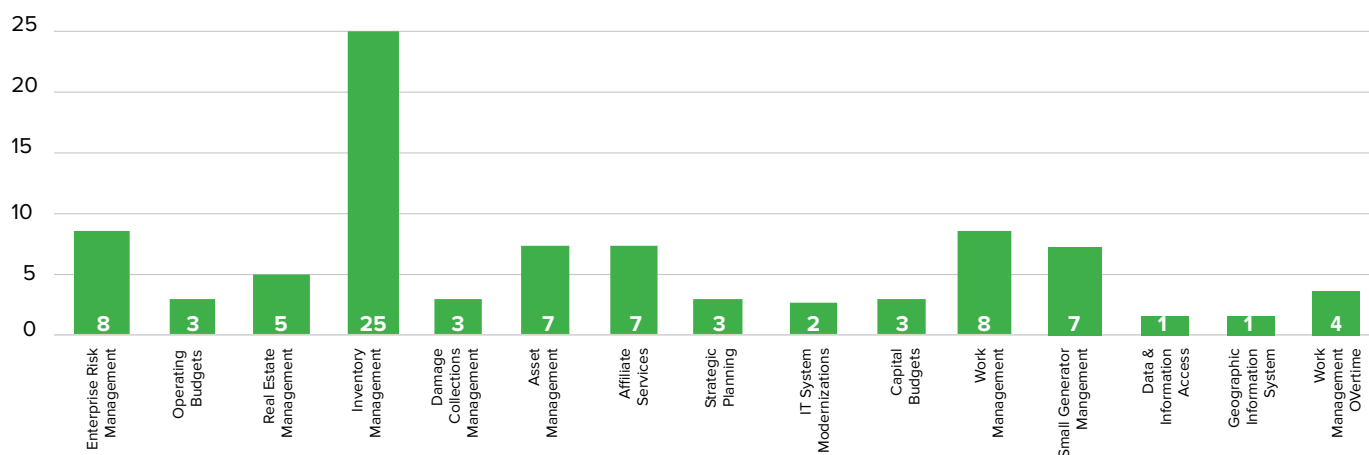
These 87 recommendations have resulted in 69 PIPs to address the operational findings. Figure 8 summarizes the status of the Board's review of these PIPs.

FIGURE 8:
Status of Project Implementation Plans for LIPA Board Management Recommendations
(As of March 2022)

Findings	Total #	Closed by PSEGLI / LIPA IV&V Complete	In Process (On Schedule / Delayed)	In 2022 Metrics	Not Accepted / Not Submitted / Not Yet Due
Risk Management	8	7	1	-	-
Operating Budget	3	2	1	-	-
Real Estate Management	5	2	2	1	-
Inventory Management	23	16	2	5	-
Collections Management	2	1	1	-	-
Asset Management	3	-	-	3	-
Affiliate Services	3	1	1	1	-
Strategic Planning	1	-	-	-	1
IT System Modernization	2	-	-	2	-
Capital Budget	1	1	-	-	-
Work Management	8	-	-	8	-
Small Generator Interconnection	7	1	-	6	-
Data and Information	1	-	-	1	-
Geographic Information System	1	-	-	1	-
Work Management - Overtime	1	-	-	-	1
Total	69	31	8	28	2

- **31 non-metric recommendations are closed** pending LIPA review or **complete** (i.e. post LIPA IV&V).

- **8 PSEG Long Island non-metric PIPs have been accepted** by the LIPA Board and are in various stages of execution.

- **28 recommendations** have now been incorporated into PSEG Long Island's OSA 2022 Performance Metrics and will be reported in separate quarterly reports.

- **2 non-metric PIPs have yet to be approved** or are not yet due.

Each of the recommendations is summarized in the discussion below.

Risk Management

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

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

#	Reported Status	Recommendation	Status Summary	Planned End Date
ERM-1	Complete	Include LIPA subject matter experts (SMEs) and ERM team members in all risk discussions	PIP approved 1/27/2021. IT sessions were significantly delayed, review held 7/14/21.	5/30/2021
ERM-2	Closed	Designate management-level owners for each risk mitigation strategy and related management action plan	PIP approved 1/27/2021. All risks have designated mitigation owners. Last review held 7/14/21 with IT.	6/01/2021
ERM-3	Complete	Establish a joint Microsoft SharePoint Extranet site so that risk information, including risk assessment, deep dive analysis, mitigation strategies, current status of implementation plans, and annual reports can be accessed in real-time by LIPA SMEs	PIP approved 1/27/2021. Complete.	12/02/2020
ERM-4	Complete	Produce an annual ERM report, providing a complete aggregation of all risks, effectiveness of mitigation actions for high-priority risks, areas of weakness/need improvement, and general observations, by June 1 of each year	PIP approved 2/24/2021. Risk report was due 6/1/2021, provided June 25 and presented to LIPA senior management on July 19 after significant revision. Annual ERM report included in PSEG LI OSA 2022 Performance Metrics.	6/30/2021

ERM-5	Closed	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. Risk reviews were completed in December 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 developed framework and completed proof of concept; PSEG LI to utilize framework on an agreed upon risk prior to PIP being closed.	6/30/2022
ERM-7	Closed	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. Training materials have been reviewed and approved by LIPA ERM and two trainings were held in December 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 3/24/21 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. Ongoing monitoring of this recommendation is required to ensure the concept is adopted throughout the organization. Separately, under the Second A&R OSA, a draft of a Contract Administration Manual to implement the Duty of Candor is due by March 2022 that addresses timely disclosure of material issues.	4/30/2021

PSEG Long Island has made considerable progress in addressing many of the deficiencies identified in the eight ERM recommendations. Specifically, the PSEG Long Island ERM team has completed 7 of the 8 ERM Recommendations and the remaining one, related to development and utilization of a risk correlation matrix, is on schedule. As a result of ERM-1 and ERM-2, there has been an improvement in the level of detail provided in the risk discussions and increased accountability by PSEG Long Island SMEs in managing their risks.

Related to ERM-2, PSEG Long Island has designated management-level owners for each risk mitigation action and developed a dashboard for Tier 1 and 2 risks that have mitigation actions underway to provide a status of the progress. LIPA will continue to work with PSEG Long Island to identify the appropriate level of detail for risks and to improve the tracking of the effectiveness of mitigation actions. Separately, the PSEG Long Island 2022 Performance Metrics (Business Services #2) includes a pilot to develop Key Risk Indicators, which will assist in monitoring critical risks.

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

For ERM-4, PSEG Long Island ERM presented the annual report to LIPA senior management on July 19, 2021. The annual report and presentation were delayed to address substantive concerns that LIPA expressed regarding the level of information provided in draft reports. The final product contained useful information and elicited meaningful discussion on the most significant risks identified by PSEG Long Island. LIPA and PSEG Long Island have negotiated a 2022 Performance Metric that will require additional improvements to the annual report, including a discussion of key insights for year-over-year changes and the description and tracking of mitigation activities. Additionally, over the 2021 risk assessment cycle, PSEG Long Island ERM did not follow the timeline developed or the process for risk profile reviews agreed upon in December 2020 before the assessment cycle began. This lack of adherence to the process was discussed multiple times and improvement has been seen related to better planning for the 2022 risk assessment cycle, including proactively planning the facilitated working sessions and sending communications out well in advance to inform those involved of the expectations related to the process.

Both LIPA and PSEG Long Island share the goal of developing and piloting a risk correlation framework (ERM-6) to identify end-to-end risk impacts to better inform mitigation strategies. LIPA ERM developed the risk correlation framework and presented a proof of concept in July 2021 that was well-received. The next step will involve PSEG Long Island ERM identifying a risk and utilizing the same process to highlight risk interdependencies, associated mitigation actions, and identified improvements for a Tier 1 or 2 risk, which will occur in the first half of 2022.

PSEG Long Island ERM included high-level risk training information in the 2021 risk assessment working sessions but no formalized training materials or sessions were developed or presented (ERM-7). PSEG Long Island has since developed a preliminary training deck and held two formal training sessions in December 2021 prior to the commencement of the 2022 risk assessment cycle.

For ERM-8, the risk escalation process has been developed and was distributed to all PSEG Long Island employees in May 2021. Additional information was provided to PSEG Long Island Vice Presidents to communicate with managers and supervisors to increase awareness on the importance of escalating identified issues. LIPA ERM recognizes it will take time to adopt the process across the organization and the effectiveness will be evaluated on an ongoing basis. Separately, under the Second A&R OSA, a draft of a Contract Administration Manual to implement the Duty of Candor is due by March 2022 that addresses timely disclosure of material issues.

Overall, PSEG Long Island ERM has made significant improvements to the program since the Board approved the eight recommendations in December 2020. However, there is still additional effort required to improve the program, and LIPA ERM will remain diligent in identifying and overseeing the activities that will ensure the program is in alignment with industry best-practices.

Operating Budgets

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

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

#	Reported Status	Recommendation	Status Summary	Planned End Date
OBD-1	On Schedule	LIPA will initiate the development of a new budget system to provide for improved documentation, centralized budget calculations, data analytics and forecasting capabilities, and budget control.	PIP approved 2/24/2021 for implementation of Enterprise Planning and Budgeting System to enable transparent and comprehensive budget planning, development, and management for LIPA and PSEG Long Island. This project is led by the LIPA team. The current phase of the project is on track, including: • Acquisition and Project Management Services • Development of Business Requirements and Traceability Matrix (RTM). • Market research on Technology Solutions. • Completing Fit-Gap Analysis • Acquisition of Technology Platform and implementation services.	Phase 0 – 2022 Q3 Phase 1 – 2023 Q3 Phase 2 – 2024 Q2
OBD-2	Complete	PSEG Long Island will develop Budget Briefing Books as part of the budget development process. The Budget Briefing Books will document and explain work plans and the proposed resource allocation at department levels.	PIP approved 2/24/2021. Budget briefing books for 2022 Budget were provided timely by 7/31/2021.	July 2021
OBD-3	Complete	LIPA is requiring PSEG Long Island to provide explanations on the reallocation of funds within the Operations & Maintenance Budget.	PIP approved 2/24/2021. Reallocation forms have been provided for activities whereby projected year-end variances are expected to be in excess of the agreed upon threshold in the PIP. Changes were also incorporated into the Second A&R OSA.	April 2021

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

With respect to OBD-3, PSEG Long Island developed a Reallocation Explanation template. The first reallocation explanation was due in April 2021. Reallocation template forms have been provided to LIPA as necessary.   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

These changes were also incorporated into the Second A&R OSA.

Real Estate Management

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

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

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

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

To address these concerns, on January 27, 2021, the Board adopted the below five recommendations. The Board requested that PSEG Long Island prepare PIPs for these recommendations no later than February 8, 2021. On February 24, 2021, the Board rejected the first iteration of these PIPs and directed PSEG Long Island to revise them consistent with LIPA Staff comments. Based upon LIPA Staff comments, PSEG Long Island resubmitted the PIPs for the Board's consideration at the May 2021 meeting. Progress on implementing these PIPs is described in the table.

This effort is critical to ensuring an accurate and comprehensive understanding of LIPA's real property and facility assets and will ensure that LIPA and PSEG Long Island are focusing their efforts on the long-term viability of the LIPA real estate portfolio in a manner that is best suited for the workforce and provides the highest value to our customers. Given that these PIPs relate to long term strategy planning for LIPA's real estate portfolio, LIPA continues to take an active oversight role, and is part of the discussions with PSEG Long Island consultants in progressing these PIPs toward completion.

#	Reported Status	Recommendation	Status Summary	Planned End Date
RE-01 (10.04)	Complete	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. PSEG Long Island's project consultant, Colliers Portfolio Strategy Consulting ("Colliers"), presented the final deliverable to LIPA and PSEG Long Island Executive Management on 11/15/2021. Collier's recommendations for specific properties are to be pursued in conjunction with 2022 T&D Metric – 33.	Q4 2021
RE-02 (10.01)	NA (2022 OSA Metric)	Develop a comprehensive and formal strategy for the development of a new PTCC and Alternate Control Center	PIP approved May 19, 2021. The PTCC project is dependent upon finding a suitable property on Long Island. Realtors continue to search for suitable properties to meet PTCC operational requirements. LIPA T&D Oversight and LIPA Legal suggested to PSEG Long Island that the search criteria and operational requirements be expanded to include other potential properties. PSEG Long Island has expanded that scope, but the milestone in selecting a property by year end 2021 was missed. Metric projects will be covered in separate quarterly reports.	NA
RE-03 (10.02)	NA (2022 OSA Metric)	Develop a joint strategy with National Grid for separation of existing operations centers, including, among others, those located at Hicksville, Riverhead, Roslyn, and Hewlett	Metric projects will be covered in separate quarterly reports.	NA
RE-04 (10.03)	On Schedule	Hire an outside consultant to perform a comprehensive review of the existing real property records to confirm accuracy, identify gaps, and make recommendations or process improvements	PIP approved May 19, 2021. The Records Management vendor is in process of scanning and reviewing the real relevant estate records. Phase 1 completion is delayed from February 2022 to April 2022. Phase 2 is in progress and the overall project remains on schedule pending the volume of shared records with National Grid.	Q2 2022
RE-05 (10.05)	Closed	Develop a succession plan for current long-serving PSEG Long Island real estate professionals to ensure knowledge capture and transfer	PIP approved May 19, 2021. The respective departments completed training documentation of the positions and met with respective Directors and Vice Presidents. LIPA and PSEG Long Island reviewed and discussed final deliverables. LIPA to follow up on bi-weekly status calls, as needed.	7/31/2021

Inventory Management

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

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

- Evaluation of existing policies, procedures, and guidelines in place for the request and issuance of materials/equipment from storerooms under conditions of high activity (i.e., storms);

- Understanding the systems or tools utilized in the process including tracking, approving and/or reporting mechanisms used for materials/equipment distribution; and

- Assessing the return of materials/equipment to storerooms after the storm event including, but not limited to monitoring processes over the expected return of materials and Key Performance Indicators in place, effectiveness of policies and procedures, and cost recording/record-keeping implications if unused materials/equipment are not returned, but then used in a non-storm event.

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

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

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

- PSEG Long Island struggles with maintaining inventory turn targets and thereby has inflated the working capital required to run the business. PSEG Long Island does not have inventory turn targets aligned with industry practice and that consider the related financial and storm fulfillment considerations.

- PSEG Long Island cannot generate written / system generated, repeatable reports with fundamental supply chain information in a formalized cadence.

- 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 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 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.

