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11/2/2022

TO: The Honorable Mayor Eric Garcetti
The Honorable Members of the Los Angeles City Council

CC: Mary Hodge, Deputy Chief of Staff, Office of the Mayor
Matt Szabo, Chief Administrative Officer
Sharon Tso, Chief Legislative Analyst

FROM: Miguel Sangalang
Executive Director
Bureau of Street Lighting

% Michael Espinosa, Office of the City Clerk

COUNCIL FILE 22-0600-S56: Report on the Bureau of Street Lighting's Long-Term Plan to Address Lighting Outages due to Theft and Vandalism

(2022 Budget Recommendation / Bureau of Street Lighting / Copper Wire Theft / Outage Over-Concentration Area Priority / Disadvantages Communities)

Los Angeles is experiencing an epidemic of wire and power theft from streetlights – in five years, these incidents have increased by more than 600% – resulting in neighborhoods being left in the dark for weeks, sometimes months, before repairs can be made. Given the severity of the issue, the Mayor and Council instructed the Bureau of Street Lighting (BSL) to report on a comprehensive long-term plan to address theft and vandalism and prevent lighting outages.

In conjunction with formulating a long-term plan, BSL has augmented its response to wire and power theft in a multitude of ways: increasing maintenance crews dedicated to quick restoration of lights; creating a new fortification methodology and capital program to secure entire circuits of street lights (roughly equivalent to blocks); exploring solar and battery-enabled streetlights to reduce the need for copper wire; and deploying new technologies, such as armored pull boxes, sensors, and cameras to improve response times and build cases for future enforcement. These new efforts have been made possible by recent investments by the Mayor and City Council that are above and beyond our regular core Assessment revenues.

My analysis of the situation is that our *suite of approaches, the basis for our long-term plan, is still the best course of action* in response to theft, vandalism, and the issue of an aging street lighting network. But because of the considerable size of the network, existing damage, and flow of new incidents of theft and vandalism, *we will need considerable new resources and funding to respond to the current situation and address the issue in the longer term.*

After reviewing our data over the past three years, seeking out best practices, and testing new methods of securing our infrastructure, the Bureau has developed a comprehensive ten year operational and fiscal plan (10-yr plan) for the Council and Mayor's review. This 10-yr plan builds upon the suite of approaches that BSL has been piloting for the past few months and significantly augments field resources to solve Copper Wire and Power Theft (CWPT), and includes, but is not limited to, the following:

- Augmenting maintenance support crews by nearly 50% (40 new positions) (\$12M)
- Establishing a fortification program that will fortify 25% of the lighting system, ~56,000 lights, over 10 years (\$8.0M)
- Establishing a Battery-and-Solar-Enabled Lighting Program for deploying 1,000 solar lights in both emergency and permanent fixes (\$3.6M)
- Initiating a permanent Field Technology Program that will deploy sensors and cameras to increase deployment efficiency and help build cases for enforcement (\$1.5M)
- Committing initial funding to purchase two new yards (Valley; South East LA), amortized over 30 years (\$2.0M)

This 10-yr plan also takes into account other causes of lighting outages, which are related to the age and state of the infrastructure itself. As an example, around 50,000 of our first generation LED lights are now end-of-life and out of warranty. In the next couple years, these lights will eventually burn out causing possible outages in nearly a quarter of the network. To prevent these, and other problems, from becoming critical issues in the future, BSL is also proposing operational additions, including, but not limited to:

- Continuing the LED lifecycle replacement program to reduce lighting failures due to burned out bulbs (\$7.0M)
- Reestablishing a Pole Replacement Program (cut in 2010) that will replace poles over 75 years of age and in danger of falling over (\$15M)
- Creating a Conduit Replacement Program to help strengthen the underground network, prevent grounds, and prepare our streetlights for all future uses (\$6.5M)
- Augmenting Bureau support functions in Information Technology, Administration, as well as interdepartmental support, such as Fleet and Personnel (\$3.2M)
- Establishing a call center to address "2nd level" calls that require specific expertise, such as questions on the Assessment and field status inquiries (\$0.4M)
- Establishing a 3-year audit cycle of BSL to ensure proper use of funding (\$0.3M)

On an annual basis and when fully up and running, BSL's proposed plan would cost approximately \$125M per year. While this is almost four times the BSL's current maintenance budget of \$33M, it reflects the true cost of the size and scope of response needed to sustainably address the issues we face and keep the lights on. The Bureau is confident in its 10 year plan as laid out, but its ability to implement this plan will depend on new sources of funding. As mentioned in previous reports, 90% of the Bureau's main funding source, Assessments on properties, have remained the same since 1996. Without a new Assessment (achieved through a vote of property owners), or new funding, our response will be significantly restricted.

The following report provides:

- I. An overview of the current conditions and the scope of the challenges, demonstrating that *a significantly enhanced budget is necessary to address them*
- II. A summary of our newly augmented efforts in FY 22-23 and the strategic approach we have initiated to *prioritize hardening our infrastructure in areas of recurrent theft*
- III. An outline of our proposed 10 year plan to comprehensively and sustainably address the issue, which, among many other investments, will *expand maintenance and support crews by nearly 50%*.

I. BACKGROUND AND OVERVIEW OF CONDITIONS

BSL operates and maintains over 220,000 streetlights that cover 2/3rds of Los Angeles' 470 square miles. These streetlights are connected by a vast underground network of approximately 9,000 miles of conduit, and 27,000 miles of copper wire, and are powered by 18,000 DWP service points. As mentioned in previous reports, the system was originally designed with ease of maintenance in mind and incorporates nearly half a million access points of pull boxes (~300,000) and hand holes (~200,000). A field staff of approximately 180 are responsible for the maintenance of the entire system.

The Bureau's operations are primarily funded by an outdated assessment on benefiting property owners that is not capable of supporting contemporary maintenance needs. The terms of this assessment structure have been frozen since 1996, with any increases requiring a majority vote of the property owners under the Assessment (weighted by value). The total revenue of the Assessment has floated around \$45M over the past 6 fiscal years. At the same time, expenditures related to CWPT, which has traditionally been considered outside of normal maintenance, has grown nearly six-fold from \$1M to \$6M. In short, the Bureau's revenue and expenditures are unsustainable and do not properly address the issue of CWPT, which are more intensive, costly repairs beyond the Bureau's normal scope of assessed maintenance. In fact, it would take the Bureau ***several years to collect enough in revenue to address an incident of copper wire theft in a residential neighborhood***. In comparison, our goals for the Bureau are to fix an incident of CWPT within four weeks.

