MIAMIBEACH

Sustainability Resiliency Committee Meeting
City Hall Commission Chambers, 3rd Floor
September 26, 2018 - 1:00 PM
Commissioner Micky Steinberg, Chair
Commissioner John Elizabeth Aleman, Vice-Chair
Commissioner Ricky Arriola, Member
Commissioner Mark Samuelian, Alternate
Elizabeth Wheaton, Liaison

DISCUSSION ITEMS

1. DISCUSS A TEMPORARY HYDROPONIC FARM AS AN INCUBATION PILOT IN NORTH BEACH OR OTHER AREAS IN THE CITY.
   Commissioner John Elizabeth Aleman
   Tourism, Culture and Economic Development
   Item C4 AE - May 16, 2018 Commission Meeting
2. DISCUSSION ON THE CITYWIDE FLEET ASSESSMENT AND ESTABLISHED POLICIES FOR ENHANCING THE CITY'S FLEET
   Commissioner Michael Gongora
   Alyssia Berthoumieux, Sustainability Specialist
   Item C4 AH - May 16, 2018 Sustainability and Resiliency Committee
3. A DISCUSSION TO REVIEW THE NEIGHBORHOOD IMPROVEMENT PROJECT SEQUENCING.
   Commissioner Mark Samuelian
   PUBLIC WORKS
   Item C4L - June 06, 2018 Commission Meeting
4. DISCUSSION REGARDING CITY OF MIAMI BEACH STREET RAISING RESILIENCY POLICY
   Commissioner Mark Samuelian
   Public Works
   Item R9L - June 06, 2018 Commission Meeting
5. DISCUSSION REFERRING A TASK TO THE CITY MANAGER'S READY TEAM: IN ORDER TO BOTH OPTIMIZE PUBLIC ENGAGEMENT AND FACILITATE TIMELY COMPLETION OF PROJECTS
   Commissioner John Elizabeth Aleman
   Amy Knowles, Deputy Chief Resiliency Officer
   Item C4V - July 25, 2017 Commission Meeting
6. DISCUSSION ON CONSIDERING A NEIGHBORHOOD BIRD SANCTUARY PROJECT
   Commissioner John Elizabeth Aleman
   Elizabeth Wheaton, Environment and Sustainability Director
   Item C4G - July 25, 2018 Commission Meeting
7. DISCUSSION ON FUNDING AND DEPLOYMENT OF TEMPORARY PUMPS
   Commissioner John Elizabeth Aleman
   PUBLIC WORKS
   Item R7K - July 25, 2018 Commission Meeting
8. DISCUSSION ON RESULTS FROM THE RESILIENCY ACCELERATOR, TO ENABLE SUCH RESULTS TO BE TIMELY REVIEWED AND CONSIDERED BY THE COMMITTEE

Commissioner Mark Samuelian

Elizabeth Wheaton, Environment and Sustainability Director

Item C7 AJ - July 25, 2018 Commission Meeting

REPORTS

9. SUSTAINABILITY COMMITTEE

   Dave Doebler, Committee Chair

10. REVIEW OF RESILIENCE STRATEGY WORKPLAN - PLANNED AND IN PROGRESS RESILIENCY PROJECTS

    Amy Knowles, Deputy Resiliency Officer

ADDENDUM

11. DISCUSSION ON STORMWATER BEST MANAGEMENT PRACTICES

    Commissioner Micky Steinberg

    Margarita Wells, Environment and Sustainability Assistant Director

    Item C4U - May 11, 2016 Commission Meeting

12. DISCUSSION OF THE BUSINESS CASE ANALYSIS FOR THE STORWATER PROGRAM

    City Manager's Office

    Amy Knowles, Deputy Resiliency Officer

MIAMIBEACH

COMMITTEE MEMORANDUM

TO: Sustainability Resiliency Committee Meeting

FROM: Jimmy L. Morales, City Manager

DATE: September 26, 2018

SUBJECT: **DISCUSS A TEMPORARY HYDROPONIC FARM AS AN INCUBATION PILOT IN NORTH BEACH OR OTHER AREAS IN THE CITY.**

RESPONSIBLE DEPARTMENT:
Tourism, Culture and Economic Development

LEGISLATIVE TRACKING:
Item C4 AE - May 16, 2018 Commission Meeting

SPONSORED:
Commissioner John Elizabeth Aleman

BACKGROUND:
At the May 16, 2018 City Commission meeting, this item was referred to the Sustainability and Resiliency Committee to further explore hydroponic farms as a potential pilot project in North Beach. The Administration made a presentation at the July 11, 2018 Committee meeting on hydroponic farms and their potential economic and social impact within Miami Beach. The Committee requested that Staff return in September with proposed farm locations.

