CITY OF GLENDALE, CALIFORNIA
REPORT TO THE CITY COUNCIL

AGENDA ITEM

Report: Solar Energy on City Owned Properties – Report to File, and to Authorize the General Manager of GWP to Issue an RFP using Engineer-Procure-Construct (EPC) Method for Six Proposed Project Sites.

1. Motion to Note and File the GWP Solar PV Development on City Owned Properties and DER Hosting Capacity Analysis and Update.

2. Resolution authorizing the General Manager of GWP, or his designee, to prepare a Request for Proposal (RFP) using the Alternative Project Delivery Method for the Engineer-Procure-Construct (EPC) of Solar PV Systems at the following proposed project sites: 1) Glendale Sports Complex Parking Lot, 2) Montrose Parking Lot 3, 3) Utility Operations Parking Lot, 4) Brand Landfill, 5) Fire Station 21, and 6) Glendale Central Library, and authorizing the City Clerk to solicit proposals.

COUNCIL ACTION

Item Type: Action Item

Approved for **October 25, 2022** **calendar**

EXECUTIVE SUMMARY

In July 2021, GWP began working with consultant, Black & Veatch, on the Solar PV Development on City Owned Properties and DER Hosting Capacity Analysis Project. The scope of the project sought is to identify the viability of installing solar PV systems on city owned properties, and to conduct a comprehensive analysis of the DER hosting capacity of the electrical distribution infrastructure.

The solar PV scope of the project included a list of 101 properties which were evaluated following a multi-step approach to determine if the conditions of the sites allowed for further consideration for installing solar. The process included an in depth analysis of current site conditions, solar modeling, structural and engineering reviews, and permitting considerations to determine if each site were to be included in the final list of viable sites for solar. Upon completion of the study in August 2022, 65 sites were identified as viable locations for solar PV installations.

The DER hosting capacity scope of the project analyzed the entire electrical distribution network to identify the maximum amount of distributed PV penetration levels for each of the 100+ distribution feeders. The intent of the DER hosting capacity study was to identify the hosting capacity ranges for each distribution feeder and to establish the maximum DER capacity without affecting the systems reliability or power quality.

COUNCIL PRIORITIES

Environmental Stewardship: GWP is continuously working towards providing cost-effective and sustainable energy to its commercial, business, and residential customers to meet the renewable and clean energy procurement and emission reduction goals.

RECOMMENDATION

Note and file this GWP Solar PV Development on City Owned Properties and DER Hosting Capacity Analysis Update, and approve a resolution authorizing the General Manager of GWP to prepare a RFP using the Alternative Project Delivery Method for the EPC of Solar PV Systems at the Glendale Sports Complex Parking Lot, Montrose Parking Lot 3, Utility Operations Center Parking Lot, Brand Landfill, Fire Station 21, and Glendale Central Library, and authorizing the City Clerk to solicit proposals.

BACKGROUND

GWP's mission is to provide clean, reliable, and affordable power to the diverse citizens and businesses of Glendale 24 hours per day, 365 days per year. This objective is currently met with a portfolio of demand-side and supply-side resources. Supply-side resources include local gas-fired generation from the aging Grayson Power Plant; local distributed solar generation; distant coal fired, hydro, nuclear, and renewable energy supplies, and a portfolio of transmission ownership rights and long-term transmission lease rights. GWP operates within the Balancing Area of the Los Angeles Department of Water and Power (LADWP) under a Balancing Authority Area Services Agreement with LADWP. Glendale is forging a leadership position in the acquisition of renewable energy and carbon allowances in both the short term and long-term markets.

GWP is faced with the imminent retirement of its largest generation resource, the natural gas-fired Grayson Power Plant, located within the City's boundaries. GWP is extremely transmission constrained, and must replace the retiring Grayson units with reliable local generation. The retirement of Grayson presents GWP with an opportunity to shift to cleaner, more efficient technology to power the City in the future.

In June 2021, the City of Glendale awarded the City of Glendale Solar and Storage Owner's Engineer (OE) project to Black & Veatch. The scope of the project included two components: (1) A comprehensive electric distribution feeder PV hosting capacity study, and (2) The development of a comprehensive plan for the City of Glendale to develop, own, operate and maintain solar and storage on City owned properties in the City of Glendale.

