**City of Palm Coast Dynamic Reinvestment in Piping Systems (DRiPs) for Wastewater Energy Efficiency and Climate Resiliency Project**

1. **Overall Project Summary and Approach**

Palm Coast joined in with the Jacksonville Metropolitan Statistical Area (MSA) to utilize a non-competitive EPA Climate Pollution Reduction Planning Grant to complete a Priority Climate Action Plan and to emphasize equity and regional collaboration across the MSA throughout the 4-year program. The City of Palm Coast hired a Chief Sustainability and Resiliency Officer in 2023 as a major milestone in the road to alignment and synchronization with the goals of the CPRG. In addition, an MSA-wide baseline GHG inventory was conducted and completed in January of 2024 and Clean Air Northeast Florida Initiative was established in 2023, to serve as a regional resource for climate and sustainability information, collaboration & action. The www.cleanairnortheastflorida.com website launched in February 2024. In addition, the Air Quality Greenhouse Gas Assessment the City of Palm Coast completed with the partnership of Audubon and ICLEI showed the water and wastewater sector accounting for a vast majority (65%) of the City’s internal GHG emissions (Scope 1). With this project, Dynamic Reinvestment in Piping Systems (DRiPS), the City is working to address one of our largest pollution sectors. Located on the west coast of Florida, Palm Coast is particularly vulnerable to the impacts of climate change. DRiPs is the first step of many to begin the changes necessary to ensure that we have a lowered carbon footprint, reliable infrastructure, improved public health and quality of life.

Development of what is now known as Palm Coast began in 1969 when the population in Flagler County was 4,500. By the time that Palm Coast was incorporated in 1999, the population of the County had grown to 28,701. Today Flagler County has a population of approximately 120,932 and the City of Palm Coast has a population of roughly 97,000. The majority of the wastewater infrastructure within the system dates from the 1970s. As the sanitary system ages, leaks and breaks occur which allows large quantities of storm and ground water to infiltrate the system. When this happens, pump stations are the first to see increases in energy consumption in extended pump run times. These extended run times cause more power usage and wear to the pumps. The more rain occurs, the less efficient the system becomes the more energy intensive it becomes. With the trends that are appearing due to Climate Change, storms are becoming longer in duration and wetter. The average rainfall has increased from 36.99 inches in 2012 to 59.89 inches in 2023.

The project’s primary goal is to decrease GHG emissions and to enhance and increase energy efficiency within the wastewater treatment system infrastructure and promote climate resiliency. The wastewater treatment system is complex and comprised of sewer mains routed through lift and pump stations to transport wastewater (influent) to the wastewater treatment plant for processing. These sewer mains can become vulnerable to infiltration. Infiltration is the process of groundwater, or water from any source other than domestic wastewater, like stormwater, entering the sanitary sewers through cracks, breaks or the misalignment of fittings. The City noticed that as a result of the changing climate, the sanitary pipes become inundated by infiltration during wet weather events resulting in recorded-high wastewater treatment plant influent almost double the normal actual daily flow rate and at times triple. For instance, for five rainfall events occurring from the end of September 2023 to the end of December2023, Wastewater Treatment Plant I experienced, continued inundation from infiltration, seeing spikes of over 10MGD all the way to 14.8 MGD, this plant is rated to max out at 6.8MGD. Hurricane events and increases in the length of time it takes rainfall to filter through the ground to the aquifer raise the systems vulnerability and the instances of pollution from sanitary sewer overflows.

Infrastructure is only adaptable to the new challenges we will see through human intervention, especially in Florida. The previous infrastructure can be vulnerable to climate change. To increase resiliency and adaptation, proactive choices to protect infrastructure while lowering greenhouse gas emissions should be a City priority. The lowering of GHG emissions will have byproducts of increased critical safety for residents and a decrease in global warming. Actions similar to this project scope can help cities across the nation adopt small changes that make a large difference. For instance, according to the Federal Emergency Management Agency, every $1 a City spends in mitigation projects is $6 in savings over the long term.[[1]](#footnote-2)

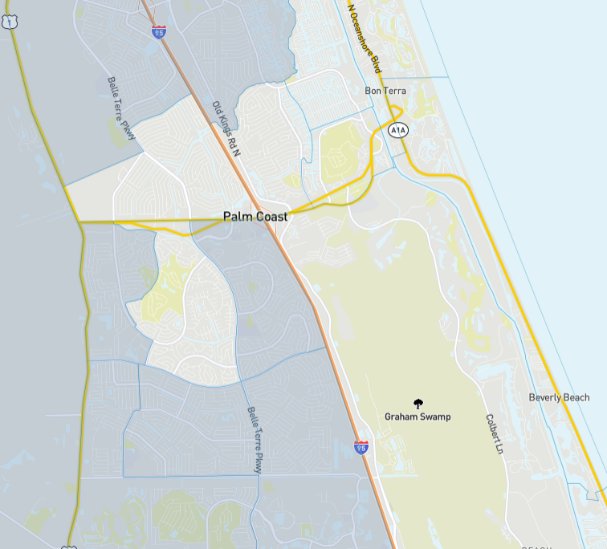
When the system experiences a rapid and sustained increase in flow levels due to infiltration the pump stations can quickly become overwhelmed. To avoid an overflow of raw sewage influent into neighborhoods and businesses, the City must deploy large diesel fuel vacuum trucks to pump down levels within the manholes. For instance, ten sanitary sewer overflows were recorded in section 39-1 alone since 2018. To avoid sanitary sewage overflows, pumping trucks are a necessity during rain events, making the City reliant on expensive, polluting emergency services. These trucks are designed to pneumatically suck liquids, sludges, slurries and the like from an underground location into the tank of the truck for transport to the wastewater treatment plant. When storm events happen, excessive ground water and stormwater infiltrates the pipes and increases the volume of influent into the pump stations. When the pump stations become overwhelmed with the excess volume, the City must deploy their three large diesel fuel vacuum trucks to lower the levels within the pump stations. Additional trucks are brought in by outside contractor services in order to meet all the pumping needs to prevent spillage and overflow of raw influent. This is very costly, inefficient, and not ecofriendly.

In addition to the GHG released by the diesel trucks, the increase in volume that must travel through the pump stations causes a spike in the energy usage needed to send the increased amount of flow on to the treatment plant. Once at the plant, the higher flow due to the infiltration causes an additional increase in energy needed to process the excess influent. The National Renewable Energy Laboratory, states in their Energy Efficiency Strategies for Municipal Wastewater Treatment Facilities[[2]](#footnote-3) publication that infiltration, inflow, and leaks in the wastewater collection system is an area of opportunity for utilities as a considerable amount of energy is wasted treating groundwater that infiltrates the system. Not only is energy wasted treating the influent, but it also increases the energy required to pump the sewage to the treatment plant. NREL further suggests that improving areas that are experiencing infiltration can have energy and financial savings.

The sewer main lining implementation in the City of Palm Coast aligns with GHG reduction through reduced diesel fuel use, increasing energy efficiency of the system, and financial energy savings. The city currently has approximately 30,000 linear feet of sanitary sewer piping identified for lining in year 1 of the grant period to prevent infiltration. Over the 4 years associated with this project the City plans to line 76,000 linear feet in total of sanitary sewer main.

To summarize, during heavy rainfall, stormwater infiltration into the wastewater infrastructure becomes a significant challenge. This influx of water disrupts wastewater operations, impacting critical processes like pumping. The consequences include inefficiencies, emergency pumping issues, deterioration of physical infrastructure and systems due to prolonged use, higher energy consumption, elevated utility bills, the need for additional personnel to handle capacity, and other related challenges. Moreover, the system continues to absorb water as stormwater percolates into the ground, extending the impact for days after the rainfall event and can be somewhat unpredictable in nature. To address these issues, the City of Palm Coast is proposing efficiency improvements through lining of the sanitary piping to better protect against the effects of high rainfall events, while actively lowering emissions, reducing energy usage and reducing running/idling times of diesel vacuum trucks, and energy efficient cost savings in pumping and utility bills.

**1.a. Description of GHG Reduction Measures**

The priority GHG reduction measure to be undertaken is wastewater treatment efficiency upgrades. This priority measure is located on page 19 of the Clean Air Northeast Florida Priority Climate Action Plan submitted to EPA on March 1, 2024, by the Jacksonville Metropolitan Statistical Area. In addition, the Air Quality Greenhouse Gas Assessment the City of Palm Coast completed with the partnership of Audubon and ICLEI showed the water and wastewater sector accounting for a vast majority (65%) of the City’s internal GHG emissions (Scope 1).