In April and May 2021, the Board adopted 20 PIPs submitted by PSEG Long Island and asked for the remaining five PIPs to be resubmitted with LIPA's concerns addressed. Those five recommendations have now been incorporated into the 2022 Performance Metrics, with the reporting recommendations rolled up to the Data Access scope and the system improvement recommendations rolled up to the Enterprise Asset Management System (EAMS) scope; and will be reported on separately.

#	Reported Status	Recommendation	Status Summary	Planned End Date
IMR-01 (GMIT1)	NA (2022 OSA Metric)	SAP System is Not Innovating with the Business. Barcoding Technology is not available in current systems.	PIP was previously not accepted. The recommendation has now been combined into the T&D-3 Enterprise Asset Management System (EAM) Implementation Plan metric. **Metric projects will be covered in separate quarterly reports.**	-
IMR-02 (GMIT2)	On-going	Lack of Visibility & Formalized Communication	PIP accepted 4/28/2021. Reports shared and reviewed at bi-monthly PSEGLI/LIPA inventory management meetings. 2022 meeting calendar has been set.	
IMR-03 (GMIT3)	NA (2022 OSA Metric)	Lack of Standard Reporting Functionality	PIP was previously not accepted. The recommendation has now been combined into the IT-6, DIA-01 metric. **Metric projects will be covered in separate quarterly reports.**	-
IMR-04 (GMIT4)	Complete	Opportunities to Improve and Formalize Training	PIP accepted 4/28/2021. PSEG Long Island indicates an internally developed employee refresher training program has been assigned to all employees for completion by the end of September 2021. LIPA verified that this training is now complete.	
IMR-05 (GMIT5)	NA (2022 OSA Metric)	Perform performance testing to validate the ability of the SAP system to support the high volume transactions during storms.	PIP was previously not accepted. The recommendation has now been combined into the T&D-3 Enterprise Asset Management System (EAM) Implementation Plan metric. **Metric projects will be covered in separate quarterly reports.**	-

IMR-06 (GMIT6)	NA (2022 OSA Metric)	Confirm detailed Business Continuity Plan and Fail-Over Preparations	PIP was previously not accepted. The recommendation has now been combined into the T&D-3 Enterprise Asset Management System (EAM) Implementation Plan metric. *Metric projects will be covered in separate quarterly reports.*	-
IMR-07 (WM1)	Combined	Barcoding technology is not utilized in material handling	Combined with IMR-01 (GMIT1)	-
IMR-08 (WM2)	Complete	Exception Reporting	No approved PIP. PSEGLI has been able to demonstrate the ability to produce exception reports using the existing system. These reports were reviewed with LIPA during the November 2021 meeting.	-
IMR-09 (WM3)	Complete	Lack of Formal Location Signage at Service Centers	PIP accepted 4/28/2021. New signage, labeling machines and labels have been purchased. Internal labor has been actively labeling all inside and outside bin locations. All signage has been installed.	
IMR-10 (WM4)	Complete	Formalize Quality Hold and Returns Locations are Present	PIP accepted 4/28/2021. A disciplined supplier returns and quality hold process with clearly defined physical and SAP Bin locations is complete. Four SAP Bins have been created. Physical space within the Hicksville warehouse receiving area has been allocated and delineated with yellow floor striping. Four milestones have been completed and were verified at the bi-monthly meeting held 9/1/21.	
IMR-11 (WM5)	Complete	Create Bin location in SAP is not restricted	PIP accepted 4/28/2021. PSEG Long Island reports complete. LIPA verified completion at 6/30/21 bi-monthly meeting.	
IMR-12 (WM6)	Complete	Risk of crew-based pilferage, misuse, mispicked inventory in a self-serve environment	PIP accepted 4/28/2021. Deliverables were reviewed with PSEG Long Island at the 6/30/21 status meeting. LIPA verified all 4 milestones were complete.	
IMR-13 (IM1)	Complete	Formalize and Communicate Storm Inventory Strategy	PIP accepted 4/28/2021. PSEG Long Island departments have collaborated to develop recommended storm inventory levels. The recommended levels were shared and discussed with LIPA and verified complete at the 9/1/21 bi-monthly meeting.	
IMR-14 (IM2)	Complete	Accountable Parties at an Executive Level do not Meet in a Formal and Routine Manner	PIP accepted 4/28/2021. Quarterly D&OP inventory forecast meetings scheduled for 6/30/2021. A draft N+2 to 12 month forecast tool has been developed and is being vetted internally. Verified complete at the 9/1/21 bi-monthly meeting.	

IMR-15 (IM3)	NA (2022 OSA Metric)	Some portion of fundamental inventory metrics to control the business are not available	PIP was previously not accepted. The recommendation has now been combined into the T&D-3 Enterprise Asset Management System (EAM) Implementation Plan metric. ***Metric projects will be covered in separate quarterly reports.***	-
IMR-16 (IM4)	Delayed	Workorder Demand, Requisitions and Maintenance BOMs for Material Order is Considered to be Inaccurate	PIP accepted 4/28/2021. In April, critical vacancies in the M&L organization (Mgr.- M&L and Analyst positions) put additional demands on the management team resulting in certain tasks not being completed on time. Both vacant positions are actively being filled. However, new hires were not in place as of the 12/21 bi-monthly meeting.	6/30/2021
IMR-17 (IM5)	Complete	Demand Forecast is not Consolidated and Reviewable in a Drill Down Manner	PIP accepted 4/28/2021. Creating a historical forecast spreadsheet with 3 years data and project plan input method. Incorporated accuracy measurement analytics and 2020 actual project data in the spreadsheet. This was reviewed at the October 2021 bi-monthly meeting and accepted as complete.	
IMR-18 (IM6)	Complete	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 completed and shared at the 9/1/21 bi-monthly meeting.	7/15/2021
IMR-19 (IM7)	Complete	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.	
IMR-20 (IM8)	Combined with SP1 (IMR-24)	Inventory Policies do not Incorporate "Storm" Clauses (which guarantee supply during critical periods) within Supplier Contracts	PIP approved 5/19/2021.	6/30/2022
IMR-21 (IM9)	Complete	Inventory Policies are Reviewed and Potentially Changed 1 x Per Year	PIP accepted 4/28/2021. Inventory Reorder and Stocking Strategy Policy MM-001 was completed 4/6/2021. Outstanding milestones reviewed and accepted by LIPA at 9/1/21 bi-monthly meeting.	

IMR-22 (IM10)	Complete	Limited Stock Rotation Regimen	PIP accepted 4/28/2021. Implemented a FIFO (First In First Out) inventory rotation process where applicable. Revised warehouse mapping and configuration to accommodate inventory rotation. Internal picking orders are directed to the oldest material first. Materials with multiple bin locations are set up with three or more bins. Bins are configured as primary, secondary, and overflow. Picks are directed to primary, when the primary is depleted the material from the secondary in rotated to the primary bin. When the secondary bin is depleted, material is rotated from the overflow bin to the secondary. Newly received material is placed in the overflow bin. Material with one bin location, picking is done from the front and newer material is placed to the rear of the shelf. Larger material is handled the same way within the yard compounds. LIPA has verified completion.	
IMR-23 (IM11)	Complete	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 verified completion.	
IMR-24 (SP1)	Complete	Nearly no usage of "storm" clauses in vendor contracts	PIP approved 5/19/2021. A preliminary report of critical inventory requirements based on historical storm activity and engineering considerations has been developed under the IM1 PIP and is pending approval. Preliminary discussions have been held with vendors to determine costs and ability to store storm inventory. A cost-benefit analysis has begun including a series of internal reviews of onsite non-labor carrying costs. LIPA has verified completion of plan milestones.	
IMR-25 (SP2)	Closed	No EDI / VMI	PIP approved 5/19/2021. A memo summarizing the potential use of PSEG's EDI transactions for PSEG Long Island was submitted on 06/01/2021 to LIPA. This memo addressed LIPA's request following submission of the SP2 plan.	10/31/2022

Collections Management

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

On February 24, 2021, the LIPA Board adopted three recommendations related to DTS charges and other 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	Delayed	Materially improve the DTS billing and collections process, including through a review and analysis of the current end-to-end process.	PIP approved on May 19, 2021. Process review & benchmarking completed. Collection & reporting enhancements completed. Initial reporting requirements provided but need to be enhanced. Billing process improvements require results demonstration to close. Need billing backlog cleanup approach to determine if billing changes are adequate.	9/30/2021
DTS-2	Complete	Provide access to the DebtNext platform to one LIPA user, who should be able to view transactions and run all reports.	LIPA personnel have access to PSEG Long Island DebtNext platform	-
DTS-3	Combined with DTS-1	Improve the billing and collections process for miscellaneous non-utility billings, including delivering improved reports to LIPA.	Combined with DTS-1.	-

LIPA and PSEG Long Island meet monthly to review progress and provide information as scheduled in the PIP. PSEG Long Island and LIPA have agreed on key performance metrics and improved reporting for collections. PSEG Long Island has implemented several collection process improvements, including enhanced reporting and onboarding a second outside counsel with 30-day collection reporting. Collection write-off processing has been inconsistent. Billing key performance metrics, and reporting include accounts billed by aging bucket (report in 30-day increments), average cycle days, # of claims open by aging bucket and # closed claims. Billing metrics and reporting need further refinement and demonstration of consistent improvement. Process improvements to reduce billing cycle time were developed, such as automating the process to generate accident jobs, identify completed invoice data for internal jobs, expansion of case approvers and claims processors, piloting accident flagging in Eastern Suffolk in October (pending outcome analysis) and claims processor performance expectations. Further improvement in the investigation and decision to bill is required.

Asset Management

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

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

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

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

On February 24, 2021, the Board adopted five recommendations to address the findings related to PSEG Long Island's asset management program (AM-1 through AM-5). On March 29, 2021, the Board adopted two additional recommendations (AM-6 and AM-7). On May 19, 2021, the Board adopted a consolidated PIP from PSEG Long Island to address AM-1 through AM-5. AM-01, AM-06 and AM-07 have now been incorporated into the 2022 OSA Performance Metrics and will be reported on separately.

#	Reported Status	Recommendation	Status Summary	Planned End Date
AM-01	NA (2022 OSA Metric)	**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.	Metric projects will be covered in separate quarterly reports.	-
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	NA (2022 OSA Metric)	**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.	Metric projects will be covered in separate quarterly reports.	-

AM-07	NA (2022 OSA Metric)	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.	Metric projects will be covered in separate quarterly reports.	-

Affiliate Services

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

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

LIPA reimbursed PSEG Long Island a total of $23.7 million for affiliate-related services in 2021. Furthermore, $18 million, or almost 80 percent of the total affiliate costs, were allocated based on a formula that assigns Long Island a percentage of PSEG's aggregated "pooled" costs across its operating companies. As a result, LIPA has minimal detail on affiliate costs and the actual services provided to support LIPA operations.

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

To improve oversight of PSEG Services Corporation affiliate charges and services funded by LIPA, and gain a better understanding of transactional charges, the Board adopted the below three recommendations on March 29, 2021. PIPs for the recommendations were adopted by the Board at the May and June 2021 meetings.

Improvements in LIPA's oversight rights for affiliate charges have been incorporated into the Second Amended and Restated OSA. AS-01 has now been incorporated into the 2022 OSA Performance Metrics and will be reported on separately.

#	Reported Status	Recommendation	Status Summary	Planned End Date
AS-01	NA 2022 OSA Metric	**Enhanced Affiliate Budget Transparency.** PSEG Long Island should prepare cost and benefit justifications for affiliate use as part of the annual budget development process in 2022. PSEG should minimize the use of transactional cost allocations and review the basis of allocating a percentage of its costs to Long Island customers to ensure that LIPA is not subsidizing New Jersey services. PSEG should document the specific IT projects affiliates perform. PSEG's budget submission should provide supporting documentation reflecting the calculation of activity/ billing hourly rates.	Metric projects will be covered in separate quarterly reports.	
AS-02	Closed	**Enhanced Affiliate Actual Cost Transparency.** PSEG must provide LIPA with a quarterly affiliate report detailing actual use of affiliates as compared to budget, including variance explanations. PSEG should provide detailed support for affiliate positions billed at a level equivalent to one full-time position.	Board adopted PIP at June 23, 2021 meeting. LIPA and PSEG have been meeting regularly to discuss format and additional data to meet this PIP. First quarterly report was due to LIPA for the 9/30/2021 quarter. Schedule for PSEGLI to provide going forward begins each year effective with second quarter.	3/1/2023
AS-03	Delayed	LIPA requires PSEG Long Island immediately request approval for hiring ServCo employees, pursuant to its contractual obligations.	Board adopted PIP at May 19, 2021. LIPA and PSEG Long Island need to implement a "contract administration manual" to formalize the approval process. Clarifications were made in the Second Amended and Restated OSA with regard to LIPA's approval rights.	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 unsuccessful. Although PSEG Long Island leaders participated in several meetings with LIPA to discuss strategic planning issues, those meetings were ultimately not productive because of a lack of support by PSEG Long Island leadership.

On April 29, 2021, the LIPA Board adopted a recommendation to develop five-year roadmaps as a tool to

improve PSEG Long Island's strategic planning processes, encourage more long-term thinking about the management of LIPA's assets, and align PSEG Long Island's budget submissions with long-range plans and short-term work plans. This process will result in greater alignment of management and budgets with the LIPA Board's objectives, better value to LIPA's customers, and accountability of PSEG Long Island management for promised results.

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

However, in the course of contract negotiations, LIPA and PSEG Long Island agreed to develop five-year strategic roadmaps in each of the five scope functions of the amended contract that will evaluate the current state of the function, articulate an end state vision, and identify specific projects to close the gap, in accordance with LIPA and the LIPA Board's vision and strategic directions. The requirements outlined in the amended contract are substantially similar to the requirements LIPA had requested in its revised PIP and address the substance of the Board's recommendations. The LIPA Board has begun reviewing LIPA's strategic direction and LIPA management has begun the planning process to compile LIPA's views of the strategic priorities and projects that should be included in the roadmaps. A PIP is still required to establish the timeline for this effort to be completed.

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

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

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

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

LIPA's CAS, which manages customer billing and other related customer information, was implemented in 1975 when the Long Island Lighting Company, as an investor-owned utility, operated the electric transmission and distribution system. Over the years, the system has become more complex and intractable, requiring workarounds to meet changing bill formats, urgent customer needs, and regulatory requirements. The utility industry has already moved away from outdated Cobalt-based systems due to the shortage of programming expertise in this antiquated language and the lack of flexibility and agility to respond to customers' 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.