ANALYSIS

1. SITE ASSESSMENT AND DESIGN BASIS FOR SOLAR PV ON CITY OWNED PROPERTIES

GWP staff identified an initial list of 101 City owned sites where there were no evident permitting issues with deploying solar PV. The site list included sites for rooftop solar PV, parking lot canopies, landfill sites, and reservoirs. Staff from the 14 Citywide departments were included in the initial site selection and the feedback received helped

determine the initial list of 101 sites.
In order to make the site data collection and survey effort more efficient, Black & Veatch used gating steps, as show in Figure 1 below, where each site had to clear the prior step to proceed with the next review step. This approach also helped maintain the focus on the sites that are well-suited for solar and /or battery energy storage system (BESS) installations according to the various deployment factors.

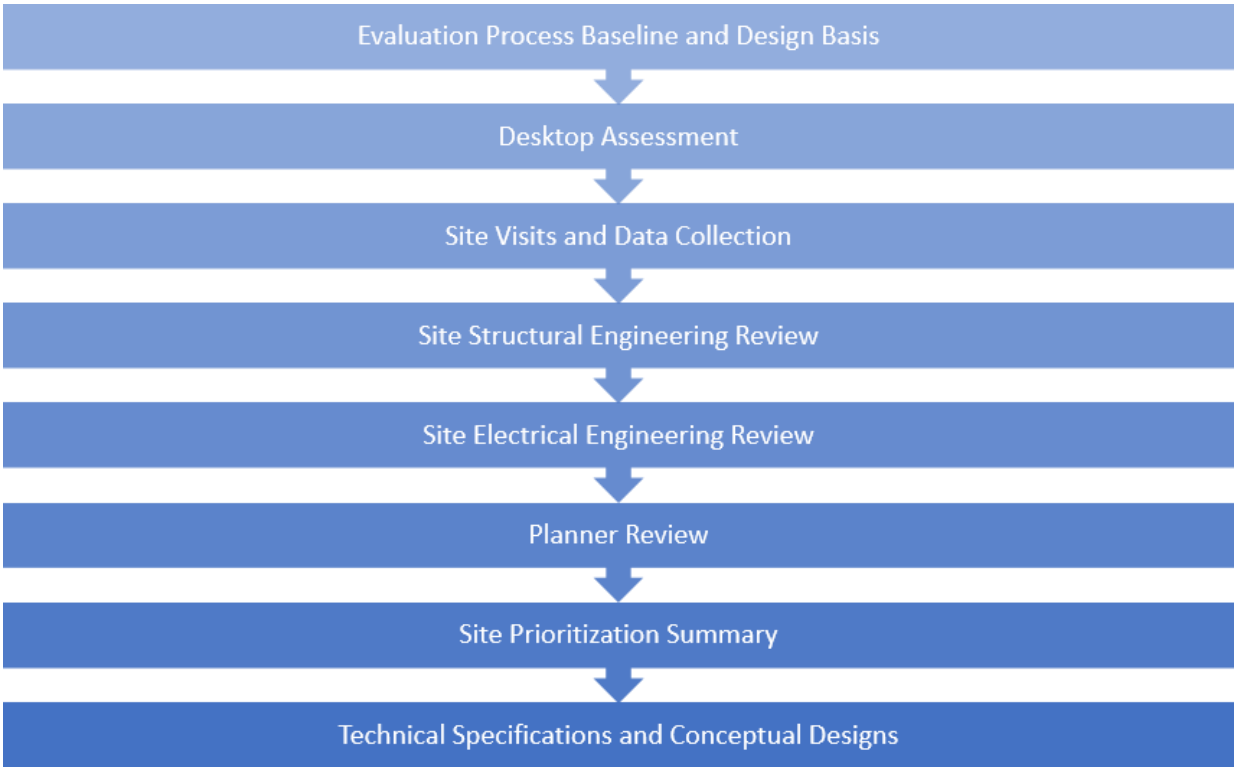

Figure 1: Site Gating Steps

Evaluation Process Baseline and Design Basis

The Black & Veatch team worked with the GWP Electric Engineering team to set the evaluation process baseline conditions and to confirm the list of sites for evaluation. This process included the following considerations and established the inputs for the Design Basis:

- Site considerations and corresponding solar technology options for the site.
- Site layout and design considerations, as well as performance criteria assumptions that were used as inputs for creating preliminary solar resource assessments using Aurora Solar Design Software.
- Site minimum size thresholds and site bucketization methodology for creating site prioritization notes, which helps prioritize project that maximize kilowatt hour (kWh) production and minimize $/watt installation cost.
- Equipment specification sheets that were used as assumptions for the analysis for the project.
- Sites with apparent constraints were suspended during this step and further analysis was not performed for them.

GWP is in the process of deploying utility scale BESS to support the utility grid. Hence, for this project, smaller distributed battery systems will only be considered for the high priority sites to provide resiliency during a power outage or emergency event.