Analysis
Indoor farming is a method of growing crops or plants, usually on a large scale and entirely indoors. This farming often implements growing techniques such as hydroponics and utilizes a mechanical system to provide plants with nutrients and light necessary for growth. A wide variety of plants can be grown indoors; however, fruits, vegetables, and herbs are often the most popular because they grow well indoors and can generate revenue.

One of the advantages of indoor farming is the control of necessary conditions to achieve optimal growth and survival of crops, thereby ensuring maximum yield per square foot of growing space. At times, the control of necessary conditions can demand a higher carbon footprint compared to outdoor farming, because of the amount of energy needed to operate the artificial system (lighting, heating/cooling, irrigation, software, and sensors). Nevertheless, indoor farming uses land and water more efficiently than conventional farming and could become a sustainable food source for the world's growing population. This urban agriculture provides an opportunity to increase access to affordable food among resource-scarce areas, thereby transforming public spaces and revitalizing communities.

Vacant buildings and underutilized spaces are being transformed into indoor farms using hydroponic, aquaponic, apiary, and aeroponic systems, as well as space-saving strategies like "vertical farming" to grow fresh food, which is often in short supply in urban areas. Vertical farming is the practice of

producing food in vertically-stacked layers or integrated in structures (such as a used warehouse or shipping container). Indoor hydroponic farming does not involve dirt; thus, no pesticides or GMOs are used. The brief, high-level overview of the indoor farming concept from the July 11th Committee meeting is attached as Exhibit A.

UPDATE:

Staff examined different areas in the community that could house a hydroponic farm but did not identify any vacant City buildings that would suitably accommodate an indoor farm or greenhouse. Therefore, the City is considering a model using shipping containers to house plants. The eight, vacant City-owned lots known as the North Beach "West Lots," spanning from 79th to 87th Streets across the North Shore Oceanside Park, could provide an opportunity to test this new farming method. Given the size and structure of the containers, Staff recommends adapting a portion of a vacant West Lot as a test site for the container model.

Concurrent with development of this agenda item, the City has been working with Dover, Kohl & Partners to examine the future use(s) of the eight, GU-zoned West Lots. Through community charrettes and meetings, residents have expressed a need for better access to fresh, healthy food in the North Beach community and an interest in a hydroponic garden as a potential remedy. At the June 27, 2018 Commission meeting, Dover Kohl presented an initial conceptual design entitled The Plan for the West Lots (the "West Lots Plan"). In light of the presentation, the City Commission included funding for redevelopment of the West Lots as a G.O. Bond item in the November 6, 2018 election. Dover Kohl's planning study, directly informed by community input, highlighted five key recommendations, including showcasing resilience and sustainability; civic/social uses which compliment the passive park; and a preference for lower height and less impactful uses in the inner core of the West Lots. Dover Kohl specifically proposed a hydroponic farm as an eco-friendly design principle that would support these key recommendations.

In other cities, the hydroponic farm is typically treated as an industrial use and located away from residential areas. The farms typically operate in agriculture or industrial districts rather than the center of walkable, mixed-use environments. Farm operations within shipping containers often resemble windowless box structures inside a parking lot with large waste-removal and recycling areas, and enormous bays that can accommodate delivery trucks. This traditional method for hydroponic farms would not be compatible with the community vision found in the North Beach Master Plan.

However, a farm may be compatible with the Master Plan vision if the operation was successfully integrated into future programming for the West Lots. The proposed map for each block in the West Lots Plan is attached as Exhibit B. The West Lots Plan proposed the North Beach Yard, on West Lot 3 (between 81st and 82nd Streets), as an optimal site for a vertical farm. The proposed project's site plan already includes planting beds in its northeast corner and its operators indicated to Dover Kohl that a hydroponic farm aligned with their core mission. In the alternative, Dover Kohl suggested possible locations as the proposed eco-park on Lot 2 (between 80th and 81st Streets) or the proposed tropical garden on Lot 6 (between 54th and 85th Streets). Staff also identified as a potential location the north half of Lot 4 (between 82nd and 83rd Streets) adjacent to the temporary skate park.

