

DC Smart Street Lighting Project

Categorical Exclusion 3

District of Columbia Department of Transportation

Federal Highway Administration

September 23, 2020

1.0 Introduction

The District of Columbia Department of Transportation (DDOT) and the District of Columbia Office of Public-Private Partnerships (OP3) are proposing to convert streetlighting across Washington, D.C., (the District) to light emitting diode (LED) technology, in conjunction with the Federal Highway Administration (FHWA). Upgrades, which will occur to existing DDOT Streetlight Division assets within existing DDOT right-of-way (ROW), will achieve a much higher energy efficiency and level of performance than the existing system. The style of lights, which include poles, arms, and fixtures, will not be changed. However, the fixtures will be upgraded to LED technology. These LED fixtures will have consistent and appropriate lumen output and correlated color temperatures (CCTs) across the District, unifying the network. There will be very minor exceptions, limited to the alleyway lights that are currently acorn-style incandescent luminaires, as discussed in **Chapter 6**. The poles will stay the same, but style of the light will change to Cobrahead, as incandescent is an outdated technology.

The proposed upgrades constitute a DDOT sponsored action, which is a project proposed for FHWA funding; therefore, the proposed action is defined as a federal undertaking. Federal participation in the proposed DDOT action, requires FHWA's compliance with the requirements of the National Environmental Policy Act of 1969 (NEPA) [42 United States Code (USC 4321)]. NEPA requires federal agencies to assess the environmental impacts of certain proposed actions.

Based on the requirements of Title 23 Code of Federal Regulations (CFR), Section 771.117 (b): Any action that normally would be classified as a Categorical Exclusion (CE) but could involve unusual circumstances will require the FHWA, in cooperation with the applicant (DDOT), to conduct appropriate environmental studies to determine if the CE classification is proper. Such unusual circumstances include: (1) Significant

environmental impacts; (2) Substantial controversy on environmental grounds; (3) Significant impact on properties protected by Section 4(f) requirements or Section 106 of the National Historic Preservation Act (NHPA); or (4) Inconsistencies with any Federal, State, or local law, requirement or administrative determination relating to the environmental aspects of the action. This environmental study has been developed to provide evidence through analysis that the CE classification of action proposed for the DC Smart Street Lighting Project is the proper classification of action. CEs are actions that meet the definition contained in 40 CFR 1508.4 and based on FHWA's past experience with similar actions, do not involve significant environmental impacts. They are actions that:

- Do not induce significant impacts to planned growth or land use for the area;
- Do not require the relocation of significant numbers of people;
- Do not have a significant impact on any natural, cultural, recreational, historic or other resource;
- Do not involve significant air, noise, or water quality impacts;
- Do not have significant impacts on travel patterns; and/or
- Do not otherwise have, either individually or cumulatively, have any significant environmental impacts.

“Significant” as used in NEPA requires the consideration of both context and intensity. Their definitions are as follows (40 CFR 1508.27):

- a) Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance usually depends upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.
- b) Intensity. This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action.

The proposed project will not result in any of the impacts listed above.

Due to the concerns raised early in the public involvement process and the potential for public controversy relating to these concerns, and in consultation with FHWA, DDOT made a determination early in the process to complete a CE Level 3 (CE-3). As indicated throughout the CE-3, DDOT coordinated extensively with the public and various agencies in an effort to address public and agency concerns expressed during the public involvement process. Measures to address the public and agency concerns have been incorporated into the Proposed Action as outlined throughout this document and summarized in the Conclusion.

Anticipated public controversy that prompted the development of the CE-3 are as follows:

- Visual – Concerns were raised regarding potential visual impacts resulting from increased brightness (lumen output) and correlated color temperatures as compared to existing streetlights.
- Health – Concerns were raised regarding potential effects to health including effects LED lighting could have on human circadian rhythms, potential for blue light associated with LED lighting to cause prostate and breast cancer and the potential for additional glare, especially discomfort glare.
- Wildlife – Concerns were raised regarding potential effects to wildlife within the District that could occur as a result in changes to lighting.
- Light pollution – Concerns were raised regarding light pollution, including light trespass, uplighting, and over-illumination that could affect wildlife species, the visibility of the night sky, and historic resources.

The above concerns are/were due to either perceived or potential impacts/effects of the proposed DC Smart Street Lighting Project action. Mitigation is required for the environmental impacts/effects of a State sponsored action proposed for participating Federal funding. 40 CFR § 1508.20 states Mitigation includes:

- a) Avoiding the impact altogether by not taking a certain action or parts of an action.
- b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- e) Compensating for the impact by replacing or providing substitute resources or environments.

23 CFR 771.109 – Applicability and responsibilities states in part:

- 1) The project sponsor, in cooperation with the Administration, is responsible for implementing those mitigation measures stated as commitments in the environmental documents prepared pursuant to this part unless the Administration approves of their deletion or modification in writing. The FHWA will ensure that this is accomplished as a part of its stewardship and oversight responsibilities.
- 2) When entering into Federal-aid project agreements pursuant to 23 U.S.C. 106, FHWA must ensure that the State highway agency constructs the project in accordance with and incorporates all committed environmental impact mitigation measures listed in approved environmental review documents.

This CE document is being prepared to fulfill the environmental documentation requirements for NEPA to document that the criteria for a CE are satisfied and that the proposed action will not result in significant environmental impacts. This CE has been prepared in accordance with NEPA, Council on Environmental Quality (CEQ) regulations (40 CFR 1500-1508), FHWA's *Environmental Impact and Related Procedures* (23 CFR 771), FHWA's *Technical Advisory Guidance for Preparing and Processing Environmental and Section 4(f) Documents* (T6640.8A), and DDOT's *Environmental Policy and Process Manual* (June 20, 2012), so a final decision of the environmental impact of the project can be made before final design begins. Given the scope of the proposed project, the project area includes the entire District of Columbia. Due to the potential of historic resources within the project area, this study also evaluated the effect of the project on historic and archeological resources in the area in accordance with Section 106 of the NHPA.

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3.0 Proposed Action

DDOT and the District of Columbia OP3 are proposing to convert streetlighting across the District to LED technology, in conjunction with the FHWA. Upgrades, which will occur to existing DDOT Streetlight Division assets within DDOT ROW, will achieve a much higher energy efficiency and level of performance than the existing system. While the style of lights will not be changed, the fixtures associated with the system will be upgraded to LEDs with consistent and appropriate lumen output and CCTs across the District, unifying the network. There will be very minor exceptions, limited to the alleyway lights that are currently acorn-style incandescent luminaires that will change to Cobrahead in an effort to update the outdated incandescent technology, as discussed in **Chapter 6**.

The proposed action will include the upgrade of DDOT Streetlight Division assets, which currently consists of approximately 75,000 primarily street and alley lights. Streetlights within the network also include overhead guide signs, internal and external lighting for “Welcome to Washington, D.C.” signs, navigation, underpass, bike, trail, and some tunnel lights. The proposed project will require lights of different lumen output and CCTs appropriate to their setting. As discussed in **Chapter 6**, with minor exceptions required to update outdated technology associated with incandescent luminaires, the style for each pole and accompanying fixture will not change.

Forty six percent of lights within the District are installed on poles owned by Pepco and Verizon (37 percent and nine percent, respectively). The existing light network consists primarily of High-Pressure Sodium (HPS) lights, and some mercury vapor, LED, metal halide, and incandescent lights. HPS is the most commonly used light fixture in the District, as well as across the country, but they have illumination limitations, pre-date technological advancements, and are not the most energy efficient light fixtures available. As the lighting industry trends toward LED lighting as the preferred light source, it is becoming more difficult to find replacement fixtures as existing fixtures need to be replaced. Incandescent and mercury vapor lights are no longer installed and are being systematically replaced throughout the system. LED is considered the most desirable light source, but accounts for slightly more than 10 percent of the total fixtures within the network. A short description of the different light sources currently used,

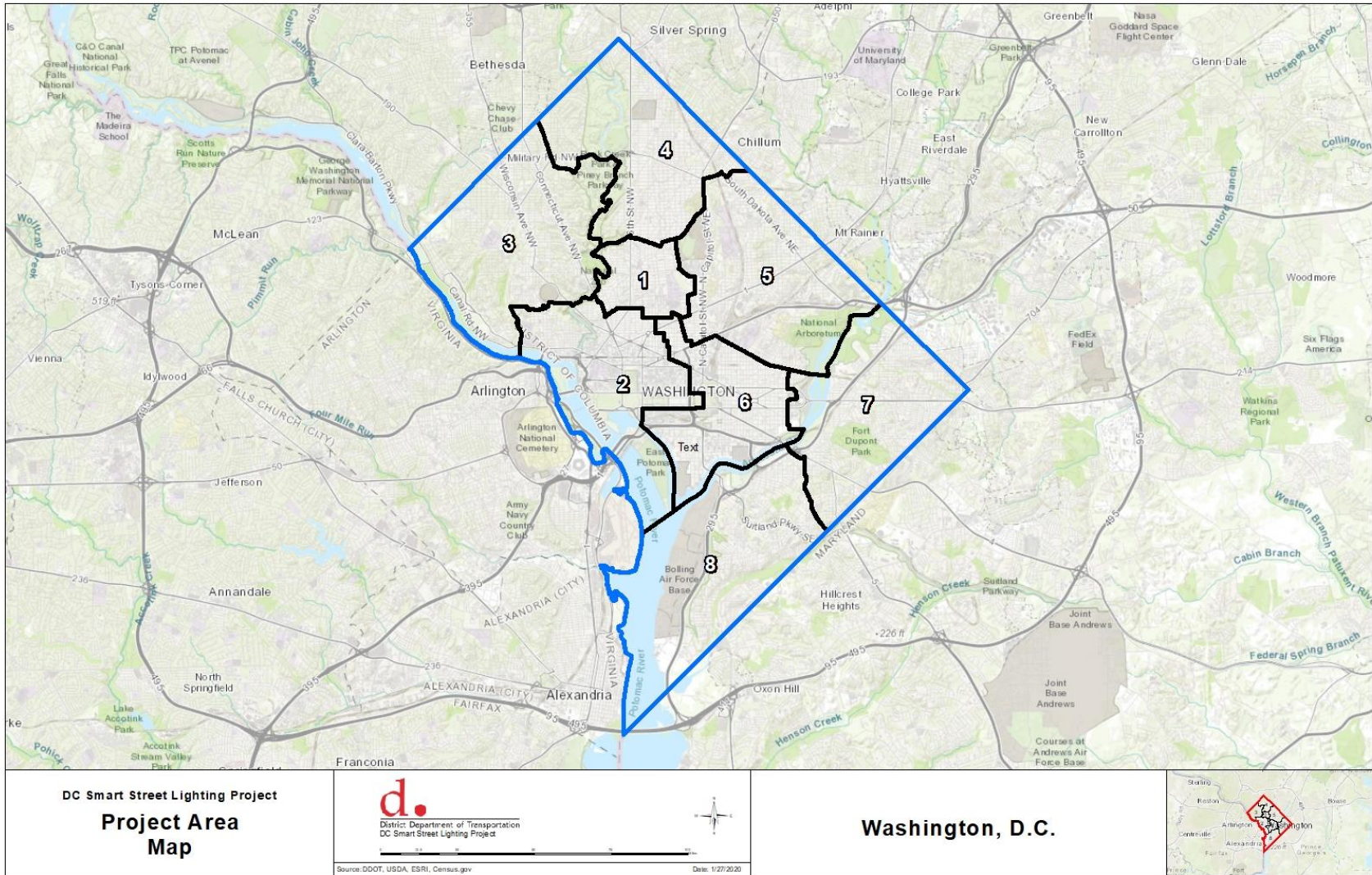
including the approximate number of lights and the percentage it represents of the lighting system, is summarized in the **Table 1**:

Table 1: Types of Streetlighting Throughout the District

Light Source	Description	# of Lights	% of network
HPS	High intensity discharge arc tube in which light is produced by radiation from sodium vapor operating under pressure	61,053	81.0%
Incandescent	Lamps which produce light by using electric current to heat a filament	5,129	6.8%
LED	Solid state lamp that uses light emitting diodes (LED) as the source of light	8,177	10.9%
Mercury Vapor	A high-intensity discharge device producing light by excitation of mercury vapors (or passing electricity through a gas) to emit a bluish white light	690	0.9%
Metal Halide	High intensity discharge arc tube in which light is produced by radiation of excited Metal Halide	234	0.3%
Other (e.g., fluorescent)	Lamps that pass electricity through a gas enclosed tube to create light usually used indoor and in some cases for signage	100	0.1%

Sources: DDOT Streetlight Policy and Design Guidelines, 2013; DCGIS DDOT Streetlight Map Layer, 2019.

4.0 Project Area Map



5.0 Purpose and Need

5.1 Purpose of the Proposed Action

The purpose of the proposed action is to upgrade, unify, and modernize the District's streetlight network to improve safety, enhance aesthetics, incorporate available technological features, reduce energy usage, reduce the carbon footprint, provide equity of service, and reduce asset management costs associated with lighting.

5.2 Need for the Proposed Action

The need for upgrading, unifying, and modernizing the streetlight network relates primarily to the lack of uniformity in and reduced efficiency and reliability of the existing network, resulting in negative impacts or limitations. This can be seen in the existing network's high energy usage and related costs, the lack of technological features that would allow for remote monitoring and control, the state of disrepair, and inconsistent light levels that can affect motorist, bicyclist, and pedestrian safety. As part of the Proposed Action, all fixtures will be equipped with remote monitoring and control capabilities, which will allow DDOT to provide equity of service to all residents throughout the District. Since the existing streetlight network does not include remote monitoring capabilities, DDOT currently relies on residents to report an outage, resulting in delays to repairs and inconsistent levels of service throughout the District. The remote monitoring capabilities will enable DDOT's Streetlight Division to detect outages as soon as they occur, minimizing the amount of time of an outage. In addition, the remote monitoring capabilities guarantee that everyone will receive equitable, or equal, service regardless of their location within the District and will relieve the public of the burden of reporting outages. The streetlighting industry as a whole is trending toward the use of LED fixtures. The older technologies that are currently used across the District are being

phased out by lighting manufacturers. As such, it is becoming increasingly difficult to find replacement fixtures when the existing fixtures burn out or are damaged.

Project goals were established based on the purpose of the project, needs, agency and public feedback, and project area constraints. The goals for the project are to upgrade DDOT's streetlighting network in an effort to:

- Provide consistent illumination to promote the safety of motorists, pedestrians, and bicyclists and enhance community livability;
- Reduce the system's carbon footprint;
- Incorporate remote monitoring and control capabilities, which will provide DDOT with the ability to provide equity of service to all residents throughout the District;
- Improve energy efficiency and reduce asset management and operational costs;
- Reduce glare and uplighting that could affect wildlife or other light sensitive activities in the District;
- Unify lighting sources to facilitate a consistent appearance; and
- Design and promote more efficient management of the system.