Desktop Assessment

The next step in the screening process included conducting desktop assessments for the potential sites using Aurora Solar Design Software and included the following steps:

- Modeling the roof footprint available space for rooftop solar locations and carport and ground mount potential for parking lots, landfills, and reservoirs using map imagery.
- Analyzing available space for solar PV equipment according to the following:
    - The roof footprint and parcel boundaries.
    - Surrounding trees and shading structures.
    - Existing obstructions.
    - Setback and clearance according to the City of Glendale Building, Fire and Municipal Zoning code requirements.
- Generating the solar irradiance map for the site according to the site model and local weather data set.
- Using a Total Solar Resource Fraction cutoff of 65 percent, site energy requirements and economics, to suggest a solar PV system size for the site.

Sites that did not meet the minimum size threshold, as set in the Site Assessment and Design Basis, were suspended during this step and further analysis was not performed for them.

Site Visits and Data Collection

After the desktop assessments were complete, the Black & Veatch team conducted site visits for the active rooftop sites to validate the desktop assessments and collect major structural, electrical, and constructability information including major electrical equipment, electrical connections, and apparent roof age and condition. Additional site constraints were identified for some sites during site visits, and these sites were suspended during this step and further analysis was not performed for them.

Site Structural Engineering Review

The sites were further reviewed for assessing structural constraints and included the following considerations:

- System and equipment layout review.
- Site suitability review of rooftop solar technologies suggested for each site including suitability analyses for roof mount systems and roof gravity and seismic analyses.
- Site suitability review of parking structures for carport technologies suggested for each site including suitability review for carport systems, parking structure gravity and seismic analyses.
- Site suitability review of landfill sites for ground mount technologies suggested for each site.

The site structural reviews were performed using the best available information (or appropriate assumptions), including data gathered during site surveys and applicable codes and standards for the systems. Sites that could not meet the minimum size threshold according to the gravity or seismic analyses were suspended during this step and further analyses was not performed for them. Sites with insufficient structural information were also suspended and further analysis was not performed for them.

Site Electrical Engineering Review

Electrical reviews were conducted on the sites following the structural reviews and included the following considerations:

- Interconnection review including an assessment of existing electrical service capacity and ratings and determination of proposed interconnection method.
- Proposed areas for equipment placement.

The site electrical engineering reviews were performed using the best available information along with appropriate codes and standards for solar systems including any data gathered during site surveys.

Planner Review

After the completion of conceptual layouts for sites with carports, the Black & Veatch team coordinated with the City's Planning department to review the proposed solar canopy designs. During this review, the Planning department provided feedback on the minimum parking stall dimensions, existing light standards, landscape preservation requirements, future proposed construction, and historic sites. Black & Veatch documented the feedback received, and these considerations should be noted during the planning as well as detailed design phase for the carport solar projects.

Site Prioritization Summary

The site prioritization summary includes notes from engineering and planner reviews and solar rough order of magnitude cost assumptions. Black & Veatch used Wood Mackenzie's interactive US solar PV costs model to provide rough order of magnitude costs for the various system sizes and types listed in Figure 2. The rough order of magnitude costs is based on Association for the Advancement of Cost Engineering (AACE) Class 5 estimates and are intended to be used for budgetary purposes.

This model utilizes a bottom-up methodology to provide U.S. solar PV system prices and costs from the perspective of the seller in $/watt. System price forecasts are in real 2022 U.S. dollars. The methodology is available upon request.

System Size and Type	Budgetary Cost ($/watt)
100 kW Rooftop	2.20
250 kW Rooftop	2.07
500 kW Rooftop	1.98
1 MW Carport	2.97
1 MW Ground Mount - Fixed Tilt	1.55

Figure 2: Budgetary All-in System Cost by System Size and Type

Conclusions and Next Steps

According to the site review methodology, 65 sites out of the original list of 101 sites are considered viable for solar PV projects and could provide an estimated 14 MW of solar power. Below is a list of potential solar systems by installation type and a table of the estimated solar PV size categories:

- 17 active sites included only rooftop solar PV systems.
- 32 active sites included only carport solar PV systems.
- 15 active sites included both rooftop and carport solar PV systems.
- 1 active site was a landfill site that could consider a ballasted ground mount PV system.