The City has identified Justice40 tract 12035060212 and 12035060208 as the areas of greatest concern based on infiltration, potential sanitary sewage overflows and energy consumption of the associated pump stations. The total amount of lining that will occur with this proposed project is 76,000 linear feet. The City stands ready to commence the project on the start date for awards (currently estimated for October 1, 2024) and finish within the five-year timeline of grant performance, with an expected four years to completion.

The project will be performed utilizing a cured-in-place (CIPP) method to prevent infiltration during rain events and therefore increase efficiency within the system. This reduction measure will address the City’s challenges in wastewater operations during heavy rainfall events. It will address the negative impact on efficiency, energy consumption, and costs and reduce GHG emissions. Energy represents the largest controllable cost of providing water or wastewater services to the public. Most facilities were designed and built when energy costs were not a major concern. With large pumps, drives, motors, and other equipment operating 24 hours a day, water and wastewater utilities can be among the largest individual energy users in a community.[[3]](#footnote-4)

The City of Palm Coast has completed numerous lining projects using cured-in-place (CIPP) pipe lining. This form of trenchless pipe sealant application is used to address failing gravity wastewater mains to prevent the infiltration of ground and storm water. This process requires no excavation. Contractors access the pipes through a manhole. They clean and inspect the pipe with pressure jets and trucks capable of vacuuming debris. Once the pipe is clean, they pass the liner into the main through the manhole and water pressure is used to expand the liner into place where the resin soaked felt material is cured with steam or UV. Once cured, a robot is utilized inside the pipe to cut out any necessary access for services attached to the pipe. This CIPP process lowers construction costs, and disruptions of services A close-up of a tunnel

Description automatically generatedto residents.

There are no risks associated with this reduction measure. The CIPP method is a trenchless installation that requires little to no digging. Access will be gained at manholes and this method requires significantly less time to complete than open trench sewer repair methods. CIPP is suitable for application to both short and long runs of piping. As opposed to open trench pipe replacement that involves street closures and detours, which can be burdensome to residents and businesses alike, this installation process has little to no effect on the project area during the construction period.

The proposed City of Palm Coast Dynamic Reinvestment in Piping Systems (DRiPs) for Wastewater Energy Efficiency and Climate Resiliency Project implementation was selected as a priority measure due to its ability to reduce GHG emissions while facilitating beneficial outcomes for the residents in the form of enhanced public health, lowered energy costs, lowered risk of property damage from system overflow during rain events, improved system resilience, improved environmental conditions by reducing overflow into streams and other bodies of water, as well as odor reduction. The project also aligns with GHG reduction through:

**Energy Efficiency:** The project's primary goal is to enhance energy efficiency by minimizing stormwater infiltration during heavy rainfall events. By addressing this issue, the City aims to optimize wastewater operations, resulting in lower energy consumption. The National Renewable Energy Laboratory (NREL) identifies infiltration, inflow, and leaks in wastewater systems as areas where energy is often wasted. The proposed solution directly targets these inefficiencies, potentially leading to substantial energy savings.

**Decreased Pumping Demands:** The energy systems affected are the lift stations, transfer pumps and pumps within the wastewater treatment plant. The project's focus on preventing stormwater from entering the wastewater system can reduce the demands on pumping stations during rainfall events. This reduction in pumping demands translates to lower energy usage and thus, a positive impact on GHG emissions.

**Reduced Diesel Fuel:** During intense or prolonged rain, drainage systems are overwhelmed and can lead to street flooding. In these scenarios, sanitary sewer overflows (SSOs) release raw sewage before it reaches the wastewater treatment facility. Because raw sewage contains bacteria and solids that can endanger human health and the environment, The City of Palm Coast has developed a systemic response to deploy trucks to vacuum the excess wastewater before an SSO can occur. The City within the 39-1 pump station service area experienced ten sanitary sewer overflows during rain events in the priority area of lining.

**Financial Energy Savings:** In addition to energy savings, the improvements will have reduced the use of chemicals during the treatment process, such as sodium hypochlorite and other sterilizing agents. The reduction of chemicals needed to process the wastewater at the treatment plant has a related scope 3 reduction as the process to produce the sodium hypochlorite and other sterilizing agents is extremely energy dependent. Excluding the 2 peak flow events, in the month of October 2023, the treatment plant used an average of 360.5 gallons of sodium hypochlorite (bleach) per day for disinfection. During those peak flow events, an average of 641.5 gallons per day was used. Excluding the record peak flow event, in the month of December 2023, we used an average of 397.1 gallons of sodium hypochlorite (bleach) per day for disinfection. During the peak flow event, we used an average of 774.5 gallons per day.

**Trenchless Pipe Repair:** A trenchless pipe repair method that uses cured-in-place pipe lining enhances the project's eco-friendliness. This method minimizes disruptions associated with traditional excavation, resulting in a more sustainable approach to infrastructure improvements.

The proposed pipe and maintenance hole lining implementation in the City of Palm Coast's wastewater infrastructure presents a promising avenue for reducing GHG emissions. The implementation aligns with **CPRG program goals** to:

**Implement ambitious measures to achieve significant cumulative GHG reductions by 2030 and beyond** through energy efficiency improvements to the wastewater system, decreased pumping demands, and reduced diesel fuel consumption. Currently, during wet weather events, especially those exceeding 1” of rainfall, Palm Coast experiences a high rate of infiltration. Prolonged spikes in flow caused by infiltration have a negative impact on efficiency, energy consumption, and costs related to the increased pumping demands and a higher flow at the wastewater treatment plant.

The City examined five master pump stations during the PCAP preparation to observe the influxes in energy usage in relation to a high rainfall event v. a drier week. This data shows that during higher rainfall events, stormwater is infiltrating the systems and causing high peaks in energy usage at the pumping stations. Below are tables demonstrating correlation between higher rainfalls and its impact on energy usage. For instance, master pump station 24-2 and 39-1 energy usage during a rainfall event and then during a dry period are compared below.

Table 1: kWh Usage in relation to rainfall

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Station | Rainfall Amount (inches) | Dates | Pump Station Wetwell Levels | kWh | Cost |
| Master Pump Station 24-2 | 0 | 10/10 | Normal | 469.29 | $60.53 |
| .34 | 10/11 | Normal | 646.6 | $82.99 |
| **2.75** | **10/12** | **Wet Well Full** | **1,887.36** | **$240.16** |
| **.01** | **10/13** | **Wet Well Full** | **2,085.10** | **$265.21** |
| **0** | **10/14** | **Starting to cycle** | **1,335.93** | **$170.31** |
| 0 | **10/15** | **Starting to cycle** | **1,199.77** | **$153.06** |
| 0 | 10/16 | Normal | 872.20 | $111.57 |
| 0 | 10/17 | Normal | 736.19 | $94.34 |
| 0 | 10/18 | Normal | 709.92 | $91.01 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Station | Rainfall Amount (inches) | Dates | Pump Station Wetwell Levels | kWh | Cost |
| PS-39-1 | 0 | 10/10 | Normal | 157.52 | 20.85 |
| .34 | 10/11 | Normal | 151.88 | 20.15 |
| **2.75** | **10/12** | **Wet Well Full** | **351.41** | **45.97** |
| **.01** | **10/13** | **Wet Well Full** | **321.56** | **42.11** |
| **0** | **10/14** | **Starting to cycle** | **284.56** | **37.32** |
| 0 | **10/15** | **Starting to cycle** | **248.45** | **32.65** |
| 0 | 10/16 | Normal | 214 | 28.19 |
| 0 | 10/17 | Normal | 201.21 | 26.53 |
| 0 | 10/18 | Normal | 181.21 | 23.94 |

In comparison to normal operating levels when rainfall was relatively 0.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Station | Rainfall Amount (inches) | Dates | Pump Station Wetwell Levels | kWh | Cost |
| Master Pump Station 24-2 | 0 | 10/20 | Normal | 679.8 | $87.2 |
| 0 | 10/21 | Normal | 693.57 | $88.94 |
| 0 | 10/22 | Normal | 754.41 | $96.65 |
| 0 | 10/23 | Normal | 631.28 | $81.05 |
| 0 | 10/24 | Normal | 574.56 | $73.87 |
| 0 | 10/25 | Normal | 594.01 | $76.33 |
| 0 | 10/26 | Normal | 583.47 | $75 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Station | Rainfall Amount (inches) | Dates | Pump Station Wetwell Levels | kWh | Cost |
| 39-1 | 0 | 10/20 | Normal | 170.65 | 22.58 |
| 0 | 10/21 | Normal | 165.21 | 21.87 |
| 0 | 10/22 | Normal | 162.27 | 21.49 |
| 0 | 10/23 | Normal | 150.16 | 19.93 |
| 0 | 10/24 | Normal | 144.68 | 19.22 |
| 0 | 10/25 | Normal | 139.76 | 18.58 |
| 0 | 10/26 | Normal | 127.34 | 16.97 |

\*Weather data was taken from both wastewater operations plant and pulled from the Ormond Beach station, from National Oceanic & Atmospheric Administration (NOAA) Record of Climatological Observations.