COMMITTEE DISCUSSION ITEMS

Potential mechanisms for solicitation and structure of a project include a ground lease of the City-owned land or financial subsidy of a private operation, depending upon the level of market interest. The City could also explore other options at the direction of the Committee, including integration of a hydroponic farm in the plans for North Beach Yard. As the City's land development regulations do not contemplate agriculture uses, GU waivers by the City Commission would likely be necessary to allow the use on the West Lots. Actual plans for a farming project would require zoning review and a building permit. Should the Committee wish to proceed with a hydroponic farm, a feasibility study that identifies viable locations would be beneficial since the concept is untested by the City.

ADDITIONAL RESOURCES AND RESEARCH

Recently, staff contacted the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS)

Tropical Research and Education Center and is planning to meet with the Urban Horticulturist/Entomologist about hydroponic container farming and explore how, if at all, the City of Miami Beach can potentially incorporate hydroponic farming into Miami Beach communities.

CONCLUSION:

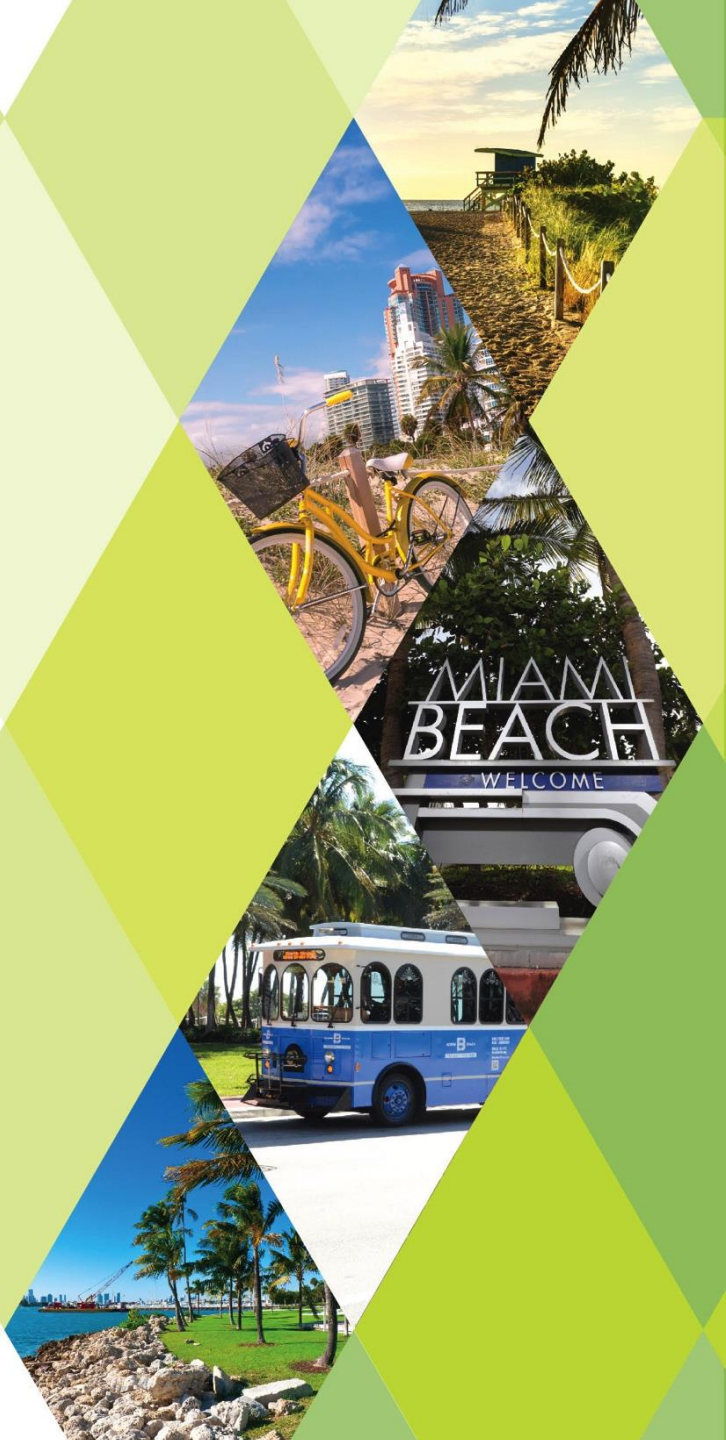
The Administration is seeking input and direction regarding these potential locations.