The revised PSEG Long Island contract requires that all systems be segregated from PSEG corporate systems and puts in place a four-month planning effort. ITSM-01 and ITSM-02 have now been incorporated as 2022 OSA Performance Metrics and will be reported on separately.

#	Reported Status	Recommendation	Status Summary	Planned End Date
ITSM-01	NA 2022 OSA Metric	Plan for Replacement of Enterprise Resource Planning System	PSEG Long Island had not submitted a PIP for this recommendation. The recommendation has now been combined into the IT-7 Systems Separation metric. Metric projects will be covered in separate quarterly reports.	-
ITSM-02	NA 2022 OSA Metric	Plan for the Replacement of the Customer Information System	Metric projects will be covered in separate quarterly reports.	-

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 2022, PSEG Long Island is budgeted to spend $715 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 require greater effort. An improved process governing capital project and Capital Budget review and approval, including managing changes during the year, will enhance transparency and accountability of customer funds and ensure adequate information flow to LIPA to conduct oversight on behalf of our customers.

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

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

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

#	Reported Status	Recommendation	Status Summary	Planned End Date
CB-01	Closed	**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 in accordance with the process outlined above regarding the consideration of a project for inclusion in the current year LIPA approved Consolidated Budget and 8-year Plan.	Board adopted PIP at August 11, 2021 meeting. PSEG Long Island has substantially provided PJDs for the 2022 Budget cycle and in accordance with the PIP will continue to provide PJDs in future periods.	4/1/2022

| CB-02 | Combined with CB-01 | **Capital Budget Changes and Reallocations**

Annual Project Justification Description Updates: PSEG Long Island should provide LIPA with annual updates to PJDs highlighting changes from the prior PJD and reflecting the current cost estimates, including R&C, schedule, and scope details as part of the annual budget process. For multi-year projects that have progressed through more advanced project design stages since the prior budget (e.g. order of magnitude, conceptual estimate, design estimate, definitive estimate), the PJD and budget request should reflect an updated R&C estimate.

Capital Budget Reallocation Explanations: To fulfill PSEG Long Island's obligation to consult with LIPA prior to reallocating budgeted funds, PSEG Long Island must submit to LIPA's CEO a Capital Budget Reallocation Explanation form, in a format requested by LIPA, when proposing to reallocate funds within the adopted Capital Budget when projected year-end spending at the project level is forecasted to result in a variance to the Annual Budget for that project equal to or greater than 10% and $0.5 million. | PIP combined with CB-01 | - |
| CB-03 | Combined with CB-01 | **Carryover Projects:** If a Capital Project funded within the Adopted LIPA Consolidated Capital Budget is delayed into the subsequent year's Capital Budget, PSEG Long Island must identify the change in the project schedule and propose to carryover the approved Capital Budget funds from the current adopted Capital Budget to the proposed Capital Budget as part of the next year's Capital Budget adoption process. LIPA CEO shall not recommend to the Board the re-funding of a project scope that was re-scheduled from a prior budget year if the funding was not carried over from the prior year. | PIP combined with CB-01 | - |

Work Management

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

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

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

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

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

After the Board's adoption of the Work Management recommendations, LIPA's Internal Audit department completed a work management audit with additional material findings in this area. These additional findings are mainly reflected in 2022 OSA metrics.

#	Reported Status	Recommendation	Status Summary	Planned End Date
WM-01	NA 2022 OSA Metric	**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 had not been accepted. The recommendation has now been combined into the T&D-3 Enterprise Asset Management System (EAM) Implementation Plan metric. Metric projects will be covered in separate quarterly reports.	-

WM-02	NA 2022 OSA Metric	**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.	Metric projects will be covered in separate quarterly reports.	-
WM-03	NA 2022 OSA Metric	**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.	Metric projects will be covered in separate quarterly reports.	-
WM-04	NA 2022 OSA Metric	**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.	Metric projects will be covered in separate quarterly reports.	-
WM-05	NA 2022 OSA Metric	**Enable Mobile and Field Management** –Improve the use of mobile devices and ergonomic transaction design to enhance field management of work and data collection and integrate the same into the new EAMS. To be completed by December 30, 2022.	PIP had not been accepted. The recommendation has now been combined into the IT-6 metric. Metric projects will be covered in separate quarterly reports.	-
WM-06	NA 2022 OSA Metric	**Improve Work Management Metrics** – Improve Key Performance Indicator/metric definition and dashboards/reporting for work management visibility and performance improvement. To be completed by July 31, 2022.	Metric projects will be covered in separate quarterly reports.	-
WM-07	NA 2022 OSA Metric	**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 March 31, 2022.	Metric projects will be covered in separate quarterly reports.	-
WM-08	NA 2022 OSA Metric	**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.	Metric projects will be covered in separate quarterly reports.	-

Small Generator Interconnection Procedures

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

In August 2021, the Board adopted seven recommendations to strengthen the SGIP business practices and benefit LIPA customers based on the findings of the assessment. The Board requested PIPs from PSEG Long Island for each recommendation for the Board's consideration. The PIP submission combined all seven recommendations into one plan and was largely incorporated into 2022 Performance Metrics.

#	Reported Status	Recommendation	Status Summary	Planned End Date
SG-01	NA 2022 OSA Metric	**Independent Review of Escalated Cases:** Currently the PSEG Long Island Interconnection Ombudsperson is the Manager of the interconnection department. PSEG Long Island should ensure an independent review of escalated interconnection cases by changing the organizational placement of the Interconnection Ombudsperson.	Metric projects will be covered in separate quarterly reports.	-
SG-02	NA 2022 OSA Metric	**Improve Customer Experience:** PSEG Long Island's SGIP portal currently provides status updates as projects move through the different phases of the SGIP. PSEG Long Island should leverage the portal to provide proactive emails and updates on upcoming activities that require coordination between PSEG Long Island and the customer such as meter installation.	Metric projects will be covered in separate quarterly reports.	-
SG-03	NA 2022 OSA Metric	**Provide new channels for online payment options:** PSEG Long Island should allow customers to provide payment quicker and eliminate delays associated with mailing a check or checks expiring before they can be cashed.	Metric projects will be covered in separate quarterly reports.	-
SG-04	NA 2022 OSA Metric	**Evaluate interconnection project cost sharing options:** PSEG Long Island should develop a method to equitably share costs for network upgrades to replace the current process for charging the customer that pushes the capacity over the limit for a circuit. PSEG Long Island should determine a method that is consistent with other New York utilities.	Metric projects will be covered in separate quarterly reports.	-

SG-05	NA 2022 OSA Metric	**Integrate the Interconnection Online Portal:** PSEG Long Island should advance the integration of the interconnectional portal with its enterprise systems to improve the system implementation and build an analytics platform to automate the technical screening process.	The recommendation has been combined into the PS&CE-4 (CE-2) Utility 2.0 – Distributed Energy Resources (DER) Hosting metric. Metric projects will be covered in separate quarterly reports.	-
SG-06	NA 2022 OSA Metric	**Leverage AMI technology to monitor system performance:** PSEG Long Island should leverage AMI technology to monitor actual DER production and alert customers if their systems are not performing as expected.	The recommendation is being combined into the IT-5 DER Visibility metric. Metric projects will be covered in separate quarterly reports.	-
SG-07	Closed	**Leverage the PSEG Long Island Interconnection Working Group:** PSEG Long Island should prioritize upgrades or modifications to the SGIP with the developers who are participants of the Interconnection Working Group. The IWG meeting is a collaborative effort bringing the Utility and Developer professionals together to identify technical and procedural improvements to the interconnection process. Many developers work with different utilities across North America and are a channel to identify improvement opportunities that have been successful elsewhere.	Revised PIP submitted December 13, 2021, and accepted January 2022.	-

Data and Information Access

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

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

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

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

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

In August 2022, the Board directed PSEG Long Island to develop a PIP with the objective of deploying a Standardized Data Access Platform consisting of an enterprise-wide data warehouse, a broader data lake, and provisioning and development of tools to support reporting and analytics. The Standardized Data Access Platform will provide PSEG Long Island management, LIPA, and the DPS seamless and effective access to PSEG Long Island financial, operational, and performance data. This data repository will contain structured data from PSEG Long Island's financial and operational systems and will be equipped with suitable tools to facilitate query, reporting, and analyses of data from the entire spectrum of data sources without the users needing to manage connections to different source systems.

The recommendation has now been incorporated into the 2022 Performance Metrics; and will be reported on separately.

#	Reported Status	Recommendation	Status Summary	Planned End Date
DIA-01	NA 2022 OSA Metric	Develop a Standardized Data Access Platform consisting of an enterprise-wide data warehouse, a broader data lake, and provisioning and development of tools to support reporting and analytics. Phase I of the implementation should, at a minimum, incorporate data from the following source systems: SAP, Outage Management System/Pragma CAD (OMS/pCAD), Advanced Metering Infrastructure (AMI) and Customer Information and Billing System (CAS). Phase II should, as a minimum, include data from Asset Management, Energy Management System (EMS), Advanced Distribution Management System (ADMS) and Supervisory Control and Data Acquisition (SCADA).	Metric projects will be covered in separate quarterly reports.	-

Geographic Information System

The Geographic Information System (GIS) is a foundational platform for every utility, leveraging geographic and geo-referenced data to manage and optimize the use of spatial information. As spatial data collection and analytics technologies become increasingly sophisticated, utility IT and operational technology ("OT") systems have evolved to leverage these capabilities, with GIS becoming an integral component of modern utility line-of-business processes and systems, including SCADA, Enterprise Asset Management, Advanced Distribution Management Systems, Distributed Energy Resource Management Systems, and Customer Information Systems.

Long-term planning is essential for leveraging the potential of GIS to optimize utility operations and drive improved decision-making via geospatial-data-derived insights. A comprehensive long-term GIS plan will assess the business objectives, opportunities, and priorities; the technology platform and marketplace; and the data, resource, and process requirements; and provide a clear roadmap for delivering business applications across the enterprise cohesively and efficiently.

PSEG Long Island's current GIS plan consists of a GIS Roadmap and Product Lifecycle chart that identifies broad timelines for upgrades/enhancements of current components and applications over the next 10 years -- a rudimentary level of planning that falls far short of a comprehensive long-term plan. In the absence of a long-term plan, PSEG Long Island's GIS project development has too often been conducted in an ad-hoc, localized manner, without adequate enterprise-level prioritization against business goals or evaluation of the IT marketplace.

Development of a comprehensive GIS Long-Term Plan would improve PSEG Long Island's ability to leverage GIS as a platform for application development across the enterprise in a manner that optimizes business value. In October 2021, the Board directed PSEG Long Island to develop a PIP with the objective of developing a comprehensive GIS Long-Term Plan that provides a clear roadmap for leveraging GIS across the enterprise in a manner that optimizes business value, and that, at a minimum:

- Assesses and identifies the business objectives, opportunities, and priorities across the enterprise lines-of-business processes and systems, including SCADA, Enterprise Asset Management, Advanced Distribution Management Systems, Distributed Energy Resource Management Systems, and the Customer Information Systems.
- Evaluates the technology marketplace and develops a comprehensive ecosystem plan that considers the core platform and associated infrastructure; system resiliency; business application development toolsets and approaches; and third-party integration products and services.
- Identifies new opportunities to establish GIS-based services, applications, and capabilities to enhance utility business performance and customer experience.
- Identifies available or potential data sets and any associated data management or integration issues.
- Addresses process and resource requirements

The recommendation has now been incorporated into the 2022 Performance Metrics as part of the GIS – Long Term Plan, Architecture and Technology Stack Upgrade Project, and will be reported on separately.

#	Reported Status	Recommendation	Status Summary	Planned End Date
GIS-01	NA 2022 OSA Metric	Develop a comprehensive GIS Long-Term Plan that provides a clear roadmap for leveraging GIS across the enterprise in a manner that optimizes business value, and that, at a minimum: • Assesses and identifies the business objectives, opportunities, and priorities across the enterprise lines-of-business processes and systems, including SCADA, Enterprise Asset Management, Advanced Distribution Management Systems, Distributed Energy Resource Management Systems, and the Customer Information Systems. • Evaluates the technology marketplace and develops a comprehensive ecosystem plan that considers the core platform and associated infrastructure; system resiliency; business application development toolsets and approaches; and third-party integration products and services. • Identifies new opportunities to establish GIS-based services, applications, and capabilities to enhance utility business performance and customer experience. • Identifies available or potential data sets and any associated data management or integration issues. • Addresses process and resource requirements Modernize/upgrade of the GIS technology stack.	Metric projects will be covered in separate quarterly reports.	-

Work Management - Overtime

In June 2021, the Board approved eight recommendations designed to improve work management practices at PSEG Long Island. Subsequently, LIPA has been meeting with PSEG Long Island to understand its workforce time management with respect to overtime practices.

LIPA recognizes that supplemental overtime pay related to incremental scheduling beyond the normal work schedule can be beneficial to provide staffing flexibility. For example, there are periods when non-recurring projects, unplanned work, or storm restoration can use supplemental time effectively in lieu of hiring additional staff. However, such scheduling needs to be managed properly to ensure the incremental work time was necessary and fiscally responsible.

LIPA hired a third-party consultant to review PSEG Long Island's time management and related timekeeping processes. LIPA Staff reviewed the consultant's report and compared the recommendations and findings contained in the report to efforts underway in accordance with existing Board approved Recommendations and associated PIPs. Based on this review, LIPA Staff recommended that the Board adopt the below additional Work Management Recommendations with the objective of improving workforce time management and timekeeping processes. PSEG Long Island was directed to develop a PIP for the recommendations no later than April 20, 2022, for review and approval by LIPA and presentation to the Board at the May 18, 2022, meeting.