CWPT Expenditures Compared to Assessment Revenue

FISCAL YEAR	ASSESSMENT REVENUE (M)	CWPT EXPENDITURES	AS % OF REVENUES	CWPT INCIDENTS
FY 16-17	\$45.0	\$1,104,926	2.4%	378
FY 17-18	\$45.4	\$1,218,017	2.6%	603
FY 18-19	\$45.5	\$1,666,883	3.7%	1,282
FY 19-20	\$45.9	\$3,910,478	8.5%	2,692
FY 20-21	\$43.8	\$4,180,755	9.6%	2,878
FY 21-22	\$44.6	\$6,159,000	13.9%	4,534

For comparison, when analyzing the Bureau of Labor Statistics' information on CPI in the Los Angeles-Long Beach-Anaheim Area in the same time period of 1996 to 2022 (24.5 years), there is a 98.99% increase in CPI. In other words, had BSL just kept up with CPI, it would be collecting around \$90M instead of \$45M.

In Fiscal Year (FY) 21-22, The Mayor and Council added new resources to reduce the backlog of streetlight outages based off of new proposals from the Bureau to approach theft and vandalism from multiple avenues (which can be found in our previous reports: CF22-0156). For this FY (FY 22-23) these resources were more than doubled to a total of over \$13M and adds more solutions to the suite already being implemented by BSL.

Current Citywide Statistics

The City saw an all-time high for theft and vandalism incidents in FY 21/22 with 4,534. Based on the most current Copper Wire Theft data shown below, 1,713 more incidents were reported as compared to the April 19, 2022 report on the ***Issue of Lighting Outages Due to Theft and Vandalism***. An additional 447 incidents were reported as compared to the August 10, 2022 ***Public Works Update on Lighting Outages*** presentation. That is an increase of 61% within a 3-month span from April to June 2022, and a 58% increase from FY 20/21, with almost 1,600 more incidents. Chart 1 on the following page illustrates the rise and spike of CWPT incidents.

Chart 1: Copper Wire and Power Thefts Hitting New All-Time High

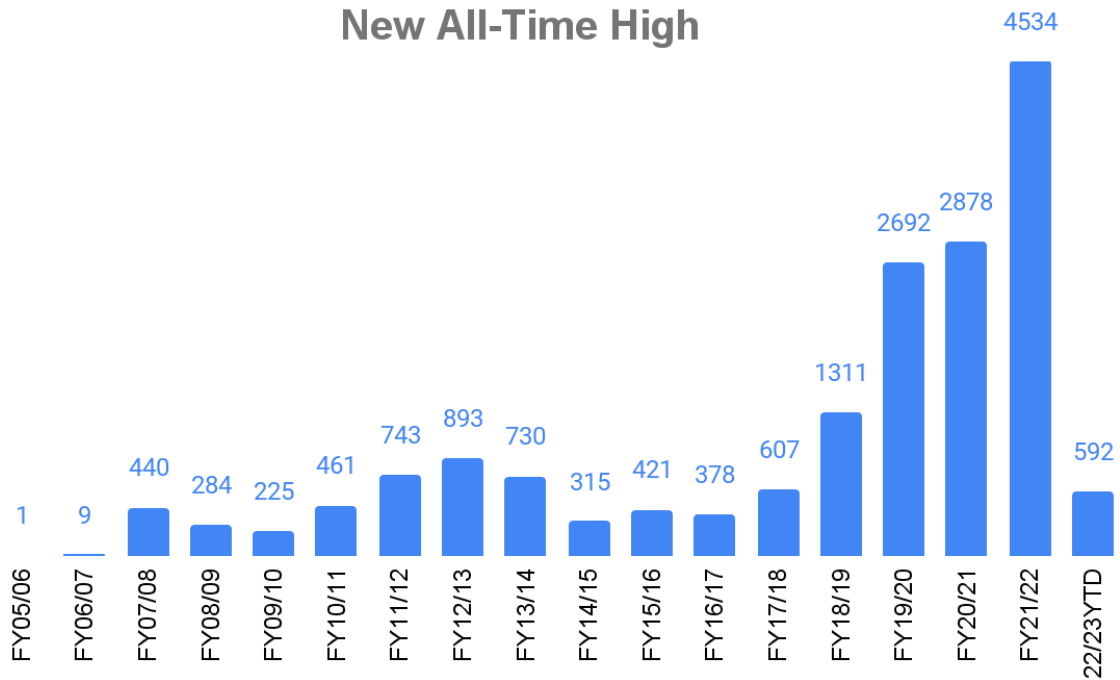
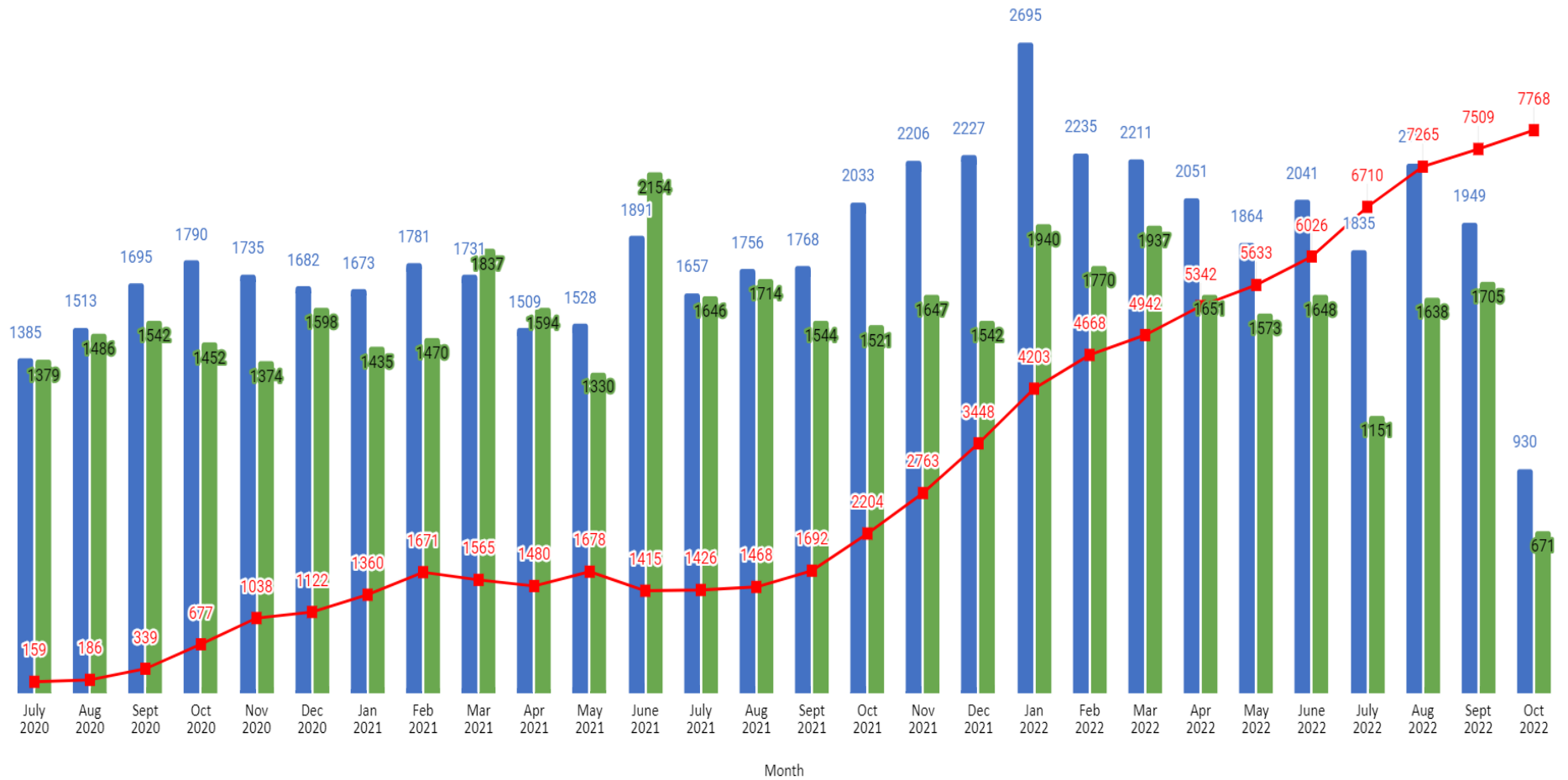