The reduction of the reliance on diesel fueled vacuum trucks for pumping out the stations during and following wet weather events to offset the infiltration will reduce other air pollutants as well. The trucks drive an average of 10 miles round trip to pump out a station and then transport to the wastewater treatment plant for unloading into a holding tank for future treatment. In addition, the trucks continue to run while vacuuming to power the suction for an average of 20 minutes per 4500-gallon load. The trucks will continue this process on repeat until the effects of the rain event cease. During rainfall events of more than 1” the 3 City trucks run on average for 7 hours per day. This duration varies depending on the severity of the rain event. For large storm events, the City has additional trucks brought in via contractor to keep up with the infiltration into the system. The table below shows an average rate of gram per mile of 6 pollutants associated with diesel fuel powered trucks.

|  |  |  |
| --- | --- | --- |
| Pollutant | Grams per mile | Grams per 10-mile round trip |
| VOC | 0.455 | 4.55 |
| THC | 0.461 | 4.61 |
| CO | 2.395 | 23.95 |
| NOx | 9.191 | 91.91 |
| Particle Matter25 | 0.215 | 2.15 |
| Particle Matter10 | 0.233 | 2.33 |

Idling the trucks corelates to the following emissions measured in grams per hour. In order to pump the influent, the trucks actually rev the engines and *when engine speed was elevated from 600 to 1100 revolutions per minute,* CO2 *and* NOx *emissions and fuel consumption increased by >150%, whereas PM and HC emissions increased by approximately 100% and 70%, respectively*.[[4]](#footnote-5) The chart below **does not** take account for the revving of the engines.

|  |  |  |
| --- | --- | --- |
| Pollutant | Gram per hour EFI | Gram per hour MFI |
| HC | 6 | 23 |
| CO2 | 4636 | 4484 |
| CO | 20 | 35 |
| NOx | 86 | 48 |
| Particle Matter | 1 | 4 |

**Pursue measures that will achieve substantial community benefits (such as reduction of criteria air pollutants (CAPs) and hazardous air pollutants (HAPs)), particularly in low-income and disadvantaged communities.** The project area is within Justice40 tract 12035060212 and 12035060208. Both tracts are considered a Low-Income and Disadvantaged Community (LIDAC), standing to benefit from enhanced public health due to lowered GHG emissions, lower energy costs due to improved energy efficiency of the system, improved systems resilience through mitigation of infiltration into the system, lowered risk of property damage during rain events due to system failure and/or overflow, and improved environmental conditions of bodies of water by reducing the instance of overflow of influent, and odor reduction upon completion of this proposed climate pollution reduction measure with an expected lower number of tank trucks idling at the pumps releasing diesel into the air of the neighborhood. Reduction of sanitary sewer overflows will contribute to cleaner water at ponds, streams, and recreational areas. Strengthened infrastructure improves resiliency to extreme weather events and reduces property damage. Finally, investment in these upgrades will lead to temporary jobs during the construction phase and potential permanent positions for system maintenance and operation.

**Complement other funding sources to maximize these GHG reductions and community benefits.** The City has established an ongoing budget to address this issue but lacks the availability of funding to complete all of the project areas. The City has budgeted for additional CIPP lining (approximately 36,000 linear feet) as part of their ongoing 5-year Capital Improvement Plan (CIP): FY 2024: 1,300,000, FY 2025: $600,000, FY 2026: 2,000,000, FY 2027: 1,500,000 & FY 2028: 1,250,000. The funds requested through this grant application are in addition to the work that has been budgeted within the CIP. The City seeks to optimize operations in extreme weather to avoid I&I events and reduce GHG emissions as quickly as possible, while reducing energy costs as well.

**Pursue innovative policies and programs that are replicable and can be scaled up across multiple jurisdictions.** The proposed sanitary main and manhole lining project is scalable and replicable across multiple jurisdictions and would greatly benefit any area where there are heavy amounts of rainfall along with an aged sanitary sewer system that is exhibiting a high level of infiltration. The National Renewable Energy Laboratory (NREL) identifies infiltration, inflow, and leaks in wastewater systems as areas where energy is often wasted. The proposed solution directly targets these inefficiencies, potentially leading to substantial energy savings.*[[5]](#footnote-6)*

*“Reducing infiltration and inflow in the collection system also can pay for itself in energy savings. By rehabilitating damaged or deteriorated sewer lines and eliminating improper connections to the system, the overall flow to the WWTP is reduced, thus reducing the amount of energy required to treat the flows.”[[6]](#footnote-7)*

In the EPA’s Energy Management Guidebook for Wastewater and Water Utilities energy represents the largest controllable cost of providing water or wastewater services to the public. Further stating that most facilities were designed and built when energy costs were not a major concern. With large pumps, drives, motors, and other equipment operating 24 hours a day, water and wastewater utilities can be among the largest individual energy users in a community.[[7]](#footnote-8) The energy systems affected are the lift stations, pump stations, transfer pumps and pumps within the wastewater treatment plant. The project's focus is on reducing energy demands by preventing stormwater from entering the wastewater system during rainfall events. This reduction in energy consumption of the pumps translates to a reduction of GHG emissions. Through this grant effort, the City of Palm Coast hopes to provide a pioneering case study for the Environmental Protection Agency in wastewater management for enhanced energy efficiency. This aspiration stems from the profound realization that by undertaking a comprehensive lining project across a substantial area in one concerted effort, the city can illuminate the transformative potential of such initiatives. This opportunity affords for a unique platform to meticulously assess the ramifications of implementing lining technologies in wastewater operations at a large scale for increased efficiencies and climate adaptation.

**1.b. Demonstration of Funding Need**

There is a strong need for CPRG implementation funding to complete this reduction measure without haste and have the system reach its reduction goals prior to 2030. The completion of this project within the 5-year period of performance would see the City of Palm Coast’s wastewater system achieve more energy efficiency and climate resiliency, within the Justice40 tracts 12035060212 & 12035060208, both of which are essential to the community. Rain events and storms plague Florida year-round, but especially during Hurricane Season which begins on June 1 and runs until November 30. Tropical Storm Risk released a forecast summary predicting the 2024 hurricane season will be very active. About 30% above the 1991-2020 30-year norm and around 50% above the long-term 1950-2023 norm.[[8]](#footnote-9)

The City of Palm Coast will leverage the funding received from this program with City funds in order to increase the achievable reduction of GHG by 2030. Currently the City has $6,650,000 budgeted within the Capital Improvement Plan (CIP) for additional CIPP lining of sanitary sewer piping. CPRG requested funding will be used to complete the additional scope of CIPP lining within the reduction measure. The CPRG funding will enable the City to optimize energy efficiency in operations during extreme weather to avoid I&I events and reduce costs as quickly as possible, while reducing the environmental footprint.

The City seeks to optimize operations in extreme weather to avoid I&I events and reduce GHG emissions as quickly as possible, while reducing energy costs as well. The City has also identified LIDAC Community and Justice40 tract 12035060212 & 12035060208 as areas of priority and stands ready to begin work on the project upon the award start date, currently estimated to be October 1, 2024.

In addition, the City is also pursuing the Florida Department of Emergency Management’s Hazard Mitigation Grant Program (HMGP) for assistance in lining manholes to help stop more infiltration in other areas.

To gain more success in an unprecedented amount of time, additional funding is required and respectfully requested through this Climate Reduction Priority Grant Program. This request of $9,946,204 would allow us to increase the magnitude of impact by more than double, allowing large investments to be funneled into climate resiliency and reduction of GHG emissions. The City simply cannot afford to undertake the entirety of the expense to complete the measure in the time needed to ensure efficiency and resiliency within the system. This project’s completion is vital to ensure the success of the measure as any areas left vulnerable continue to block success of the reduction measure and leave the system open to vulnerabilities.

**1.c. Transformative Impact**

Palm Coast has identified Justince40 tract 12035060212 & 12035060208 as the priority areas for this project. All residents within this Low-Income and Disadvantaged Community (LIDAC), stand to benefit from enhanced public health due to lowered GHG emissions, improved systems resilience through mitigation of infiltration into the system, lowered risk of property damage during rain events due to system failure and/or overflow, improved environmental conditions of bodies of water by reducing the instance of overflow of influent, and odor reduction upon completion of this proposed climate pollution reduction measure.

The proposed sanitary main and manhole lining project is scalable and replicable across multiple jurisdictions and would greatly benefit any area where there are moderate to heavy amounts of rainfall along with an aged sanitary sewer system that is exhibiting a high level of infiltration.