#	Reported Status	Recommendation	Status Summary	Planned End Date
WMOT-01	PIP Not Yet Due	Coding and Description Enhancements: Review WBS or Work Order Coding for all projects and Operating Funded Work. Ensure coding is useful for overtime analysis purposes. On an annual basis, review "Short Text" activity codes based on usefulness and ability to enhance decision-making.	Recommendation submitted for Board approval at the March 2022 Board meeting. PIP due April 20, 2022.	NA
WMOT-02	Combined with WMOT-01	Enhanced PSEGLI Management Review: Enhance PSEG Long Island internal management review including comparing actuals to target and drilling into areas and jobs that used overtime.	Recommendation submitted for Board approval at the March 2022 Board meeting. PIP combined with WMOT-01.	NA
WMOT-03	Combined with WMOT-01	Training: Develop training materials for supervisors making overtime decisions to guide decision-making in a consistent manner. Formalize the scheduling of initial training for new supervisors and refresher training for existing supervisors.	Recommendation submitted for Board approval at the March 2022 Board meeting. PIP combined with WMOT-01.	NA
WMOT-04	Combined with WMOT-01	Multi-year overtime target planning: Utilize workforce planning models and techniques to establish long-range (out-year) overtime targets by craft as a guide to ensuring effective and efficient use of overtime utilizing.	Recommendation submitted for Board approval at the March 2022 Board meeting. PIP combined with WMOT-01.	NA

LIPA

Long Island Power Authority

PSEG Long Island

Project Implementation Plan

for

Isaias Task Force Recommendation Implementations

Recommendation No. 3.2.1.1

Project Title: 3.2.1.1: PSEG Long Island should complete the implementation of the planned telecommunication design changes and conduct additional capacity testing as soon as possible. The Task Force will review the design and results of these capacity tests. PSEG Long Island should explore if there are ways to conduct the load tests so that the calls (a) originate in the service territory, and (b) consist of a representative mix of land line and mobile phones. We believe that it is prudent not to simply rely on Verizon Business's assurance that the new design will accommodate device and location diversity.

PIP History, Feedback and Actions

On January 26th, LIPA provided feedback on the submitted Tier 1 and Tier 2 implementation plans. On February 2nd PSEG-LI provided documented responses to the feedback from LIPA for all rejected IT implementation plans. PSEG-LI and LIPA met to discuss the specific feedback and proposed path forward for this Implementation plan in a meeting on 2/05/2021. The below are the PSEG-LI responses to the feedback. In the meeting PSEG-LI and LIPA discussed the feedback. No agreement was reached in the meeting, LIPA requested that we provide supporting data, rationale and updates to the Project implementations plans. LIPA stated they would take the feedback and input into consideration in reviewing the plans.

LIPA Response (Submission 12/7/2020): *No specific PIP submitted. PSEG-LI changed LIPA recommendation in the telecom PIP to suit its own prior effort rather than address the capacity and design issue. Deliverables list does not conform to deliverables specified (does not provide detail design and specifications). No indication whether they will conduct tests as recommended in the 30-Day Report. Resubmit in January with specific PIP and correction of recommendation statement.*

PSEG Long Island Actions:
- Separate PIP focusing on recommendation 3.2.1.1 was developed and submitted to LIPA
- A detailed project schedule was submitted outlining the various tests conducted as well as remediations executed in support of each test
- A detailed testing plan with anticipated outcomes was included with submission

LIPA Response (Submission 1/13/2021): *LIPA has repeatedly urged PSEG Long Island to conduct a comprehensive end-to-end testing of the phone system that is similar in volume and velocity as encountered in Tropical Storm Isaias. The tests conducted so far have not satisfied this requirement. To have satisfactory end-to-end testing, the test plan needs to include the following: (a) sustained volume of at least 5,000 concurrent calls for at least 1 hour, (b) paper analysis of carrier and Intrado capacity that considers NE USA storm scenarios where multiple utilities are utilizing Intrado and carrier bandwidth, (c) comprehensive end-to-end testing. Comprehensive end-to-end testing must include the following test characteristics: (a) mix of mobile phones and land- line calls into PSEG-LI's storm line (0075), (b) land-lines must originate in LATA-132, (c) Call journey path must include a combination of 5,000 concurrent calls that passes through the Intrado IVR all the way to the PSEG-LI Enterprise Service Bus with ultimate message acknowledgement from OMS, (d) a parallel call journey path simulating the "wire-down" scenario pushing a minimum of 575 concurrent calls originating from the Long Island customer premise that would be redirected by the Intrado HVCA IVR to the PSEG-LI call center and answerable by PSEG-LI customer service representatives.*
Also, keep in mind, the end-to-end test scenario is just not a technical demonstration but a demonstration of how technology, processes, and people are orchestrated during a real storm and could reveal potential failure modes in the entire system. In the tests conducted by PSEG-LI, the requirements for comprehensive end-to-end testing have not been met. The tests conducted to date have not exercised all the journey paths in an end-to-end model. In fact, the wire-down calls did not originate in Long Island and did not utilize the 0075 storm number. Instead, they originated in Intrado and terminated in the PSEG-LI call center. Similarly, there have been no performance tests that originate in Long Island and terminate in the OMS system. We agree that some progress has been made but the system is far from ready for acceptance. We also observe that the additional tests that PSEG-LI has conducted because of LIPA's imploring have frequently resulted in findings of significant failures.

We have also urged PSEG-LI to conduct the tests during the day instead of around midnight, which provides false assurance. Daytime calls (especially Monday mornings or Thursday afternoons) are more likely to simulate a real-life stress test scenario.

PSEG Long Island Actions and Comments:
- To have satisfactory end-to-end testing, the test plan needs to include the following:
    - (a) sustained volume of at least 5,000 concurrent calls for at least 1 hour,
        - *This is a condition that will be tested as part of the planned end to end testing and, as such, has not been included in this specific PIP.*
    - (b) paper analysis of carrier and Intrado capacity that considers NE USA storm scenarios where multiple utilities are utilizing Intrado and carrier bandwidth,
        - *Intrado has stated that a shared capacity for 150,000+ concurrent callers is available for PSEG use. Verizon does not disclose specific details on their network, however they routinely review and adjust their capacities in order to stay in line with forecasts. To vet this information any further would require disclosure of proprietary information on the makeup and usage of other customers, which both Verizon and Intrado have indicated is not possible.*
    - (c) comprehensive end-to-end testing.
        - *This will be completed as part of the overall end to end testing effort currently in progress. As such, the effort hasn't been separately documented in this PIP.*
    - **ACTION:** We will again ask Intrado for their peak volume during ISAIAS.
    - **ACTION:** A formal email will be sent to Verizon for response regarding inability to share detailed capacity information on their network.
- Comprehensive end-to-end testing must include the following test characteristics:
    - (a) mix of mobile phones and land- line calls into PSEG-LI's storm line (0075),
        - *Simulating cell phones is not possible as there is no feasible way to access these networks via testing tools.*
        - *Several factors can impact the success of a cellular telephone call, including RF signals traversing the air, issues and/or capacities of the cellular towers, issues with the cellular handset itself, etc. The only valid test for cellular connectivity would have to include all of these factors, which effectively means placing thousands of calls from thousands of physical cell phones, spread all around Long Island, during an actual storm event. This is not feasible. PSEG is instead working to make considerable expansions to the availability of additional digital channels as an alternate path over reliance on traditional telephony as a mitigation for such limitations.*
        - *Land line simulation is what has been tested in the test iterations outlined in this PIP.*
    - (b) land-lines must originate in LATA-132,
        - *Simulating land line calls from within Long Island would require the provision of significant infrastructure not in place today. This includes installing multiple points of presence (POPs) spread around Long Island and scaling telecom capacity to each that would sufficiently be able to generate the requisite 150,000 calls per hour and 5,000 concurrent calls.*

> *This effort would be immense, excessively costly and time consuming. It also would still fail to fully recreate the conditions expected as calls would still be concentrated in specific areas where the POPs are located instead of spread throughout Long Island as in reality. Additionally, these tests would still fail to simulate the increased load that would be present during storms or other similar force majeure events that is unrelated to PSEG business.*

- o (c) Call journey path must include a combination of 5,000 concurrent calls that passes through the Intrado IVR all the way to the PSEG-LI Enterprise Service Bus with ultimate message acknowledgement from OMS,
  - ▪ *This is planned to be covered by end to end testing.*
- o (d) a parallel call journey path simulating the "wire-down" scenario pushing a minimum of 575 concurrent calls originating from the Long Island customer premise that would be redirected by the Intrado HVCA IVR to the PSEG-LI call center and answerable by PSEG-LI customer service representatives. Also, keep in mind, the end-to-end test scenario is just not a technical demonstration but a demonstration of how technology, processes, and people are orchestrated during a real storm and could reveal potential failure modes in the entire system. In the tests conducted by PSEG-LI, the requirements for comprehensive end-to-end testing have not been met. The tests conducted to date have not exercised all the journey paths in an end-to-end model. In fact, the wire-down calls did not originate in Long Island and did not utilize the 0075 storm number. Instead, they originated in Intrado and terminated in the PSEG-LI call center. Similarly, there have been no performance tests that originate in Long Island and terminate in the OMS system.
  - ▪ *The final wire down tests did leverage the storm TFN, pass through Intrado and get redirected to PSEG. It was only a previous troubleshooting test that was targeted directly at the transfer numbers.*

On September 10th, LIPA and PSEG-LI had a meeting to discuss various recommendations, including 3.2.1.1 and there were no actions identified to move the recommendation from rejected to accepted. On November 23rd, LIPA had a meeting with PSEG-LI to discuss rejected PIPs and LIPA provided further comments. Below is a summary of the meeting, LIPA comments, and PSEG-LI actions.

LIPA Response November 23:
We request that the PIP be revised to incorporate the following deliverables:

- *Detailed design and specifications of final deployed system, including comprehensive architecture diagram.*
- *Test Strategy and Test Plans. Test Strategy should clearly specify the journey paths covered by the tests, as well as those not included. Test Plans for each conducted test should include any Test Scripts, Test Cases and Test Data utilized in the testing.*
- *Test Results for each conducted test, including the full results as well as a Summary Report.*

We will accept a revised PIP that includes the above Deliverables and the associated Delivery Dates. Note that revisions must be made in-line in the relevant sections in the body of the PIP to be considered for acceptance.

PSEG Long Island Actions:
- Updated 3.2.1.1 PIP to include:
  - Refreshed deliverables table with testing documents provided in the close out document that was submitted 9/2/2021. These are in alignment with the items requested.
  - Added line for updated telecom design to project artifacts table.

LIPA Response February 9:

We asked that certain Deliverables and the associated Delivery Dates be incorporated into the PIP. We provided detailed descriptions of the Deliverables. The PIP Deliverables list includes these deliverables at a high level with Delivery Dates of 8/16/2021, stating that they were included in the Close Out Document of that date. However, those earlier Deliverables do not satisfy the requirements we specified in our descriptions. For instance:

1. *We asked for 'Detailed design and specifications of final deployed system, including comprehensive architecture diagram' to be added as a Deliverable. The added 'Updated Telecom Design' deliverable references the Design Document submitted in August 2021, which is (i) a now obsolete version that does not accurately document the final deployed system; and (ii) not detailed and comprehensive.*
2. *We asked that Test Plans for each conducted test should include any Test Scripts, Test Cases and Test Data utilized in the testing. No Test Scripts or Test Data were provided in August 2021.*
3. *We asked for Test Results for each conducted test, including the full results as well as a Summary Report. The Test Results provided in August 2021 for two of the tests included only the Summary Reports.*

Please add the Deliverable descriptions to the PIP, and provide updated Delivery Dates.

PSEG Long Island Actions:

1. *We asked for 'Detailed design and specifications of final deployed system, including comprehensive architecture diagram' to be added as a Deliverable. The added 'Updated Telecom Design' deliverable references the Design Document submitted in August 2021, which is (i) a now obsolete version that does not accurately document the final deployed system; and (ii) not detailed and comprehensive.*
   a. **Updated design document is included in the attached close out document which depicts the current design in production.**
2. *We asked that Test Plans for each conducted test should include any Test Scripts, Test Cases and Test Data utilized in the testing. No Test Scripts or Test Data were provided in August 2021.*
   a. **Scripts used to execute the tests are included in the test strategy documents. All test strategy documents are included in the attached close out document. We do not have the actual scripts as the tool used to perform the testing was provided by a third party.**
3. *We asked for Test Results for each conducted test, including the full results as well as a Summary Report. The Test Results provided in August 2021 for two of the tests included only the Summary Reports.*
   a. **Test results are provided in the close out document for every test run for telecom.**

Please add the Deliverable descriptions to the PIP, and provide updated Delivery Dates.
Deliverable section updated in the attached updated PIP.

Table of Contents

1. Project Definition

This project includes efforts to enhance telecom routing within the carrier networks to optimize distribution of calls between the customer, the HVCA and PSEG LI facilities. A series of bottlenecks within the carrier infrastructure were identified in the aftermath of Tropical Storm Isaias and have been eliminated through a series of routing changes made by the carrier. Additional stress testing will be conducted to confirm the success of these changes and the ability to successfully handle storm volumes moving forward.

1.1. Project Purpose, Objectives, and Success Criteria

Project Objectives:

The project objectives are to execute additional stress tests on the telecom infrastructure from the Toll Free Network through to the HVCA and PSEG LI Contact Center in order to confirm routing changes previously made have successfully addressed identified bottlenecks. Additional remediations and tests, as needed, will be made until the infrastructure meets Storm volume benchmarks.

Project End State and Success Criteria:

Blue Sky and Storm Days Telephone System are tested and deployed. Detailed design, specifications and configuration of the system is documented (as deployed). Plan for ongoing periodic testing will be documented and activated through recommendations 3.2.1.2, 3.2.1.5 and 3.2.1.6.

2. Project Deliverables:

Deliverable	Delivery Date	Comments
Moved #0025 to Verizon Business, create IVR scripts, create routing plans	August 6, 2020	Included with Close Out Document
Tested #0025 with 20% of 5000 concurrent calls which is what is estimated during storms	September 1, 2020	Included with Close Out Document
800 preliminary report/causal determination created	September 14, 2020	
PSEG requests further information from Verizon	November 5, 2020	
Stress test Verizon ILEC environment to 5000 concurrent calls	November 6, 2020	Included with Close Out Document
Stress test Verizon ILEC environment to 5000 concurrent calls (Test 2)	November 13, 2020	Included with Close Out Document
VZ responds with explanation of blockages experienced by LIPA on Aug 4. Also documents LIPA questions and VZ responses to those questions concluding that LIPA will always be reliant, in part, on the adequacy of interconnecting networks (including Vzt,	November 17, 2020	

cellular companies, and other VoIP offering services) which is a factor beyond their control		
Stress test the environment to 5000 concurrent calls (Test 3)	December 3, 2020	Included with Close Out Document
Stress test the environment to 5000 concurrent calls (Test 4)	December 15, 2020	Included with Close Out Document
Call Center Wire Down Capacity Test	January 8, 2021	Included with Close Out Document
Call Center Wire Down Capacity Test	January 12, 2021	Included with Close Out Document
Updated Telecom Design	March 10, 2022	Included with Close Out Document
Test Results	April 11, 2022	Full test results for each test conducted (Summary Reports were provided in Close Out Document)
Detailed design and specifications of final deployed system, including comprehensive architecture diagram	April 11, 2022	

The test plan, tests performed to date and architecture for this recommendation are provided in the recommendation close out document.