Chart 2 on the next page depicts the amount of incidents opened and closed on a monthly basis in relation to the ongoing backlog of unresolved incidents, which currently stands at more than 7700 incidents. There are a few points to note on the chart:

1. The start of FY20-21 we deployed more crews as we were given more resources compared to the previous FY.
2. Sept 2021 through Nov 2021 saw staffing levels fall due to higher than expected attrition and to COVID.
3. July 2022 saw significant staffing levels fall due to illness, including COVID.

The chart is indicative of the need for additional resources – staff, material, overtime – in order to even respond to the inflow of requests from residents and businesses. We do, however, also recognize that there may be duplicative requests for a single outage, and have put into place other measures, such as the Street Lighting Census based off of aerial photography and field inspections, so that requests can be compared to collected data based on need.

Chart 2: Street Lighting Incidents



■ Incidents Reported/Opened per Month ■ Incidents Closed per Month ■ Cumulative/Backlog

Current Citywide Response Times

A consistent complaint from residents is the length of time it takes for an outage to be fixed. Copper and wire and power theft incidents are among our most time consuming incidents, because they add several necessary and extensive steps to fully repair street lighting circuits. I recognize it as a major issue and it is proven out in our data.

In previous years, the share of CWPT incidents in comparison to all incidents was relatively small at around 2%. This has grown to nearly 20% this past fiscal year, or nearly 1 in 5 incidents being related to CWPT. Coupled with the fact that repairs due to CWPT are labor-intensive and time-consuming (as one repair can take multiple hours, if not days, compared to replacing a burned out LED which would be an hour at most), it is a large reason why all response times citywide are up. Table 2 below shows the average response time (days) for the top six (6) incident types closed in their respective Fiscal Year. With the steady increase in CWPT, the ongoing maintenance needs of the Street Lighting network have been impacted. As a result, response times were adversely affected, sometimes doubling between Fiscal Years.

One caveat to note is FY 22-23's significantly higher response times in all categories – even higher than expected with the increase in CWPT. A major reason for this is the method by which the data is collected and defined. BSL averages the response time based on the closed date of an incident, not the open date. We do this because the reverse would constantly change past years making them incomparable. This means that if a service request was closed in FY 22-23, but was opened in FY 21-22, the time would count *against* FY 22-23. During FY 22-23 we have been closing a high number of older incidents due to our expanded capacity and focus on CWPT hot spots, giving us a higher year-to-date average. With all the changes and efforts underway BSL is still confident that we can reduce response times by the end of FY 22-23.

Table 2: Average Response Time to Complete Incident - Days							
Incident Type	FY 16/17	FY 17/18	FY 18/19	FY 19/20	FY 20/21	FY 21/22	FY 22/23 YTD
Single Light Out	3.3	4.9	6.6	14.1	20.8	30.7	48.9
Multiple Lights Out	8.9	16.2	20.9	36.5	48.2	51.9	174.4
Copper Wire Theft	19.1	22.2	38.0	60.2	37.2	57.4	106.5
Power Theft *	N/A	N/A	N/A	N/A	60.4	47.6	61.4
Post Hit **	131.3	143.5	128.6	62.2	51.7	168.2	87.0
Conduit Hit	38.3	22.2	19.3	24.4	13.1	21.9	40.4
*Power Theft tracking started in 2020.							
**Post Hit incidents require longer repair times due to out of stock material and lead time on poles. Many post hit incidents remain open.							

Part of the reason I am confident that we will achieve a reduction in response times is due to other methods of assessing the data. At the request of the Public Works Committee, Table 3 shows the amount of CWPT incidents closed and the average response time per Council

District. At a more granular level it actually shows the impact of the additional resources received in FY 21/22 – In almost all districts BSL was able to close out more CWPT incidents and at a faster rate. This is attributable to the additional resources that BSL has received.

Another statistic to note is the change in Average Days to Close for CD 11, dropping from 70 days to 4 days. After further analysis, the Infrastructure Protection Division (IPD) found CD11's main issue is Power Theft. For FY 21/22, 72% of reported CWPT incidents in CD 11 were related to Power Theft. This explains the quick turnaround in resolving the incident, as our crews only remove all extensions/cords and restore the lighting as quickly as possible with minimal work. However, power theft incidents tend to recur almost immediately.