“A *considerable amount of energy is wasted treating groundwater that infiltrates systems through pipes that are broken or out of alignment.”[[9]](#footnote-10)*

Wastewater treatment is a sector where GHG emission reduction measures are not yet widely adopted but is often the largest energy usage of a municipal operations. The emissions created by the energy demand can be directly reduced by increasing energy efficiency. Both the reduction of environmental impacts and the decrease of treatment costs by enhancing the energy savings can be accomplished simultaneously.[[10]](#footnote-11) These energy cost reductions can result in the outcomes of lowered utility bills and the City is pledging to apply 25% of its financial energy savings in the first five years to waive the cost of water utility connection fees on new workforce and/or affordable housing construction. The waiver program will be reassessed after the 5-year period to examine how it is being utilized and evaluate program success. Lindsay Elliot, Executive Director of Flagler Habitat for Humanity, states this is a “is a strategic and impactful way to address the pressing issue of housing affordability.” Please see attached letter of support.

1. **Impact of GHG Reduction Measures**

This project completion will see 12 pump stations increase efficiency due to the lining of piping to prevent infiltration and has an estimated GHG reduction of 399 mtCO2e by 2030 and 1,571 mtCO2e by 2050.

**Gallons Pumped through Station 39-1:** the estimated gallons per day at 39-1 with the pump at about 50% efficiency, during the November rain events, was approximately 1,100,000 gallons pumped per day. Before the rain event caused infiltration the pump averaged around 275,000 gallons per day. To calculate the GHG reduction, information regarding rainfall exceeding 1 inch in the year 2023 within the City of Palm Coast was sourced from the National Oceanic and Atmospheric Administration (NOAA) database. Additionally, data pertaining to a specific rainfall event surpassing 1 inch and the average energy consumption in kilowatt-hours (KWH) emitted from the 7 pump stations were acquired from the Palm Coast Wastewater Department. Emissions reductions were estimated using the FRCC CO2e assessment from NREL and were adjusted every two years out to 2050 based on the predictions in this source.

|  |  |  |
| --- | --- | --- |
| Cumulative GHG Emissions Reduction, in mtCO2e for the City of Palm Coast Wastewater Efficiency Strategy | | |
|  | 2030 | 2050 |
| 12 pumps within project | 399 | 1571 |

Average kWh daily and monthly usage is lower in drier months when compared to wetter months. Master Pump Station 24-2 in February (drier month) had an average of 14,852 kWh monthly and 479 kWh average daily, the month of December (wetter month) had 22,826 kWh average monthly, and 787 kWh averaged daily. While all of this cannot be contributed to stormwater, higher rainfall events are contributing to a larger spike of energy usage. To best reach a calculation of carbon dioxide savings, pump stations will be grouped in size and capacity and then be examined for kWh spikes See below data collected during the PCAP on master pump stations’ average kWh daily usage for the year 2023 and for comparison by its side is the daily kWh usage for the high rain fall event that took place on October 13th, 2023.

|  |  |
| --- | --- |
| Average Daily kWh Usage | High Rainfall kWh Usage (10/13) |
| 608.34 | 2,085.10 |
| 306.49 | 534.72 |
| 125.40 | 321.56 |
| 317.12 | 888.37 |
| 493.79 | 1,885.75 |

The reduction of the reliance on diesel fueled vacuum trucks for pumping out the stations during and following wet weather events to offset the infiltration will reduce other air pollutants as well. Palm Coast has 3 Mack tandem axel trucks in their public works fleet. The models used by external contractors vary (Peterbilt and Sterling). These have similar fuel consumptions. During a recent rain event over a weekend this last month (March 2024). The vacuum trucks ran about 7 hours to keep up with the excess flow caused by infiltration. The fuel capacity is 125 gallons and the truck monitored used 24% of the fuel in those 7 hours. This equals about 4.25gallons per hour. If we use 15 Trucks during a large-scale event (3 City and 12 Contractor) this amounts to about 63.75 gallons of diesel per hour burned. This is 1,530 Gallons per day and for a rain event totaling 3 days, 4,590 gallons are used. Revving, which is necessary to run the pumps, could considerably worsen consumption. The trucks drive an average of 10 miles round trip to pump out a station and then transport to the wastewater treatment plant for unloading into a holding tank for future treatment. The table below shows an average rate of gram per mile of 6 pollutants associated with diesel fuel powered trucks.

|  |  |  |
| --- | --- | --- |
| Pollutant | Grams per mile | Grams per 10-mile round trip |
| VOC | 0.455 | 4.55 |
| THC | 0.461 | 4.61 |
| CO | 2.395 | 23.95 |
| NOx | 9.191 | 91.91 |
| Particle Matter25 | 0.215 | 2.15 |
| Particle Matter10 | 0.233 | 2.33 |

In addition, the trucks rev, continuing to run while vacuuming to power the suction for an average of 20 minutes per 4500-gallon load. When engine speed is elevated from 600 to 1100 revolutions per minute, CO2 and NOx emissions and fuel consumption increased by greater than 150%. [[11]](#footnote-12) The trucks will continue this process on repeat until the effects of the rain event cease. This can range from hours to days depending on the severity of the rain event. The table of emissions below is split into two groupings: Trucks with electronic fuel injection (EFI) and mechanical fuel injection (MFI). Idling trucks corelates to the following emissions measured in grams per hour[[12]](#footnote-13):

|  |  |  |
| --- | --- | --- |
| Pollutant | Grams per hour EFI | Grams per hour MFI |
| HC | 6 | 23 |
| CO2 | 4636 | 4484 |
| CO | 20 | 35 |
| NOx | 86 | 48 |
| Particle Matter | 1 | 4 |

**From September 2023 through December 2023, the total hours of vacuum truck use from outside contractors was 2529:** September 25th-October 3rd: **508.5 hours** number of trucks deployed: 57; 10/10-10/13: **465 hours** - trucks deployed: 32; 11/16-11/18- **80 hours** - trucks deployed: 10 ; 12/16-12/18- **211 hours -** trucks deployed: 18.

**The estimated total vacuum truck hours including city operated trucks** (averaging 7 hours per day for 3 vehicles for 17 days were September 25th-October 3rd: **676.5 hours** - trucks deployed: 81; 10/10, 10/12, 10/13: **654 hours** -trucks deployed: 41; 11/16-11/18- **143 hours** - trucks deployed: 19. 12/16-12/18- **211 hours -** trucks deployed: 18.

**2.a.** **Magnitude of GHG Reductions from 2025 – 2030**

The energy efficiency gained through this project within the Wastewater Treatment System will cause quantitative and permanent reductions in GHG emissions. The CIPP lining of the sanitary sewer collection piping has a useful life of up to 100 years. The period of 2025 through 2030 will see a reduction of 399 mtCO2e.

**2.b.** **Magnitude of GHG Reductions from 2025- 2050**

The GHG emission reductions achieved in the period of 2025 through 2050 are 1,571 mtCO2e. Again, this improvement in air quality achieved through the GHG emission reductions will be a permanent achievement. These are the ghg emission reductions gained from the EPA CPRG-funded project and do not include additional GHG emission reductions through the additional separately funded areas that will add to the collection system's efficiency and continue to provide reduced mtCO2e.

**2.c. Cost Effectiveness of GHG Reductions**

$9,947,404 CPRG grant dollars divided by 399 (2025-2030 reductions) equals a cost effectiveness of **$24,931 per mtCO2e reduced**. The cost of the CIPP lining, while it is more cost effective than pipe replacement, is still a capital investment. The materials have suffered from the inflation seen throughout the infrastructure field in the last 4-5 years. Qualitative benefits that will be achieved but aren’t reflected in the cost effectiveness monetary amount include **enhanced public health** through the reduction of pollutants. A reduction in s**anitary sewer overflows** that contaminate the neighborhoods with raw sewage, **lowered noise pollution** a vacuum truck sound level is reported at 85 dBA.[[13]](#footnote-14) Noise pollution can cause hearing loss as well as contribute to non-auditory health issues. The high levels of dBAs effect the surrounding community’s populations by interrupting concentration, increasing heartrates, and limiting the ability to carry on a conversation,[[14]](#footnote-15) **reducing particulate matter (PM10)[[15]](#footnote-16) and (PM2.5)[[16]](#footnote-17)** which can cause premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decrease in lung function, and increased respiratory symptoms.[[17]](#footnote-18) **Improved System Resiliency** during wet weather events ranging from 1” rainfalls to the more extreme tropical storms, hurricanes and winter Nor’easters seen often in Florida.