The team is planning on performing an end to end test for OMS v5.5. This test will also include telephony components. The end to end test plan has also been included in the appendix for reference.

The Project Management Office (PMO) will create and maintain the following across all IT Implementation Plans:
- Integrated Project Plan
- Status Reports
- Risks and Issues Log

2.1. Assumptions, Dependencies, and Constraints.

2.1.1 Assumptions:
- Tests to confirm wire down redirect and eliminate MPLS bottleneck are successful as planned requiring no additional modification and testing
- LIPA ID 0.1 an executive summary recommendation from the 30-Day Report will be complete upon completion of recommendations 2.2 and 2.6
- End to end testing to be handled as separate holistic effort beyond the scope of this implementation plan
- Carrier diversity will not be addressed as part of this implementation plan. Options will be assessed as part of recommendation 4.05

2.1.2 Dependencies:
- Intrado and Empirix support required for planning and executing hammer tests

2.1.3 Constraints:
- Competing projects and operational activities that constrain available resources.

- Availability of vendor resources to provide application updates and support testing activities.
- Test environments cannot be used for hammer testing as they do not represent production capacities. Production systems will have to be used during non-peak windows.
- Intrado allows hammer testing of infrastructure during a daily maintenance window of 12AM to 6AM. Daytime testing is not allowed, due to the possibility of interfering with production systems for other customers.
- Empirix cannot support hammer tests originating from within Long Island on existing infrastructure

3. Project Structure

3.1. Internal Project Organization

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

Role	Name	Responsibilities
Steering Committee	Dan Eichhorn (Chair) Zeeshan Sheikh Michael Sullivan Rick Walden	• Championing the PSEG LI Storm Restoration initiative • Establishing guiding principles for the project • Ensuring project activities remained aligned with the guiding principles as *defined* • Providing guidance and input on *key project decisions* • Challenging the project team where appropriate • Approving major *changes to the project's scope, objectives, timelines, costs, etc.* • Acting as the decision maker for issues requiring *escalation* • Removing institutional barriers when *they arise by serving as a project advocate*
Leadership	PSEG LI CIO – Greg Filipkowski Exec Dir, Special Proj – David Lyons	• Ensuring *workstreams adhere to guiding principles as defined by project leadership* • Managing issues and decision making • Remov*ing obstacles that impede the success of the overall project Providing strategic guidance* • Challenging the project team where appropriate • Approve procurement of external parties (as needed)
Team Lead	Irving Landesbaum	• Drive workstream tasks and deliver recommendations for Solution Design Specification • Provide support for Testing • Aid in the developme*nt functional requirements* • Provide input on requirement / design • Coo*rdinating Business Resources to support the project* • Key Point of contact to for questions from the vendor • Providing sign off for deliverables that require business *input/acceptance* • Delivering the project on time and on budget
Workstream Lead	David Nidoh (ACN)	• Reporting overall status of the project to Stakeholders and Program Leadership • Identifying and escalating resource issues • Providing status reports for delivery to internal and external stakeholders (LIPA, DPS) • Manage resource*s, schedule, issues, risks and change requests* • Process development, requirements definition, • Providing subject matter expertise to th*e project* • User Impact Analysis • Facilitating workshops
Performance Engineer	Sri Kanaparthy (ACN)	• Supporting Build/Test/Deploy Activities • Assist with Environment setup • Coordinating Development activities • Assist with Technical Design and Architecture • Assist with Transfer of Environments

Role	Name	Responsibilities
Test Lead	Miguel Ramos (ACN)	• Test Script Development • Test Script Execution for Assembly / Unit Test • Test Execution
Test Coordinator	Sikder Islam	• Test Coordination between Vendor and PSEG resources • Responsible for execution of Test Scripts • Test Script Development
Stress Test Engineer	Empirix	• Test Execution • Compilation of Test Results

3.2. Other Stakeholders

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

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

4. Project Plan

4.1. Project Work Plan

More tactically, in order to achieve the objectives outlined in Section 2 of this document, PSEG LI has developed a strategic Project Plan comprised of the following activities:

Task	Recommendation	% Complete	Start	Finish
Recommendation	**PSEG Long Island should complete implementing the planned design changes and conduct additional capacity testing as soon as possible.**	**100%**	**Fri 11/6/20**	**Fri 2/12/21**
Task	**Tier 1**	**100%**	**Wed 1/6/21**	**Tue 1/12/21**
Subtask	Preliminary Review of Tier 1 implementation plan responses (align on response and direction)	100%	Wed 1/6/21	Wed 1/6/21
Subtask	Initial Review with LIPA meeting	100%	Thu 1/7/21	Thu 1/7/21
Subtask	Final Review with PSEG Leadership	100%	Fri 1/8/21	Fri 1/8/21
Subtask	Submission date of the Tier 1 implementation plan responses to LIPA	100%	Tue 1/12/21	Tue 1/12/21
Task	1st Hammer Test: 5,000 concurrent calls to Intrado phone number	100%	Fri 11/6/20	Fri 11/6/20
Task	2nd Hammer Test: Test 42,000 trunk capacity between verizon telecom and verizon business, 5,000 concurrent calls	100%	Fri 11/13/20	Fri 11/13/20
Task	3rd Hammer Test	100%	Mon 11/23/20	Mond 11/23/20
Task	**4th Hammer Test**	**100%**	**Mon 11/23/20**	**Fri 12/11/20**
Subtask	Stress Test Planning with Empirix, Verizon and HVCA	100%	Mon 11/23/20	Wed 12/2/20
Subtask	Execute Hammer Test	100%	Thu 12/3/20	Thu 12/3/20
Subtask	Compile Test Results (Empirix)	100%	Thu 12/3/20	Wed 12/9/20
Subtask	Review and approve Test Results	100%	Thu 12/10/20	Fri 12/11/20
Task	**5th Hammer Test: Wire Down Capacity Test #1**	**100%**	**Thu 12/3/20**	**Tue 12/22/20**
Subtask	Stress Test Planning with Empirix, Verizon and Intrado for second test to include wire down and capacity on ipsec tunnel	100%	Thu 12/3/20	Wed 12/9/20
Subtask	Execute Wire Down Hammer Test	100%	Tue 12/15/20	Tue 12/15/20
Subtask	Compile Test Results (Empirix)	100%	Tue 12/15/20	Wed 12/16/20
Subtask	Review and approve Test Results	100%	Wed 12/16/20	Tue 12/22/20
Task	**Wire Down Remediations**	**100%**	**Tue 12/22/20**	**Tue 1/5/21**
Subtask	Evaluate options for resolving AT&T TFN Bottle Neck with Intrado	100%	Tue 12/22/20	Tue 12/22/20
Subtask	Intrado researches technical feasibility of proposed design change	100%	Wed 12/23/20	Mon 12/28/20
Subtask	Meet with AT&T to determine process for RESPORG'ing TFN to VzB	100%	Wed 12/23/20	Wed 12/23/20
Subtask	Fill out Verizon form to officially request RESPORG of TFN to VzB	100%	Wed 12/23/20	Mon 12/28/20
Subtask	AT&T transitions TFN to VzB	100%	Tue 12/29/20	Tue 1/5/21
Subtask	Regression test TFN on VzB to confirm connectivity	100%	Tue 1/5/21	Tue 1/5/21

Task	6th Hammer Test: Wire Down Capacity Test #2	100%	Tue 1/5/21	Fri 1/8/21
Subtask	Stress Test Planning with Empirix, Verizon	100%	Tue 1/5/21	Tue 1/5/21
Subtask	Execute Wire Down Hammer Test	100%	Fri 1/8/21	Fri 1/8/21
Subtask	Compile Test Results (Empirix)	100%	Fri 1/8/21	Fri 1/8/21
Subtask	Review and approve Test Results	100%	Fri 1/8/21	Fri 1/8/21
Task	**PRI Testing and Remediation**	**100%**	Fri 1/8/21	Fri 1/8/21
Task	**7th Hammer Test: Wire Down Capacity Test #3**	100%	**Mon 1/11/21**	**Thu 1/14/21**
Subtask	Stress Test Planning with Empirix, Verizon and Intrado	100%	Mon 1/11/21	Mon 1/11/21
Subtask	Execute Wire Down Hammer Test	100%	Tue 1/12/21	Tue 1/12/21
Subtask	Compile Test Results (Empirix)	100%	Wed 1/13/21	Wed 1/13/21
Subtask	Review and approve Test Results	100%	Thu 1/14/21	Thu 1/14/21
Milestone	*Hammer Test successfully meets benchmarks for all scenarios*	*100%*	*Thu 1/14/21*	*Thu 1/14/21*
Subtask	Management Review and Approval of Task	100%	Fri 1/15/21	Fri 1/15/21
Subtask	Submission of recommendation close-out document	100%	Mon 1/18/21	Fri 2/12/21
Milestone	*LIPA Task #3.2.1.1 Complete*	*100%*	*Fri 2/12/21*	*Fri 2/12/21*

4.2. Risk Management Plan

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

Category	Project Risk	Mitigation
Resources	Availability of resources due to other Storm duty priorities	Careful prioritization of projects with LIPA recommendations as top priority in order to complete all tasks/milestones on time.
Schedule / Cost	Vendor delays cause the schedule to shift and key project milestones are not able to be met on time	Work with the vendor to quickly resolve impediments.
Testing	Vendor testing infrastructure not currently designed to simulate high volume calls originating from Long Island	Empirix has stated that infrastructure can be deployed to execute this test, but will require additional server builds and telco connectivity in local area. Will not be addressed in current testing but may be added to roadmap for future discussions.
Testing	End to end testing with OMS is not being conducted as part of this implementation plan.	This testing will be conducted holistically at the completion of all required remediations.
Testing	All current testing occurring during Blue Sky / Overnight conditions that may not represent daytime / storm loads. This may not be sufficient given shared network with HVCA	Document risk for review by LIPA. Currently, vendors are unwilling to execute load tests during daytime hours.
Infrastructure	Lack of carrier diversity at the TFN / Telco level	Document risk for review by LIPA. Potential opportunity to add diversity through CCaaS implementation.

4.3. Issue Resolution Plan

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

4.4. LIPA Reporting Plan

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

5. Technical Execution Plan

5.1. Technical Approach

5.1.1 Technical Improvements:

Additional architecture changes have been added as a result of testing initial changes and identifying new bottlenecks. This demonstrates that thorough testing of all changes, not just for functional success, but also for the expected performance improvements will be essential to verify that bottlenecks impeding achievement of Storm volume benchmarks have been identified and, where possible, remediated.

5.1.2 Process Improvements:

In addition to the many technical improvements to the telecom and carrier infrastructures that will be made, a series of process enhancements will also be implemented. This will include improved vendor coordination before, during and after storms and other impactful events. Internal process improvements will also be made to include enhanced communications with key stakeholders, updated escalation matrices and processes and quality assurance reviews. All changes will be clearly documented and approved and distributed for execution during the next service impacting event.

5.2. Quality Assurance Plan

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

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

Test plan and test results will be signed off by PSEGLI CIO and President & COO of PSEGLI, and shared with LIPA upon completion

The following scenarios will be incorporated in the test that is conducted to validate additional call volume capacity

1. Telecom conducts performance testing and successfully handles 5000 concurrent calls (~150,000 calls per hour).
2. Verizon IVR is able to route the call volumes successfully to Intrado.
3. Verizon and Intrado are able to successfully communicate while under strain and additionally do not affect each other's performance during peak storm simulations.
4. No abnormal amount of failed or dropped calls based on Empirix historical testing data. (<4%)

5.3. Documentation Plan

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

Project Artifacts	Description
Updated Telecom Design	Detailed design and specifications of final deployed system, including comprehensive architecture diagram
Test Strategy & Plans	Test cases & test data are meeting the design requirements
Test Execution Results	Test results indicate the design requirements accomplished.

Revision History

Name	Date	Reason for Changes	Version
David Nidoh	12/10/2020	initial draft	1.0 draft 1
David Nidoh	1/8/2021	Revised	2.0 draft 1
Brenda Mokua	12/14/2021	Updated Project Plan and Org Chart	3.0 draft 1
Brenda Mokua	12/15/2021	Updated PIP History	3.0 draft 2

PSEG Long Island

Project Implementation Plan

for

Isaias Task Force Recommendation Implementations

Recommendation No. 4.10

Project Title: Implement a solution that allows OMS to decouple customer reporting from field management activities

4.10 - Implement a solution that allows the OMS to decouple customer reporting from field management activities.

On February 2nd LIPA provided the following feedback to PSEG via email.

Isolate field recovery operations from OMS if and when it fails. The OMS and Computer Aided Dispatch (CAD) can operate in a way that prevents OMS unresponsiveness from affecting field management activities.

A key component of that mode of operation is to manage customer reports, both incoming and outgoing. Presently, PSEG Long Island has configured the OMS to provide a near real-time response to any customer outage report, where every customer report is routed as a message to the OMS and a response is provided to the requestor.

It has been demonstrated through testing that high levels of customer reports, experienced during Tropical Storm Isaias, caused performance failures within the OMS, with consequent issues in field management activities. An alternative solution is required, where customer reports are decoupled from OMS operation. There are many potential solutions available that deliver this level of decoupling.

This recommendation will be satisfied by provisioning for an ability to direct HVCA customer reports (channel) to a sink other than OMS so that HVCA messages are no longer pressuring the OMS. Of course, appropriate messaging responses must be provided to the customer suitable to the circumstances.

LIPA feedback on PSEG submission of the Implementation Plan on February 19th:

The recommendation requires PSEG LI to implement a solution that allows "OMS to decouple customer reporting from field management activities". Nowhere in this PIP or in the PIP Response to 4.17 is it evident that the requirement to be able to decouple "customer reporting" from "field management activities" is being addressed. There is no demonstrated traceability of the solution to the requirement. In a meeting with PSEG LI, LIPA explained that this recommendation requires that when one part of OMS is failing, e.g., customer reporting, the system should provide the ability to disconnect that portion of the functionality and have the rest of OMS continue to function (e.g. field management activities). We do not see evidence or any discussion of the requirement being addressed, and how the solution will be tested against this requirement.