ATTACHMENTS:

	Description	Type
🗋	Attachment 1 (Hydroponic Farms Presentation)	Memo
🗋	Attachment 2 (West Lots Plan Map)	Memo

MIAMIBEACH
RISING
ABOVE

Hydroponic Farming



The Future of Agriculture

- Urban agriculture – by definition includes indoor farming, rooftop/backyard gardens, community plots and edible landscapes
- Today much of the food is engineered and transported, sometimes up to 1,500 miles - goal is to cut those food miles drastically and offer healthy, nutritious, highest-quality food to local communities
- Addresses climate change + resiliency through smart technology

Feeding the Future

Megatrends affecting traditional farming:

- ***Volatility (weather conditions)***
- ***Resource scarcity***
- ***Urbanization***
- ***Inequities in access to healthy foods***

(Stanford Social Innovation Review)

Average food prices have gone up by 2.6% annually

Food production must increase by 70% before the year 2050 to meet global food needs

(Food and Agriculture Organization of the United Nations)

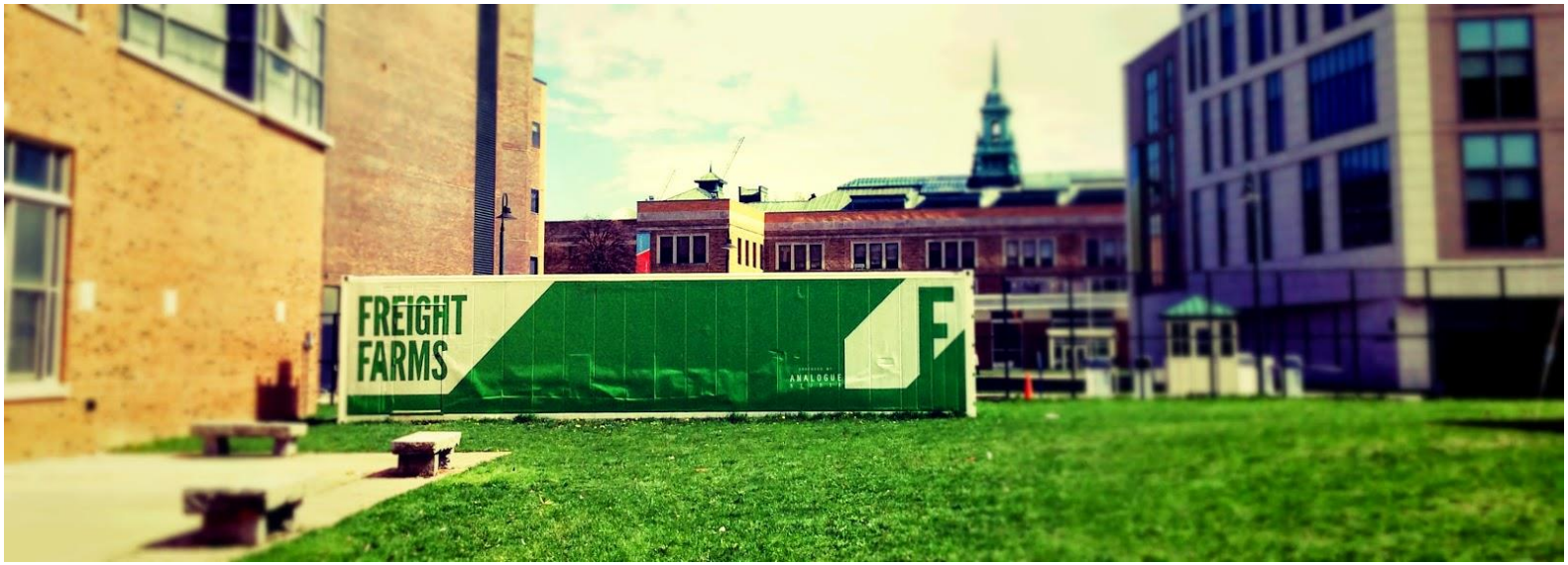
PROS VS CONS

Pros	Cons
Increased plant productivity (optimal survival, growth, and maturation)	Higher need of monitoring & expertise
Focus on in-demand crops	Risk of system failure, affected by power outages
Growing plants despite seasonality or region or space	Risk of mass plant mortality and waterborne diseases can spread quickly
Uses land and water more efficiently	Energy needed to operate the artificial system for indoor farming (lighting, heating/cooling, ventilation, air conditioning, nutrition, irrigation, software, and sensors for that particular growing environment)
Cost-effective in the long-run	Upfront equipment costs
Potential increased economic	Altering Building Codes & Zoning