Table 3: Council District Specific Information						
CD #	# OF CWPT INCIDENTS CLOSED			AVERAGE DAYS TO CLOSE		
	FY 21/22	FY 20/21	% Change	FY 21/22	FY 20/21	% Change
1	209	138	51%	37	138	-73.3%
2	248	111	123%	76	111	-31.7%
3	162	171	-5%	63	171	-63.1%
4	197	43	358%	42	43	-1.3%
5	76	31	145%	39	31	27.1%
6	372	190	96%	55	190	-70.9%
7	251	65	286%	61	65	-6.8%
8	235	152	55%	54	152	-64.4%
9	808	643	26%	80	643	-87.6%
10	175	103	70%	52	103	-49.5%
11	111	70	59%	4	70	-94.6%
12	538	315	71%	55	315	-82.6%
13	268	134	100.0%	33	134	-75.3%
14	334	319	5%	54	319	-83.2%
15	243	78	212%	34	78	-56.9%
TOTAL	4227	2563	65%	49	171	-71.2%

Geographic CWPT Trends

Additionally challenging is the nature of theft and vandalism as it changes depending on location in the City. At the request of the Mayor and Council, BSL has further analyzed CWPT based on geography and demographics and has concluded that in the Metro-Southeast Los Angeles parts of the City there tends to be areas that are repeatedly hit by CWPT versus the Northwest and Northeast Valley parts of the City where there might be larger geographies of areas affected due to the more nomadic or sometimes linear nature of theft (moving block by block and stealing wire as the thieves progress). The past two years also saw a change in the share of incidents between the Valley and Metro areas of LA. Now, nearly half of all incidents are in the Valley areas of the City, whereas the previous year only saw about 33% of all incidents in the Valley, as seen in Table 4, which presents a deployment challenge as BSL only has a small shared

satellite office with 11 staff for the entire Valley and requires us to deploy out of our Santa Monica yard for most cases.

Table 4: Valley Districts Breakdown		
CD #	# Of CWPT Incidents Reported	
	FY 21/22	FY 20/21
2	259	118
3	162	185
4	211	46
6	495	222
7	360	68
12	582	324
Rest of CDs	2465	1915
Total	4534	2878
*46% of all reported CWPT incidents were in the valley FY 21/22		
**33% of all reported CWPT incidents were in the valley FY 20/21		

II. SUMMARY AND ASSESSMENT OF NEW EFFORTS IN FY 22-23 TO COMBAT CWPT

Current Copper Wire and Power Theft Replacement Program

In FY 21/22, the Bureau reorganized several divisions and created an Infrastructure Protection Division (IPD) to solely focus on implementing mitigation strategies and create new metrics that would provide adequate data control. In that same Fiscal Year, BSL's (IPD) worked with its Field Operations Division (FOD) to develop new Restoration and Fortification standards that Maintenance and Vandalism Districts will adhere to when repairing CWPT incidents. The following standards are described in Table 5 below.

Table 5: BSL Standards for CWPT Repairs	
Term	Definition
Restoration Lvl 1	Repair and restore lights on the circuit, epoxy pullboxes and/or handholes at vandalized location(s) only
Restoration Lvl 2	Repair and restore lights on the circuit, bury pullboxes and weld handholes at vandalized location(s) only
F22 - Fortified Circuit	Baseline fortification includes burying pullboxes, welding handholes, and relocating fuses to the top of the pole for <u>all</u> lights connected to a service point

FOD's Vandalism Districts can adhere to any of the three standards shown above, because they have the necessary staff and equipment needed to execute any of the three repairs. However, Vandalism Districts primarily focus on Fortification. The Maintenance Districts can only adhere

to Restoration Lvl 1 and Lvl 2, because they do not possess the same equipment and staff as the Vandalism Districts. Maintenance Districts primarily respond to all routine repairs (e.g. burned/broken light, ground on circuit, post hits) but have taken on Theft and Vandalism Incidents (affecting five spans or less) in recent years.

Since the inception of these new standards, BSL has worked with different Council Districts to address their CWPT priority areas. With the help of their discretionary funds, BSL has been able to complete the work shown in Table 6 below. BSL has spent \$750k in discretionary funds to prioritize CWPT repairs in CDs 3, 7, 8, and 12. BSL is expected to spend an additional \$978k in CD6 and CD9.

Table 6: Work Completed with CD Discretionary Funds								
CD	Total # of Circuits Repaired	# of Circuits Restored	# of Circuits Fortified	# of Lights Restored	# of Lights Fortified	# of Doors Welded	# of Pullboxes Buried	# of Spans Pulled
3	11	0	11	200	200	176	190	24
7	26	18	8	333	124	145	150	48
8	29	0	29	566	563	508	522	20
12	22	14	8	299	128	128	151	61
Total	88	32	56	1398	1015	957	1013	153

Defining Success for Fortified Circuits

CWPT incidents create substantial damage and complications that require extended repair times compared to other incident types. Historically, BSL's previous repair model would make repairs to all affected lighting systems promptly and immediately move on to repair the next circuit. The outcome was not always a true success, as perpetrators would go back to the recently repaired circuit and would steal the newly replaced copper wire again. Continuing with these repair methods was proving to be futile and not cost-effective.

Part of IPD's initiatives tested the effectiveness of various mitigation strategies including; vandal proof lids, power outlets, solar lighting, epoxy, and equipment relocation. The key mitigation strategy that surpassed all other pilot strategies was the complete fortification of street lighting circuits as described above in Table 5 - F22 - Fortified Circuit.

The overall objective of fortifying the street lighting circuits is to deter any repeated CWPT incidents. If BSL crews go to repair a street light or a circuit, the expectation is that the repair will be long lasting and keep the lights on for an extended amount of time. This, in turn, will help reduce the backlog and response times for routine street lighting maintenance issues, i.e. post hits, conduit hits, circuit grounds, and light outages due to non-vandalized issues.

A fortified circuit is deemed to be successful if fortification work prevents the copper wire from being stolen from the lighting system and keeps lights in operational order (or, as we like to say in the Bureau, if we “built our castle wall and the wall did not fall”).

To date, crews have fortified 116 circuits, with a 94% success rate of preventing further intrusion and keeping almost 2,500 lights on.

Approved Funding for CWPT FY 22-23

BSL was given a total of \$13.6M for the FY 22-23 budget to continue its efforts in combating Copper Wire and Power Theft (CWPT). These efforts include a **Strategic Fortification Plan**.

To effectively use the approved funding, \$10.2M was allocated for the continued support of the Copper Wire and Power Theft Replacement Program, \$1.6M was allocated for Citywide Solar Lighting, \$381K was allocated for the Council District 3 Vanalden West Bike Path Solar Lighting Retrofit Project, and \$1.5M was allocated for Sensors and Cameras to protect the street lighting system.