LIPA and PSEG met on March 8th to discuss the above (below was conveyed via meeting notes sent to LIPA on March 8th):

- LIPA (Osman Ahmed) acknowledged the feedback provided on Feb 2nd was not consistent with the feedback provided via the LIPA review as part formal PIP review, this was a mistake
- LIPA (Osman Ahmed) agreed 4.10 should be resubmitted to reflect the HVCA decoupling outcome as prescribed above on Feb 2nd.
- LIPA requested that PSEG answer the following questions related to the overall solution design of decoupling:
    - Is there an ability have "discrete decoupling" HVCA, Mobile, Web, etc. i.e individually decouple. The PSEG team will address this in the deep dive on the digital solutions this week and reflected in the PIP
        - **PSEG Answer:** The current solution will decouple channels with OMS. The intent of the queue is to throttle inbound calls from digital channels to the OMS to minimize the risk of overloading OMS. Discrete decoupling will not be required as part of this solution.
    - Is PCAD able to operate if core OMS is not operating. The PSEG team will address this in the deep dive on the digital solutions this week.
        - **PSEG Answer:** PCAD can be operated independently from the Core OMS via manual work around.

- PSEG will review the holistic architecture changes with LIPA on March 15th to to discuss further and answer any questions LIPA may have.

On September 13th, LIPA and PSEG-LI had a meeting to discuss various recommendations, including 4.10. During the meeting, LIPA requested additional supporting documentation for the recommendation. PSEG-LI provided the required files on September 17th to move the recommendation from rejected to accepted. On November 23rd, LIPA had a meeting with PSEG-LI to discuss rejected PIPs and LIPA provided further comments. Below is a summary of the meeting, LIPA comments, and PSEG-LI actions.

LIPA Response September 13:
- *Provide ERIP documentation that supplies information on the OMS interface as it relates to field crew management.*

PSEG Long Island Actions:
- Submitted ERIP documentation on 9/17/21.

LIPA Response November 23:
- *Include plan to update the async queue developed for OMS 5.5 such that it can be deployed with OMS 6.7.8, SOP for workaround.*
- *Include plan to develop and deliver process and procedure documentation for handling the async queue during storm conditions.*
- *Include plan to develop and deliver training for various roles involved in operating the async queue during storm conditions.*

PSEG Long Island Actions:
- Updated 4.10 PIP to include:
  - Assumptions section updated to reflect that no SOP for workarounds will be developed. Tasks for ensuring that the solution works with 6.7.8 were added to the plan.
  - Documentation Plan section was updated to reflect development of process and procedure documents for turning the async queue on as part of storm mode and reverting to blue sky mode. Section also indicates that specific resources were identified for these tasks; no additional training is required.

LIPA Response February 9, 2022:
1. *Is the ESRI "outage reporter" form available today? If yes, what is its URL? If no, when will it come online?*
2. *With respect to making the ESRI form available to customers, who is responsible to posting the links to the social media platforms? What are the steps this personnel needs to take in order to post the links on Facebook, Twitter, Instagram, LinkedIn and YouTube respectively? Is there one place where one can make this happen or does one has to go to each of these platforms individually and post them one at a time?*
3. *What actions are the Mellville's Call Center staff supposed to take in the even they receive a call from the Police/Fire agencies on the Satellite phones during a storm event? Has the training on how to use the satellite phones already been provided to the call center staff? Is there a timeline for its availability?*
4. *With respect to the staff training for processing wire downs, tree down, pole down and blocked road reports submitted using the new ESRI form and database tools, the plan says that this will be provided in the future. Has this training already been provided to the staff? Is there a timeline for its availability?*

PSEG Response March 4, 2022:
1. The ESRI "outage reporter form" is available today. The link has always been "live" but with wording stating "Do not report a live outage… currently in testing." The URL will

not be made generally available until/unless needed. Part of the process of getting it out for use would be to update the text on the site to correspond to other messaging being used in that event. The current BC plan is to prepare for a planned activation , update to the messaging, and broadcast via all platforms. The URL is:

https://lipa.maps.arcgis.com/apps/CrowdsourceReporter/index.html?appid=b95ccdd8bfa24f45889a3ea4a77dcae7

2. The Corporate Communications team will provide the link to the ESRI form on the PSEG Long Island website, social media channels, and will request that local media stations broadcast that information, similar to how they broadcast the call center outage phone number and updates during all storms. Corporate Communications has a lead for each of these areas, and they align timing of all storm updates with the entire team to maintain consistent information across all platforms.
3. Currently, all FD/PD calls come into the hotlines, and are managed by the call representatives remotely. Three satellite phones were installed in a permanent location in the Call Center. If call systems fail, or are overloaded, the decision to activate use of the satellite phones would be broadcast to Emergency Planning who would share this information with Nassau, Suffolk and NYC Emergency Operations Centers. These satellite phones would then be covered 24/7 at the Call Center. Usage of satellite phones is drilled with Call Center personnel on a monthly basis. Processes for a call received via satellite phone are the same as processes for calls received via hotlines.
4. Training was provided on the ESRI tool in 2021.

NOTE: The technical approach and solution to enable is part of the solution for PIP 4.17. To reduce tracking duplication, this implementation plan (4.10) is a replication of the implementation plan for 4.17. The HVCA requirement will be included in the requirements and testing of 4.17.

Table of Contents

1. Project Definition

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

The project goal is to verify a solution is in place to protect the OMS system from becoming inundated with customer calls in the event of a large storm with high numbers of outage reports. This project focuses on including queueing protection for the ESB along with setting up an OMS reporting database for digital channels.

Any mention of the "Digital Channels" in this document refers to the following channels:
- Kubra Notifi
- PSEG LI Mobile App
- IVR
- HVCA (High Volume Call App)
- PSEG Public website
- MyAccount Customer Portal
- Alexa/Google

1.1. Project Purpose, Objectives, and Success Criteria

1.1.1 Project Objectives:

The objectives of the project are:
1. Design and implement a solution that allows outage reports and requests from various digital channels to be queued up before being sent to OMS

1.1.2 Project End State and Success Criteria:

End State:
- The end state of the Digital Channels Enhancement project will be to verify queuing messages in the ESB are setup as asynchronous

Success Criteria:

- Success is defined as an operable solution, thoroughly tested and deployed in a production environment

2. Project Deliverables:

The following are the list of deliverables that will be delivered as part of the implementation:

Deliverable	Delivery Date	Comments
To Be Proposed Architecture	1/8/2021	Create architecture for proposed plan
Detailed Roadmap and Implementation Plan	12/3/2021	Create detailed roadmap and implementation plan for solution 4.17
RTM Documentation Complete	4/2/2021	

Functional Design – ESB Queueing Layer and Flow Control	6/11/2021	Create a functional design – ESB Queueing Layer
Technical Design - ESB Queueing layer	3/24/2021	Create a technical design – ESB Queueing layer
Documentation for activating/deactivating queue in Storm mode	10/31/2021	Detailed procedure for activating the queue during storm mode and deactivating upon return to blue sky
IT training for activating/deactivating queue	11/30/2021	Identification of key personnel and execution of procedures
All configuration items in CMDB.	1/29/2022	Per our understanding, LIPA requests any configuration to be added in service now and tracked with this deliverable

The Project Management Office (PMO) will create and maintain the following across all IT Implementation Plans:
- Integrated Project Plan
- Status Reports
- Risks and Issues Log

2.1. Assumptions, Dependencies, and Constraints

2.1.1 Assumptions:
- PSEG LI has the necessary resources in place from an internal and third-party standpoint to complete all of the objectives including implementation work as needed
- The project team will move forward to implement recommendations and enhanced solutions for the existing PSEG LI framework and vendor partnerships
- Vendor resources will be available to provide SME time and answer any questions for respective applications
- All modifications to the webservice will happen on Sonic ESB first with a migration to MuleSoft ESB on a future date determined through design sessions
- PSEG LI will track changes made to the project plan for auditing purposes. This will allow for tracking impacts to schedule. Storms or other external factors will be accounted for (workarounds or extensions need to be included in the audit trail)
- Will leverage current ESB webservice to provide customer messaging
- Assuming minimal modifications to customer messaging
- Kubra messaging changes can be done as part of existing service agreement
- Intrado messaging changes can be done as part of the service agreement
- Team will deploy changes on CGI OMS 5.5 first and re-factor for CGI OMS 6.7 post go live
- No SOP for workarounds will be developed; workarounds are documented in "Restoration Contingency Plans for Critical System Failures" (ERIP-GEN-004).

2.1.2 Dependencies:
- PSEG LI has a dependency on XTENSIBLE for performing changes on the Sonic ESB
- PSEG LI has a dependency on CGI to help design the ESB queue to insulate CGI OMS
- PSEG LI has a dependency on the OMS team to stand up the OMS testing environment and make it available for end to end testing activities requiring the digital channels

2.1.3 Constraints:
- Competing projects at PSEG LI could affect delivery timelines

- Storm season will be a priority for PSEG LI resources who will be unavailable when performing storm roles or resolving current production issues

3. Project Structure

3.1. Internal Project Organization

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

Role	Name	Responsibilities
Steering Committee	Dan Eichhorn (Chair) Zeeshan Sheikh Michael Sullivan Rick Walden	• Championing the PSEG LI Storm Restoration initiative • Establishing guiding principles for the project • Ensuring project activities remained aligned with the guiding principles as defined • Providing guidance and input on key project decisions • Challenging the project team where appropriate • Approving any major changes to the project's scope, objectives, timelines, costs, etc. • Acting as the decision maker for any issues requiring escalation • Removing institutional barriers if and when they arise by serving as a project advocate
Leadership	PSEG LI CIO – Greg Filipkowski Exec Dir, Special Proj – David Lyons	• Ensuring workstreams adhere to guiding principles as defined by project leadership • Managing issues and decision making • Removing any obstacles that may impede the success of the overall project Providing strategic guidance • Challenging the project team where appropriate • Approve procurement of external parties (as needed)
Team Lead	Veronica Isaac	• Drive workstream tasks and deliver recommendations for Solution Design Specification • Provide support for Testing • Aid in the development functional requirements • Provide input on requirement / design • Coordinating Business Resources to support the project • Key Point of contact to for questions from the HVCA IVR vendor, Outage Map vendor and Xtensible Team • Providing sign off for deliverables that require business input/acceptance • Delivering the Digital Channels project on time and on budget
Workstream Lead	Stan Pique (ACN)	• Reporting overall status of the project to Stakeholders and Program Leadership • Identifying and escalating any resource issues • Providing status reports for delivery to internal and external stakeholders (LIPA, DPS) • Manage resources, schedule, issues, risks and change requests • Process development, requirements definition, • Providing subject matter expertise to the project • User Impact Analysis • Facilitating workshops
Performance	Sri Kanaparthy (ACN)	• Supporting Build/Test/Deploy Activities

Engineer		• Assist with Environment setup • Coordinating Development activities • Assist with Technical Design and Architecture • Assist with Transfer of Environments
Technical Architect	Pedro Miraldo	• Supporting Build/Test/Deploy Activities • Environment setup • Assist in the configuration of the Digital Channels • Coordinating Development activities • Technical Design • Testing Lead • Transfer of Environments
Business Lead	Nayan Parikh	• Process development, requirements definition, functional design • Technical Design • Supporting vendor questions and workshops Testing Execution
Test Lead	Miguel Ramos (ACN)	• Test Script Development • Test Script Execution for Assembly / Unit Test • Test Execution
Test Coordinator	Sikder Islam	• Test Coordination between Vendor and PSEG resources • Responsible for execution of Test Scripts • Test Script Development
Environment Lead	Anish Thomas	• Technical Design development • Environment design support

3.2. Other Stakeholders

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

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

4. Project Plan

4.1. Project Work Plan

LIPA ID	Type	Task Name	Current Status	% Complete	Start	Finish
4.17	**Recommendation**	**Digital Re-architect the inter-system message queuing applications for greater dynamic stability under highly demanding workloads.**	**Complete**	**100%**	Fri 11/13/20	Sun 2/6/22
4.17	Subtask	Analyze conceptual architecture view for the inter system message queuing applications	Complete	100%	Mon 1/4/21	Fri 1/8/21
4.17	Subtask	Host Design Sessions to produce future state architecture for inter-system message queueing application	Complete	100%	Mon 1/4/21	Fri 1/8/21
4.17	Task	Tier 1	Complete	100%	Wed 1/6/21	Fri 1/15/21
4.17	Subtask	Preliminary Review of Tier 1 implementation plan responses (align on response and direction)	Complete	100%	Wed 1/6/21	Wed 1/6/21
4.17	Subtask	Internal PSEG approval of proposed architecture	Complete	100%	Fri 1/15/21	Fri 1/15/21
4.17	Subtask	Submission date of the Tier 1 implementation plan responses to LIPA	Complete	100%	Fri 1/15/21	Fri 1/15/21
4.17	Subtask	Explore asynchronous messaging to ESB from digital channels	Complete	100%	Mon 1/11/21	Fri 2/12/21
4.17	Subtask	Explore dynamic adjustment of time out settings across channels	Complete	100%	Mon 1/11/21	Fri 2/12/21
4.17	Subtask	Create Detailed Roadmap and Implementation plan	Complete	100%	Mon 8/2/21	Fri 10/8/21
4.17	Subtask	Identify Xtensible resources	Complete	100%	Mon 1/11/21	Mon 1/11/21
4.17	Subtask	Identify impacts for additional resources (meet with Xtensible for Intrado/Kubra etc.)	Complete	100%	Mon 1/11/21	Fri 2/12/21
4.17	Subtask	Identify impacts for F5 networking	Complete	100%	Mon 1/11/21	Fri 2/12/21
4.17	*Milestone*	*MS: Procure resources*	Complete	*100%*	*Fri 1/15/21*	*Fri 2/12/21*
4.17	**Design Phase**	**Design Phase**	**Complete**	**100%**	Thu 1/28/21	Fri 6/11/21
4.17	Task	Create Functional Design - ESB Queueing Layer and flow control	Complete	*100%*	Mon 4/12/21	Fri 6/11/21
4.17	Subtask	Design ESB queuing layer to work with digital channel vendors and CGI	Complete	*100%*	Mon 3/1/21	Fri 4/2/21
4.17	Subtask	Create RTM document	Complete	*100%*	Mon 3/1/21	Fri 4/2/21
4.17	*Milestone*	*MS: RTM Documentation complete/ LIPA Review*	Complete	*100%*	*Fri 4/16/21*	*Fri 4/16/21*
4.17	**Build / Development phase**	**Build / Development phase**	**Complete**	**100%**	Fri 11/13/20	Fri 6/11/21
4.17	Subtask	Develop ESB queueing and flow control	Complete	100%	Thu 2/25/21	*Fri 4/16/21*
4.17	Subtask	Create Technical Design - ESB Queueing layer and flow control	Complete	100%	Mon 4/12/21	Fri 6/11/21