Solar PV System Size Categories for 65 City Owned Properties Identified as Viable

PV System Size Range	# of Sites	% of Total Sites	Total MW	% of Total PV Size
20 kW - 100 kW	26	40%	1.5	11%
101 kW - 200 kW	14	22%	1.9	13%
201 kW - 400 kW	15	23%	4.3	30%
401 kW - 1,400 kW	10	15%	6.5	46%
Totals	**65**	**100%**	**14.2**	**100%**

Figure 3: Solar PV System Size Categories

Electric Distribution Feeder PV Hosting Capacity Analysis

A hosting capacity analysis is a high-level analysis that provides a general starting point for distribution engineers and planners to evaluate whether upgrades to the electric distribution system are needed to reach desired PV penetration levels. PV hosting capacity is defined as the maximum amount of distributed PV generation that can be added to a distribution feeder without affecting the system's reliability or power quality. Adding generation units beyond the distribution feeders' PV hosting capacity will require further analysis, and in most cases, control and network updates will be needed. Understanding the current PV hosting capacity of GWP electric distribution feeder

infrastructure will aid in planning system upgrades to reach the goal of increasing its distributed generation footprint.

GWP's electric distribution network includes 4.2 kilovolt (kV) and 12.5 kV class feeders. Many contributing factors affect each feeder's ability to accept DER penetration, such as DER location on the feeder and feeder voltage class. In general, a feeder's voltage class will have an impact on its ability to accept DER penetration. The greatest impact on the feeder's ability to accept DER penetration is loading. At the lower voltage class, the hosting capacity is very low at all feeder lengths. Feeders with the higher voltage class have higher hosting capacity when cared to the lower voltage class. The length of the feeder is also a defining factor for the hosting capacity of both lower voltage and higher voltage classes.

The load connected to the feeder plays a significant role in its hosting capacity since the load affects the point of reverse power flow and occurrence of violations. Reverse power flow happens when generation is larger than consumption. Therefore, a lightly loaded feeder will see reverse power flow at lower levels of PV penetration. As the load increases the point at which reverse power flow occurs will increase. Similarly, the point at which voltage and thermal violations occur will be affected by loading.

The analysis of the electric distribution feeder PV hosting capacity included simulations of the Synergi Electric model for the 103 feeders that make up the GWP electric distribution network. Simulations using the Synergi Electric PV stochastic analysis began by clearing out all PV generation in the model and then randomly placing small PV devices back in the model, building over a series of steps until a maximum PV generation was achieved. This process was repeated to complete 500 profiles for each feeder.

The data was then analyzed to determine the PV hosting capacity of each feeder. A data analysis program based on American National Standards Institute (ANSI) C84.1-2020 for voltage limits and equipment specifications for reverse power flow and thermal overloading was then used to identify violations and system thresholds. This analysis provided kilowatt (kW) values for each feeder's PV penetration levels where no upgrades are needed, where upgrades may be needed, and where upgrades are required. The PV penetration levels where no upgrades are needed are categorized as location independent and represent the kW values that will be considered for solar adoption.

As GWP systematically upgrades its 4kV feeders to 12kV, the PV hosting capacities for those upgraded feeders will increase significantly. Additionally, the hosting capacity on some of the feeders may be increased by implementing the following options:

- Volt/Var Optimization**:** Volt/Var control plays an important role in improving voltage profile. By encouraging customers to install inverters with volt/var capability, it is possible to mitigate some of the overvoltage problem and, hence, increase the hosting capacity.
- Feeder Reconfiguration**:** Hosting capacity of the feeders can be increased by adjusting the existing regulator setpoint. This will uniformly shift the voltage across the regulation zone. Adding regulators to a long feeder will also create a

new regulating zone, impacting the voltage profile. Reconductoring the feeder in such a way that the primary impedance is lowered will indirectly change the voltage profile. This will resolve overloading problems if there are any. Any positive change to the voltage profile will increase the hosting capacity.

- Selective Location**:** In this study, all of the sections of the PV were considered to have an equal change of hosting PV, but by restricting the location of the PV closer to the substation, it is possible to increase the hosting capacity.

2. RFPS USING THE ALTERNATIVE PROJECT DELIVERY METHOD FOR THE ENGINEER-PROCURE-CONSTRUCT OF SOLAR PV SYSTEMS

The six solar PV systems described below are estimated to provide 4 MW of solar power representing 28% of the total estimated 14 MW of viable solar installations on City owned properties. The total estimated annual output for these six sites is 6.7 million kWh, which is the equivalent to the average annual electric consumption of 600 homes.