Food Economy & the Future of Agro-Tech

- Increased interest in the private market for funding vertical farming and agricultural technology
- "Inside-Out" Community Revitalization: Offers opportunities for social enterprise and supplemental income for low-income families and Seniors.
- Case Study Canada: Added $1.3 billion in GDP, 34,000 jobs between 2013-2015
- Case Study Lexington, Kentucky: Food Chain

Transforming Public Spaces



- Temporary, moveable equipment (Shipping containers)
- Transform vacant building and warehouse spaces
- Provides community gathering points to increase social cohesion and connection
- Adaptable to the urban environment
- Case Study: Camden, New Jersey

OVERALL MAP


Lot 1
Parking Garage
& Cafe
Lot 2
Eco-Park & Active
recreation
Lot 3
North Beach Yard
Lot 4
Water Square
Lot 5
Eco-hotel &
City Market
Lot 6
Tropical Gardens
& Playground
Lot 7
Bohemian Village
Lot 8
Community
Eco-Tech Center &
Teen Center
79th st
80th st
81st st
82nd st
83rd st
84th st
85th st
86th st
87th st
North Beach
Oceanside Park
Collins Avenue

MIAMIBEACH

COMMITTEE MEMORANDUM

TO: Sustainability Resiliency Committee Meeting

FROM: Jimmy L. Morales, City Manager

DATE: September 26, 2018

SUBJECT: **DISCUSSION ON THE CITYWIDE FLEET ASSESSMENT AND ESTABLISHED POLICIES FOR ENHANCING THE CITY'S FLEET. (ITEM C4 AH)**

RESPONSIBLE DEPARTMENT:
Alyssia Berthoumieux, Sustainability Specialist

LEGISLATIVE TRACKING:
Item C4 AH - May 16, 2018 Sustainability and Resiliency Committee

SPONSORED:
Commissioner Michael Gongora

BACKGROUND:
At the City Commission meeting on June 6, 2018, the Mayor and City Commission referred a discussion to the Sustainability and Resiliency Committee (SRC) to discuss the citywide fleet assessment and established policies for enhancing the city's fleet.

Analysis
In collaboration with all city departments, the Environment & Sustainability (E&S) and Fleet Departments completed a fleet assessment using data from June 2015 through May 2016 with the goal of identifying ways of improving the efficiency of our fleet, while reducing greenhouse gas emissions. The fleet assessment is part of the city's resiliency strategy to reduce its impact on the environment by mitigating the effects of climate change.

In 2015, the City of Miami Beach joined the Global Covenant of Mayors for Climate & Energy (formerly known as the Compact of Mayors) pledging to reduce greenhouse gas (GHG) emissions, track progress towards GHG reduction goals and enhance the city's resiliency to climate change. As part of this pledge, the City has been annually compiling its community wide and government operations GHG emissions inventories with 2014 as the baseline. The City's fleet accounted for about 22% of its total greenhouse gas emissions for 2014 and 2015. In 2015, the City government operations' total emissions accounted for almost 3% of the community wide emissions. Fleet emissions were the largest emissions source for government operations after municipal facilities. Thus, the fleet is one of the City's main targets to reduce its GHG emissions for government operations.

In order to compile the data for the fleet assessment, the automatic vehicle locator (AVL) data for all departments was gathered for the period between June 30, 2015 and May 30, 2016. The AVL reports for each vehicle provided the miles traveled, the time the engine was turned on, and the idle time for that vehicle each day during the report period. The following was calculated for each vehicle: total miles

traveled during report period, average idling time, average miles traveled in a day, average miles traveled in a month, and lifetime fuel efficiency. Then, the data was organized by department and analyzed as a whole.

E&S and Fleet staff met with each department to understand their fleet operations, discuss their fleet usage behavior, and together identify opportunities to improve the efficiency of their fleet. Different alternatives and possible pilot programs were presented and discussed, including: Uber/Lyft business account, vehicle pool, car share program, bicycle program, electric vehicles (EVs), and hybrids. We received feedback from each department about the feasibility of these programs and compiled a list of these considerations in the Fleet Assessment (Attachment A).

Uber/Lyft Business account
Having an Uber/Lyft business could help departments reduce the number of vehicles in their fleet. A business account allows the account manager to restrict access to the account to certain employees and set geographic parameters for the areas where access to the account is permitted.