6.0 Alternatives

NEPA requires that federal agencies explore a range of reasonable alternatives. The range of alternatives considered reflects the type of proposed action and the potential for environmental impact.

Several light sources were considered; however only LED met the Purpose and Need for the project. Other alternatives considered but not carried forward included several outdated lighting technologies including HPS, Metal Halide, Mercury Vapor, and Fluorescent.

HPS – Over 80 percent of the existing DDOT streetlight assets are HPS. The life expectancy of HPS streetlights is slightly higher than metal halide, mercury vapor and fluorescent fixtures. In addition, HPS is substantially more efficient than the previously mentioned fixtures. However, HPS streetlights have a life expectancy that is less than half the life expectancy of LED fixtures; and LED fixtures are nearly three times more efficient than HPS fixtures. In addition, HPS lighting is omnidirectional, which tends to result in a less efficient light source and increased light pollution. HPS has a poor color rendering, as it is typically limited to a more yellow light. In addition, HPS lighting requires an extended period of time to reach full light output, as well as a long time to fully cool down once the light is extinguished. Furthermore, HPS lights are fragile and operate with a glass bulb, which could create a safety issue. HPS lights contain a small amount of toxic mercury, which requires a specific waste disposal plan when a bulb reaches the end of its life. Broken bulbs release a small amount toxic mercury as a gas. HPS lights tend to be more expensive to replace and maintain. While the transition to HPS could potentially result in improved efficiency of approximately 8 percent of DDOT streetlight assets it would result in the degradation of approximately 11 percent of the assets that are already LED. HPS would not be an upgrade and it would not improve safety, enhance aesthetic, incorporate available technological features, reduce energy usage, reduce the carbon footprint, provide equity of service, or reduce asset management costs. The conversion

to HPS lighting across the District would not meet the purpose and need of the project. As a result, this alternative was eliminated from further consideration.

Mercury Vapor and Metal Halide – Mercury vapor and metal halide lighting each account for less than 1 percent of the DDOT streetlight assets. Mercury vapor lighting is the least efficient of the light sources considered and extending mercury vapor lights are being systematically replaced across the District. Metal halide lights are more efficient than mercury vapor but not as efficient as other lighting sources. Conversion to either of these technologies would not improve but would result in decreased efficiency and increased cost. They have a short lifespan. Each requires an extended period of time to reach full light output, as well as a long time to fully cool down once the light is extinguished. Therefore, this type of lighting can only be used where a delay is acceptable. These lights contain a small amount of toxic mercury, which requires a specific waste disposal plan when a bulb reaches the end of its life. Broken bulbs release a small amount of toxic mercury as a gas. The conversion to either mercury vapor or metal halide lighting would not be an upgrade and it would not improve safety, enhance aesthetic, incorporate available technological features, reduce energy usage, reduce the carbon footprint, provide equity of service, or reduce asset management costs. As a result, these alternatives were eliminated from further consideration.

Fluorescent –Fluorescent lights are omnidirectional, resulting in increased light pollution. Like other light sources, fluorescent lights contain a small amount of toxic mercury, which requires a specific waste disposal plan when a bulb reaches the end of its life. Broken bulbs release a small amount of toxic mercury as a gas. The use of fluorescent lighting is being phased out and is not widely available. Since the use of fluorescent lighting does not meet the purpose and need of the project, this alternative was eliminated from further consideration.

LED – Only LED lighting was found to meet the purpose and need for the project. LED lighting would represent an upgrade compared to the other outdated technologies considered. The implementation of LED lighting could unify, and modernize the District’s streetlight network to improve safety, enhance aesthetics, incorporate available technological features, reduce energy usage, reduce the carbon footprint, provide equity of service, and reduce asset management costs associated with lighting. LED lighting is more efficient than all other lighting types evaluated. LED streetlights have a life expectancy that is more than double the life expectancy of HPS fixtures, the most efficient of the other lights considered. In addition, LED fixtures are nearly three times more efficient than HPS fixtures. Therefore, LED lighting produces the lowest levels of carbon dioxide. While the initial conversion is costly, the cost to maintain and use LED lighting is less than all other types of lighting that was evaluated. In addition, other entities across the District are converting their lighting to LED. The conversion to LED lighting would ensure lighting assets owned by DDOT are consistent with those assets that are owned by others. Finally, the streetlighting industry is and has been trending toward the use of LED fixtures as opposed to HPS and other older technologies. The older technologies that are currently used across the District are being phased out by lighting manufacturers. As such, it is becoming more difficult and costly to find replacement fixtures when the existing fixtures burn out or are damaged.

Therefore, LED lighting was carried forward as the only Build Alternative in addition to the No Build Alternative.

The following alternatives are being explored and evaluated in detail:

- Alternative 1 - No Build Alternative
- Alternative 2 - Preferred Alternative – Replace existing light fixtures with LED

6.1 Alternative 1 – No Build

Consideration of the No Build Alternative is required by NEPA per CEQ regulations. This alternative serves as a baseline, against which to measure the benefits and environmental consequences of the build alternatives. The No Build Alternative assumes routine asset management will continue to be performed on the streetlights across the District, but it will not include any changes to the existing streetlights. This alternative will not meet the purpose and need for the project, nor will it meet any of the goals listed above. By maintaining the existing conditions, the District would miss many of the benefits associated with any improvements. The existing system does not provide the equity of service to all residents throughout the District. It provides inconsistent illumination levels, which will not increase safety and community livability. If the system is not upgraded, asset management and operational costs will likely continue to climb as certain lights become more obsolete and parts will be harder to find and more expensive. The existing system will continue to lack efficiency and would not reduce the carbon footprint. Without upgrades to the system overall, the opportunity to have remote dimming and to reduce high levels of glare and light trespass would not be realized across the District.

6.2 Alternative 2 – LED Conversion

Alternative 2, the Preferred Alternative, includes the conversion of all DDOT Streetlight Division assets to energy-efficient LED fixtures. This does not include streetlights within the District that are owned and operated by third party entities, including private property owners and federal agencies such as the National Park Service (NPS), National Capital Planning Commission (NCPC), Architect of the Capitol (AOC), the General Services Administration (GSA) as well as other District-owned lights, including those owned by the DC Department of General Services (DGS), the DC Department of Parks and Recreation (DPR), and the DC Housing Authority, as DDOT does not have jurisdiction over these assets. Alternative 2 is consistent with the DDOT Streetlight Policy and Design Guideline, which recommends the conversion of existing light

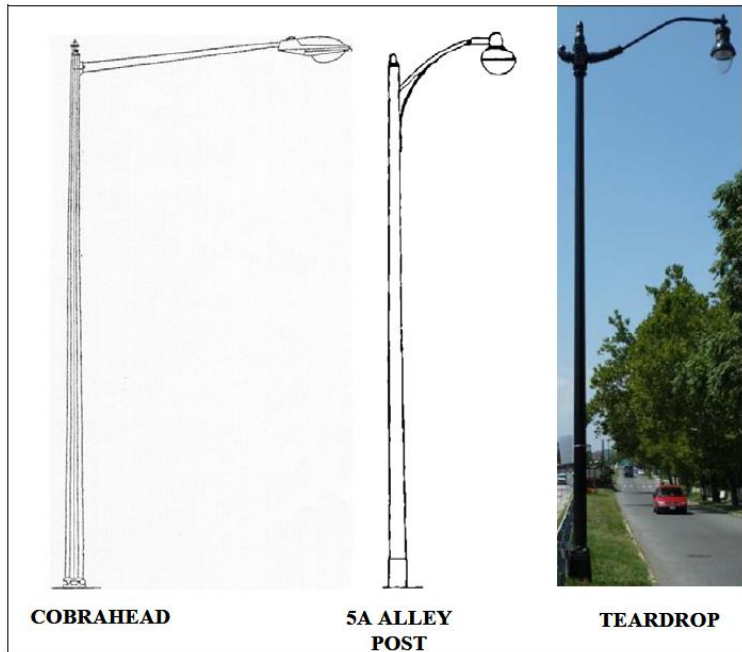
sources to LED. The conversion to LED results in improved illumination, uniformity, adaptability to context sensitive needs, and overall cost efficiency in maintenance and operations. No ground disturbance is required as part of the LED upgrade. No poles or structures will be removed or added as a part of the proposed project. While the project will enable future smart city technologies, it is not included as part of the proposed action. In addition, the project will not include surveillance, small cell technology, or any other technologies.

The style for the pole and accompanying fixture will not change. That is, if an existing light is identified as a Twin 20, it will remain a Twin 20. Various styles of poles are illustrated in **Figures 1** and **2**. There will be very minor exceptions limited to the alleyway lights that are currently acorn-style incandescent luminaires, referred to as an acorn fixture and illustrated under 5A in **Figure 2**. The style of these will change to Cobrahead, as incandescent is an outdated technology. Additionally, some lights will maintain their style, but appearance may change slightly following conversion. Existing Cobrahead-style fixtures, on the left in **Figure 2**, will remain as such, but the exact shape may change. There are currently multiple looks to Cobrahead lights across the District, depending on manufacturer. Cobraheads will be replaced to be more consistent. This will improve not only aesthetics but operational costs as it provides DDOT with the ability to purchase replacement parts in bulk. Wall pack lighting, commonly found in underpasses, may appear different when upgraded to LED technology, but the style will remain the same.

Figure 1: Upright Poles within the District



Figure 2: Types of Pendant Poles



In order to achieve the project goals, avoid or minimize potential impacts, and respond to public and agency feedback, Alternative 2, includes the following features:

- Context based lighting standards.** Feedback provided from residents indicated that the CCTs of the fixtures was a concern for some residents. HPS has a very warm, golden light, while LED is capable of producing a cooler, sometimes bluer, white light. Additionally, the brightness of lighting is a concern for some residents. CCT is not tied to brightness, but white light helps the eye render colors better. So white LEDs may appear brighter than the HPS they are replacing. Based on this feedback, DDOT's Streetlight Division developed a systematic approach to identify where specific lumen output and CCTs will be used. The lumen is the unit of measurement used to

measure the total quantity of visible light emitted by a light source per unit of time. Simply put, the lumen output determines the brightness of a light fixture. Land uses were identified as commercial, where the land is dominated by commercial uses, intermediate, which is a mixed use that could include commercial use on the lower levels and residential uses in upper levels of a building, and residential. In addition to land use, roadways were identified as interstate and freeways, principal arterials, minor arterials, collectors, local, and alleys. CCT and lumen output varies between not only roadways and land use, but by different pole styles. Spacing and height also play a role in light distribution. This systematic approach is consistent with the lighting design guidelines of the American Association of State Highway Transportation Officials (AASHTO).

The American Medical Association (AMA) has published guidelines suggesting that streetlight fixtures should have a CCT that does not exceed 3,000 Kelvin (K), which is considered a warm, white light, in an effort to avoid potential health effects of blue light on humans and wildlife. Taking into consideration these guidelines and community feedback, DDOT has committed to installing LED fixtures with a CCT no higher than 3,000 K. Lighting in residential areas will not exceed a CCT of 2,700 K, which is considered an extra warm, white light. This is consistent along all roadway types except interstates. Light fixtures within commercial and intermediate land use areas along interstates, principal arterial roadways, and minor arterial roadways will not exceed 3,000 K. Light fixtures within commercial and intermediate areas along collector and local roadways, as well as alleyways, will not exceed 2,700 K. Lumen levels for light fixtures along interstates, principal arterials, minor arterials and collectors in commercial and intermediate land use areas will range between 6,000 and 20,000 lumens. Lumen levels along principal and minor arterials and collectors in residential areas will be lower and will range between 6,000 and 16,000 lumens. Along local roadways, lumen levels for light fixtures will range between 6,000 and 14,000 lumens in commercial areas, between 3,840 and 9,200 lumens in intermediate areas, and

between 3,840 and 7,680 lumens in residential areas. Within alleys, lumen levels will range between 7,300 and 7,360 lumens for commercial uses, 5,400 and 5,428 lumens for intermediate uses, and 3,312 and 3,348 lumens in residential areas. The ranges vary based on the style of fixture and represent maximum lumen levels that will be allowed for each roadway and land use type. Lights will have the ability to be dimmed below these levels.

- **Remote monitoring and control.** All fixtures will be equipped with remote monitoring and control, as well as remote dimming capabilities. The system will detect outages as soon as they occur allowing DDOT to provide more efficient asset management and equitable service to the entire District. This will minimize the amount of time of an outage and will relieve the public of the burden of reporting outages.
- **Light control.** The design will also allow for dimming to occur remotely and within a reasonable timeframe. In addition, each fixture will be compatible with shielding capabilities, which will minimize light trespass. The shielding will focus the light downward and minimize backlighting towards homes and uplighting toward the night's sky. While shielding will not be incorporated into every fixture, shielding is available upon request. Fixtures that are currently shielded will be shielded automatically as part of the LED conversion. Historic preservation and the visual environment are important issues to a number of agencies within the District. While it is important to limit uplighting to some degree, some uplighting is desirable to preserve the appearance of Washington Globe post top fixtures, especially within historic districts. A National Mall Roads Interagency Working Group was developed, which included representatives from the Commission of Fine Arts (CFA), AOC, NPS, NCPC, and FHWA. Consultation with the National Mall Roads Interagency Working Group, as well as separate consultation with the CFA indicates that it would be desirable to ensure that the full silhouette of the Washington Globe fixture is appreciated. As a result of this consultation, it was determined that the design associated with

those fixtures will be required to limit uplighting to 10 to 15 percent of the total lumen output of post top globe fixtures, or globe fixtures on upright poles. There are currently no limitations on uplighting for existing globe fixtures. As these fixtures will likely be designed specifically for this project, the exact specification will be determined during the final design of the lights. The goal of the design with regard to uplighting is to reduce uplighting to the least amount that still allows the full silhouette of the Washington Globe to be appreciated.

Unlike conventional fixtures, which emit light in all directions, each LED fixture consists of individual diodes. Each diode can be physically manipulated to emit light in a certain direction. Diodes will be aimed toward the ground, which will minimize light shining horizontally from each fixture. These actions will also minimize glare. Moreover, this directionality improves uniformity of the light and further reduces the wattage needed to illuminate the ROW.

7.0 Affected Environment and Consequences

This section describes the current environmental conditions and resources within the study area, as well as potential environmental consequences as a result of the project. The affected environment is the environmental setting for the identified project area. The environmental consequences are the anticipated environmental effects that will result from the implementation of the proposed project and can be beneficial or adverse in nature. The primary focus of this section is on those resources that could potentially be affected by the proposed conversion of the streetlight network to LED.