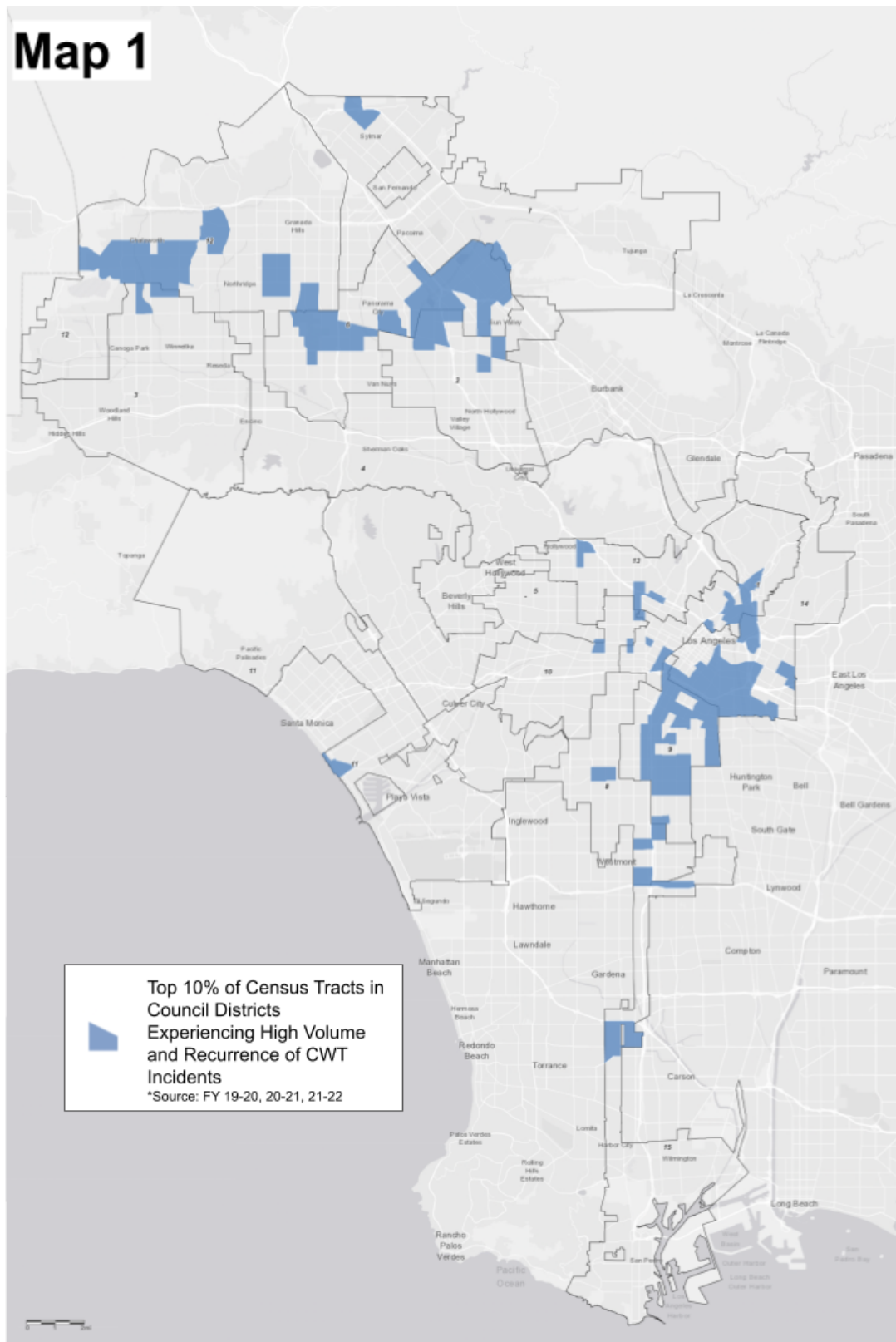
Strategic Fortification Plan

Historically, wire theft data has shown that CWT incidents are concentrated in hot spot areas in and around South LA and the Valley. Ultimately, it was determined that in order to truly fortify a hot spot, fortification of all street lighting components along the entire circuit must take place to prevent vandals from gaining entry in the future. Refer to Table 5 for details.

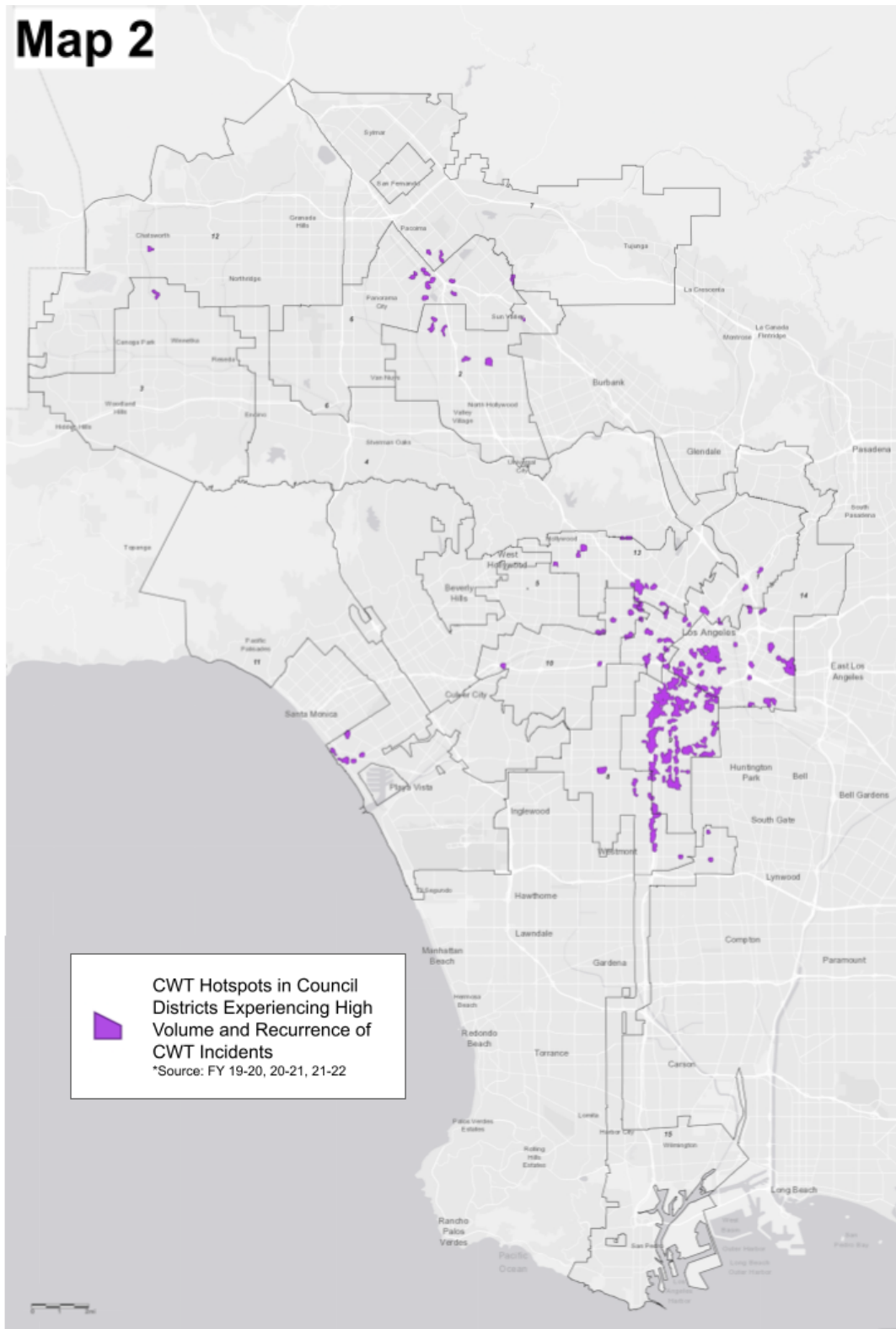
BSL’s Performance Management Unit (PMU) helped IPD develop a map which indicates areas in the city that have had a high rate/recurrence (hot spots) of CWT incidents within the last three Fiscal Years. With PMU’s help, IPD was able to develop a realistic approach to combating CWT Citywide, by listing which circuits will benefit from the new fortification efforts.