4.17	*Milestone*	*MS: Build Complete*	*Complete*	*100%*	*Fri 5/21/21*	*Fri 5/21/21*
4.17	Subtask	Get Outages Webservice improvement	Complete	100%	Fri 11/13/20	Fri 11/13/20
4.17	Subtask	Outage Hub View Refactoring to improve performance	Complete	100%	Fri 11/13/20	Fri 11/13/20
4.17	**Test Phase**	**Test phase**	**In Progress**	**100%**	**Wed 3/17/21**	**Thu 1/6/22**
4.17	Subtask	Functional Testing	Complete	100%	Mon 5/24/21	Fri 5/28/21
4.17	Subtask	SIT / UAT Testing and defect resolution	Complete	100%	Mon 5/24/21	Fri 5/28/21
4.17	Subtask	Performance Testing and defect resolution	Complete	100%	Mon 5/24/21	Fri 5/28/21
4.17	Subtask	Leverage Recommendation 4.12 - Perform a holistic test simulating calls from all channels to verify time out settings do not impact one another	Complete	100%	Fri 1/22/21	Fri 5/28/21
4.17	Subtask	Get Outages Webservice improvement testing	Complete	100%	Mon 5/24/21	Fri 5/28/21
4.17	Subtask	Test outage hub view refactoring	Complete	100%	Mon 5/24/21	Fri 5/28/21
4.17	Subtask	Change Management	Complete	100%	Fri 5/28/21	Tue 6/1/21
4.17	Subtask	Solution Deployment 5.5	Complete	100%	Tue 6/1/21	Tue 6/1/21
4.17	Subtask	Refactor for OMS 6.7	Complete	100%	Thu 5/13/21	Wed 5/19/21
4.17	Subtask	Regression test for OMS 6.7	Complete	100%	Tue 9/7/21	Fri 11/12/21
4.17	Subtask	Solution Deployment 6.7	Complete	100%	Fri 2/4/22*	Sun 2/6/22

*Dependent on and coupled to OMS 6.7.8 go-live

4.2. Risk Management Plan

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

Category	Project Risk	Mitigation
Resources	Resource constraints from Digital team due to competing projects	Assign and commit business and IT resources and verify they are available to support this project. As necessary, hire contract resources to back fill normal job responsibilities
Resources	No holistic solution owner from PSEG LI to oversee entirety of solution	PSEG LI to designate a resource to be the holistic oversight for entire solution
Resources	Availability of resources due to other Storm duty priorities	Careful prioritization of projects with LIPA recommendations as top priority in order to complete all tasks/milestones on time

Schedule / Cost	Contract negotiation could delay project due to multiple vendor partners involved for making changes to the entire architecture	PSEG LI to expedite contract approvals and determine if there are options for performing some work internally
Schedule / Cost	Vendor delays cause the schedule to shift and key project milestones are not able to be met on time	Work with the vendor to quickly resolve impediments
Schedule / Cost	The activities outlined in the Digital Channels project have become more complex than anticipated	Review the additional work required to complete the project with the steering committee. Add the scope required to complete the project to the implementation plan. Clearly identify the steps that will be taken to anticipate this complexity in future projects
Program Management	Lack of Scope/Requirements control including changes needed to legacy IT systems	Lack of scope/requirements control is the leading cause of budget and schedule overruns for this scale of project. It will be critical to closely define project scope/requirements, quickly clarify any uncertainties as they arise, and escalate as required. Any changes in scope/requirements must be agreed-to by the executive steering committee
Program Management	Additional recommendations for improvement are developed and will need to be added to this workstream	Additional recommendations that have activities similar to those addressed in this project will be identified and logically grouped within tracks. Resource requirements will be identified. Where necessary, contract resources will be hired to back fill normal job responsibilities

4.3. Issue Resolution Plan

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

4.4. LIPA Reporting Plan

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

5. Technical Execution Plan

5.1. Technical Approach

5.1.1 Configuration of ESB webservices:

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

Here is the list of known differences / enhancements that will be in ESB QA that are not yet in production:

- o ManageTroubleTicket
  - Container memory allocation increased from 1GB to 2GB.
  - Maximum number of connections to ESB service increased from 5 to 25.
  - Maximum number of connections to OMS services increased from 5 to 25.
  - Timeout setting for OMS service connection (time ESB waits for available OMS service connection) reduced from 30 to 1.5 seconds.
  - Timeout setting for OMS service response (time ESB waits for OMS service response) reduced from 30 to 12 seconds.
- o ManageCustomerAccount
  - Container memory allocation increased from 1 GB to 2 GB.
  - Maximum number of connections to ESB service increased from 5 to 25.
  - Maximum number of connections to Kubra Notifi web services increased from 5 to 25.
  - Timeout setting for Kubra service connection (time ESB waits for available Kubra service connection) reduced from 30 to 1.5 seconds.
  - Timeout setting for Kubra service response (time ESB waits for Kubra service response) reduced from 30 to 12 seconds.
  - Timeout setting for mainframe response (time ESB waits for mainframe response) reduced from 30 to 12 seconds.
  - RCCP/GridX changes -- not performance issue plus or minus, just a noted difference.

5.1.2 *Configuration of applications* - Here are the time out changes being made to various digital channels in coordination with ESB changes.

Channel	Current in Production	Settings to be Tested
MyAccount web (Sitecore)	30 seconds	10 seconds – Gettroubleticket 10 seconds – Submittroubleticket
NuanceIVR	15 seconds	15 seconds
TFCC IVR	6 seconds (live call) 120 seconds (backup trouble ticket submission)	6 seconds (live call) 120 seconds (backup trouble ticket submission)
Voice Assistance (Alexa/Google Home)	8 seconds	8 seconds
My Account Mobile App	15 seconds – Gettroubleticket 20 seconds – Submittroubleticket	15 seconds – Gettroubleticket 20 seconds – Submittroubleticket
Kubra Texting (iFactorSL)	5 seconds – Gettroubleticket (current)	10 seconds – Gettroubleticket 10 seconds – Submittroubleticket

	5 seconds – Submittroubleticket (current)	*This will depend on Kubra standing up a performance testing environment.*
Kubra Outage Map	10 minutes - timeout 15 minutes - refresh	25 minute - time out 30 minute - refresh *This will depend on Kubra standing up a performance testing environment*
CGI OMS	2 minutes default **Note:** this cannot be done per individual webservice but this would only apply to Gettroubleticket & Submittroubleticket	Please confirm the timeout settings for the CGI web services.

ESB	30-60 seconds – Gettroubleticket (current)
	30-60 seconds – Submittroubleticket (current)
		• ManageTroubleTicket
		  o Timeout setting for OMS service connection (time ESB waits for available OMS service connection) reduced from 30 to 1.5 seconds.
		  o Timeout setting for OMS service response (time ESB waits for OMS service response) reduced from 30 to 12 seconds.
		• ManageCustomerAccount
		  o Timeout setting for Kubra service connection (time ESB waits for available Kubra service connection) reduced from 30 to 1.5 seconds.
		  o Timeout setting for Kubra service response (time ESB waits for Kubra service response) reduced from 30 to 12 seconds.
		  o Timeout setting for mainframe response (time ESB waits for mainframe response) reduced from 30 to 12 seconds.
		• Incident.Getoutages
		  o Timeout setting increased from 30 to 55 minutes.

F5	Universal time out	Universal time out

5.1.3 Changes to webservices:

PSEGLI customer facing systems (e.g. IVR, Texting, etc.) do not directly interact with OMS web services. They interact with the canonical ESB web service called ManageTroubleTicket. This service has two operations, SubmitTroubleTicket and GetTroubleTicket.

SubmitTroubleTicket invokes CGI OMS web service InboundCallService.CreateCall. The interaction is fully synchronous today so the customer facing system does not get a response until the ESB service has received a response (or timed out waiting for one) and converted it to the SubmitTroubleTicket response message. Typically, customer facing systems wait 5-10 seconds for the response before determining that it failed and relaying that failure message to the customer.

SubmitTroubleTicket will be refactored to provide an immediate response to the consumer (customer facing systems) while queuing up request for asynchronous metered flow to CGI OMS CreateCall API. This will enable the OMS system to not be overwhelmed with incoming requests as the ESB SubmitTroubleTicket process will only send to OMS at a rate that it can handle.

This solution accomplishes a few things:
- Provides protection for OMS in cases where the incoming trouble ticket submissions cannot be processed

Allows all channels to respond quickly to customer interaction with "success"
- This should both allow for a better customer experience and reduce the number of repeat trouble ticket submissions
- Makes sure all channels trouble ticket submissions are handled in a consistent way
- Does so without requiring any changes to the customer facing systems
- **Note:** messaging changes will need to be explored.

The flow for ManageTroubleTicket.GetTroubleTicket was also reviewed and found not to be conducive to an asynchronous pattern or a hybrid pattern as, typically, the customer is waiting for a response for the status of their outage. There are improvements to that flow being explored but that exploration no longer includes consideration of an asynchronous mode.

ESB features that enable decoupling for both the 5.5 and 6.7 environments are described in the table below.

Channel / Applications	ESB Queue	ESB 5.5 Filtering & Queue	ESB 6.7 Filtering and Queue
• MyAccount • Mobile App • Google, Alexa • Nuance IVR	Disabled or Enabled	Those applications proactively prevent users from sending an outage report if they are part of a known outage. This means if the customer is part of a known outage and even if said customer has yet to submit its first outage report, those applications will not submit an outage report to PSEG LI.	No Change
• Intrado IVR • Text	Disabled	Intrado IVR and Text applications do not filter repeat customer outage reports. Even if the customer is part of a known outage or has already submitted an outage report, repeat outage reports are sent to PSEG LI OMS.	No Change

	Enabled	As part of the currently implemented queue filtering logic (as of 15-Sept-2021), if an outage report submission happens to be on a known outage, it will be filtered out even if the customer has yet to submit its first outage report.	As part of the planned filtering in V4, the very first customer outage report will be sent to OMS even if the customer is part of a known outage. Subsequent repeat outage reports will be filtered out regardless of customer channel being used.
• Muni Portal	Disabled (never enabled)	The Muni Portal channel application does not filter out repeat outage reports. Moreover, that application, even in the event of a storm, is never enabled to use the ESB queue. This was designed to give priority to the low volume of emergency type calls (i.e. wire downs) coming from that application. The synchronous integration avoids the potential delay of those wire downs emergency calls in the ESB queue.	No Change
• ESB Queue	Enabled	The queue cache contains the following columns: ID,CustomerAccountNumber, QueueInsertionDateTime, OMSCreationDateTime,Duplicate Record (YorN)	Added logging of the digital channel to the queue cache for analysis purposes.
• ESB Queue Cache Cleanup	Enabled	Manual Process	Batch Process

5.1.4 Changes to Infrastructure:

Leveraging existing capabilities within PSEG LI ESB.

5.2. Quality Assurance Plan

5.2.1 QA Methodology:
- The team will adhere to the PSEG's IT standards for the deployment of this project. PSEG LI IT SharePoint will be used as the document repository
- The deliverables will follow the following QA processes:
  - Team lead review and signoff
  - Peer Review (PSEG)
  - Subject Matter Advisor Review as necessary
  - PSEG Signoff by PSEGLI CIO and President & COO of PSEGLI
  - Independent Verification and Validation by LIPA CIO
- An individual test plan will be created, and for this recommendation it will include the following: Scope of testing, Test Criteria, Tests to be performed (e.g.: Functional, Acceptance, Regression, Performance Testing, End to End)

- Test plan and test results will be signed off by PSEGLI CIO and President & COO of PSEGLI, and shared with LIPA upon completion

5.2.2 Test Scope:
Testing of incoming calls from a future storm will incorporate the following digital channels:

Channel	Test Plan (High Level)	Test Outcome
Kubra Notifi	Simulate incoming outage calls from this channel into OMS	Verify ESB is able to queue the incoming calls
PSEG LI Mobile App	Simulate incoming outage calls from this channel into OMS	Verify ESB is able to queue the incoming calls
IVR	Simulate incoming outage calls from this channel into OMS	Verify ESB is able to queue the incoming calls
HVCA	Simulate incoming outage calls from this channel into OMS	Verify ESB is able to queue the incoming calls
PSEG corporate website	Simulate incoming outage calls from this channel into OMS	Verify ESB is able to queue the incoming calls
MyAccount Customer Portal	Simulate incoming outage calls from this channel into OMS	Verify ESB is able to queue the incoming calls
Alexa/Google	Simulate incoming outage calls from this channel into OMS	Verify ESB is able to queue the incoming calls

ESB must be capable of handling large call volumes (to be defined in threshold documentation) and must be able to place those requests in a queue to be relayed to OMS. Testing must be done across multiple channels providing input at one time to verify real storm conditions are met and performance is not impacted with multiple reporting methods.

5.3. Documentation Plan

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

Deliverable	Delivery Date	Comments
To Be Proposed Architecture	1/6/2021	Create architecture for proposed plan
Detailed Roadmap and Implementation Plan	12/3/2021	Create detailed roadmap and implementation plan for solution 4.17
Functional Design – ESB Queueing Layer and Flow Control	4/2/2021	Create a functional design – ESB Queueing Layer
Technical Design - ESB Queueing layer	6/11/2021	Create a technical design – ESB Queueing layer
Documentation for activating/deactivating queue in Storm mode	10/31/2021	Detailed procedure for activating the queue during storm mode and deactivating upon return to blue sky
IT training for activating/deactivating queue	11/30/2021	Identification of key personnel and execution of procedures
All configuration items in CMDB.	1/29/2022	Per our understanding, LIPA requests any configuration to be added in service now and tracked with this deliverable

Revision History 4.17/4.10

Name	Date	Reason for Changes	Version
Ali Husnain	12/9/2020	Initial draft	1.1
Alexander Kniazev	12/9/2020	Updated test criteria and project scope	1.2
Alexander Kniazev/Ali Husnain	12/10/2020	Rewrite to address individual recommendation with updates to the project plan	1.3
Nathan White	2/5/2021	Updated Progress and submit for 4.10	1.4
Alycia Cloud	12/2/2021	Resubmit with info for changes to queue version, documentation and training	1.5
Brenda Mokua	12/14/2021	Updated Org Chart	1.6
Brenda Mokua	12/15/2021	Updated PIP History	1.7
Brenda Mokua	1/3/2022	Updated Deliverables Section	1.8
Miguel Ramos	1/4/2022	Updated Project Plan	1.9

PSEG Long Island
Project Implementation Plan

for

LIPA Board Adopted Recommendations to Development of a Standardized Data Access Platform

Project Title: Standardized Data Access Platform

Table of Contents

1. Project Definition

PSEG Long Island will implement a Standardized Data Access Platform consisting of an enterprise-wide data warehouse, a broader data lake, and provisioning and development of tools to support reporting and analytics. The Standardized Data Access Platform will provide PSEG Long Island management, LIPA, and the DPS seamless and effective access to PSEG Long Island financial, operational, and performance data. This data repository will contain structured data from PSEG Long Island's financial and operational systems and will be equipped with suitable tools to facilitate query, reporting, and analyses of data from the entire spectrum of data sources without the users needing to manage connections to different source systems.