7.1 Land Use Impacts

7.1.1 Existing Conditions

Existing land use information is derived from geographic information systems (GIS) data obtained from the Office of the Chief Technology Officer (OCTO) showing an approximate rendering of land use, most recently updated in September 2019. According to the Comprehensive Plan for the National Capital (April 2011), the District is approximately 69 square miles in size and includes eight square miles of water and 61 square miles of land. By the 1960s, the District was largely developed. Center City, which is approximately 6.8 square miles in size, includes the “monumental core” of the District and includes the US Capitol, the White House, the Washington Monument, Lincoln Memorial, Federal Triangle and Smithsonian Museums. It also includes the District’s traditional Downtown and other employment centers such as the Southwest and West End, as well as Gallery Place and Penn Quarter, the region’s entertainment and cultural center. Urban neighborhoods such as Mount Vernon Triangle, NoMA (north of Massachusetts Avenue), Capitol Riverfront and Poplar Point are also included in Center City.

The “monumental core” is surrounded by commercial use, as well as public uses, such as federal, local, and institutional uses. The commercial area is surrounded by an inner ring of moderate to high density

residential and mixed-use neighborhoods, extending west to Georgetown, north to Columbia Heights and Petworth, east across Capitol Hill, and south to the Anacostia River and Near Southwest. Beyond the inner ring is an outer ring of less dense development, characterized largely by single family housing and garden apartments. These rings generally correspond to historic development patterns, with most of the inner ring developed prior to 1910 and the outer ring developed after 1910.

A summary of existing land uses found within the District can be found in **Table 2**. The District's land use is dominated by transportation and residential uses, with 23 percent and 26.1 percent of the overall land use being dedicated to those respective uses (see **Appendix B – Existing Land Use**). Most of the commercial and higher density development beyond the core of the District hugs radial avenues like Connecticut Avenue NW and Pennsylvania Avenue SE. Most of the District's industrial development follows the railroad corridors running from Union Station east along New York Avenue and north to Silver Spring, Maryland. The historic connection between transportation and land use continues to shape the District today, with Metrorail station areas emerging as the District's newest activity centers.

Approximately 18.2 percent of the District's land use is designated as parkland or land dedicated to open space. Large open space networks are obvious, particularly along the stream valleys along Rock Creek and the Potomac and Anacostia Rivers. Large institutional uses, such as colleges, universities, hospitals, and seminaries are also visible across the District. Large federal facilities located outside of the central portion of the District are also highly visible and include such facilities as Bolling Air Force Base, the St. Elizabeth's Hospital Campus, Walter Reed Hospital, and the Armed Forces Retirement Home. Many of the federal and institutional uses are located in areas that are primarily residential.

Table 2: Existing Land Use Summary

Land Use Type	Percentage	Acreage
Low Density Residential	11.8%	8,548.1
Low-Medium Density Residential	9.1%	6,575.1
Medium Density Residential	4.4%	3,159.3
High Density Residential	0.9%	681.5
Commercial	4.5%	3,241.3
Industrial	1.0%	699.3
Mixed Use	0.2%	155.2
Public and Institutional (Federal Public, Local Public, Public, Quasi-Public, Institutional)	14.5%	10,483.0
Parks and Open Space	18.2%	13,226.8
Water (Canal, Lake, River)	10.4%	7,550.2
Transport, Communication, Utilities	2.0%	1,422.6
Transportation (Median, Parking, Right-of-Way, Roads, Alleys)	23.0%	16,701.8
Other	0.1%	80.7
TOTAL	100%	72,525

Source: DCGIS Open Data: Planning, Land Use, and Zoning. September 2019.

The District is located along the Potomac River between Maryland and Virginia, with an area of approximately 69 square miles. The District serves as the capital of the United States. It is bounded by Maryland to the north, east, and west and by Virginia and the Potomac River to the south. The District was established in 1790 by Congress in an effort to establish a permanent location for the federal government. The site was chosen due to its central location among the original 13 states along the east coast. The District can be described as a heavily urbanized area that is heavily developed with a high population density. The District serves as the principal city for the Washington Metropolitan area, which consists of 10 surrounding counties, including five counties in Maryland (Montgomery, Prince George's, Frederick, Charles, and Calvert) and five counties in Virginia (Arlington, Fairfax, Loudoun, Stafford, and Prince William).

The District is divided into eight wards, as illustrated in **Chapter 2**. The District’s Office of Planning oversees planning within each ward. Ward 1 is located within the center of the District and is the smallest by area, as well as the most densely populated ward. Ward 1 is dominated by residential land uses, most of which are row homes or apartments. A majority of the downtown portion of the District is located within Ward 2 and includes the National Mall, the White House, several national monuments, the Central Business District, and the Federal Triangle, which boasts the highest concentration of offices and jobs within the District. Ward 3 is found within the western portion of the District and is largely residential. It boasts several notable parks as well. A majority of Rock Creek Park serves as the eastern border of Ward 3. Ward 4 is located in the northern portion of the District and is primarily residential. Ward 5, which is located within the eastern portion of the District, is very diverse and contains a variety of features, including residential, commercial, and industrial areas. Ward 6 is located within the central part of the District and has a variety of land uses, including residential, commercial, offices, recreational, and various institutional uses, such as the United States Capitol Building, Library of Congress, Eastern Market and the Old Naval Hospital. Ward 7 is located within the eastern part of the District and is dominated by residential areas, transit, and extensive parkland. Ward 8 is the southernmost ward in the District and is home to residential, institutional, sports arena, and commercial land uses.

7.1.2 Environmental Consequences – Alternative 1

The No-Build Alternative includes no changes to the existing DDOT Streetlight assets. Normal asset management, which includes maintenance, will continue. As such, the No Build Alternative will have no effect on land use within the District.

7.1.3 Environmental Consequences – Alternative 2

Alternative 2 includes the conversion of existing DDOT Streetlight Division assets to LED. Alternative 2 will not result in the displacement of any residences or businesses. There will be no ground disturbance as

part of the LED conversion. The use of land within the District will not change as a result of the proposed project. Light poles will remain in the existing locations and no new poles will be added as part of this undertaking. A change in the type of lighting provided will not result in changes in existing or planned land use as a result of Alternative 2. Therefore, no land use impacts will result from Alternative 2.

7.2 Social Impacts

7.2.1 Affected Environment

As outlined in **Section 7.1**, each Ward within the District is unique in composition and features numerous different types of neighborhoods, government facilities, institutions, park and recreation areas, commercial areas and other functions. Within each Ward, wide variety of community facilities can be found. The types and concentration of community facilities varies within each Ward. An illustration of existing community facilities within each Ward, as well as an accompanying spreadsheet that shows the name and location of each resource, is included in **Appendix C**.

Further, Executive Order 12898 Environmental Justice in Minority Populations and Low-Income Populations requires federal agencies, departments and their contractors to consider any potentially disproportionate human health or environmental risks that their activities, policies, or programs may pose to minority populations.

According to the United States Census Bureau's website, in as of July 1, 2019, it is estimated that the District had a population of 705,749. According to the most recent United States Census data, the District's poverty rate (16.2 percent) is higher than the United States average, which is 15.1 percent. The minority rate across the District is 54.4 percent. Approximately 46.4 percent of residents within the District are black or African American. Of the overall total, 11.3 percent of residents are Hispanic or Latino.

7.2.2 Environmental Consequences – Alternative 1

The No Build Alternative will not affect the social fabric of the District. No changes to the lighting network will occur. This alternative will not meet the purpose and need for the project, nor will it meet any of the goals established by the project. By maintaining the existing conditions, the District would miss many of the benefits associated by the proposed improvements. The existing system does not provide the equity of service to all residents throughout the District. The delayed self-reporting of damage and outages will continue, resulting in continued delay in repairs. This has been shown to occur in minority neighborhoods where residents are less likely to report outages. The No Build Alternative provides inconsistent illumination levels, does not enhance safety, or improve community livability. By not upgrading the system, asset management and operational costs will likely continue to climb with parts becoming more obsolete and expensive. The existing system will continue to lack efficiency and would not reduce the carbon footprint. Without upgrades to the system overall, in addition to many of the assets remaining in disrepair, the high levels of glare and light trespass would not be reduced across the District.

7.2.3 Environmental Consequences – Alternative 2

Alternative 2 will not negatively impact the social fabric of the District. Access to all community facilities throughout the District will not be altered and will be maintained for the duration of the project. Some may be enhanced with more consistent lighting. The project is replacing fixtures within existing lights and therefore will not alter or divide any communities. Further, the style of the fixtures will not change, with some very minor exceptions, so the look, feel, and character of each community will remain unchanged from the project. As discussed in **Chapter 6**, alleyway lights that are currently acorn-style incandescent luminaires, will change to Cobrahead, as incandescent lighting is an outdated technology. All other lights will maintain their style, but their appearance may change slightly following conversion. Existing Cobrahead-style fixtures will remain as such, but the exact shape may change. While there are currently

multiple looks to Cobrahead streetlights across the District, Cobraheads will be replaced to be more consistent. The proposed project will provide better lighting and improved safety for pedestrians, bicyclists, and vehicles, resulting in a beneficial impact to the District as a whole. Given the scope of the proposed action, the proposed project will be consistent with regard to the effects it will have on various populations across the District. All residents within the District will benefit equally from the implementation of the proposed project. Alternative 2 will not adversely impact any populations within the District.

One of the main goals of the proposed project is the ability to provide equity of service to all residents throughout the District. While street lighting is provided throughout the District, the maintenance and repair of the network is inconsistent. The existing streetlight network does not include remote monitoring, so it is not immediately known when and where outages occur. DDOT relies on residents to contact them directly or to call 311 to report an outage. Residents currently residing within some areas of the District are unable to or less likely to report an outage, and they do not typically call 311. The delay in reporting can result in delays to repairs resulting in inconsistent levels of service throughout the District. The remote monitoring that will be included with Alternative 2 will ensure that all residents throughout the District, regardless of location, receive the same level of service. With remote monitoring, everyone receives equitable, or equal, service and the burden of reporting outages will no longer be put on the residents of the District.

Alternative 2 will also enhance safety. AASHTO is an organization that sets standards and publishes specifications, test protocols, and guidelines that are used in highway design and construction throughout the United States. The FHWA Lighting Handbook was developed in 1978 and updated in 2012. It was supplemented and developed using resources developed by AASHTO, the Illuminating Engineering Society (IES), and the International Commission on Illumination and provides guidance concerning the design and application of roadway lighting. The purpose of roadway and street lighting is to provide illumination of

pedestrians, obstructions, and potential hazards for drivers. Roadways are less safe in total darkness than when light is present. Lighting levels are established by applying criteria based on road classification, pavement type, and pedestrian activity and conflict level. The higher the amount of pedestrian activity in an area, the higher the level of lighting recommended.

According to AASHTO, the fatality rate associated with nighttime crashes is more than three times the fatality rate of daytime crashes. Lighting improves the visibility of the roadway, increases sight distance, and makes obstacles more visible to drivers. When hazards are more visible, they are also more avoidable. The addition of street lighting is a proven safety measure. Studies cited by AASHTO indicate that when street lighting is added to an area, nighttime crashes decrease by an average of 50 percent. In addition, fatal crashes decrease by an average of 43 percent. Lighting also provides a sense of personal security for pedestrians, bicyclists, and transit users. A lack of lighting reduces that personal security. As such, while lighting may be dimmed, it will never be dimmed below the approved AASHTO safety standards.

A significant benefit to residents within the District is crime deterrent. It has long been thought that improved lighting could potentially reduce crime, especially at night. Improved lighting affords individuals increased visibility, which could act as a deterrent for potential crime, as there is an increased risk of potential offenders being seen or identified while committing a crime. This could also result in increased visibility of police, which is a deterrent as well. Improved lighting could result in residents spending more time outdoors during evenings or at night, increasing the potential number of people within neighborhoods available to observe the surroundings. Improved lighting could also encourage people to walk in the evening, which also increases the number of residents outdoors that are able to observe the surroundings.

Improved lighting could potentially result in decreased crime during the day as well as night, as it helps the government demonstrate its commitment to controlling crime. This could result in reluctance on the

part of a potential offender to commit crime in a neighborhood with improved lighting. Improving lighting and therefore improving the appearance of a neighborhood could increase community pride and cohesiveness. If residents are proud of their community, it is more likely that they will report crimes.

Several comments were received by residents during the public involvement period expressing their concerns about potential human health effects as a result of LED light installation. Comments included concerns that nighttime light can have a profound effect on human circadian rhythms and even small variations in light levels can have an effect. Comments also included concerns that exposure to blue light adversely affects diurnal/circadian rhythms and sleep/wake cycles, resulting in safety and health issues, including the suppression of melatonin at night. Furthermore, some comments noted studies indicate that exposure to blue-enriched outdoor light at night has been found to have a positive association with both prostate and breast cancer. Finally, several comments were received that indicated that there are concerns about the potential for additional glare, especially discomfort glare, resulting from the installation of LED lighting.

NEPA requires a comparison between existing conditions, to be used as a baseline, and the conditions proposed by the implementation of the proposed action. The District is a heavily urbanized area with an extensive streetlight network. As such, a substantial amount of nighttime lighting currently exists.

According to a 2012 AMA report, glare from nighttime lighting can create safety hazards, as it can cause a driver to blink and squint, and can cause ocular aversion, and eye fatigue, resulting in visual impairment. Concerns have been raised that blue-wavelength light produces more glare, a safety hazard that can impair the vision of motorists and pedestrians. Glare is caused from excessive lighting. It can also be caused by the angle of the lighting, as well as the intensity of the contrast between the light source and the lack of light around it. The concerns raised by the public have been considered when determining the design of the lighting and measures will be implemented to address those concerns. The design of the

lighting must consider the reduction of glare into drivers' and pedestrians' eyes while enhancing visibility. Lighting levels are proposed to be between 2,700 K, which is considered extra warm, white light, and 3,000 K, which is considered warm white light, consistent with AMA recommendations. These lights, which have color temperatures akin to residential interior lighting, present no health risk to humans or wildlife as compared to the existing condition. Consistency with those recommendations reduces discomfort and disability glare. In addition, diodes will be pointed downward, toward the ground, as opposed to outward, reducing the likelihood that light would be emitted horizontally and cause glare. Furthermore, lumen levels provided with each fixture will be consistent with levels currently provided. As part of this phase of the project, no lights will be added or removed from the streetlight network.

AMA stated in their report that at 3,000 K, the human eye still perceives the light as "white," but it is slightly warmer in tone, and has about 21 percent of its emission in the blue-appearing part of the spectrum. This emission is still very blue for the nighttime environment but is a significant improvement over the 4,000 K lighting installed within other cities because it reduces discomfort and disability glare. The appearance of the 3,000 K lighting is more aesthetically pleasing to humans than 4,000 K lighting. In addition, lighting at 3,000 K or less would reduce any potential effects to diurnal/circadian rhythms and sleep/wake cycles and has less of an impact on wildlife. The 2,700K extra warm white light in residential areas would further address public concerns.

All fixtures within the District will benefit from the proposed project, as remote monitoring and control, as well as remote dimming capabilities, will be included as part of the proposed action. The system will detect outages as soon as they occur. This will minimize the amount of time of an outage and will relieve the public of the burden of reporting outages.