(CONTINUES ON NEXT PAGE)

Map 1



Map 2



Map 1 and Map 2 (above, Page 11 & 12) depict the circuits where BSL will deploy their Strategic Fortification Plan through its Vandalism District. The purple clusters on Map 2 represent Copper Wire Theft (CWT) hotspots in Council Districts experiencing high volume and recurrence of incidents in the last three fiscal years. BSL will deploy current CWT resources received for FY 22/23 focused on completely fortifying Street Lighting Circuits (F22 - Fortified Circuit Standard). The blue zones on Map 1 represent the top 10% of Census Tracts in Council Districts Experiencing High Volume and Recurrence of CWT Incidents in the last three fiscal years. Using Map 1, BSL will initiate discussions with the various Council District Offices to gather their input on the impact of CWT in their districts and get a sense of where they are experiencing CWT. BSL will inquire about the top three (3) priority areas that are centered in and around these high CWT census tract areas where BSL will also deploy resources to perform complete fortification of Street Lighting Circuits. This strategy will be a more collaborative and strategic effort between the affected council districts and BSL and result in a reduction of response time and prevention of future CWT incidents.

As mentioned above, as part of the **Current Copper Wire Replacement Program**, maintenance districts will also support the CWT prevention efforts by performing Street Lighting Circuit Restorations (Lvl. 1 and Lvl. 2) during the course of their normal maintenance operations. These restoration efforts aim to quickly restore lighting to the community while also preventing CWT.

With these current strategic efforts, BSL expects the following outcomes:

- Lighting in many more communities will be out for shorter periods of time
- Theft of Copper Wire will be deterred and the resulting outages will occur less often
- BSL will be able to reduce their incident backlog
- In preventing CWT, Maintenance Crews will be able to respond to more community requests

Redeployment of Field Crews

Due to the high level of wire theft, the extensive backlog of street lighting incidents, and the vast area of the Valley, the BSL has implemented changes to staff assignment and deployment for the Valley region within the last two months.

Historically, there has been one Valley maintenance district made up of approximately 11 crew members and a Supervisor and one Valley CWPT district, working out of a shared yard space in Van Nuys. In September 2022, a second (East) Valley “district” was added, to split the territory of the Valley in two, with the new district operating out of our main field office on Santa Monica Blvd due to space constraints at the Van Nuys yard. The East Valley district is responsible for responding to lighting incident repairs east of Woodman, and north of Mulholland to the City limit. The changes to the assignments in the Valley resulted in a reduction of 120 incidents in the Valley in the past month and a half.

Effective October 23, 2022, further changes were implemented for logistical purposes, to address inefficiencies, and to streamline both maintenance and CWPT repair efforts. At that time, the remaining maintenance crews moved from the Van Nuys yard to the main Field Office location, where all but one maintenance district is centralized. At the same time, additional CWPT crews and resources moved up to the Van Nuys yard, which will operate solely as a CWPT response center for the Valley region. Additionally, two more crews were sent to our West District satellite yard, and now service the valley area west of the 405 freeway.

Lastly, in addition to the changes noted above, a dedicated inspection crew was created to respond to and properly assign 311 reported outages to the proper street lighting jurisdiction (i.e. maintenance or vandalism), saving crew time from going to job and not having the manpower, tools, or materials necessary to complete a given repair. A second inspection crew will be added following the hiring of another crew leader in one month. At this time, each crew can inspect approximately 30 incidents per day.

It is anticipated that the above changes will have a positive impact on repair times and reduction of incidents due to the following:

- Half of all reported incidents in the Valley were related to CWPT in FY 21/22. Staffing up these crews and focusing on this work in that area will allow for concentrated focus on major repairs that tend to affect many street lights across these areas;
- Centralized maintenance crews will allow for crew makeup changes in case of employee absence or specific job needs;
- Splitting the Valley into three district jurisdictions allows for crews to become more familiar with distinct areas and provide more tailored services accordingly;
- Ramping up Restoration and Fortification efforts in one of the most impacted areas of the City will provide the BSL with good pilot areas in which to assess successful methods of response, as well as methods/procedures that warrant improvement.

New Design and Construction Specifications

To protect and harden future street lighting systems, the Bureau issued a Directive on September 8, 2022, requiring fortification specifications on all new street lighting installation plans. This policy change requires the implementation of street lighting reinforcement methods to below ground and above ground street lighting circuits whenever a new street light is installed or relocated. This affects the construction of all new street lighting done by our Field Operations Divisions and contractors and will be a proactive measure to protect the street lighting system.

Solar Program

As a copper wire theft mitigation strategy, long-term solution, and overall sustainability effort, the BSL has several solar lighting pilots in progress for FY 2022-23. Using solar lighting fixtures eliminates the need of reinstalling copper wire that provides power to the light fixture – theft

cannot occur when there's nothing to steal. This investment will help reduce the cost of materials and labor repairing theft and vandalism, keeping the lights on.

In the past, solar lighting fixtures have had their own share of problems, including battery life and theft and vandalism of the battery bank found at the base of the street light pole. In the new pilot, BSL is using the latest battery and solar technology with integrated fixtures that house the majority of the components at the top of the luminaire, reducing the threat of tampering or theft.

1. The BSL applied for funding from the LA City Innovation and Performance Commission's Innovation Fund and was granted funds to launch a Solar Lighting Pilot program aimed at achieving multiple outcomes at once: the prevention of "lights out" due to theft and vandalism; the reduction of Greenhouse Gas emissions through less energy consumption from the grid; and the increased resilience of neighborhoods through infrastructure that can work through any emergency.