**2.d.** **Documentation of GHG Reduction Assumptions**

To determine the greenhouse gas (GHG) reduction potential for twelve pump stations, including PS 39-1 and PS 57-4 and ten other affected stations (CP-1, 19-1, 20-1, 20-2, 32-2, 24-2, OKR Master, 57-1, 57-2, and 57-3), a systematic approach was implemented. The aim was to evaluate the impact of lining existing clay sanitary pipes on reducing energy consumption caused by stormwater and groundwater intrusions, thereby minimizing the operational runtime of pumps to avoid overworking and overloading. For comparison, the analysis included PS 22-2 and MPS-B, recently installed pumps utilizing PVC pipes, serving as benchmarks due to minimal groundwater intrusion. By assessing annual spike energy usage and comparing it with average yearly consumption, along with determining the percentage increase during spike events compared to daily averages, insights were gained into performance variations among the three pumps. PS 39-1 and PS 57-4 were the target pumps, while PS 22-2 and MPS-B acted as comparison pumps with newly lined infrastructure. The calculated percent reduction range had an upper limit of 25%. To establish the lower limit, daily average energy usage during wetter months, notably spike events, was contrasted with that during drier months, with the difference yielding the lower limit set at 10%. Incorporating a conservative approach, wherein a more cautious range of 5%-12% was applied to the remaining affected pumps, ensured a careful estimation of potential energy reduction across all stations. This approach allowed for a balanced assessment of GHG reduction potential, taking into account the variations in infrastructure and environmental conditions among the pump stations. Subsequently, energy reduction within the calculated ranges was applied to all affected pump stations, with appropriate CO2e emission rates assigned to projections for GHG reduction by 2030 and 2050.

To calculate the total CO2 emissions resulting from diesel fuel consumption during big storm events, first, determine the total gallons of diesel fuel used per year based on the number of trucks deployed, their operational hours, and fuel consumption rates. Then, apply the EPA-provided conversion factor of 10,180 grams of CO2 per gallon of diesel, which is equivalent to 10.180 × 10^-3 metric tons of CO2 per gallon of diesel, to convert the total gallons of diesel fuel to metric tons of CO2 emissions. This conversion equation, Total CO2 Emissions (metric tons) = Total Gallons of Diesel × 10.180 × 10^-3, allows for an accurate estimation of the environmental impact of truck operations. To quantify the CO2 emissions specifically within the targeted areas served by PS 39-1 and 57-4, we recognized the necessity of isolating the impact within the specific geographical bounds of pump 39-1 and 57-4's service areas. Through the analysis of land area ratios, we determined that this targeted area represents approximately 10% of the total land area affected by storm events. Consequently, we applied this ratio to the calculated total CO2 emissions attributable to fuel consumption by tank trucks during big storm events. Appropriate CO2e emission rates assigned to projections for GHG reduction by 2030 and 2050.

Information regarding rainfall exceeding 1 inch in the year 2023 within the City of Palm Coast was sourced from the National Oceanic and Atmospheric Administration (NOAA) database. Additionally, data pertaining to a specific rainfall event surpassing 1 inch and the average energy consumption in kilowatt-hours (KWH) emitted from the affected pump stations were acquired from the Palm Coast Wastewater Department. Emissions reductions were estimated using the FRCC CO2e assessment from NREL and were adjusted every two years out to 2050 based on the predictions in this source.

**3. Environmental Results – Outputs, Outcomes, and Performance Measures**

**3.a. Expected Outputs and Outcomes**

**Outputs.** The project’s expected outputs are the lining of the sanitary sewer collection system piping, the lowering of reliance on diesel fuel trucks during heavy rain falls and the redirection of 25% of the City’s financial energy savings to new workforce/affordable housing utility connections.

**Outcomes.** Residents of Justice40 tract 12035060212 & 12035060208, as well as residents City-wide, stand to benefit from the project outcomes that include GHG reduction, increased energy efficiency, enhanced public health and quality of life, energy cost reduction, and improved system resiliency. The GHG reduction expected from the lining of the sanitary system collection pipes by 2030 is 399 mtCO2e and 1,571 mtCO2e by 2050.

Additionally, a GHG emission reduction will be related to the reduced reliance on diesel fueled vacuum trucks for pumping out the manholes during and following wet weather events to offset the infiltration will reduce air pollutants as well. The trucks drive an average of 10 miles round trip to pump out a manhole and then transport to the wastewater treatment plant for disposal. In addition, the trucks continue to run while vacuuming to power the suction for an average of 20 minutes per each 4500-gallon load.[[18]](#footnote-19) The trucks will continue this process on repeat until the effects of the rain event cease. This can range from hours to days depending on the severity of the rain event. With the least severe rainfall events that measure around 1” the City’s 3 trucks run for 7 hours a day making 10-mile round trips to vacuum the pump stations for 20 minutes per load to ensure that the system does not experience SSOs. The chart below would be for the effects of one rain event greater than 1”. The heavier and longer rain events that bring much more rain would multiply these numbers as the number of vacuum trucks would be greater and the operating time would potentially be longer.

|  |  |  |  |
| --- | --- | --- | --- |
| Pollutant | Grams per 10-mile round trip | Grams per 20 min pumping | **Total grams for 7 hours continuous operation** |
| VOC | 63.7 |  | **63.7** |
| THC | 64.54 |  | **64.54** |
| CO | 335.3 | 78.75 | **414.05** |
| NOx | 1286.74 | 108 | **1394.74** |
| PM2.5 | 30.1 | 9 | **39.1** |
| PM10 | 32.62 |  | **32.62** |
| HC |  | 51.75 | **51.75** |
| CO2 |  | 10089 | **10089** |

Increased Energy Efficiency is an outcome of the project. In the preparation of the PCAP, the City of Palm Coast examined five master pump stations to observe the influxes in energy usage. Data collected on the kWh usage shows that during higher rainfall events, stormwater and rising groundwater tables are infiltrating the systems and causing high peaks in energy usage at the pumping stations that last for an average of 3 days. Decreasing utility usage to circumvent greenhouse gases is an outcome of this project. For instance, average kWh daily and monthly usage is lower in drier months when compared to wetter months. Master Pump Station 24-2 in February (drier month) had an average of 14,852 kWh monthly and 479 kWh average daily, the month of December (wetter month) had 22,826 kWh average monthly, and 787 kWh averaged daily. While all of this cannot be contributed to stormwater, higher rainfall events are contributing to a larger spike of energy usage. To best reach a calculation of carbon dioxide savings pump stations will be grouped in size and capacity and then be examined for kWh spikes.

Enhanced Public Health is an outcome through the reduction of pollutants. Sanitary Sewer Overflows that contaminate the neighborhoods with raw sewage will be decreased. Lowered noise pollution is an expected project outcome. A Vacuum truck sound level is reported at 85 dBA.[[19]](#footnote-20) Noise pollution can cause hearing loss as well as contribute to non-auditory health issues. The high levels of dBAs effect the surrounding community’s populations by interrupting concentration, increasing heartrates, and limiting the ability to carry on a conversation.[[20]](#footnote-21)

“*Chronic noise, even at low levels, can cause annoyance, sleep disruption, and stress that contribute to cardiovascular disease, cerebrovascular disease, metabolic disturbances, exacerbation of psychological disorders, and premature mortality. Noise interferes with cognition and learning, contributes to behavior problems, and reduces achievement and productivity… with children among the most vulnerable.*”[[21]](#footnote-22)

Reducing the pollutants associated with diesel fuel truck emissions is another expected outcome of the project. This has a direct correlation to public health, especially in Justice40 communities. Particulate matter (PM10) describes inhalable particles that are 10 micrometers in diameter and smaller[[22]](#footnote-23) while (PM2.5) are fine inhalable particles with diameters of 2.5 micrometers and smaller.[[23]](#footnote-24) Once inhaled, these can get deep within the lungs and some can enter the bloodstream causing serious health problems.[[24]](#footnote-25) These health problems can include but are not limited to premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decrease in lung function, and increased respiratory symptoms[[25]](#footnote-26) In addition, particles can be carried over long distances by wind to water sources. Depending on the chemical composition of the particles, this can cause acidity in lakes and streams, changes to nutrient balance in coastal waters, depletion of nutrients in soil, damage to farm crops, and acid rain effects[[26]](#footnote-27) The reduction of reliance on utilizing vacuum trucks to band-aid the sanitary sewer collection system will have a positive effect on enhanced public health through the reduction of noise pollution and air pollution as tank trucks will not be idling in communities with increased efficiency in wastewater piping

Energy Cost Reductionis an outcome as the output of lining the sanitary system collection system piping to prevent infiltration will cease weather related spikes in the volume of the flow transported to the treatment plant for processing. This will alleviate the extra costs of energy to run the equipment longer to accommodate the increase in volume, the costs of extra chemicals needed to treat the larger volume, and additional employees needed on shift to help with the capacity load created by the infiltration.