7.3 Relocation Impacts

Alternative 1 will not require the relocation of any businesses or residences within the District. Alternative 2 will not require the relocation of businesses or residents and all proposed activities will occur to existing streetlights within DDOT ROW.

7.4 Economic Impact

7.4.1 Affected Environment

On an annual basis, the District currently spends approximately five million dollars on energy to operate streetlights. In addition, given the dated conditions of the existing streetlight network, the existing fixtures require routine replacement and maintenance.

7.4.2 Environmental Consequences – Alternative 1

Since Alternative 1 will not include the conversion of the streetlight network, there will be no change to the economic conditions within the District. The No Build Alternative will not allow the District to achieve the full economic potential of the reduced costs associated with the LED conversion. Asset management costs will continue to grow as parts become obsolete, harder to find, and more expensive.

7.4.3 Environmental Consequences – Alternative 2

The implementation of Alternative 2 will result in substantial economic benefits for the District. DDOT currently has over fifty different types and styles of streetlights. In addition to different appearances, each of those different types of lights have different performance levels and asset management requirements and different parts are required to maintain and repair each type of light. The upkeep of such a wide variety of lights is not only more costly, but more difficult to properly and consistently manage and maintain. With more consistent lighting technology throughout the District, the management and upkeep

of the lights will be more cost efficient. In addition, given the technological improvements, remote monitoring of the lights will facilitate more timely and efficient maintenance and repairs. The remote monitoring will detect outages as soon as they occur. This will minimize the amount of time of an outage and will relieve the public of the burden of reporting outages. This ability will allow DDOT to tailor lighting needs across the District, increasing lighting efficiency. A major benefit is the remote dimming capability afforded by LED technology.

The proposed replacement of the existing lights to LED technology would be economically beneficial. The existing lighting system includes outmoded incandescent and mercury vapor alley lights that are currently expending too much energy illuminating alleys and streets within the District. In addition, more than 80 percent of the streetlights within the District are currently HPS, which costs more than twice as much to operate than LED streetlights. The installation of LED lights throughout the District would result in a 50 to 60 percent reduction in energy costs annually, which translates into approximately a three-million-dollar annual savings on energy costs. In addition, the LED lights would last three to four times longer than the existing lights and will need fewer repairs. DDOT's decision to focus on the appropriate lumen output for each setting, rather than a specific wattage, not only addresses public concerns about the perceived brightness of the lights but it allows DDOT to realize the energy and economic benefits of the ever-improving LED technology. As LED technology improves, the same lumen output may be achieved at a lower wattage, reducing energy costs.

The District of Columbia *Streetlight Policy and Design Guidelines* provides a summary of the properties of each lighting type currently used within the District (see **Table 3**). The "life" indicates the anticipated number of hours expected for the lifetime of each fixture type. Efficacy is described as "a measure of the "efficiency" of a lamp" and is measured in lumens per watt (lpw). This figure allows entities to compare the energy efficiency between each fixture type. The color rendering index (CRI) is measured on a scale from 0 to 100 percent and indicates how accurately an identified light source is at rendering a light source

when compared to a "reference" light source. A light source with a higher CRI is able to reveal the colors of various objects more accurately when compared with ideal or natural lighting.

Table 3: Summary of Light Properties by Type

Option	Life (hours)	Efficacy (lpw)	CRI	Color of Light
LED	35,000-50,000	30-300	≥ 70	Warm white (for roadway application)
HPS	20,000-24,000	50-110	<40 (approx. 22)	Orange
Metal Halide	6,000-15,000	72-76	75-90	White
Mercury Vapor	16,000-24,000	30-50	40-60	Blue-White
Fluorescent	10,000-24,000	40-140	20-80	White

LED technology has become the standard light source for roadway lighting as compared to widely-used HPS lamps and it is improving at a rapid pace. As advances are made to improving LED luminaires, the usage of LED luminaires should be increased to provide the most economic long-term lighting strategy.

HPS streetlights account for an estimated 61.5% of the total power consumption of the DC streetlight system. The life expectancy of HPS streetlights is slightly higher than metal halide, mercury vapor and fluorescent fixtures. In addition, HPS is substantially more efficient than the previously mentioned fixtures. However, LED streetlights have a life expectancy that is more than double the life expectancy of HPS fixtures, as indicated in **Table 3**. In addition, LED fixtures are nearly three times more efficient than HPS fixtures. The CRI for HPS fixtures is substantially lower than the other fixtures within the District, while the CRI associated with LED fixtures is considered more "true" with regard to determining colors.

7.5 Traffic and Transportation

7.5.1 Affected Environment

The District has numerous modes of transportation available for use within the District, including vehicular (cars, trucks), commuter rail systems, bus transportation, car sharing, airports, and walking/bicycling. Commuters heavily influence travel patterns within the District, with only 28 percent of commuters traveling from within the District. The remaining commuters travel primarily from Virginia and Maryland. As of 2006, roadway rights of way dominated the land use within the District, accounting for over 25 percent of the overall land use. Roadway types include interstates and freeways, principal arterials, minor arterials, collectors, local streets and alleys. The District also has an extensive sidewalk and trail network. Traffic within the District comes from a variety of sources, including but not limited to commuters, residential, freight delivery, government activities, and tourism.

7.5.2 Environmental Consequences – Alternative 1

The No Build Alternative will have no effects on transportation. This includes not realizing any benefits that the transportation network might experience as a result of improved visibility and greater reliability of the DDOT streetlight assets.

7.5.3 Environmental Consequences – Alternative 2

Alternative 2 will improve safety throughout the District by implementing the appropriate lighting conditions by roadway type, in addition to land use. Roadways were identified as interstate and freeways, principal arterials, minor arterials, collectors, local, and alleys. CCT and lumen output will vary by roadway type. For example, streetlights installed for roadways classified as principal arterials will not exceed a CCT of 3,000 K, while streetlights within residential areas will not exceed a CCT of 2,700 K. Along those same roadways, lumen levels within commercial areas would range between 10,000 and 20,000 lumens, while

lumen levels within residential areas would range between 8,000 and 16,000 lumens, depending on lighting style. These lumen levels vary by fixture style and indicate the maximum lumen levels by roadway and land use types. Lights will have the ability to be dimmed below those maximum levels. Addressing public concerns regarding an increased “brightness” of LED lights, lumen levels provided would be consistent with those that are currently provided throughout the District.

As discussed in **Section 7.2**, AASHTO and IES developed a FHWA Lighting Handbook in 2012 that provides guidance concerning the design and application of roadway lighting in an effort to provide illumination of pedestrians, obstructions, and potential hazards for drivers, improving the visibility of the roadway, thereby improving safety for motorists and pedestrians. When hazards are more visible, they are also more avoidable, making street lighting a proven safety measure. While lighting may be dimmed, it will never be dimmed below the FHWA-approved safety guidelines, as illustrated in the FHWA Lighting Handbook, as discussed in **Section 7.2**. Alternative 2 will provide more consistent lighting throughout the District.

As mentioned previously, streetlighting is proven to improve safety for not just vehicle user, but bicyclists and pedestrians as well. More consistent lighting could enhance the visibility of pedestrians, bicyclists, and any potential obstructions within or adjacent to a roadway. An additional added benefit to the project is that it will ensure that bus and other transit boarding and offloading areas are subject to better lighting. As such, Alternative 2 could potentially result in positive impacts for pedestrians, motorists, and transit users.

In addition to traditional street and alley lighting, conversions will be made to overhead guide signs, internal and external lighting for “Welcome to Washington, D.C.” signs, navigation, underpass, bike, trail, and some DDOT-owned tunnel lights. Conversions will improve visibility for bike and trail users, improving safety and security. The conversion of the streetlight network will also improve lighting and therefore

visibility within tunnels and underpasses. The conversion of navigation lighting will change the fixture, which is located within a red or green casing.

According to a 2012 AMA report, glare from nighttime lighting can create safety hazards, as it can cause a driver to blink and squint, and can cause ocular aversion, and eye fatigue, resulting in visual impairment. Concerns have been raised that blue-wavelength light produces more glare, a safety hazard that can impair the vision of motorists and pedestrians. Glare is caused from excessive lighting. It can also be caused by the angle of the lighting, as well as the intensity of the contrast between the light source and the lack of light around it. The design of the lighting will consider the reduction of glare into drivers' and pedestrians' eyes while enhancing visibility. Lighting levels will be between 2,700 K and 3,000 K, consistent with AMA recommendations. Consistency with those recommendations reduces discomfort and disability glare. In addition, diodes will be pointed downward, toward the ground, as opposed to outward, reducing the likelihood that light would be emitted horizontally and cause glare.

7.6 Pedestrians and Bicyclists

7.6.1 Affected Environment

The District is a heavily urbanized area with a substantial network geared toward pedestrians. There is an extensive sidewalk network that enables pedestrians to safely walk between locations. Sidewalks are used by transit users, tourists, commuters, residents, and more. In addition to the extensive sidewalk network, DDOT oversees a network of interconnected trails that provide safe and convenient bicycle and pedestrian access throughout the District. Some popular trails include the Anacostia Riverwalk Trail, Marvin Gaye Park Trail, Metropolitan Branch Trail, Oxon Run Trail, and South Capitol Street Trail. As discussed above, bicycling is an important means of transportation within the District and an extensive

45-mile network of dedicated bicycle lanes exist and are dedicated to their use. The District is heavily urbanized and much of the streetlight network is meant to enhance lighting for pedestrians and bicyclists.

7.6.2 Environmental Consequences – Alternative 1

Alternative 1 will have no effects on pedestrian and bicyclists, as no activities are proposed. This includes any benefits that the transportation network might experience as a result of improved visibility. Different types of lighting provide various levels of visibility and glare. Providing optimal visibility is important for pedestrians and bicyclists, from navigating sidewalks to crossing streets. The No Build Alternative will fail to meet these needs. Alternative 1 would not provide consistent illumination levels or remote monitoring to facilitate quicker repair times, providing limited opportunities to enhance safety.

7.6.3 Environmental Consequences – Alternative 2

The main purpose of street lighting is to provide visibility in nighttime and low-light conditions. According to AASHTO, studies indicate that fatal nighttime crashes are reduced by up to 60 percent when adequate roadway lighting is implemented. This includes increased visibility of pedestrians and bicyclists. Alternative 2 will result in positive impacts for pedestrians, bicyclists, and transit users by improving safety conditions throughout the District by providing more consistent lighting coverage. Increased visibility can provide a sense of safety and security in the evenings, promoting civic engagement and livability. As mentioned previously, the conversion includes street and alley lighting, as well as overhead guide signs, internal and external lighting for “Welcome to Washington, D.C.” signs, navigation, underpass, bike, trail, and tunnel lights. The conversion will improve visibility along streets, trails, within tunnels and underpasses, improving safety and security, improving visibility for pedestrians and bicyclists. The project will also ensure that bus and other transit boarding and offloading areas are subject to better lighting by providing more consistent lighting.

As mentioned earlier, concerns have been raised that glare from excessive lighting could potentially be a safety hazard for both pedestrians and bicyclists. Lighting levels are proposed to be between 2,700 K and 3,000 K, consistent with AMA recommendations. In addition, the improved color rendering as compared to existing lighting throughout the District is beneficial to both pedestrians and bicyclists, as it assists them with more easily identifying cars, obstacles, and other people. The proposed lighting levels included in Alternative 2 will reduce discomfort and disability glare. In addition, diodes within the LED fixture will be pointed downward, toward the ground, as opposed to outward, reducing the likelihood that light would be emitted horizontally and produce glare. Finally, the proposed project will include remote monitoring, which will facilitate more efficient repairs and minimize the duration of outages as compared to Alternative 1.

7.7 Air Quality

7.7.1 Affected Environment

In accordance with 40 CFR 93.126, lighting improvements are exempt from the requirement to determine conformity. Therefore, an air quality analysis is not required.

7.7.2 Environmental Consequences – Alternative 1

The No Build Alternative will have no effects on air quality, as no activities are proposed. It will also not improve the energy efficiency of the existing system and will not reduce greenhouse gas emissions.

7.7.3 Environmental Consequences – Alternative 2

While an air quality analysis is not required for this type of project, it is important to note that the District currently uses a high amount of energy to operate the existing street light network. High energy usage is not only costly for the District and its taxpayers, but also contributes to greenhouse gas emissions. The

nation has been battling greenhouse gas emissions and excessive energy usage with the enactment of the Energy Independence and Security Act of 2007. This legislation requires lighting to become 25 percent more energy efficient, leading manufacturers to move away from producing incandescent light fixtures. To comply with the act, the Sustainable DC Plan outlines the energy reduction goals, which recommends replacing all street and public lighting with high-efficiency fixtures.

In 2011, the District received a \$1.1 million grant from the United States Department of Energy to reduce its carbon footprint and replace over 1,000 non-energy efficient alley lights within the District. In January 2017, the DC Smart Lighting Project was developed as a way to not only improve the environment, but to also address deficiencies and plan for the future. Studies indicate that LED fixtures utilize the least amount of energy of all lighting fixtures, which, in turn, results in the emission of the least amount of carbon dioxide of all of the fixture types used. Data was entered into the United States Environmental Protection Agency's Greenhouse Gas Equivalencies Calculator to calculate the amount of the reduction in greenhouse gas emissions that will occur by converting the existing streetlights to LED. The existing street lighting system uses approximately 83.7 million kilowatt hours (kWh) of electricity annually, resulting in the production of approximately 65,000 (US) tons of carbon dioxide annually. The implementation of the LED system proposed under Alternative 2 will reduce this by 50 to 60 percent and use approximately 34.7 million kWh of electricity annually, resulting in the production of approximately 27,000 tons of carbon dioxide. The conversion to LED lighting will result in a reduction of approximately 48.9 million kWh of electricity annually, resulting in a reduction of approximately 38,000 tons of greenhouse gases annually throughout the District, as LED lights are more efficient and require less energy to operate. While HPS lights are more energy efficient than mercury-vapor and metal halide, they are not the most energy efficient light fixtures available. Replacing the light fixtures with a more energy efficient fixture is an effective way to reduce energy usage, as well as the carbon footprint. LED fixtures are not only more

energy efficient, but they last longer, require fewer repairs, and provide more consistent lighting than the other fixture types currently used within the District.

7.8 Noise

7.8.1 Affected Environment

The proposed project will not involve construction of a new roadway, a change in the vertical or horizontal alignment of an existing roadway or add new travel lanes. As such, the proposed project will qualify as a Type III project in accordance with the 2011 noise Policy. Therefore, a Traffic Noise Analysis is not required.

7.8.2 Environmental Consequences – Alternative 1

No improvements will be completed as a result of Alternative 1. Since Alternative 1 will not result in an increase in traffic volumes or capacity, this alternative will have no effect on noise levels within the District.

7.8.3 Environmental Consequences – Alternative 2

Alternative 2 is limited to the conversion of the existing street lighting network. No changes to any roadways will occur as a result of the Alternative 2. Since Alternative 2 will not result in an increase in traffic volumes or capacity, this alternative will have no effect on noise levels within the District.