Sixty-five solar lights were purchased through the grant, and are currently being deployed in copper wire theft hot spots throughout all 15 council districts. All 65 units will be deployed and evaluated, by no later than December 2022.

2. Bike Path Lighting: The BSL piloted five solar lighting fixtures along the LA River Bike Path near Elysian Valley, where repeated vandalism and theft had caused ongoing outages. The five solar units were installed to provide temporary emergency lighting until permanent repairs could be made by our field crews. These units proved to be very effective as they provided sufficient lighting to illuminate the bike path. We are currently testing six solar lighting fixtures, of which two were installed on 7/26/22 along the bike path. Four other solar fixtures were installed in various locations for roadway lighting applications.

In the FY 22-23 Budget, the BSL received funding for solar lighting along the entire portion of the CD3 bike path between Vanalden and Mason (119 units). We are currently working with solar lighting manufacturers to test units, and assess what technology can work with the existing ornamental light style. The BSL will finish evaluation of the options, purchase, and convert the entire existing system to solar by early 2023.

3. BSL was provided \$1.6M funding through the FY 22-23 budget for Citywide solar street lighting. The Bureau is working with solar manufacturers to ensure these lighting fixtures pass necessary BSL lighting requirements to be approved LED Fixtures for roadway lighting. Currently, the solar lights are approved for emergency lighting or pedestrian/bike path lighting. Ahead of full testing, BSL will purchase 20% of the solar fixtures for deployment as soon as possible.

Smart City

The Bureau of Street Lighting received \$1.5M for SMART City Technologies, Sensors & Cameras in the current FY budget, as an additional means to protect the street lighting network. The plan is to use \$750K to purchase cameras to aid in enforcement and prevention, \$500K to purchase smart nodes, and \$250K to purchase nodes, sensors, and cameras based on need.

Our IT Division is currently testing cameras to be installed on street lights in high CWPT areas. Once evaluated, cameras will be purchased and deployed by the end of this calendar year. With the deployment of cameras, the goal is to potentially catch CWPT activity to help LAPD in apprehension. Cameras will be strategically placed in areas of repeated CWPT and in those areas where circuits cannot be completely fortified, due to the material of the street light. We will also look into areas where illegal dumping is a nuisance. Recycling centers are another option in hopes to catch any perpetrators selling the stolen wire.

To help monitor the CWPT restoration and fortification efforts, smart nodes are being installed on all lights within the repaired circuit. The advantage of installing nodes on fortified lights is it allows us to get immediate alerts via email when line voltage goes to zero. This will potentially allow us to notify LAPD during the act of copper wire being stolen, as well as track the success of the fortification efforts. Being able to rely on instant notifications of street lighting issues, instead of depending on constituents to report outages to 311, will be a major advantage to our response and monitoring activities.

Enforcement

Enforcement of Copper Wire Theft has been an ongoing issue for the Bureau of Street Lighting. Wire theft can happen within minutes, so catching a perpetrator in the act is hard to do. Since 2006, the Bureau has worked with other City agencies, State Officials, the City Attorney's Office, the District Attorney's Office, the Los Angeles County and LAPD to formulate various solutions to this problem. Based on the results of this collaboration, various measures have been taken as identified below.

- Amendment to Penal Code 344 which imposed additional requirements on recycling centers that would be purchasing the copper.
- Neighborhood awareness campaigns throughout the years to inform neighborhoods to be alert with any suspicious activity.
- Changes to street lighting designs to use a lockable pull box with a polymer/concrete pull box lid.
- Street lighting designs in isolated locations such as bikeways either do not have pull boxes or have these buried under concrete.
- The State of California initiated a new law, AB 844, that significantly helps deter metal theft by increasing the crime to a felony.
- The Bureau implemented a pull box prevention program that installed lockable lids to deter copper wire theft. This is successful at the location installed but seems to move the problem to those areas not secured. The City has over 250,000 pull boxes Citywide.
- Work with City Attorney's office to identify appropriate Penal Code sections, to which LAPD can charge those engaged in the theft of wire or power, or vandalism of our street lighting system: 487a, 487j, 498(b)(1-5), 591, 490.2, 594

At this time, there is no practical way for the BSL to enforce the Copper Wire Theft issue as it is not equipped, designed, or designated to do so. We are, however, focusing on building cases with the information we do have, and using the technology above, to aid the LAPD and City Attorney to successfully prosecute perpetrators.

Since May 15, 2022, a Management Analyst from our Field Operations has been working weekend overtime to file police reports for Copper Wire Theft incidents. The goal is to document and quantify the issue, outside of our internal records. So far a total of 63 police reports have been filed in person throughout various precincts. The total loss reported is over \$673,000 (from only the 63 incidents mentioned) and counting. In addition to the \$673,000, BSL has also spent almost 200 hours filing these 63 police reports. We believe it is important to document and file police reports but are constrained by reporting and resources to report crimes.

There are challenges to filing police reports to document the BSL's loss to theft, including some restrictions that online reporting (the easiest method) can only be used for loss less than \$5,000 – CWPT incidents can easily go to \$20,000. Reports must be filed at the police station assigned to the area of the theft if above the \$5,000 threshold. This requires BSL staff to drive all over the City to make individual police reports, which also have different filing practices.

Please note that in past budget cycles, the BSL has requested resources for in-house enforcement of CWPT/Power Theft, as well as for funds for contracted Private Investigation services to monitor scrap and recycle centers to help enforce the purchase/transfer of stolen street lighting wires.

These efforts have accounted for approximately 21% of our restoration funds with an average of \$434,000 per month towards combating CWPT issues. We are confident that once we are able to staff up completely, it will reinforce our resources to help contribute with backlog reduction and improve our CWPT data citywide.

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III. OUTLINE OF PROPOSED 10-YEAR PLAN

The following is the proposed 10-yr plan for the Bureau and captures the current issues areas while preparing to head off future problems. The 10-yr plan can be broadly categorized into four major parts: maintenance, System Protection, Lifecycle Replacement, and Support Services. These parts are described after the table. Attachment 1 of the report is a spreadsheet that contains the details behind the high-level summary below. Note that the summary DOES NOT total to \$125M. For ease of reading and understanding, more detailed items, such as related costs, were kept in Attachment 1.