Improved System Resiliency is directly related to energy efficiency; both are projected outcomes of the project. In 2015, the American Council for an Energy Efficient Economy (ACEEE) identified primary resilience benefits of energy efficiency which included increased ability to respond to system emergencies, the ability to maintain energy supply during disruptions, and the ability to manage energy price increases.[[27]](#footnote-28)

The project output of lining the sanitary sewer collection system pipes to prevent infiltration into the system will facilitate the outcome of system resiliency. The system’s extreme vulnerabilities during wet weather events ranging from 1” rainfalls to the more extreme tropical storms, hurricanes and winter Nor’easters seen often in Florida will abate once the rainfall cannot enter the system and cause flow increase. Without the infiltration, which exacerbates both the pumping stations and the treatment plant, the system will be much better positioned to withstand these weather events. This will become more important as climate changes in the Atlantic are having an impact on the size and force of these storm events.

**3.b.** **Performance Measure and Plan**

**Performance Measures** will include tracking volume of flow, energy consumption, GHG emissions calculations, Sanitary System Overflows (SSO), and Diesel consumption.

* **Volume of flow** at the wastewater treatment plant by capturing a baseline at 0” rainfall and with rain events of 1” or greater. As the output of lining the pipes to prevent infiltration progresses, we will project to see a decrease in volume surges ending with a projected stabilization during 1” rainfalls once the piping has all been lined.
* **Energy consumption** of the plant treatment pumps, lift stations, and transfer pumps with a 0” rainfall baseline and with 1” or greater rainfall events that are the identified impacted pump/lift stations for lining.
* **GHG emissions** calculations based on energy consumption of the treatment pumps and the pump stations.
* **Sanitary System Overflows** will be tracked to report the estimated volume and the rainfall event associated with the SSO in areas of lining compared to other areas of clay piping that may have yet to be lined.
* **Diesel consumption** by emergency response of vacuum trucks tracked annually.

The following metrics will be tracked to provide a more thorough analysis of the performance measures to accurately measure the success of the outcomes of GHG reduction, increased energy efficiency, enhanced public health and quality of life, energy cost reduction, and improved system resiliency upon project completion:

* Reduced inflow and infiltration volume can be gauged by comparing pre- and post- upgrade flow rates during wet weather conditions will help to measure the outcomes of increased energy efficiency, GHG reduction, energy cost reduction and improved system resiliency. The volume of flow at the wastewater treatment plant will be captured at a baseline of 0” rainfall and with rain events of 1” or greater. As the output of lining the pipes to prevent infiltration progresses, we will project to see a decrease in volume surges ending with a projected stabilization during 1” rainfalls once the piping has all been lined.
* The number and volume of sanitary sewer overflows before and after upgrades will help to measure improved system resiliency and enhanced public health and quality of life.
* Energy usage at the lift stations, transfer pumps, wastewater treatment pumps should be recorded with a 0” rainfall baseline and then monitored and tracked with 1” rainfall events will help to measure energy efficiency, GHG reductions, and improved system resiliency.
* Diesel consumption by the emergency response trucks will be tracked annually and will help to measure GHG reductions, enhance public health and quality of life, and improved system resiliency.

This data will be used to compile the semiannual and final reports during the granting period. The City will continue to track metrics in order to, on a yearly basis, assess, quantify and report benefits and avoided disbenefits to the community.

**3.c. Authorities, Implementation Timeline and Milestones**

**Roles and Responsibilities.** The City of Palm Coast will be responsible for implementing the reduction measure of wastewater treatment efficiency upgrades through the lining of sanitary sewer collection piping. The City is the owner of the infrastructure and will be responsible for maintaining it in a state of good repair following the project.

**Implementation Timeline.** Assuming an award notification start date of October 1, 2024, the City will procure and get approval of a project consultant to prepare the Quality Assurance Project Plan (QAPP), assist with public engagement and technical reporting requirements. This process should take approximately 3 months to complete. Public Engagement will be an ongoing process throughout the granting period. The QAPP preparation will begin once the consultant has been contracted and should take approximately four months to complete. Two months were allotted for EPA approval of the QAPP. Procurement and approval of the contractor will then take place between December 2024 with the bid document preparation and ending around February 2025 with bid award and approval from EPA. A construction period of 4 years was scheduled to give plenty of grace for unforeseen delays such as weather or supply chain delays and/or disruptions. A semi-annual report was scheduled for every six months until project closeout. Upon completion a final report will be turned in and one-year post project completion a follow-up report will be delivered to EPA detailing the actual reductions achieved by the project.

|  |  |
| --- | --- |
| Anticipated award start date | October 1, 2024 |
| Consultant RFP document preparation | October 2024 |
| Procurement and EPA approval of consultant | October – December, 2024 |
| Public Engagement | Ongoing throughout grant activities |
| QAPP Preparation | December 2024 – March 2025 |
| QAPP Review and approval by EPA | March 2025 – April 2025 |
| Contractor Bid Document Preparation | December 2024 |
| Procurement and EPA approval of contractor | January – February 2025 |
| Construction | April 2025 – April 2029 |
| Semi Annual Reporting | Every 6 months (October and March of each year) |
| Grant Closeout – Final reporting | October 2029 |
| Follow up actual reduction reports | October 2030 |

**4. Low-Income and Disadvantaged Communities**

**4.a. Community benefits**

The project area is within Justice40 tract 12035060212. This Low-Income and Disadvantaged Community (LIDAC), stands to benefit from **enhanced public health** due to lowered GHG emissions, **improved systems resilience** through mitigation of infiltration into the system, **lowered risk of property damage** during rain events due to system failure and/or overflow, less idle times of diesel trucks and **improved environmental conditions** of bodies of water by reducing the instance of overflow of influent, and odor reduction upon completion of this proposed climate pollution reduction measure.

There are no risks associated with this reduction measure. The CIPP method is a trenchless installation that requires little to no digging. Access will be gained at manholes and this method requires significantly less time to complete than open trench sewer repair methods. CIPP is suitable for application to both short and long runs of piping. As opposed to open trench pipe replacement that causes street closures and detours which can be burdensome to residents and businesses alike this installation process has little to no effect on the project area during the construction period.

**Enhanced Public Health** through lowered noise pollution is an expected project outcome and a huge benefit to the community. A Vacuum truck sound level is reported at 85 dBA.[[28]](#footnote-29) Noise pollution can cause hearing loss as well as contribute to non-auditory health issues. The high levels of dBAs effect the surrounding community’s populations by interrupting concentration, increasing heartrates, and limiting the ability to carry on a conversation.[[29]](#footnote-30)

“*Chronic noise, even at low levels, can cause annoyance, sleep disruption, and stress that contribute to cardiovascular disease, cerebrovascular disease, metabolic disturbances, exacerbation of psychological disorders, and premature mortality. Noise interferes with cognition and learning, contributes to behavior problems, and reduces achievement and productivity… with children among the most vulnerable.*”[[30]](#footnote-31)

Reducing the pollutants associated with diesel fuel truck tailpipe emissions is another expected outcome of the project. This has a direct correlation to public health, especially in Justice40 communities. Particulate matter are fine inhalable particles.[[31]](#footnote-32) Once inhaled, these can get deep within the lungs and some can enter the bloodstream causing serious health problems.[[32]](#footnote-33) These health problems can include but are not limited to premature death in people with heart or lung disease, nonfatal heart attacks, irregular heartbeat, aggravated asthma, decrease in lung function, and increased respiratory symptoms[[33]](#footnote-34)

In addition, particles can be carried over long distances by wind to water sources. Depending on the chemical composition of the particles, this can cause acidity in lakes and streams, changes to nutrient balance in coastal waters, depletion of nutrients in soil, damage to farm crops, and acid rain effects[[34]](#footnote-35)

The reduction of reliance on utilizing vacuum trucks to band-aid the sanitary sewer collection system will have a positive effect on enhanced public health through the reduction of noise pollution and air pollution.

**Improved System Resiliency** as resiliency of the system is directly related to energy efficiency, both are projected benefits of the project. In 2015, the American Council for an Energy Efficient Economy (ACEEE) identified primary resilience benefits of energy efficiency which included an increased ability to respond to system emergencies, the ability to maintain energy supply during disruptions, and the ability to manage energy price increases.[[35]](#footnote-36) The project will facilitate system resiliency. The system’s extreme vulnerabilities during wet weather events ranging from 1” rainfalls to the more extreme tropical storms, hurricanes and winter Nor’easters seen often in Florida will abate once the rainfall cannot enter the system and cause flow increase. Without the infiltration, which exacerbates both the pumping stations and the treatment plant, the system will be much better positioned to withstand these weather events. This will become more important as climate changes in the Atlantic are having an impact on the size and force of these storm events.