7.9 Water Quality and Wetlands

7.9.1 Affected Environment

Section 404 of the Federal Water Pollution Control Act of 1972, also referred to as the Clean Water Act, provides protection for Waters of the United States (WOUS). WOUS can be generally defined as all navigable waters and waters that have been or can be used for interstate or foreign comers, their tributaries, and any waters that, if impacted, could affect the former, including wetlands. Impacts to wetlands are considered separately from other WOUS for permitting processes. For this reason, existing wetlands and open waters will be addressed independently of streams in this document.

Water resources are regulated by several federal and local laws and regulations including the Clean Water Act; CFR Part 122.26 – Storm Water Discharges; Safe Drinking Water Act of 1974; DC Water Pollution Control Act of 1984; DC Storm Water Permit Compliance Amendment Act of 2000; and Title 21 of DC Municipal Regulations (Chapter 11- Water Quality Standards and Chapter 19 – Water Quality Monitoring Regulations). Construction projects can affect these ecosystems and water quality by eliminating resources, increasing runoff, adding pollutants, and altering hydrology.

According to District GIS data, there are three major natural bodies of water, including the Potomac River and two tributaries that flow into it, the Anacostia River and Rock Creek. An illustration of existing water resources within the District is included in **Appendix D**. Several additional wetlands, several streams, and Federal Emergency Management Agency (FEMA)-designated floodplains are also located within the District. Three man-made reservoirs are also located within the boundaries of the District, including Dalecarlia Reservoir, which is located within the northwest portion of the District on the boundary between the District and Maryland, McMillan Reservoir, located near Howard University, and the Georgetown Reservoir, within the Palisades neighborhood, upstream of Georgetown.

7.9.2 Environmental Consequences – Alternative 1

Alternative 1 includes no changes to DDOT streetlight assets and will have no effect on stormwater management, water quality, or water resources.

7.9.3 Environmental Consequences – Alternative 2

Alternative 2 is limited to the conversion of the existing DDOT street lighting network within the District and will have no effect on stormwater management, water quality, or water resources.

7.10 Threatened and Endangered Species

7.10.1 Affected Environment

According to the United States Fish and Wildlife Service (FWS) Information, Planning, and Consultation (IPaC) website, the Federally listed threatened Northern Long-eared Bat (*Myotis septentrionalis*) and Yellow Lance (*Elliptio lanceolata*) and the Federally listed endangered Hay's Spring Amphipod (*Stygobromus hayi*) could potentially be found within the proposed project area. On July 24, 2018, FWS stated that the proposed project is not likely to adversely affect the endangered, threatened, or candidate species, because while the project is within range of the species mentioned above, is unlikely that those species would occur within the project area that was submitted (see **Attachment D**). Therefore, no Biological Assessment or further Section 7 consultation with FWS is required.

7.10.2 Environmental Consequences – Alternative 1

Alternative 1 will not change existing lighting in the District. As a result, there would not be a reduction in uplighting from Washington Globe fixtures that is included as part of Alternative 2. This alternative will have no effect on wildlife or habitat.

7.10.3 Environmental Consequences – Alternative 2

Activities associated with Alternative 2 will be confined to replacing the existing light fixtures will have no direct effect on wildlife or habitat as a result of the upgrade activities.

Artificial lighting can attract or repel various species of wildlife. It has been determined that blue and white light is more impactful on species, while softer green, yellow, and amber lighting has less of an effect. Street lights tend to attract such species as insects, amphibians, and birds, but can deter various rodents and bats. Migrating birds tend to be attracted to lights from various artificial sources, such as street lighting, beacons on towers, and buildings. This can lead to collisions with buildings, towers, and other structures. In addition, artificial lighting can result in birds migrating at the wrong time, resulting in missed opportunities for mating and nesting.

Concerns have been raised that night lighting adversely affects pollination and the species that facilitate pollination. In addition, there are concerns that LED lights are more attractive to flying invertebrates than HPS and other streetlighting technology. Finally, concerns have been raised that blue light has a strong lethal effect on some insect species, and it has been suggested that LED light could serve as an alternative to chemical pesticides.

NEPA requires a comparison between existing conditions, to be used as a baseline, and the conditions proposed by a proposed action. The District is a highly developed, urbanized area. As such, an extensive streetlighting network currently exists. No additional lighting structures will be added within the District and no lighting will be removed. The proposed lighting levels associated with Alternative 2 are consistent with those that currently exist within the District. AMA recommends that lighting levels not exceed 3,000K. At that CCT, the color temperature is similar to interior residential lighting, which presents no health risk to humans or wildlife, especially when compared to the existing conditions. Furthermore, at 3,000 K, lighting has less of an impact on wildlife. The International Dark-Sky Association supported AMA's

recommendations to not exceed 3,000 K. Excessive outdoor lighting disturbs nocturnal wildlife and their habitat, negatively affecting birds, insects, turtles, fish, and other species (International Dark-Sky Association, 2019). Shielded lighting not exceeding 3,000 K minimizes impacts to nocturnal wildlife. As a result of public feedback and consistent with AMA and International Dark-Sky Association recommendations, a vast majority of lighting within the District, especially within non-commercial areas, will be 2,700 K, which is considered extra warm white light. The remaining lights within the District will be 3,000 K, which are considered warm white light. Further, the lumen output associated with each fixture will be consistent with the existing fixtures throughout the District.

LED streetlights project all light forward to the intended area, limiting the illumination of adjacent areas that are not intended to be illuminated. This minimizes the projection of lighting upward and outward, that is typically associated with other lighting technologies. Uplighting as it pertains to migratory bird species, insects and bats, was a particular concern for some residents. DDOT will require Cobrahead fixtures to eliminate all uplighting. As discussed in **Chapter 6**, the developer that designs the fixtures will be required to limit uplighting to 10 to 15 percent of the total lumen output of post top globe fixtures, or globe fixtures on upright poles, in an effort to reduce uplighting to the least amount possible while preventing impacts to historic resources, as required in consultation with the District of Columbia State Historic Preservation Officer (DC SHPO). There are currently no limitations on uplighting for existing globe fixtures. It was determined that, as part of the proposed project, each fixture will be compatible with shielding capabilities, which will minimize upward light trespass. In addition, lights can be remotely dimmed or extinguished completely with no delays, if necessary. Finally, the lower CCTs being implemented as part of the project tend to be less disruptive on wildlife, as it is less disruptive to natural circadian rhythms.

The implementation of Alternative 2 would not result in a substantial change from the existing conditions found within the District. The proposed project includes the replacement of existing light fixtures with

LED fixtures. In addition, as stated early, on July 24, 2018, FWS stated that the proposed project is not likely to adversely affect the endangered, threatened, or candidate species, because while the project is within range of the species mentioned above, is unlikely that those species would occur within the project area that was submitted (see **Attachment D**). Therefore, it is unlikely that the proposed project will adversely affect wildlife within the District.

7.11 Historic and Archeological Preservation

This section provides an evaluation of historic properties and archaeological resources. Historical resource investigations were completed for the proposed action in accordance with federal and local laws and regulations, including Section 106 of the NHPA (54 USC 300101 et seq.).

7.11.1 Affected Environment

As our nation's capital, the District has a rich and vibrant history. The planned city was founded after the American Revolution as the country's seat of government. In 1791, President Washington commissioned Pierre Charles L'Enfant to design the capital city. The District houses many significant buildings, including the US Capitol, the White House, the Supreme Court, and many other important government buildings, national landmarks, museums and memorials. Aesthetically, the District is unique with its characteristic magnificent buildings with limited heights and many historic areas. The District is one of the most visited cities in the world.

This heritage is represented in its culture, its people, and especially in its built environment. Significant buildings, structures, objects, historic districts, and archaeological sites abound across the entire District. The District of Columbia Inventory of Historic Sites was developed by the Government of the District of Columbia's Historic Preservation Office and most recently updated in September 2009. The inventory includes almost 25,000 properties throughout the District. The District has over 50 historic districts located

across the District, including 28 neighborhood historic districts. According to the District of Columbia Inventory of Historic Sites, the inventory also includes 500 historic landmark designations that includes more than 800 buildings and an additional 150 historic landmark designations of other structures, including parks, engineering structures, monuments, building interiors, artifacts, and archaeological sites. Over 600 resources within the District are listed on the National Register of Historic Places. These notable places range from important dwellings such as Tudor Place and the Octagon House to important landscapes like Rock Creek Park to significant archaeological sites including a circle of Civil War forts that once protected the District from Confederate troops. Over time, technological and planning changes have altered the urban environment, resulting in new roadways, infill, and upgraded utilities. Despite these modifications, the District as a whole has a high level of historic integrity, and its residents, workforce and visitors have a deep appreciation for our capital's significant past.

According to the NCPC's website, several agencies have influenced the design of streetlights over the course of the District's history. The CFA was instrumental in the design and aesthetics of streetlights within the District, as they had review authority from the time the CFA was established in 1910 until the Home Rule was established by the District in 1973. At that time, the design and implementation of streetlights became the purview of the District Department of Public Works until 2002, when DDOT took over responsibility for street lighting in the District and maintains that role today. There are parts of the District, however, like the National Mall and Capitol Grounds, where the streetlights are the responsibility of federal agencies—in this case, NPS and AOC, respectively. These areas are not included as part of this project. In addition, the conversion of lighting within parks, including but not limited to National Parks and District-owned parks, is not included as part of this project. However, it should be noted that these parks currently have LED lights, some over 3,000K.

Formal Section 106 consultation was initiated by FHWA in May 2018. On May 30, 2018, the DC SHPO, the agency with jurisdiction over historic resources, responded to FHWA's consultation initiation. While the

DC SHPO acknowledges the benefits associated with the proposed project, their primary concern is that the project be implemented in a way that will not diminish the integrity of the historic resources within the District. Informal consultation between the DC SHPO, DDOT, OP3, NCPC, and other agencies has been ongoing in an effort to establish criteria to determine the appropriate brightness and CCT range for various land uses. On October 7, 2019, a letter was sent to each Advisory Neighborhood Commission (ANC) within the District formally inviting them to participate in the Section 106 consultation process. In addition, agencies invited to attend an Interagency Review meeting, held at DDOT on October 28, 2019, were also invited to participate in the Section 106 consultation process. Agencies invited to participate include District of Columbia Office of Health, NCPC, United States Naval Observatory (USNO), District of Columbia Office of Planning, CFA, United States Coast Guard, NPS, GSA, John F. Kennedy Center for the Performing Arts, National Geospatial Intelligence Agency (NGA), Smithsonian Institution, AOC, and the United States Army Corps of Engineers.

7.11.2 Environmental Consequences – Alternative 1

Since no activities will occur as a result of the No Build Alternative, this alternative will have no effect on historic or archaeological resources.

7.11.3 Environmental Consequences – Alternative 2

The LED conversion associated with Alternative 2 will not result in ground disturbance. In addition, alterations to the light structures are not proposed as part of this project. As discussed in **Chapter 6**, there will be very minor exceptions, such as the alleyway lights that are currently acorn-style incandescent luminaires. The style of these incandescent lights will change to Cobrahead, as incandescent is an outdated technology. There are currently multiple looks to Cobrahead lights across the District, depending on manufacturer. Cobraheads will be replaced to be more consistent. While some lights will maintain their style, their appearance may change slightly following conversion. Existing Cobrahead-style fixtures

will remain as such, but the exact shape may change. This will improve not only aesthetics but operational costs as it provides the District with the ability to purchase replacement parts in bulk. Last, wall pack lighting--commonly found in underpasses—may appear different when converted to LED technology, but the style will remain the same.

Public and agency feedback indicate that uplighting is a concern. As part of the proposed project, each fixture will be compatible with shielding capabilities, which will minimize light trespass. DDOT will require Cobrahead fixtures to eliminate all uplighting. As discussed in **Chapter 6**, the developer that designs the fixtures will be required to limit uplighting to 10 to 15 percent of the total lumen output of post top globe fixtures, or globe fixtures on upright poles, in an effort to reduce uplighting to the least amount while still allowing the full silhouette of the Washington Globe to be appreciated, as agreed to in consultation with the DC SHPO. There are currently no limitations on uplighting for existing globe fixtures. No lights will be added or removed as part of this project and the lumen output of the lights will be consistent with what exists today.

Federal funds are participating in this project; therefore, the requirements of Section 106 of the NHPA (54 U.S. Code §306108) and its implementing regulations 36 CFR part 800, are applicable. As a consulting party to the Section 106 process, the DC SHPO advises and assists Federal agencies in carrying out their Section 106 responsibilities to ensure that historic properties are taken into consideration at all levels of planning and development. FHWA notes and provides reference to the DC SHPO's assistance to FHWA ensuring Section 106 responsibilities regarding historic properties with potential for effect resulting from this undertaking. On May 28, 2020, FHWA determined that the proposed undertaking will have *No Adverse Effect* on historic properties based on the criteria for an assessment of adverse effects contained in 36 CFR 800.5. This regulation is defined in coordination included in **Appendix F**.

During initial consultation with DC SHPO, potential concerns were raised regarding the potential for ground disturbance, wattages and CCTs, shielding, dimming, and the potential to have an effect on existing fixtures. DC SHPO stated that the concerns appear to have been addressed and it is understood that no ground disturbance will be required; wattages and CCTs within a general range of 75-215 watts and 2,700-3,000 K will be used based upon context and remotely dimmed/adjusted, as appropriate; internal shielding will focus light down and minimize light pollution while still allowing 10 to 15 percent illumination of the tops of Washington Globe and Twin-Twenty fixtures so the complete shape of the globes will be discernable at night; and existing streetlight fixtures will largely be maintained with only minimal changes anticipated to the design of cobrahead fixtures. Based on this analysis, on June 22, 2020, DC SHPO concurred with FHWA's determination that the proposed project will result in no adverse effects to historic properties, provided that any associated change of streetlight fixtures within historic districts will continue to follow DDOT's standard procedures. DC SHPO recommends that DDOT continue to work closely with the National Mall Roads Interagency Working Group and others to determine the appropriate brightness and color temperatures for nationally significant areas, such as the Monumental Core, since these areas have historically been lit differently than residential and commercial areas to emphasize their national importance and this distinctive lighting could be considered part of their historic character (see **Appendix F**).

7.12 Section 4(f) of the Department of Transportation Act of 1966

Section 4(f) of the US DOT Act of 1966, which is codified at 49 USC 303 and 23 USC 138, implementing regulations at 23 CFR. 774, permits the use of land from a publicly-owned public park, recreation area, wildlife or waterfowl refuge, or land of a historic site of national, state, or local significance only if there is no feasible and prudent avoidance alternative, to the use of land from the property; and the action includes all possible planning to minimize harm to the property resulting from such use or if FHWA

determines that the use of the identified property, including any measures to minimize harm (including avoidance, minimization, mitigation, or enhancement measures), will have a *de minimis* impact on resources protected under Section 4(f) (23 CFR 774.17).