Category	Item Name	Cost
Maintenance	Current Maintenance Budget (Excludes CWPT)	\$33.0 M
	Items funded through other sources (General Fund or Gas)	
Maintenance	CWPT Replacement Program	\$5.8 M
System Protection	CWPT Replacement Enhancement, inc. Fortification	\$6.0 M
System Protection	500 Battery-Enabled Solar Lights	\$1.6 M
System Protection	Smart Cities Field Technology	\$1.5 M
	Subtotal	\$14.9 M
	New items Proposed as 10-yr plan	
Maintenance	Additional Maintenance Support	\$12.0 M
System Protection	Battery-Enabled Solar Deployment	\$2.2 M
System Protection	Additional Smart Cities Field Technology	\$1.8 M
System Protection	Fortification of Street Lighting Circuits (F22 standard)	\$4.5 M
Lifecycle Replacement	LED Lifecycle Replacement	\$7.0 M
Lifecycle Replacement	Streetlight Pole (electrolier) Replacement	\$15.9 M
Lifecycle Replacement	Conduit Replacement	\$6.4 M
Support Services	GSD; PER; Internal Info Tech; Administration; Call Center; Audit	\$3.7 M
Support Services	New Yard	\$2.0 M
	Subtotal	\$55.5 M

Maintenance

Before the adoption of LED technologies, maintenance generally consisted of the replacement of high-intensity-discharge fixtures that had burned out and related fuses. Despite the rapid pace of these types of outages and the size of the City, the BSL staffing levels (~180 field staff) were able to address these outages in quick succession as it did not require extensive repairs. In comparison to today, more maintenance is due to theft or vandalism which takes several hours, if not days, to complete. Now, these maintenance crews typically work on theft and vandalism incidents that are affected by thefts that span less than five streetlights. Conversely, the additional strengthening of street lighting infrastructure and reduction of maintenance access has increased the amount of effort to troubleshoot issues that would have otherwise been relatively quick fixes. By hardening the system we now require heavier equipment to go into and fix the streetlights.

Our estimation is that, given the types of outages and increased difficulty of work, it would require an additional ~\$18.0M increase in the maintenance budget on top of the current \$33.0M annually budgeted to comprehensively address theft and vandalism and regular maintenance. The increase will go towards adding an additional 50% staff in the maintenance crews.

If properly resourced, our estimation is that we would be able to achieve the following outcomes:

- Improving response times for minor outages (e.g.: single lights out due to light failure, specific grounds) to 4 days. (FY21/22 saw responses at around 30 days)
- Improving response times for major repairs (e.g.: larger outages due to system failures which may include theft) to 14 days. (FY21/22 saw responses at around 60 days)
- Increasing the number of poles painted per day to 17, which extends pole life.

System Protection

As mentioned, the lighting system was designed with ease of access and maintenance in mind. To harden the lighting system would essentially require a reengineering of its design and a major capital program to undertake the issue. BSL believes that the suite of responses which has been formulated the past two years – fortification, new technology deployments, solar lighting – is the most effective way to address problematic recurring issues of CWPT. While a quick reaction would be to fortify the entire system completely as soon as possible, BSL does not see that as feasible within the 10 year span because of the amount of effort and money required for fortification (previously estimated at \$400M), and that it would make maintenance considerably more difficult and costly. Our advice is to use strategic deployment of these suites of responses and adjust accordingly.

Our estimation is that it would require ~\$17.6M in the line items categorized as System Protection to create a suite of responses that would build effective 'castle walls and watchtowers' to protect the street lighting system. This would include additional crews that are dedicated to fortification capital work, which secures entire electrical circuits, and the purchase of new technologies.

If properly resourced, our estimation is that it would contribute to the outcomes listed in maintenance. The funding would achieve:

- A new solar replacement program that deploys 1,000 battery-enabled solar lights per year
- The complete fortification of over 5,600 lights per year, with the 10 year goal of fortifying 25% of the total system.
- The establishment of 100 sensor assets beyond smart nodes throughout the system to monitor and report on issues in real time.

Lifecycle Replacement

One of the most daunting challenges on the horizon is the lack of a lifecycle replacement strategy. While the poles and pipes of the streetlighting network have exceeded most life span expectations, with some infrastructure in the field approaching a century's worth of work, we consider the average lifespan of the pole to be 75 years and the average lifespan of conduit to be 50 years. Conduit can deteriorate over time or vegetation growth can damage conduit and wires, causing electrical grounds. Poles, if uninspected and deteriorated, can cause damage and liabilities for the City should they fall. Most pressing is the issue of LED replacements, as I mentioned in the summary. Without a maintenance plan to replace failing LED fixtures, thousands to tens of thousands of streetlights can go out every year.

Our estimation is that it would require ~\$26.0M in lifecycle replacement programs that cover conduit, electroliers (poles), and LED fixtures in order to keep the system in good working order.

If properly resourced, the funding would achieve:

- An ongoing 10 year LED lifecycle replacement program replacing 10% of the fixtures each year. The lifespan of an LED is currently 10 years, as is their warranty.
- The replacement of all electroliers above 75 years of service.
- The replacement of 51 miles of conduit on an annual basis to prevent electrical grounds and ensure sufficient capacity in the system for the use of new technologies, including the sensors and smart nodes mentioned in the *System Protection section*.

Support Services

Our ability to marshal staff, equip them with the right tools and technology will depend on support and administrative services both within and outside of BSL. As the Bureau grows, the demand for such support will only increase.

Our estimation is that it would require ~\$5.7M in order to properly resource additional support functions, including the purchase of at least one new yard. One point to note is our suggestion of a 3-year audit. Given the magnitude of change and funding involved, we believe it prudent to place checks and controls to improve public confidence on how their Assessment is being used.

RECOMMENDATIONS

As directed by the Mayor and Council, this report details a long-term plan to comprehensively address copper wire theft and lighting outages. This report also highlights other critical issues, such as the frozen assessment and regular maintenance needs that may have detrimental impacts to the lighting network over time. Much of what I propose will require deliberation given the size and scale of the problem and solutions. With that in mind, I recommend that the City Council:

1. Instruct CAO, working with BSL and other departments as necessary, to analyze the 10-yr plan proposed by BSL and determine the appropriateness of its plan of action and accuracy of its costs. This analysis shall also be used to inform the Ordinance of Initiation (CF22-1236) currently being considered by Council, which is requesting the City Attorney and BSL to return with an ordinance that presents a path towards updating the BSL's Assessments.
2. Approve BSL's deployment proposal regarding Fortifications: allotting 3 circuit fortifications per impacted council district based on Census tract information and the input of the relevant Council Office; allotting remaining funds to be put towards BSL's high-impact list that takes into account repeated outages due to CWPT.
3. Instruct BSL to include Restoration, Fortification, and a New Yard budget requests as part of their submittal for the Mayor's Proposed Budget to be considered by the Mayor and Council.
4. Instruct BSL to pursue two senior project coordinator positions to augment and assist in the response to CWPT given the volume of requests and need for greater collaboration and information sharing.
5. Request the Mayor's Office lead a copper wire theft working group to help find other solutions, such as legislation, that can help abate theft and vandalism.