**4.b. Community Engagement**

The Northeast Florida MSA conducted extensive intergovernmental coordination and outreach in the development of the Clean Air Northeast Florida Priority Climate Action Plan. To identify stakeholders, NEFL MSA contacted local elected officials, community organizations, and advocacy organizations known to be interested in clean energy infrastructure and practices. A list of stakeholders is located on page 3 of the PCAP.

A bi-weekly meeting was held via MS Teams of all sustainability and resilience officers within the NEFL MSA and a monthly meeting of the NEFL Regional Council, a NEFL CPRG working group comprised of regional stakeholders across all sectors, including public, private, academia, and nonprofit subject matter experts, to discuss progress on the CPRG and offer insight and feedback from different perspectives.

Effectively communicating to LIDACs the benefits of initiatives, such as reductions in GHG emissions, job creation, clean energy job training, decreased energy costs, green space creation, and stakeholder engagement, was implemented with these goals in mind:

**Transparent and Accessible Information:** Concise and easily understandable information about the initiative and its benefits: plain language, infographics, and visuals used to break down complex concepts.

**Tailored Messaging:** Address the specific concerns and interests of LIDACs. How the initiative directly impacts their daily lives, communities, and well-being was given importance.

**Storytelling:** Success stories and case studies from similar communities or individuals who have benefited from the initiative. Personalizing the narrative to make it relatable and emotionally engaging.

**Community Representatives:** Trusted community representatives, including community leaders and influencers identified and involved to bridge the gap between the initiative and LIDACs bringing credibility and trust to the conversation.

**Interactive Workshops and Seminars:** Workshops, seminars, or webinars hosted in LIDAC communities to explain the benefits in detail. Participation and project buy in was encouraged by addressing questions and concerns from residents.

**Visual Impact Assessment:** Visual representations provided, such as maps or graphs, to illustrate the reductions in GHGs, criteria pollutants, and hazardous air pollutants (HAPs) in specific communities or areas.

**Job Creation Tracking:** Job creation data identified and shared within the communities, highlighting success stories of individuals who found employment opportunities within their own neighborhoods.

**Clean Energy Training and Apprenticeships:** Investment in clean energy job training and apprenticeship programs in LIDAC communities showcased, highlighting the success stories of participants who have improved their career prospects.

**Energy Cost Reductions:** Data and examples shared of how the initiative has led to decreased energy costs for residents in LIDAC communities. Using real-life utility bill comparisons to demonstrate savings.

**Qualitative Descriptions:** Qualitative descriptions used to capture the human and community-centric aspects of the initiative's impact.

**Feedback Mechanism:** An accessible feedback mechanism for LIDACs was established in order to ask questions, voice concerns and share their own stories related to the initiative. It was important to actively listen and respond to the feedback, build trust and show that their input matters.

The outreach events have been largely virtual, and documentation can be found on the cleanairnortheastflorida.com website. With this comprehensive approach, the NEFL MSA demonstrated their commitment to genuine collaboration and meaningful engagement with LIDACs throughout the project’s implementation process, fostering a respectful and productive relationship.

Palm Coast is committed to continuing meaningful public engagement for the project and will proactively implement a community participation process (CPP), based on equity, which seeks full representation from the public based on the community’s demographics. Using EPA’s *Capacity Building Through Effective Meaningful Public Engagement* booklet to further expand the public engagement during the implementation phase of the project Palm Coast will keep the public informed, engaged and involved.

The community participation process will include identifying impacted communities; educating all, including the MSA and all stakeholders, on the unique needs and aspirations of the affected communities; informing the public of upcoming or ongoing projects that may affect them through multiple widely accessible information streams; authentically communicate with the community to receive their input on the proposed project by offering multiple opportunities for feedback; creating continuous open communication with community members and other interested parties; evaluating and adjust based on feedback received from community members and other interested parties.

Any potential risks to the communities should be identified, i.e., project/process impacts, public criticism, lack of participation, and/or community confusion, so that they may be mitigated through the actions and efforts of the engagement plan.[[36]](#footnote-37)

To increase the likelihood of participation, effective practices will be utilized to ensure optimal participation from residents of LIDACs. Those practices include:

* Outreach to facilitate the development of stakeholder contact lists.
* Consultations with individuals or organizations that represent and or service LIDACs.
* Conducting public input sessions both in-person and virtually.

The Community Participation Plan will include a combination of in-person meetings, virtual meetings, and digital surveys to ensure that all stakeholders are able to participate and share their ideas and opinions toward the project. Utilizing this combination of in-person and virtual meetings along with digital surveys will help to make the public involvement more than just a paper exercise or a box to check off in the planning process.

1. **Job Quality**

The City plans to redirect 25% of the financial energy savings generated within the program's first five years to contribute to lowering water utility connection fees for new workforce/affordable housing construction. This community-focused approach contributes to long-term sustainability and aligns with broader environmental and social goals. Reduction of SSOs will contribute to cleaner water at ponds, streams, and recreational areas. Strengthened infrastructure improves resiliency to extreme weather events and reduces property damage. Finally, investment in these upgrades will lead to temporary jobs during the construction phase and potential permanent positions for system maintenance and operation.

1. **Programmatic Capability and Past Performance**

**6.a. Past Performance**

Palm Coast has a proven track record with executing grant funded projects including the examples listed below. The team has experience following federal and non-federal contract and procurement requirements including, but not limited to, Buy America, Americans with Disability Act, and Davis Bacon Act as well as a proven track record of successfully completing projects within the grant deadlines. Most recent examples of completed projects include:

**Backup Power to five (5) Wastewater Pump Station** 97.039 Hazard Mitigation Grant Program

The Scope of Work for this project is to provide protection for the PEP & Lift stations during storm events in Palm Coast, Flagler County, FL. Funded through the HMGP as approved by the FDEM and the FEMA. The project is for the purchase and installation of an emergency system to reduce and/or mitigate the damage that might otherwise occur from severe weather or other hazards. Currently working to close grant. Funding Agency Contact: Liliana Hernandez, Project Manager, FDEM (850)359-9349 Liliana.Hernandez@em.myflorida.com

|  |  |  |
| --- | --- | --- |
| Contract # | Funding Amount | Agency/Assistance Listing Number |
| H0026 | $241,847.25 | FEMA-DR-4283-27-R |
| H0033 | $218,364.00 | FEMA-DR-4283-31-R |
| H0034 | $242,172.75 | FEMA-DR-4283-33-R |
| H0035 | $232,826.25 | FEMA-DR-4283-34-R |
| H0036 | $331,237.50 | FEMA-DR-4283-35-R |
| H0037 | $230,772.75 | FEMA-DR-4283-36-R |
| H0242 | $291,903.75 | FEMA-DR-4337-118-R |

**Lehigh Trailhead.** Funded through a Local Agency Program (LAP) Agreement with FDOT, the project consisted of the construction of a new trailhead at the intersection of Royal Palms Parkway and Belle Terre Parkway which will provide a connection to the existing Lehigh Trail with access from the entrance and parking lot for the construction of a parking lot, signing and pavement markings, sidewalks, drainage improvements, stormwater system, water fountain, bike rack, restroom building, fencing, shade coverings, landscaping, irrigation and lighting as well as alternates for a dog park and community gardens. The City is currently in the process of completing grant closeout.

Funding Agency Contact: **Deborah White,** D-5 Construction Special Projects. Phone: (385)943-5396

[deb.white@dot.state.fl.us](mailto:deb.white@dot.state.fl.us)

**Old King’s Widening Phase 1** Funded through Florida Department of Transportation (FDOT) under the Transportation Regional Incentive Program (TRIP) (CSFA 55.026), the $6,870,513.00 roadway project consisted of construction and CEI services for the widening of Old King’s Road in Flagler County from a 2-lane roadway to a 4-lane roadway with raised medians. The City successfully completed the project and was approved for all requested reimbursements. This was due to the documentation kept and submitted to FDOT by city staff as well as by the CEI that was selected to oversee this project. The grant agreement was extended due to the construction being behind schedule. City staff were able to secure this extension, again due to the proper documentation of the project and circumstances.