- **Phase I** - of the implementation should, at a minimum, incorporate data from the following source systems: SAP, Outage Management System/Pragma CAD (OMS/pCAD), Advanced Metering Infrastructure (AMI) and Customer Information and Billing System (CAS). Phase II should, as a minimum, include data from Asset Management, Energy Management System (EMS), Distribution Management System (DMS) and Supervisory Control and Data Acquisition (SCADA).
- **Phase I Delivery**: Phase 1 scope targeted dated: December 31, 2022.

1.1 Project Purpose, Objectives, and Success Criteria

Project Objectives: The objective of this project is to deliver a standardized Data Access Platform that gives PSEG Long Island Management, LIPA, and DPS seamless and effective centralized access to PSEG Long Island financial, operational, and performance data in order to inform and support PSEG Long Island and LIPA's decision-making, as well as to provide transparency and facilitate LIPA and DPS' oversight.

Project End State and Success Criteria:

1) A standardized Data Access Platform that gives seamless and effective centralized access to PSEG Long Island financial, operational, and performance data has been built, served data on, comprehensively tested and documented, and deployed to PSEG Long Island Management, LIPA, and DPS personnel.

2) The deployed system is simple, easy to use, and delivers on fundamental reporting.

3) The deployed system provides consistent, reliable, accessible, and understandable data structures and tools for querying, reporting, and analysis of data from the entire spectrum of data sources without the users needing to manage connections to different source systems.

4) The deployed system allows self-service for stakeholders, with users having real-time access to the data to use their own tools, develop their own reporting, etc., as well as sufficient training to effectively utilize these capabilities.

5) Comprehensive data, as defined in LIPA-approved detailed business requirements for Phase 1, from, at a minimum, the SAP, Outage Management System/Pragma CAD (OMS/pCAD), Advanced Metering Infrastructure (AMI) and Customer Information and Billing System (CAS) source systems, is incorporated into the system in Phase 1 of the project.

6) Comprehensive data from, at a minimum, the Asset Management, Energy Management System (EMS), Distribution Management System (DMS) and Supervisory Control and Data Acquisition (SCADA) source systems, is incorporated into the system in Phase 2 of the project.

7) Detailed architecture, design, specifications, and configuration of the system is documented; and system O&M processes and procedures are established, documented, tested and trained for.

2. Project Deliverables

Multiple deliverables will be delivered through the course of the project. Major deliverables are listed below. Additional detailing of the deliverables is in the Work Plan.

Deliverable	Delivery Date	Comments
Project Plan	2/1/2022	PM assigned and Project Plan developed
Project Charter	2/1/2022	Identify and engage key stakeholders from PSEG LI, LIPA, and DPS
Current State Reporting and Analytics Inventory	3/31/22	Identifies existing reports and system access.
High Level Business Requirements and High-Priority Use Cases;	3/31/22	As described in the Technical Approach section
Data Assessment	3/18/2022	As described in the Technical Approach section
Master Data Analytics Project Plan and Long-Term Roadmap	3/31/2022	As described in the Technical Approach section
Systems Selection and Procurement Plan	6/30/22	Describes the planned system, including the base platform, optional components and tools, and any planned procurements
Detailed Business Requirements & Traceability Matrix	6/30/22	As described in Technical Approach
Reporting and Analysis Framework	7/30/22	Framework for analyzing and reporting, including timing / frequency, data accessibility, controls, and reporting processes
Architecture and Generalized Data Model	8/1/2022	As described in the Technical Approach section
Solution Implementation Plan	9/1/2022	Detailed plan outlining design, development, and build of reporting solution
Test Plan	9/1/2022	As described in the Quality Assurance Plan section
Test Results	12/1/2022	As described in the Quality Assurance Plan section
Fully tested, documented and deployed Phase 1 system, with all configuration items in CMDB	12/31/2022	Deployed Phase 1 system will satisfy all items in the Project End State and Success Criteria section,

		except for item # 6 which is specific to Phase 2.
Detailed design and specifications of final deployed system, including Architecture Diagram and updated hardware and infrastructure specifications, covering all environments; system O&M processes and procedures.	12/31/2022	
Project Close-out Report	1/15/2023	

2.1. Assumptions, Dependencies, and Constraints

Assumptions:

- Initial funding request will be approved to begin 1st phase of project (Discovery & Requirements) January, 2022.
- URB will approve capital funding required to deliver this project
- Appropriate resource (internal and external) will be available and ready at the start of the project - 2/1/22
- Additional risks, constraints and dependencies will be identified during Discovery phase of project
- The dates provided in the project plan for phases listed after the initial Discovery phase will most likely need to be revised once Discovery and Requirements phase is completed

Dependencies:
- LIPA approval of project plan

Constraints:
- Detailed project plans and timelines for design and build of the solution will be determined based on outcomes from Discovery & Requirements.
- Availability of appropriate expert resources from LI for project support and expertise.
- Availability of PSEGLI IT resources also working on storm remediation projects

3. Project Structure

3.1. Internal Project Organization

Role	Responsibilities
Executive Business Sponsor David Lyons	• Provide strategic direction and governance
Executive IT Sponsor Greg Filipkowski	• Manage issues and decision making • Remove obstacles that impede the success of the overall project • Provide strategic guidance • Challenge the project team where appropriate • Approve procurement of external parties (as needed)
Project Sponsor TBD	• Establish guiding principles for the project • Provide guidance and input on key project decisions • Monitor completion of activities • Challenge the project team where appropriate • Approve major changes to the project's scope, objectives, timelines, costs, etc. • Act as the decision maker for issues requiring escalation • Remove institutional barriers if and when they arise by serving as a project advocate
IT Project Lead Meena Malhotra	• Drive workstream tasks and deliver recommendations for Solution Design Specification • Provide input on requirement / design • Coordinate Business Resources to support the project • Key Point of contact to for questions from the vendor • Provide sign off for deliverables that require business input/acceptance • Deliver the project on time and on budget
Business Lead TBD	• Business process development, requirements definition • Reporting requirements, guidance and validation • Testing Execution
Project Team	• TBD

3.2. Other Stakeholders

The other key stakeholders involved in the execution of this plan are:
- LIPA
- LIPA Board of Trustees
- DPS
- Customer Operations and T&D Operations SME

4. Project Plan

4.1. Project Work Plan

A preliminary high-level work plan is presented below. The detailed work plan and schedule will be developed after the Discovery and Requirements stage and submitted by March 31st, 2022, as part of the Master Data Analytics Project Plan and Long-Term Roadmap deliverable.

Type	Task Name	Target Finish Date
Task	Develop Project Plan	2/1/2022
Task	Develop Project Charter	2/1/2022
Task	*Discovery and Requirements/Data Assessment*	*3/31/22*
Sub-Task	Document Current State: Reporting and analytics inventory and current system access	
Sub-Task	Conduct Stakeholder Workshops (PSEG LI, LIPA, DPS)	
Sub-Task	Conduct Data Assessment	
Deliverable	Data Assessment	
Deliverable	High Level Business Requirements, RTM and High-Priority Use Cases	
Sub-Task	Develop detailed plans	
Milestone	Master Data Analytics Project Plan and Long-Term Roadmap approved by LIPA	3/31/2022
Task	*Detail Requirements*	
Subtask	Conduct Detailed Stakeholder Workshops (PSEG LI, LIPA, DPS)	*6/30/22*
Subtask	*Create Requirements Traceability, define Use Cases*	*6/30/22*
Milestone	Detailed Business Requirements & Traceability Matrix approved by LIPA	
Task	*Solution Visioning/Evaluation*	
Sub-Task	Gap Analysis	
Sub-Task	Solution Visioning/Systems Evaluations	
Milestone	Systems selected	
Sub-Task	Procurements	
Task	*Design*	
Sub-Task	Reporting and Analysis Framework scope	
Sub-Task	Develop Technical and Logical Architecture	
Sub-Task	Develop generalized data model	
Milestone	Solution designed	
Task	*Build*	
Sub-Task	Build Development, Test and Production Environments	
Sub-Task	Serve data from Phase 1 Source Systems	
Sub-Task	Develop Phase 1 solutions	
Sub-Task	Test	
Milestone	System tested and documented	
Task	*Deployment*	
Sub-Task	Training	
Sub-Task	Production Go-live	

Milestone	Phase 1 Scope Delivered	12/31/2022

4.2. Risk Management Plan

Category	Project Risk	Mitigation
Resources	Not enough bandwidth for PSEGLI IT to support project needs	Review Resource Plan with SLT and plan for additional resources as needed
Resources	Timeline for onboarding of new external resources may impact overall project timelines	Begin process for background checks and onboarding as quickly as possible
Schedule	Depth of subject matter expertise on current configuration of SAP is inadequate	More time may be required by internal resources to investigate and complete tasks

4.3. Issue Resolution Plan

Issues and risks will be identified by the PSEG LI Team and the PMO. These items will be logged in an issue/risk tracker. The issue/risk tracker will be used to track items to closure, identifying the resolution date and course of action taken.

4.4. LIPA Reporting Plan

Monthly Reporting of Project Status will be provided to LIPA in accordance with the LIPA-specified requirements and processes for Board Recommendation Metric projects.

5. Technical Execution Plan

5.1. Technical Approach

The project will be conducted in two phases:

- The first phase (Phase 1) will focus on building a base platform, architecture and data model that can meet current and future reporting needs. It will include analysis and development of a plan and long-term roadmap, evaluation and any needed procurements

of systems and tools, architecture and data modelling, implementation of the system with comprehensive data, as defined by LIPA-approved business requirements for Phase 1, from the SAP, Outage Management System/Pragma CAD (OMS/pCAD), Advanced Metering Infrastructure (AMI) and Customer Information and Billing System (CAS) source systems, and deployment to PSEG LI, LIPA and DPS personnel.

- The second phase (Phase 2) will expand the system to incorporate comprehensive data from, at a minimum, the Asset Management, Energy Management System (EMS), Distribution Management System (DMS) and Supervisory Control and Data Acquisition (SCADA) source systems.

Detailed scope, deliverables, work plan and approach for Phase 2 will be developed after Phase 1. The remainder of this section will address Phase 1, which will include the following key steps:

1) Discovery and Requirements

The Discovery and Requirements stage will be comprised of two parallel efforts, one systems-focused and the other business-focused:

- (Systems Focus) Data Assessment – The Data Assessment will take a broad look at existing data to determine what is available and what is readily accessible. All PSEG LI data sources will be inventoried and assessed, including for data quality, data quantity, data classification impacts, and system/technical constraints and considerations. Data value will be assessed against business needs and against general guidelines and best practices on key data types for the subject matter. An existing reporting and analytics inventory will also be compiled.

- (Business Focus) High-level Business Requirements and Use Cases – Consultations will be conducted with all relevant business leads for all three stakeholders (PSEG LI, LIPA, DPS) to help define the universe of data that needs to be available in the platform long-term, identify the high-priority use cases, and determine the required functional and performance characteristics of the platform and tools.

These parallel efforts will inform the development of the Master Data Analytics Project Plan and Long-Term Roadmap, which will be the primary deliverable for this stage. The plan will include the detailed Phase 1 scope, work plan and schedule. Detailed Business Requirements & Traceability Matrix will also be developed and submitted for LIPA review and approval.

2) Solution Visioning/Evaluation

A gap analysis will be conducted between the business requirements identified in the Discovery and Requirements stage and the current state. Commercially available platforms and tools will be evaluated, the desired system state will be determined, and any needed procurements will be initiated.

3) Design

The system technical and logical architectures and a generalized data model will be designed, to develop a framework for a base platform that can support both currently identified and future reporting and analytics requirements.

4) Build

The system, comprised of the base platform and all tools and optional components, will be built in accordance with the specifications, including standing up Development, Test and Production environments. Comprehensive data from the source systems in scope for Phase 1 will be served on the platform in accordance with the developed generalized data model. Reporting and analytics for the Use Cases in scope for Phase 1 will be developed per the requirements, along with any supporting interfaces and integrations, and comprehensively tested and documented.

5) Deployment

The comprehensively tested and documented system will be put into production and deployed to all identified PSEG LI, LIPA and DPS users, along with sufficient training to allow the users to effectively develop their own reporting as well as run and leverage the deployed Phase 1 reports and analytics.

5.2. Quality Assurance Plan

Quality Assurance activities will be conducted throughout the project's life cycle and will include quality assurance reviews of all project deliverables.

A Test Plan will be designed and executed according to business requirements and specifications created for this recommendation and submitted for LIPA review. It will include the following: Test Strategy, Scope of Testing, Test Criteria, Tests to be Performed (including Unit, Functional, User Acceptance, Performance and End to End testing).

During the Test Phase, test scenarios and test scripts will be designed and executed according to business requirements and specifications. Defects, or testing outputs which conflict with the expected output, will be managed and addressed by the project team to ensure quality standards are adhered to in support of the system implementation.

Test scenarios, scripts, data and results will be shared with LIPA upon completion.

5.3. Documentation Plan

Throughout the project lifecycle the implementation team will document and deliver the key deliverables as listed above in Section 2. The due date of each deliverable will be based off the Project Schedule. A final Project Closure Document for Phase 1 will be delivered once all scope is delivered.

Revision History

Document	Created By	Reviewed By	Target Date	Distribution

Name	Date	Reason for Changes	Version
Dave Lyons	x/xx/2021	Initial Draft	1.0 draft 1