Most departments agreed using Uber/Lyft would be useful for trips to meetings, especially on occasions where parking is difficult. It would allow staff to take advantage of that time to continue working during their ride and would allow the other vehicles in their fleet to be used during the whole duration of their meeting. It could also help save time for staff and reduce stress. In all, it could help departments use their limited resources more efficiently. If a department elects to open an Uber/Lyft account and give away a vehicle, then they could see savings on fuel, maintenance and repair costs. The average maintenance, repair, and fuel expenses for a compact car in the City's fleet total to $1,734 annually. That is equivalent to $0.49 per mile driven, on average. This does not account for the cost of purchase of a compact car, about $19,800 for a "fully loaded" Ford Focus[1]. When comparing the cost of a ride with Uber/Lyft to a trip using a City compact car, the price of driving a City compact car is significantly less expensive in most scenarios. When a trip would include parking, such as driving to a meeting at the Miami-Dade County, then the cost difference decreases. For example, the estimated cost of a round-trip with Uber/Lyft to the County is $29.64 and the estimated cost of driving a city car (taking into consideration maintenance, repair, and fuel) adding parking costs is $23.02. However, a deeper economic analysis would be needed in order to analyze these costs and cost savings for departments with Uber/Lyft accounts as well as for the collective compact vehicles in the city fleet.

Vehicle pool program
A vehicle pool is a way of assembling vehicles in a central location so that multiple departments may use them. This provides a way for individual departments to have fewer vehicles while still having access to some when all vehicles in their fleet are in use. The creation of the vehicle pool would be initiated by departments turning in their vehicle so that it could be assigned to the pool.

Many departments have expressed interest in joining a vehicle pool but only a couple of them were ready to give up a vehicle for the pool. Many mentioned they need to have vehicles on hand to respond to urgent calls. While no department uses their entire fleet on any given day throughout the analysis period, the average usage of compact vehicles across all departments was almost 70% during weekdays. Additionally, many vehicles hold special equipment that is essential for staff to perform daily operations. Since a central location is needed for vehicles to be pooled so that it is convenient for departments in different buildings to participate there is a limit to the number of vehicles that could be used in a vehicle pool and the combination of departments that could participate together. Furthermore, several departments have already transferred one or more vehicles from their fleet to another department in need.

Car Share program
A car share program would eliminate the number of vehicles the city owns and allow employees to

borrow them when needed to fulfill their responsibilities. However, there are no car share programs currently operating in the city. A car share company previously doing business in the city pulled out from the Miami Beach market once their economic model proved unsuccessful due to the increasing popularity of ridesharing apps.

Bicycle program
A number of departments, including Code, Parking and Police, incorporate bicycles into their fleet, especially during special events\periods with high traffic. After their fleet assessment interview, the Building Department initiated a bicycle program pilot. The pilot has been successful and this program is being extended to additional employees.

The bicycle program is an ideal fit for departments with inspectors that can carry all of their equipment on the bicycle. It is important to remember that bicycle use is weather-dependent so a back-up plan is required for days that are not appropriate for bike riding.

Electric Vehicles (EVs)
EVs do not emit any emissions when they are driven. Since most of our region's electricity is produced from natural gas, the emissions due to the electricity used to charge an EV are less than the emissions due to gasoline or diesel in an internal combustion engine (ICE) vehicle.

After the fleet assessment interview, in June 2017, the Parking Department purchased the city's first EV. On average, a standard Ford Focus in the Parking Department travelled 5,852 miles in the report time period. Consequently, the purchase of the Ford Focus Electric to replace one of their vehicles should reduce their emissions by 1.72 MT CO2e annually. That is equivalent to the CO_2 sequestered by 44 tree seedlings grown for 10 years.

Other departments have expressed interest in purchasing EVs or Neighborhood Electric Vehicles (NEVs), which are smaller, low-speed, electric vehicles. Some of the considerations include the necessary charging station infrastructure and location for this infrastructure. Also, a factor that was brought up is the opportunity to purchase foreign vehicles that are more technologically advanced than domestically available vehicles. In addition, the allocation of funds would be essential for the transition to EVs. A Ford Focus costs approximately $19,740, a Ford C-Max Hybrid costs approximately $24,334; and a Ford Focus Electric costs approximately $28,324.