On October 12, 2022, the General Manager of GWP obtained the City Manager's approval for the herein proposed procurement for these six proposed projects, as required by Glendale Municipal Code (GMC), Section 4.13.070. Staff is recommending that the City Council authorize the adoption and issuance of an RFP for these six proposed projects utilizing the Engineer Procure Construct (EPC) project delivery method. GWP staff has found that it is more efficient to use the EPC method for such projects because the time needed for the research and design phases can be reduced with a similar outcome in the final construction. By using the EPC method, design items can be addressed as they come up by the engineer-procure-construct entity without the need for delays in engineering, then procurement, and lastly construction that occurs using the traditional design-procure-bid-build project delivery method.

1. Glendale Sports Complex Parking Lot Solar PV Carport Canopy Project:

The Sports Complex Parking Lot conceptual site plan estimates a solar PV system size of 916 kW. This location is one of the ten properties that have the potential of delivering up to 46% of the total estimated 14 MW of solar power. The solar solution for this location utilizes carport style solar canopies and is designed to cover most of the parking spaces at the Sports Complex.

2. Montrose Parking Lot 3 Solar PV Carport Canopy Project:

The Montrose Parking Lot 3 conceptual site plan estimates a solar PV system size of 807 kW. This location is one of the ten properties that has the potential of delivering up to 46% of the total estimated 14 MW of solar power. The solar solution for this location utilizes carport style solar canopies and is designed to cover most of the parking spaces at Montrose Parking Lot 3. The installation of solar canopies in Parking Lot 3 will most likely require a reconfiguration of the parking spaces to align with the installation of the solar support posts. This would result in a loss of parking spaces, revenue, and may trigger additional ADA improvements, including the installation of ADA stalls to current code and quantity standards, and parking pavement improvements, to name a few. These changes need to be considered during the EPC process.

3. Utility Operations Center (UOC) Parking Lot Solar PV Carport Canopy Project:

The UOC Parking Lot conceptual site plan estimates a solar PV system size of 305 kW. The solar solution for this location utilizes carport style solar canopies and is designed

to cover most of the parking spaces at the UOC Parking Lot.

4. Brand Landfill Ground Mount Solar PV Project:

The Brand Landfill conceptual site plan estimates a solar PV system size of 1.4 MW.

This location is the largest site identified as being viable for solar and has the potential of delivering 10% of the total estimated 14 MW of solar power. The landfill has been closed for over three decades and was used for the disposal of inert material, mostly concrete and asphalt. The solar solution for this location utilizes ground mount solar panels secured by means of an anchoring design.

5. Fire Department Station 21 Rooftop and Carport Canopy Solar PV Project:

The Fire Station 21 conceptual site plan estimates a solar PV system size of 237 kW. The solar solution for this location utilizes both rooftop mounted solar and carport style solar canopies. It is designed to maximize rooftop coverage and to cover some of the parking inside the facility.

6. Glendale Central Library Rooftop Solar PV Project:

The Central Library conceptual site plan estimates a solar PV system size of 402 kW. This location is one of the ten properties that has the potential of delivering up to 46% of the total estimated 14 MW of solar power. The solar solution for this location utilizes rooftop mounted solar and is designed to maximize rooftop coverage. The Central Library is currently undergoing a roof redesign and reroofing project which will be completed prior to the solar PV installation.

STAKEHOLDERS/OUTREACH

GWP will conduct outreach as each of the projects are designed and ready to be built.

FISCAL IMPACT

Funds for this project are available in the FY 2022-23 budget per the table below.

Additional appropriations will be requested when proposals are received and the award of EPC contracts are requested.

Funding Source	Account String	Amount
Electric Depreciation Fund, GWP, Projects, GWP Solar Design Built Program	43110-5830-GWP-0020-P0000-T0000-F3600	$3,500,000

ENVIRONMENTAL REVIEW

The requested action herein which is authorization to issue the RFP and solicit proposals does not require environmental review. Environmental review will be conducted for each project as applicable.

CAMPAIGN DISCLOSURE

Not applicable.

ALTERNATIVES

Alternative 1: Authorize and approve the actions requested and recommended in this report.

Alternative 2: Do not authorize or approve the actions requested and recommended in this report which will delay the implementation of clean energy solar PV development on City owned properties.

Alternative 3: Consider any other alternative not proposed by staff.

ADMINISTRATIVE ACTION

Prepared by:
Daniel Scorza, P.E., Chief Assistant General Manager - Electric

Approved by:
Roubik R. Golanian, P.E., City Manager

EXHIBITS / ATTACHMENTS

Exhibit A: City Owned Solar PV Priority List (6) Conceptual Images

Exhibit B: October 11, 2022 Memo to City Manager, and City Manager approval of the Engineer Procure Construct project delivery method.