As defined under 23 CFR 774.17, the use of a Section 4(f) resource occurs by a project or program approved by the US DOT when:

- The Section 4(f) property is permanently incorporated into a transportation facility.
- There is a temporary occupancy of a Section 4(f) property that is adverse in terms of the statute's preservation purposes as determined by specified criteria (23 CFR 774.13(d)).
- A constructive use occurs when the transportation project does not incorporate land from a Section 4(f) property, but the proximity impacts are so severe that the protected activities, features, or attributes that qualify a resource for protection under Section 4(f) are substantially impaired (23 CFR 774.15).

The temporary occupancy of land does not constitute a use, as defined under 23 CFR 774.13(d), provided that the following four criteria are met:

- (i) Duration of the occupancy must be temporary, i.e., less than the time needed for the construction of the project, and there should be no change in ownership of the land.
- (ii) The scope of work must be minor, i.e., both the nature and magnitude of the changes to the Section 4(f) resource are minimal.
- (iii) There are no anticipated permanent adverse physical impacts, nor will there be interference with the activities or purpose of the resource, on either a temporary or permanent basis.

(iv) The land being used must be fully restored, i.e., the resource must be returned to a condition which is at least as good as that which existed prior to the project.

7.12.1 Affected Environment

According to GIS information provided by OCTO, there are over 50 historic districts located within the District, as well as over 600 resources that are listed on the National Register of Historic Places. In addition, hundreds of publicly-owned public park and recreation areas are located throughout the District.

7.12.2 Environmental Consequences – Alternative 1

The No Build Alternative includes no changes to DDOT streetlight assets and will have no effect on Section 4(f) resources.

7.12.3 Environmental Consequences – Alternative 2

Given the number of resources within the District, many of the existing streetlights are located within resources that are protected by the provisions of Section 4(f). However, Alternative 2 will not result in permanent impacts to any Section 4(f) resources within the District. In addition, LED conversion activities will not occur within any public parks, including but not limited national parks or District-owned parks. 23 CFR 774.13 has identified several exceptions to the requirement for Section 4(f) approval. Since the temporary impacts associated with construction activities will occur by temporary occupancy only, the requirements of Section 4(f) (23 CFR 774.13(d)) will not apply based on the officials with jurisdiction agreement with the following criteria:

(i) *Duration of the occupancy must be temporary, i.e., less than the time needed for the construction of the project, and there should be no change in ownership of the land.*

Finding: The duration of the entire project, from the initiation of the design to the completion of construction, will be approximately 24 months, however work will progress across the District and each area will be occupied for a much shorter duration. It will take approximately 30 minutes to exchange the fixture at each location. Therefore, the time it will take to complete activities will vary by the size of the resource. The occupancy within each historic resource will result in no impacts to access to, the use of, or impair the resource. There will be no change in ownership of the land.

(ii) The scope of work must be minor, i.e., both the nature and magnitude of the changes to the Section 4(f) resource are minimal.

Finding: The scope of work is limited to the replacement of the internal fixture associated with each light.

(iii) There are no anticipated permanent adverse physical impacts, nor will there be interference with the activities or purpose of the resource, on either a temporary or permanent basis.

Finding: The scope of work is limited to the replacement of the internal fixture associated with each light and the work will not interfere with the activities at any of the resources. On May 28, 2020, FHWA determined that the proposed project will have no adverse effect on historic properties. On June 22, 2020, DC SHPO concurred that the proposed project will have no adverse effect on historic properties.

(iv) The land being used must be fully restored, i.e., the resource must be returned to a condition which is at least as good as that which existed prior to the project

Finding: The proposed project will result in no ground disturbance.

7.13 Hazardous Waste Sites

7.13.1 Affected Environment

According to the District Department of Energy and the Environment there are records for 148 open Leaking Underground Storage Tanks (LUST) within the District. The tanks hold various types of substances, including but not limited to diesel, gasoline, fuel oil, heating oil, motor oil, jet fuel, and many other substances.

7.13.2 Environmental Consequences – Alternative 1

Alternative 1 includes no changes to DDOT streetlight assets. Therefore, additional site assessments to determine the presence of hazardous materials are not required as part of Alternative 1.

7.13.3 Environmental Consequences – Alternative 2

The LED conversion proposed with Alternative 2 requires no ground disturbance as only the fixture within each light will be upgraded. Additional site assessments to determine the presence of hazardous materials are not required. However, HPS, fluorescent, mercury vapor, and mercury halide fixtures all contain a small amount of toxic mercury, which can present a waste disposal issue when they are removed. In July 1999, the Environmental Protection Agency (EPA) issued a ruling that classified lights containing mercury and other hazardous waste as universal waste, which is a subset of hazardous waste. Anyone who disposes of or handles universal waste lights in bulk can recycle or send them to a hazardous waste landfill without filling out extensive paperwork. The ruling includes fluorescent, high-intensity discharge, neon, mercury vapor, HPS, and metal halide lights. As part of the upgrade project, the removal and disposal of the fixtures will be consistent with EPA regulations.

7.14 Visual Impacts

7.14.1 Affected Environment

The District is unlike any other city. The visual conditions within the District are dominated by transportation infrastructure, parkland, residential development, office buildings, and commercial uses. Some areas within the District are heavily urbanized and are dominated by office, commercial, and manufacturing buildings, while other areas are dominated by residential uses and parkland. The District is located within a topographic bowl, with the White House, the Capitol, and the Monumental core in the middle. The central portion of the District is primarily flat. The elevation rises with distance from the banks of the Potomac River. As mentioned previously, the District is home to many historically significant buildings, national landmarks, museums and memorials. The District is more than just home to government agencies. There are more than 50 historic districts within the District as well. Aesthetically, the District is unique with its characteristic magnificent buildings with limited heights and many historic areas. As part of the Height of Buildings Act of 1910, residential structures cannot exceed a height of 90 feet, while business structures cannot exceed a height of 110 feet. Very few structures within the District exceed that height.

The District serves as our nation's capital and is considered a highly developed and urbanized setting with an extensive streetlighting network. The network currently consists of a variety of inefficient lighting technologies, including HPS, incandescent, mercury vapor, metal halide and other types, such as fluorescent. Each lighting technology has a different color emission associated with it, as indicated in **Table 3**. The color emission affects the CRI, which indicates how accurately different lighting technologies show color when compared to daylight. Technologies with a higher CRI, such as LED and metal halide, show the true color of objects that are viewed under those lights as compared to a natural light source,

where HPS, which has the lowest CRI. Objects viewed under lighting with a low CRI appear to be substantially different in color than they are when viewed under a natural light source.

DDOT is responsible for developing streetscapes within the District and ensuring that public spaces meet specific standards. A primary mission is to improve the appearance and vitality of street and sidewalk space, while balancing security and aesthetic conditions. Visual sensitivity within an area will be determined largely by the types of activities and land uses that occur within that area. Areas that are within land uses designated as residential, park, and some institutional uses, as well as historic resources, are considered to be visually sensitive areas.

NPS and AOC have completed large scale conversions of streetlighting to LED in various parts of the District without negatively affecting the visual quality of the area. The fixtures installed have a CCT higher than 3,000 K. Streetlighting conversions have occurred in areas that are considered to be visually sensitive, including Rock Creek Parkway, the Jefferson Memorial, National Mall and surrounding the Washington Monument.

The conversion of lighting within the District does not include streetlights that are owned and operated by third party entities, including private property owners and federal agencies such as the NPS, NCPC, AOC, GSA, the DGS, DPR, or the District of Columbia Housing Authority as DDOT does not have jurisdiction over these properties.

7.14.2 Environmental Consequences – Alternative 1

Since Alternative 1 will not result in to the conversion of lighting within the District, the visual environment within the District will not change. While routine maintenance for fixtures will still occur, lighting as a whole will be inconsistent. In addition, light structures that are currently damaged throughout the District may not be repaired as quickly and individual outages will take longer to address.

7.14.3 Environmental Consequences – Alternative 2

Lighting has historically played an important role in the design of parks and residential areas within the District. Feedback during the public involvement process indicated that the CCT and lumen output of the fixtures was a concern for many residents. As mentioned previously, informal consultation between the DC SHPO, DDOT, OP3, NCPC, ANCs and other agencies has been ongoing in an effort to establish criteria to determine the appropriate brightness and CCT range for various land uses. Several LED conversions have occurred within the District to date. NPS and AOC have completed large scale conversions to LED in various parts of the District. The fixtures installed had a CCT higher than 3,000 K. The fixtures installed by NPS and AOC are considered cooler than the maximum 3,000 K fixtures proposed as part of Alternative 2. This project will replace all fixtures currently owned by DDOT, including those that may have already been converted to LED as part of previously completed maintenance projects.

Alternative 2 will be limited to upgrading existing lighting without changing the type, number, or location of the lighting structures within the District. Potential impacts associated with Alternative 2 will be related to the quality of light and the perception of the light emissions. The poles and light structures will not change. As such, there will be no changes in the visual appearance, setting, or viewsheds within the District as a result of Alternative 2.

HPS provides a more golden, warmer light, while LED puts out a whiter, bluer, cooler light. Brightness of lighting is a concern of many residents. The higher the CCT, the brighter the light output. Based on this feedback, the District put together a systematic approach to identify where specific lumen output and CCTs will be used. Land uses were identified as commercial, where the land is dominated by commercial uses, intermediate, which is a mixed use that could include commercial use on the lower levels and residential uses in upper levels of a building, and residential. In addition to land use, roadways were identified as interstate and freeways, principal arterials, minor arterials, collectors, local, and alleys. CCTs

and lumen output vary between not only roadways and land use, but by different lighting styles. Lighting in all residential areas will be limited to a CCT of 2,700 K. This was consistent regardless of roadway types. Streetlighting within commercial areas will have lights with a CCT of 3,000 K. While lumen output varies, it will be consistent with existing lumen output. For example, teardrop fixtures located within residential areas along roadways designated as minor arterials would have a maximum lumen output of 14,000 lumens, consistent with lumen output associated with existing fixtures. These lights have the ability to be dimmed below those maximum lumen levels. While there is concern among residents that the project will result in brighter lighting throughout the District, that is generally not the case. This project will not increase the brightness of the streetlight fixtures within the District. By focusing on and prescribing the lumen output of the street lights, rather than wattage, DDOT will maintain a pre-determined “brightness” of the lights. As LED technology improves, the same lumen output may be achieved at a lower wattage. This addresses public concerns and avoids the potential for wattages resulting in brighter lighting than desired or anticipated. Finally, LED technology offers better light distribution, which could reduce the overall lumen output of most lights in the network.

One of the most meaningful benefits of the proposed project is the ability to dim lighting. As part of their current process, a lighting survey is conducted by DDOT’s Streetlight Division if a resident or organization requests an increase or decrease in lighting levels or requests the installation of a shield. Each ward within the District has a technician assigned to that ward. The assigned technician schedules a night to perform a lighting assessment. Sometimes the technician is able to visually assess the situation and determine whether it is appropriate to increase or decrease lighting levels, install a shield, or trim trees around the light. Other times, the technician uses a handheld meter to take a photometric reading of the street to determine if the foot-candle level is appropriate. If it is determined that the lighting level is insufficient, they can recommend increasing the wattage. If the request is to lower light levels, they determine a more

suitable foot-candle level and design a solution that meets the request of the residents while maintaining safety. A contractor then completes the necessary work to make the changes.

Dimming capabilities will be used to adjust lighting levels to individual community needs. While a process will be implemented by which dimming can be requested, the exact process has not yet been determined. Requests for dimming must initially be presented to the affected ANC. DDOT will develop a process that incorporates feedback from ANCs, as well as from the broader community, in an effort to ensure that dimming is determined by a majority of residents, as opposed to allowing a small number of residents to determine the appropriate lighting levels. Similar to the current process, DDOT's Streetlight Division will then conduct a lighting survey to determine how much lighting levels can be increased or decreased but still maintain safe lighting levels. When the appropriate lighting levels are determined, those changes will be implemented. Dimming will occur remotely and within a reasonable timeframe.

As discussed earlier, shielding compatibility will be included for every fixture. While shielding will not be incorporated into every fixture, shielding is available upon request. Fixtures that are currently shielded will be shielded automatically as part of the LED conversion. The shielding will focus the light downward and minimize uplighting (lighting illumination aimed upward, into the night sky, as opposed to down toward the ground, where lighting is needed). DDOT will require Cobrahead fixtures to eliminate all uplighting. As discussed earlier, uplighting will be limited to 10 to 15 percent of the total lumen output of post top globe fixtures, or globe fixtures on upright poles. There are currently no limitations on uplighting for existing globe fixtures. The goal of the design with regard to uplighting is to reduce uplighting to the least amount that still allows the full silhouette of the Washington Globe to be appreciated, as recommended in consultation with CFA. Shields will be used where appropriate to minimize light trespass into sensitive areas.

DDOT coordinated with USNO to discuss the proposed project and how the light from streetlights affects the work that is done at the Observatory, which benefits from less light pollution. Representatives have expressed interest in the ability to dim fixtures. Initial lighting output will be the exact same as what currently exists in each area. Lighting levels will be raised as the lights dim as they are approaching the end of their life cycle. In addition, the lumen levels emitted by each fixture will be consistent to the lumen levels currently associated with each fixture. Feedback provided by the USNO was considered and will continue to be included in the design of the project in an effort to address their concerns. Feedback from the USNO indicates that their desire is to have the warmest light possible, as they are capable of filtering red light. USNO requested full-capped shielding from uplighting. While the fixtures will not be fully shielded, there will be more shielding of uplighting provided than what currently exists. In addition, LEDs direct light down instead of outward or up. Finally, USNO requested low illuminance. All fixtures will have remote dimming capabilities.

Several residents raised concerns about increased brightness and the potential for glare, especially disability glare, resulting from the proposed action. As discussed earlier, glare is caused from excessive lighting, as well as the angle of the lighting. Lighting levels are proposed to be between 2,700 K, which is considered extra warm, white light, and 3,000 K, which is considered warm white light, consistent with AMA recommendations for minimizing glare. Consistency with those recommendations reduces discomfort and disability glare. In addition, diodes will be pointed downward, toward the ground, as opposed to outward, reducing the likelihood that light would be emitted horizontally and cause glare.

As stated previously, AMA indicated that at 3,000 K, the human eye still perceives the light as “white,” but it is slightly warmer in tone, and has about 21 percent of its emission in the blue-appearing part of the spectrum. Lighting at this level is more pleasing to humans than 4,000 K lighting used in other cities.

7.15 Construction Impacts

This section identifies and assesses the potential construction impacts of Alternatives 1 and 2, as well as plans for minimizing any temporary impacts.

7.15.1 Environmental Consequences – Alternative 1

Since Alternative 1 will not result in any construction activities of any kind, this alternative will not cause construction impacts.