Hybrid Vehicles
A hybrid vehicle has a traditional internal-combustion engine as well as an electric motor with a battery pack. A central feature of hybrids is regenerative breaking which is a function that generates electricity when some of the vehicle's momentum is absorbed during breaking or slowing down. There are currently 21 hybrids in the City's fleet, a mix of Ford C-max hybrids and Ford Fusion hybrids.

The process of "greening" our fleet will be a combination of right-sizing, establishing vehicle pool and bicycle programs, creating Uber/Lyft business accounts, and replacing Ford Focus vehicles with hybrids and/or EVs. As each department goes through the process of replacing their Ford Focus, it is recommended that they work with the Fleet Department to consider replacing it with a hybrid or EV, when feasible. This would encourage the city to transition to a less polluting fleet of low-emissions and no-emissions vehicles. It is crucial that funding is available to enable this transition.

While the fleet assessment was solely focused on identifying opportunities to use our city fleet more efficiently, many employees expressed their interest in commuting to work through more environmentally conscious means such as biking, carpooling, public transit, hybrid vehicles, and EVs if the city provided incentives.

The City has commissioned a comprehensive review of vehicle use by the Matrix Consulting Group (Matrix). As part of this process, each department will be developing an organizational chart for vehicles assigned to their department that associates vehicles to programs, functions, and staff and will provide additional information such as if the vehicles are tied to a pool versus a driver and reasons for low use. Matrix is evaluating the need for each and every vehicle, department by department. When that exercise is complete and a new baseline is developed, we can employ a more strategic approach to fleet purchases and performance.

Further analysis is needed to identify a suitable scenario for transition to low-/no-emissions vehicles and policy direction. This analysis would require examination of: financial strategy/platform used to replace vehicles, funding availability, and lifecycle of current compact vehicles and their projected replacement timeline. Additionally, the analysis should also consider how other cities are electrifying their fleet, such as the City of Coral Gables which purchased 20 EVs for its fleet in 2016 (and currently has 43 EVs in its fleet). The City of Coral Gables was able to use a lease to own program along with incentives from Nissan to help take advantage of tax incentives and lower the cost of the EVs. Nissan also provided the City of Coral Gables two fast charging stations for their large purchase of Nissan Leaf vehicles.

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[1] The “fully loaded” price of the Ford Focus includes dealer warranty, extra keys, AVL system, emergency flashers, fuel management system, and graphics.

CONCLUSION:

The following is presented to the members of the Sustainability and Resiliency Committee for discussion and further direction. The Administration recommends the Committee to support an internal policy for the replacement of Ford Focus vehicles to hybrid and/or EV alternatives with allocation of funds for the transition. Additionally, it is recommended that the City explore different financial strategies to identify the most effective way to transition to low-/no-emissions vehicles and perform a fleet-wide analysis every five years to determine if there are any further opportunities to utilize current vehicles more efficiently. This analysis should also consider the number and types of vehicles that are projected to be replaced.

ATTACHMENTS:

Description	Type
Attachment A: Fleet Assessment Overview	Other

CITY OF MIAMI BEACH

FLEET ASSESSMENT

MIAMIBEACH
RISING
ABOVE

CITY FLEET

Compact cars are the most feasible to transition.

OBJECTIVES

- Improve efficiency of the City's fleet by identifying opportunities to **use our current fleet more efficiently** and creating **alternative options** for staff to make environmentally conscious decisions.

- **Reduce greenhouse gas emissions** to mitigate the effects of climate change.

METHODOLOGY

- ↓ Download Automatic Vehicle Location (AVL) data for each vehicle
- ↓ Group individual vehicle data into respective departments
- ↓ Compile and analyze AVL data for each department
- ↓ Analyze Fleet Management data of all active vehicles
- ↓ Research and analyze vehicle specifications
- ↓ Research alternative options and possible pilot programs
- ↓ Meet with each department to discuss data and opportunities