Funding Agency Contact: Lorien Scarlett, District 5 Local Program Coordinator, FDOT, 386-943-5520 [Lorien.Scarlett@dot.state.fl.us](mailto:Lorien.Scarlett@dot.state.fl.us)

**Freshwater Canal Dredging for Conveyance Improvements and Resilience** Totaling $1,621,830 in a loan acquired through the Florida Department of Environmental Protection this project involves the dredging of sediment, debris, and organic material that accumulated at the bottom of a 2-mile stretch of our freshwater canal system for approximately 50 years. The primary purpose of this project was to restore the canals to their original design which created additional capacity for stormwater runoff and resulted in reduced localized flooding in the surrounding neighborhood. This project was funded by a zero-interest loan known as the Clean Water State Revolving Fund. The loan management and reimbursement process were very similar to that of a grant. Funding Agency Contact:  
Pankaj Shaw, Email: [Pankaj.shaw@Floridadep.gov](mailto:Pankaj.shaw@Floridadep.gov)

**London Waterway** is a multi-purpose project with its main goal focusing on increasing Stormwater storage in a section of town prone to flooding. The project was designed to appear as a passive neighborhood park while also providing water quality benefits and reducing flooding in the surrounding neighborhood. This project consists of excavating a 13-acre lake, providing pipe connections to an adjacent canal system, two boardwalks that extend into the lake, two tree islands and will have a vegetated boundary with native plantings. This project was partially funded through the St. Johns Water Management District (SJRWMD) cost-share grant. This project is currently under construction. The dollar amount of grant is $904,500. Funding Agency Contact: Derek Busby, Cost Share Project Manager

Office: (386) 329-4459, Email: [dbusby@sjrwmd.com](mailto:dbusby@sjrwmd.com)

**6.b. Reporting requirements**

Palm Coast was originally a Planned Unit Development community run by the International Telephone and Telegraph Corporation (ITT). The City of Palm Coast is one of the newest cities in the State of Florida, first incorporated in 1999. The City has Annual Financial Reports and started to include in 2004 “Schedule of Expenditures of Federal Awards and State Financial Assistance.”

The City works diligently to meet reporting requirements for its grant funded projects. It has met the necessary progress milestones on projects and kept the lines of communication open with the program managers for the funding agencies with timely progress reports and grant closeouts. Recently, a Grants Management Policy was drafted and is in the process for final approval. A draft version is attached to this application. The stated purpose of the policy document is:

* To ensure proper oversight of all funds appropriated by the City.
* To minimize the City’s risk of non-compliance with grant requirements.
* To ensure proper administration and accounting for all grants.

The City of Palm Coast continues to reach standards and the requirements of SEFA reporting. To ensure best reporting and grant management the City of Palm Coast has master services agreements in place for grant monitoring services that are used for larger grants and construction projects. The consultants work with project managers and finance. The highlight our commitment to detail and SEFA reports we are providing our SEFA reports from 2019-2023 attached to our submission. The City of Palm Coast will consult with the Environmental Protection Agency to seek guidance on the best way to put this opportunity to bid.

**6.c. Staff Expertise**

The City of Palm Coast has a dedicated team of professionals committed to serving the community with excellence and integrity: Helena Alves, Director of Finance, Carl Cote, Director Stormwater & Engineering, Mary Kronenberg, Project Manager I Stormwater & Engineering, and Maeven Rogers, Chief Sustainability & Resiliency Officer. The Staff’s experience brings a diverse background to the team. Biographical sketches of the team members are attached to this application for review.

1. **Budget and Timely Expenditure of Grant Funds**

Please see the attached Budget Narrative and Budget Spreadsheet.

**7.a.** **Budget Detail**

* + - Personnel -- $135,000
    - Fringe Benefits -- None
    - Travel -- $6,204
    - Equipment -- $220,000
    - Supplies -- None
    - Contractual -- $9,585,000
    - Other -- None
    - Indirect funds – None

**Personnel** consists of one $60,000 per year .5 FTE position with a yearly increase of $2,500 per year. Year one is funded at $30,000 and year two is funded at $32,500 and so on through year four. This position would assist with providing oversight of the grant, overseeing the implementation of the project activities, external communications, acting as a liaison with the consultant to facilitate grant reporting, facilitating internal and external coordination, developing materials, and conducting meetings / public engagement. This would be a **new** position and the duties would be 100% devoted to this grant funded effort for the four years of the grant funded project.

**Travel** consists of funding in the total amount of $7,404 ($1,851 per year) for One staff (Project Manager or Project Coordinator) to attend a regional / national clean transportation conference once a year to share NE FL’s progress and learn from other regions. Local travel is needed to attend local meetings, project activities, and training events. Local travel rate is based on the federal mileage reimbursement rate for 2023.This is further broken down as $300 per year for conference registration fees ($1,200 grant budget total), $400 roundtrip airfare once per year for four years ($1,600 grant budget total), hotel costs at $150 per day at three days per year for $450 per year ($1,800 grant budget total), a per diem of $71 per day for 3.5 days per year at $248 total and $992 for the four year grant budget total, taxi/uber/lyft transportation at $45 per year or $180 for the four year grant budget total, parking at $20 per day for 4 days per year for $80 per year and $320 for the four year grant budget total.

**Equipment** comprises $220,000 of the project budget. There are two items within this category: Flow meter/ hour meter with a quantity of 10 at $2,000 each. These are necessary to measure the flow at the affected pump stations **to accurately calculate the reduction of infiltration and correlate that with the reduction of energy usage** of the stations before during and after rain events. The second item is a mission communication system also known as SCADA. The cost for this system is $200,000. It features wireless communications with real time alarms and proactive alerts for possible issues like excessive pump starts or runtimes. This cost is for the system components and installation.

**Contractual services** include both the consultant services and the contractor services. The total for the category is $9,585,000 with the majority being for the contractor services. The consultant will be procured under a Request for Qualifications with the approval of EPA to complete the QAPP ($25,000), the semiannual progress reports ($10,000 per year for four years - $40,000 total for the four-year period), and the final report ($20,000) for a total of $85,000. The contractor to perform project scope of work is budgeted based on costs researched from 2024 invoices of identical work and is $125 per linear foot of CIPP lining of Sanitary Sewer Collection System piping. 76,000 linear feet will be lined for a total of $9,500,000. 30,000 linear feet in year one ($3,750,000), 25,000 linear feet in year two ($3,125,000) and 21,000 linear feet in year three ($2,625,000).

**7.b.** **Expenditure of Awarded Funds**

The City of Palm Coast has implemented a Policy and Procedures to ensure all grants (federal, state, county, and private) awarded to the City are effectively and efficiently researched, applied for, appropriated, and monitored. This document is currently in final draft form and in the process of approval. The following paragraphs are excerpts which illustrate the City’s approach to **ensure proper management and to track expenditure of grant funds.** The Draft Grants Management Policy is attached to this application.

*The application, acceptance, and administration of grants should be coordinated with the Finance Department. The Director of every Department is accountable for all grants within his/ her departmental jurisdiction. Each grant shall have a Project Manager identified. Finance will compile a report of expenditures coded to the grant accounts and provide invoices, proof of payment, and other financial documents needed for reimbursement. Finance will also be responsible for end of year financial reporting of grant activity and related single audit.*

The project will be overseen by Helena Alves, Director of Finance, Carl Cote, Director Stormwater & Engineering, Mary Kronenberg, Project Manager I Stormwater & Engineering, and Maeven Rogers, Chief Sustainability & Resiliency Officer who will be assisted by a grant funded part time position to assist in tracking progress and expenditure of funding.

**7.c.** **Reasonableness of cost**

The project’s budget includes personnel, travel, equipment, and contractual services for a total of $9,947,404. These are the necessary activities to carry out the implementation of the reduction measure addressed by project DRiPs. The project will accomplish the goals of GHG emission reduction and Climate Change resiliency by providing the means to make the wastewater treatment more energy efficient. The costs of Equipment and contractual services were based on invoicing and estimates pricing from 2024. One part-time personnel position will be created and funded by the grant. Travel was kept to one state or national conference a year and local travel. The bulk of the budget is in the physical scope of work necessary to accomplish the GHG emission reductions and the other categories act as the needed support for that scope of work.

**Conclusion**

The City of Palm Coast recognizes the importance and the direct impacts that the DRiPs project can provide. As such, the City has established an ongoing budget to address this issue but lacks the availability of funding to complete all needed areas to create more resilient infrastructure. The City of Palm Coast respectfully requests $9,947,404 in Climate Pollution Reduction Grant funding from the Environmental Protection Agency for the DRiPs Project. This funding will be used to implement the Solid Waste & Wastewater Sector priority measure *Wastewater Treatment Efficiency Upgrades* within Justice40 tracts 12035060212 & 12035060208*.* Thank you for your consideration of this project.

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2. https://www.nrel.gov/docs/fy12osti/53341.pdf [↑](#footnote-ref-3)
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18. https://pubmed.ncbi.nlm.nih.gov/17063863/ [↑](#footnote-ref-19)
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