7.15.2 Environmental Consequences – Alternative 2

Construction activities associated with Alternative 2 have the potential to result in impacts inclusive of changes to traffic, parking, and pedestrian movements and the potential for lighting inconsistencies while the fixtures are being replaced. Prior to initiating work in an identified area, door hangers will be posted on each door to notify residents of the intent to initiate activities and provide a range of dates activities are expected to occur. Work will be performed in a “rolling” manner, with personnel moving from one streetlight to the next. It is estimated to take approximately 30 minutes to upgrade a streetlight fixture and, unless an issue were to arise, no streetlights would be left in the middle of an upgrade at the end of the day. While day to day there will be a point where the new LED fixtures are adjacent to older fixtures to be upgraded, the lumen output level would be consistent and there will be no gaps in the lighting compared to existing conditions.

During construction, trucks may be used to access each area. They will be parked along or adjacent to the street on which the conversion is occurring. Temporary shoulder, lane closure, or parking restrictions may be required for technicians to complete the conversion. This will typically be accomplished with an arrow truck behind the work vehicle, moving from streetlight to streetlight. Once work is complete in an area it will be re-opened. Some work will also be completed from sidewalks, resulting in the partial obstruction

of sidewalks. Again, each upgrade is anticipated to take approximately 30 minutes, and sidewalks are not expected to be closed during the conversion.

In order to minimize potential impacts during construction, strict performance requirements will be implemented. LED conversion work along freeways, expressway, arterials, collectors, pedestrian paths, and bike lanes will not be allowed during the morning and evening rush hours or on holidays. In addition, both a Traffic Control Plan (TCP) and Transportation Management Plan (TMP) will be developed. Vehicular and pedestrian access to residences, businesses and public buildings will be maintained, as will pedestrian access to and through and work areas. Failure to comply with the approved plans will result in penalties. Finally, when conversion activities begin in an identified ANC, those activities must be completed entirely before moving on to another ANC. While conversion activities might occur within two or three ANCs at the same time, each ANC will be completed before leaving that ANC. This will minimize any potential visual inconsistencies that might result from the proposed project.

7.16 Summary

A summary of the environmental consequences is included in **Table 4** to document that the Proposed Action meets the requirements of a CE-3. This reflects the discussion of potential environmental consequences outlined in the sections above including how issues of public concern were addressed.

Table 4: Summary of the CE Analysis of Significant Environmental Impacts

CE Criteria of Significant Environmental Impacts		Analysis Included in Section	Conclusion
1	Induce significant impacts to planned growth or land use for the area	7.1 Land Use Impacts 7.2 Social Impacts 7.3 Relocation Impacts 7.4 Economic Impacts	No significant impact
2	Have a significant impact on any natural, cultural, recreational, historic, or other resource	7.10 Threatened and Endangered Species 7.11 Historic and Archeological Resources 7.12 Section 4(f) of the US Department of Transportation (DOT) Act 7.13 Hazardous Waste Sites 7.14 Visual Impacts 7.15 Construction Impacts	No significant impact
3	Involve significant air, noise, or water quality impacts	7.7 Air Quality 7.8 Noise 7.9 Water Quality and Wetlands	No significant impact
4	Have significant impacts on travel patterns	7.5 Traffic and Transportation 7.6 Pedestrians and Bicyclists	No significant impact
5	Either individually or cumulatively, have any significant environmental impacts.	All	No significant impact

8.0 Environmental Commitments

As presented in **Chapter 1**, early in the public involvement process, it was determined that the proposed project has the potential to result in public controversy surrounding the following concerns:

- Potential visual impacts
- Potential health concerns
- Potential effects to wildlife, and
- Light pollution, including light trespass, uplighting, and over-illumination.

DDOT has coordinated extensively with the public and various agencies and specific mitigation measures have been incorporated into the design of the proposed project to address those concerns. These mitigation measures, or environmental commitments, are highlighted in the following sections and discussed throughout **Chapter 7**.

8.1 LED Conversion

Lighting within the District will not exceed a CCT of 3,000K, which is considered a warm, white light. Within residential areas, lighting will not exceed a CCT of 2,700K, which is considered an extra warm, white light.

8.2 Light Control

Each LED lighting fixture consists of individual diodes that can be physically manipulated to emit light in a specific direction. Each diode will be aimed toward the ground, which will minimize light shining horizontally from each fixture. In addition, the design of the lighting will allow for dimming to occur remotely and within a reasonable timeframe. Furthermore, each fixture will be compatible with shielding

capabilities, which can minimize light trespass. The shielding will focus light downward and minimize backlighting towards homes and uplighting toward the night sky.

8.3 Historic – Washington Globe Fixture

As a result of coordination with the DC SHPO and the CFA it was determined that the design of the fixtures associated with Washington Globes will be limited to 10 to 15 percent uplighting of the total lumen output of the post top globe fixtures, or globe fixtures on upright poles. The goal of this design requirement as it relates to uplighting is to reduce uplighting to the least amount possible that still allows the full silhouette of the Washington Globe to be appreciated.

8.4 Social Impacts

The proposed project will include remote monitoring to ensure that all residents throughout the District, regardless of location, receive the same level of service. With remote monitoring, everyone receives equitable, or equal, service. The system will detect outages as soon as they occur, minimizing the overall time of an outage and relieving the public of the burden of reporting outages.

The design of the lighting will consider the reduction of glare into drivers' and pedestrians' eyes while enhancing visibility. Lighting levels are proposed to be between 2,700 K, which is considered extra warm, white light, and 3,000 K, which is considered warm white light, consistent with the AMA recommendations. In addition, lighting at 3,000 K or less would reduce any potential effects to diurnal/circadian rhythms and sleep/wake cycles and has less of an impact on wildlife. The 2,700K extra warm white light in residential areas would further address public concerns. Each fixture will be compatible with shielding capabilities, further reducing potential glare and light trespass.

8.5 Traffic and Transportation

DDOT has developed and will implement requirements for maximum CCT and lumen output for streetlights based on roadway classification and land use. For example, streetlights installed for roadways classified as principal arterials will not exceed a CCT of 3,000 K in commercial or intermediate land uses, while streetlights within residential areas will not exceed a CCT of 2,700 K. Along those same roadways, lumen levels within commercial and intermediate areas would range between 10,000 and 20,000 lumens, while lumen levels within residential areas would range between 8,000 and 16,000 lumens, depending on lighting style. While these lumen levels represent the maximum lumen levels for those land uses and roadway types, light fixtures may be dimmed below these levels. Addressing public concerns regarding an increased “brightness” of LED lights, the lumen levels provided would be consistent with those that are currently provided throughout the District. The design of the lighting will consider the reduction of glare into drivers’ and pedestrians’ eyes while enhancing visibility.

8.6 Pedestrians and Bicyclists

The proposed lighting levels will reduce discomfort and disability glare. In addition, diodes within the LED fixture will be pointed downward, toward the ground, as opposed to outward, reducing the likelihood that light would be emitted horizontally and produce glare.

8.7 Threatened and Endangered Species

As part of the proposed action, no additional lighting structures will be added within the District and the proposed lighting levels associated with the Proposed Action are consistent with those that currently exist within the District. Lighting levels will not exceed 3,000K which is consistent with recommendations from the International Dark Sky Association and the AMA. As a result of public feedback, a vast majority of

lighting within the District, especially within non-commercial areas, will be 2,700 K. The lumen output associated with each fixture will be consistent with the existing fixtures throughout the District.

Individual diodes associated with LED fixtures will be manipulated to direct light towards an intended area, as opposed to upward or horizontally. In addition, limiting uplighting to 10 to 15 percent of the total lumen output of the Washington Globe fixtures, along with shielding compatibility for other fixtures, will further limit upward light trespass and address uplighting concerns related to migratory bird species, insects and bats. Lights will be able to be remotely dimmed or extinguished completely with no delays, if necessary.

8.8 Hazardous Waste

Existing HPS, fluorescent, mercury vapor, and mercury halide fixtures contain a small amount of toxic mercury. As part of the upgrade project, the removal and disposal of these fixtures will be consistent with EPA regulations.

8.9 Visual Impacts

No lights will be added or removed as part of the Proposed Action. Any actions will be limited to upgrading existing lighting. The poles and light structures will not change.

In an effort to address concerns relating to visual impacts, DDOT will employ a systematic approach to identify where specific lumen output and CCTs will be used based on roadway classification and land uses. Lighting in all residential areas will be limited to a CCT of 2,700 K, regardless of roadway types. Streetlighting within commercial areas will have lights with a CCT of 3,000 K. While lumen output varies, it will be consistent with existing lumen output.

Lights can be dimmed remotely. DDOT will develop and implement a process by which dimming can be requested. The process for dimming requests includes the completion of a lighting survey and presentation to the affected ANC to incorporate feedback from ANCs and the broader community, in an effort to ensure that dimming is determined by a majority of residents. The process is discussed further in **Chapter 7**.

Shielding compatibility will be incorporated into every fixture but will only be incorporated automatically for those fixtures that are currently shielded. Otherwise, shielding is available upon request.

DDOT coordinated with USNO to discuss the proposed project and how the light from streetlights affects the work that is done at the Observatory, which benefits from less light pollution.

8.10 Construction Impacts

Several commitments have been made in an effort to minimize impacts associated with construction activities. Prior to initiating work in an identified area, door hangers will be posted on each door to notify residents of the intent to initiate activities and provide a range of dates activities are expected to occur. Work will be performed in a “rolling” manner, with personnel moving from one streetlight to the next, and once work is complete in an area it will be re-opened. It is estimated to take approximately 30 minutes to upgrade a streetlight fixture and, unless an issue were to arise, no streetlights would be left in the middle of an upgrade at the end of the day. While day to day there will be a point where the new LED fixtures are adjacent to older fixtures to be upgraded, the lumen output level would be consistent and there will be no gaps in the lighting compared to existing conditions.

LED conversion work along freeways, expressway, arterials, collectors, pedestrian paths, and bike lanes will not be allowed during the morning and evening rush hours or on holidays. In addition, both a TCP

and TMP will be developed. Vehicular and pedestrian access to residences, businesses and public buildings will be maintained, as will pedestrian access to and through and work areas.

When conversion activities begin in an identified ANC, those activities must be completed entirely before moving on to another ANC. While conversion activities might occur within two or three ANCs at the same time, each ANC will be completed before leaving that ANC.

9.0 Public and Agency Involvement

Public and agency coordination for the proposed project was conducted in accordance with the requirements of NEPA and Section 106 of the National Historic Preservation Act (54 USC 300101 et seq.). Coordination served to help identify and evaluate alternatives, and to resolve issues related to the proposed action. Federal and local agencies, as well as the public, were invited to review and comment on the proposed project. The public outreach and agency coordination resulted in many of the specific features of the Preferred Alternative.

9.1 Public Outreach

Over the years, DDOT has undertaken extensive collaboration and coordination with community stakeholders on this project, including residents and associations.

A total of eight public meetings were held, one in each Ward across the District, in an effort to provide the public with an overview of the proposed project. The meetings were advertised on the District of Columbia Municipal Regulations and District of Columbia Register website (<https://www.dcregs.dc.gov>), as well as the DDOT's website and social media channels. The following meetings were held:

- February 22, 2018, Capitol View Neighborhood Library, located at 5001 Central Avenue SE (Ward 7) from 6:30 PM until 8:30 PM.
- February 24, 2018, Mt. Pleasant Public Library, located at 3160 16th Street NW (Ward 1) from 11:30 AM until 1:30 PM.
- December 4, 2018, Woodridge Library, located at 1801 Hamlin St NE (Ward 5) from 6:00 PM until 8:00 PM.
- December 6, 2018, Chevy Chase Library, located at 5625 Connecticut Ave NW (Ward 3) from 6:00 PM

until 8:00 PM.

- December 11, 2018, Waterfront Station I, 1100 4th Street SW, Second Floor (Ward 6) from 6:00 PM until 8:00 PM.
- December 12, 2018, Anacostia Library, located at 1800 Good Hope Road SE (Ward 8) from 6:00 PM until 8:00 PM.
- November 5, 2019, Georgetown Public Library, located at 3260 R Street NW (Ward 2) from 6:30 PM until 8:00 PM.
- November 6, 2019, Roosevelt High School, located at 4301 13th Street NW (Ward 4) from 6:00 PM until 7:30 PM.

Meeting minutes for each of the meetings are provided in **Appendix H**.

In addition to the formal meetings listed above, DDOT attended and presented at several local ANC meetings and met with individual residents to discuss the project. Residents were provided with an opportunity to provide feedback on the project. At the meetings, the opportunity was provided to ask questions directly to staff. Comment forms were provided at each meeting for attendees to use to provide comments or feedback on the project as well. At each meeting, in addition to comment forms, attendees were provided with several options to provide feedback on the project, including by email, phone, and mail. All comments were answered during the meeting. No additional written comments were received during the first six meetings. A summary of questions asked at each of the meetings is provided in **Appendix H** as part of the meeting minutes developed for each meeting. The meetings held in November 2019 were held in an open house format. Comment cards were received during each of those open house meetings. In addition, comments were received via email during the public comment period after

the meetings. A summary of the comments received, responses to those comments, and where those comments are addressed within the CE-3 are included in **Appendix H**.

9.2 Streetlight Advisory Panel

A Streetlight Advisory Panel (SAP) was developed to provide feedback on the proposed project. The purpose of the SAP is to receive periodic updates during the procurement, design, construction and operations phases of the proposed project and to provide critical feedback that will improve the overall quality of the project. The SAP includes nine District residents that were appointed by Mayor Muriel Bowser in 2018 and are community representatives, a member of the former Streetlight Task Force, or skilled in environmental, historic preservation and design, lighting technology, public health and safety, and economic development. The first SAP meeting was held on November 13, 2018. All subsequent SAP meetings have been held on the second Tuesday of every month from 4:30 until 6:00 PM. The meetings were held in Room 527 of the John A. Wilson Building from November 2018 through March 2019. Beginning in April 2019, the meetings have been held in Room 639 of DDOT Headquarters, located at 55 M Street SE. As stated above, these meetings will continue through project implementation. Information on the SAP, including time and location of each standing meeting, is also included on the website (<https://ddot.dc.gov/streetlightp3>). A link to SAP meeting materials is included on the website as well.

9.3 Agency Coordination Meetings

Beginning in March 2018, DDOT contacted District, regional, and Federal agencies to introduce the proposed project to agency staff. Coordination and meetings with agencies have occurred throughout the process. Meetings were held both one-on-one with individual agencies or as part of larger interagency meetings. A summary of the coordination is outlined below:

United States Naval Observatory (USNO)

DDOT coordinated with the United States Naval Observatory to discuss the proposed project and to discuss how the light from streetlights affects the work that is done at the Observatory. On February 12, 2019, representatives from the SAP, as well as DDOT, were invited to take a tour of the USNO. A tour of the grounds was given and a history of the USNO and related astronomy was provided. USNO representatives provided a brief presentation on how ambient light affects their work. After the presentation, the group was able to see where the most prominent sources of light pollution were originating from. On March 13, 2019, a meeting was held with staff from the USNO. DDOT provided a brief overview of the project and the USNO discussed how light from streetlights affects their work, which benefits from less light pollution.

National Capital Planning Commission (NCPC)

DDOT has coordinated extensively with the NCPC and a NCPC working group, which included representatives from the CFA, AOC, NPS, NCPC, and FHWA, was established that has met monthly since October 2018. Meeting dates and a short synopsis of each meeting are as follows:

- January 23, 2018 – DDOT initially met with the NCPC working group. The purpose of the initial meeting was to discuss streetlighting standards with the meeting attendees, focusing on LED conversion. DDOT shared their work in an effort to inform attendees of their efforts to date so that they could coordinate their efforts
- March 13, 2018 – DDOT discussed streetlighting standards with NCPC representatives. The discussion was focused on LED conversion. DDOT shared their work to inform NCPC of their efforts to date so that they can coordinate with federal agencies.

- May 3, 2018 – DDOT delivered a formal presentation at NCPC’s monthly open session meeting to NCPC commissioners. Attendees were provided with an overview of the project scope, benefits of the proposed project, and the proposed public-private partnership structure. An overview was provided of the planned coordination with federal agencies and questions from the commissioners were answered.
- August 24, 2018 – DDOT met with NCPC to continue to discuss streetlighting standards with a focus on LED conversion. DDOT shared work efforts to date so that NCPC can coordinate with federal agencies. NCPC provided an update to DDOT on its streetscape project.
- October 17, 2018 – DDOT met with the NCPC working group to provide an update of efforts to date. Representatives of DDOT discussed the proposed CCT and wattage maps that were developed and shared them with the group.
- February 11, 2019 – DDOT met with NCPC during the monthly working group meeting. DDOT provided a status of the Draft LED Streetlight Performance Criteria to be provided to the concessionaire when available. A letter from NCPC to DDOT regarding the proposed CCT and mapping was provided, with additional comments to be provided at a later date. The draft lighting framework was discussed, including outstanding issues and a review of agency comments. The 2005 Memorandum of Understanding (MOU) between NCPC and DDOT was discussed, including obsolete clauses and citations. The meeting ended with a discussion of action items.
- March 27, 2019 – DDOT met with NCPC during the monthly working group meeting. The group met to review the 2019 MOU and discuss amendments to the document. The attendees coordinated to review and comment on streets for prioritization for consistent CCTs, as well as proposed wattages. In addition, an overview of the Lighting Policy and Framework Information was presented to the commission members.

- April 29, 2019 – DDOT met with NCPC during the monthly working group meeting. The purpose of the meeting was for lighting engineers and consultants to discuss and reconcile differences between the proposed local and federal LED streetlight performance criteria. The methodology for determining CCTs and wattages was discussed. Street classifications, land use, and other considerations are made before deciding the appropriate CCT and wattage to be implemented in an identified area.
- August 21, 2019 – DDOT met with staff from NCPC’s physical planning division. DDOT provided an update of the status of the project and answered questions about streetlighting design.

DC State Historic Preservation Officer (DC SHPO)

DDOT has coordinated extensively with the DC SHPO to discuss the proposed project and to determine the best way to avoid/minimize impacts to historic resources. Formal Section 106 consultation was initiated by the FHWA in May 2018. On May 30, 2018, the DC SHPO responded to FHWA’s consultation initiation. While the DC SHPO acknowledges the benefits associated with the proposed project, their primary concern is that the project is implemented in a way that will not diminish the integrity of the historic resources within the District. Informal consultation between the DC SHPO, DDOT, OP3, NCPC, and other agencies has been ongoing in an effort to establish criteria to determine the appropriate brightness and CCT range for various land uses. On October 7, 2019, a letter was sent to each ANC within the District formally inviting them to participate in the Section 106 consultation process. Several meetings have occurred between the two agencies. Meeting dates and a short synopsis of each meeting are as follows:

- April 10, 2018 – DDOT met with the DC SHPO to introduce the proposed project. The reason for the meeting was to provide the DC SHPO with an overview of the project and to discuss the effects that the proposed project could have on historic properties throughout the District. DDOT stated

that changes to the fixtures will be made in-kind, meaning only the fixture itself would be affected. The look of the pole and shape of the fixture will not change.

- May 15, 2018 – FHWA sent a letter to DC SHPO formally initiating the Section 106 process.
- May 30, 2018 – DC SHPO responded to FHWA’s initiation of the Section 106 process. They acknowledged that while the project presents worthwhile benefits, it is important to ensure that the project is carried out in a manner that will not diminish the integrity of the many historic landmarks, historic districts, and other historic properties throughout the District that will be directly and indirectly affected by the proposed project. DC SHPO stated that there had been ongoing consultation with DDOT, OP3, NCPC, and other District and Federal entities to determine the best ways to evaluate the potential effects of the proposed project on historic properties.
- March 13, 2019 – DDOT met with DC SHPO to provide them with a project update. An update was provided on the public outreach efforts to date with both federal partners and residents. DC SHPO staff appreciated the systematic approach to the CCTs and wattages proposed, as well as the process for determining what those CCTs and wattages should be. In addition, DC SHPO appreciated the proposed shielding and dimming protocols associated with each fixture. DDOT confirmed the previous statement that the project will maintain the current style of all poles in place, swapping only the lighting technology to achieve energy efficiency goals.
- August 23, 2019 – DDOT met with DC SHPO staff to provide an update on the status of the project. DDOT again confirmed that changes are being made in kind, not changing the historic nature of the asset. Public and agency feedback indicate that uplighting is a concern. It was determined that, as part of the proposed project, each fixture will be compatible with shielding capabilities, which will minimize light trespass. CFA and NCPC agreed with the decision to incorporate shielding capabilities into each fixture. As discussed in **Chapter 7**, the developer that designs the

fixtures will be required to limit uplighting to 10 to 15 percent of the total lumen output of post top globe fixtures, or globe fixtures on upright poles, in an effort to reduce uplighting to the least amount that still allows the full silhouette of the Washington Globe to be appreciated, as required in consultation with the DC SHPO. DDOT gave an update on the public outreach efforts that had been completed to date. DC SHPO staff indicated that a concurrence with a determination of no adverse effect is expected.

- May 28, 2020 – FHWA provided coordination to DC SHPO stating that the proposed undertaking would result in no adverse effect on historic properties based on the criteria for an assessment of adverse effects contained in 36 CFR 800.5.

US Commission of Fine Arts (CFA)

DDOT met with staff from the CFA in an effort to introduce the project and discuss the aesthetics of the streetlight network and any anticipated or perceived impacts from LED conversion. CFA staff expressed concern over the amount of shielding proposed by DDOT. CFA staff wanted to ensure that the full silhouette of the Washington globe post top fixtures is appreciated. To do so, a minimum percentage of light must be able to trespass upwards and the fixture cannot be fully capped. CFA's concerns were noted and DDOT explained the process for developing specifications on uplighting.

US Coast Guard (USCG)

In addition to lighting along roadways, DDOT is responsible for maintaining navigation lights on all bridges within the District. As such, those navigation lights will be upgraded as part of the proposed project. DDOT contact the USCG to discuss the proposed project, what it entails, and activities associated with the project. USCG indicated that they do not review or approve the technical specifications of equipment and lights used for bridge lighting. In addition, DDOT is required to meet the provisions of 33 CFR 118.60 – Characteristics of Lights. Coordination with the USCG is included in **Appendix I**.

Interagency Meeting

Finally, on October 28, 2019, an interagency meeting was held. Representatives from DDOT, District of Columbia Office of Health, NCPC, USNO, CFA, FHWA, and the District of Columbia Office of Planning attended the meeting. DDOT provided a status of the project to date and an update to the project timeline to the various agencies in attendance. Concerns about potential overlighting were raised, triggering a discussion on the process for remote dimming. Many overlighting concerns can be alleviated with shielding instead of dimming. As a result, the ability to implement shielding will be incorporated into each fixture.

An overview of the Section 106 of the National Historic Preservation Act was described for meeting attendees. Based on conversations with DC SHPO to date, at that time it is expected that the DC SHPO would concur with a determination that the proposed undertaking will have no adverse effect on historic properties. An overview of public involvement activities to date were described for the meeting attendees. Representatives with NCPC confirmed that NPS and AOC have replaced lights in several sensitive areas within the District with LED lights. Finally, the implementation of the project was described for the attendees. When work is initiated within an ANC, the entire ANC will be finished before moving onto the next. The presentation and meeting minutes completed for the interagency meeting are included in **Appendix J**.

9.4 Project Website

In June 2017, a project website (initially found at <https://op3.dc.gov/page/project-profile-dc-smart-street-lighting>, and in October 2019 changed to <https://ddot.dc.gov/streetlightp3>) was launched to provide information on the project, NEPA process, schedule, and to encourage interested parties to sign up for the project newsletter and comment on the project. A short project background was provided that

includes a high-level project description of the proposed project. The website lists the agencies involved with planning and managing the project and the current status of the project.

A procurement timeline is included on the website that explains the activities that have occurred to date. An industry forum was held to discuss the project with interested teams. A Request for Qualifications was issued on June 21, 2017 and Statements of Qualifications were received from each team on August 28, 2017, which described both the team and their project delivery approach.

A Community Engagement section is included on the website, which includes dates and locations of each meeting, as well as links to the presentations provided at each meeting. Information on the SAP, including time and location of each standing meeting, is also included on the website. A link to SAP meeting materials is included on the website as well.

10.0 CONCLUSION

In summary, Alternative 2 includes the replacement of all DDOT-owned streetlight sources to LED. This Alternative would upgrade, unify and modernize the District's streetlight network to improve safety, enhance aesthetics, incorporate available technological features, provide equity of service, reduce energy usage, reduce the carbon footprint, reduce glare and uplighting that may affect wildlife, and reduce asset management costs associated with lighting throughout the District, thereby meeting the purpose and need for this project.

Public and agency feedback resulted in several context sensitive and design solutions that have been incorporated into Alternative 2. These solutions include the following:

- DDOT has made a commitment to install LED fixtures with a color temperature no higher than 3,000 K consistent with AMA recommendations in an effort to avoid any potential health effects to wildlife and humans. As mentioned previously, lighting at 3,000 K or less would reduce any potential effects to diurnal/circadian rhythms and sleep/wake cycles and has less of an impact on wildlife. The 2,700K extra warm white light in residential areas would further address public concerns.
- The majority of lighting, including all lighting within residential areas would not exceed a color temperature of 2,700 K. In addition, lumen levels associated with the upgraded light fixtures will be consistent with those that currently exist throughout the District. Unlike conventional fixtures, which emit light in all directions, each LED fixture consists of individual diodes. Each diode can be physically manipulated to emit light in a certain direction. Diodes will be aimed toward the ground, which will minimize light shining horizontally from each fixture. These actions will also minimize glare. Moreover, this directionality improves uniformity of the light and further reduces

the wattage needed to illuminate the ROW. These measures will address concerns as they relate to the potential for increased brightness and light trespass.

- All fixtures will be equipped with remote monitoring and control capabilities, which will provide DDOT with the ability to provide equity of service to all residents throughout the District. Since the existing streetlight network does not include remote monitoring capabilities, DDOT currently relies on residents to report an outage, resulting in delays to repairs and inconsistent levels of service throughout the District. The remote monitoring capabilities will enable the District to detect outages as soon as they occur, minimizing the amount of time of an outage. In addition, the remote monitoring capabilities guarantee that everyone will receive equitable, or equal, service, regardless of location within the District, and relieving the public of the burden of reporting outages.
- Dimming will be remotely controlled and responsive to neighborhood feedback.
- Each fixture installed within the District will be compatible with shielding capabilities, which, in combination with the use of LED fixtures that contain individual diodes, will further minimize light trespass. The shielding would focus the light downward and minimize uplighting. Fixtures that are currently shielded will be shielded automatically as part of the LED conversion.
- No ground disturbance is required as part of the LED upgrade and the proposed project will not add or eliminate light fixtures during the conversion to LED.
- With very minor exceptions, there will be no change to pole style. However, structures may be repaired, if necessary.

- Alleyway lights that are currently acorn-style incandescent luminaires will change to Cobrahead-style lights, as they are inconsistent with the majority of alleyway lights and incandescent lighting is an outdated technology.
- There are currently multiple looks to Cobrahead streetlights across the District. Some Cobrahead style lights will be replaced to be more consistent, but these fixtures will retain their style, even if the shape may change slightly.
- There will be no change in the visual appearance, setting, or viewsheds within the District as a result of the proposed project.
- The proposed project will not affect the significance of any historic resources within the District and is not inconsistent with other LED upgrades within the District that have been implemented by AOC and NPS.

The project complies with 23 CFR 771.117, as it does not “induce significant impacts to planned growth or land use for the area; does not require the relocation of people or businesses; does not have a significant impact on any natural, cultural, recreational, historic or other resource; does not involve significant air, noise, or water quality impacts; do not have significant impacts on travel patterns; or do not otherwise, either individually or cumulatively, have any significant environmental impacts.”Furthermore, there are no unusual circumstances, such as significant environmental impacts, substantial controversy on environmental grounds, significant impact on properties protected by Section 4(f) requirements or Section 106 of the National Historic Preservation Act, and is consistent with all Federal and local laws, requirements, and administrative determinations relating to the environmental aspects of the action.

In compliance with CEQ regulations 40 CFR 1508.4 and 40 CFR 1508.27, the Alternative 2 would not individually or cumulatively have a significant effect on the human environment. The proposed action

would not result in significant environmental impacts, as defined in 40 CFR 1508.27 and described in **Chapter 1**.

DDOT respectfully requests that the Federal Highway Administration approves that the proposed project is categorical excluded from further environmental review.

11.0 SIGNATURE PAGE

It is hereby determined that the proposed DC Smart Street Lighting Project meets the criteria for Categorical Exclusion Level 3 in accordance with the 40 CFR 1508 771.117. This action does not: induce significant impacts to planned growth or land use for the area; require relocation of significant numbers of people; have significant impact on any natural, cultural, recreational, historic, or other resource; involve significant air, noise, or water quality impacts; have significant impacts on travel patterns; or otherwise, either individually or cumulatively, have any significant impacts and do not require the preparation of an Environmental Assessment or an Environmental Impact Statement.

As supported by information contained in this Categorical Exclusion Document, this project qualifies for a Categorical Exclusion Level 3, in accordance with the Programmatic Categorical Exclusion Agreement between DDOT and FHWA.

DISTRICT OF COLUMBIA DEPARTMENT OF TRANSPORTATION

 Jeffery Marootian
 Director
 District Department of Transportation

 Date

FEDERAL HIGHWAY ADMINISTRATION

 Division Administrator
 Federal Highway Administration
 District of Columbia Division

 Date