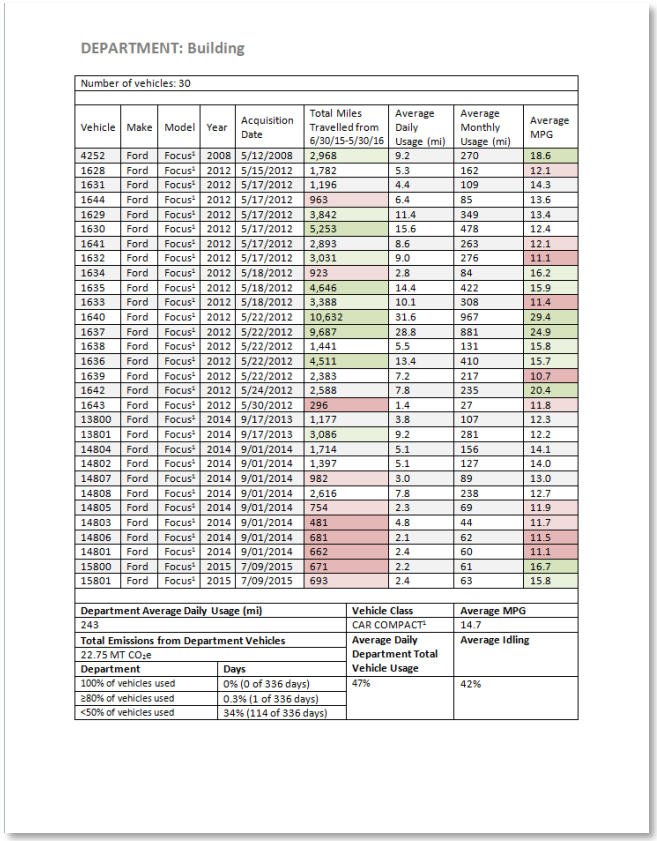
DATA ANALYSIS

- AVL data gathered included:
  - Daily miles travelled
  - Daily engine time on
  - Daily engine idle time
- Data gathered from Fleet Management:
  - Vehicle acquisition date
  - Vehicle make, model, year
  - Lifetime miles travelled
  - Lifetime fuel gallons
- Information gathered from each department:
  - Function for each type of vehicle
  - Vehicle needs and operations for normal operations and special events

- Additional data gathered:
  - g CH_4/mi for each specific vehicle
  - g N_2O/mi for each specific vehicle
  - g CO_2/mi for each specific vehicle
- Calculations and analysis:
  - Vehicle total miles travelled
  - Average daily miles travelled
  - Average monthly miles travelled
  - Vehicle lifetime fuel efficiency
  - Vehicle and department GHG emissions during analysis period
  - Average fuel efficiency for vehicle class in city fleet
  - Average daily department total vehicle usage
  - Average weekly department total vehicle usage
  - Vehicle and dept. average idling
  - GHG emissions equivalences

DATA OVERVIEW

- A short overview of the data analyzed was presented to each department in our interviews:
  - Range of miles travelled
  - Range of vehicle fuel efficiency
  - GHG emissions
  - Average idling
  - Average vehicle usage
- A graph of weekly average fleet usage in each department was also presented.
- All departments with Ford Focus vehicles in their fleet are included in this report.



DEPARTMENT: Building

Number of vehicles: 30

Vehicle	Make	Model	Year	Acquisition Date	Total Miles Travelled from 6/30/15-5/30/16	Average Daily Usage (mi)	Average Monthly Usage (mi)	Average MPG
4252	Ford	Focus[1]	2008	5/12/2008	2,968	9.2	270	18.6
1628	Ford	Focus[1]	2012	5/15/2012	1,782	5.3	162	12.1
1631	Ford	Focus[1]	2012	5/17/2012	1,196	4.4	109	14.3
1644	Ford	Focus[1]	2012	5/17/2012	963	6.4	85	13.6
1629	Ford	Focus[1]	2012	5/17/2012	3,842	11.4	349	13.4
1630	Ford	Focus[1]	2012	5/17/2012	5,253	15.6	478	12.4
1641	Ford	Focus[1]	2012	5/17/2012	2,893	8.6	263	12.1
1632	Ford	Focus[1]	2012	5/17/2012	3,031	9.0	276	11.1
1634	Ford	Focus[1]	2012	5/18/2012	923	2.8	84	16.2
1635	Ford	Focus[1]	2012	5/18/2012	4,646	14.4	422	15.9
1633	Ford	Focus[1]	2012	5/18/2012	3,388	10.1	308	11.4
1640	Ford	Focus[1]	2012	5/22/2012	10,632	31.6	967	29.4
1637	Ford	Focus[1]	2012	5/22/2012	9,687	28.8	881	24.9
1638	Ford	Focus[1]	2012	5/22/2012	1,441	5.5	131	15.8
1636	Ford	Focus[1]	2012	5/22/2012	4,511	13.4	410	15.7
1639	Ford	Focus[1]	2012	5/22/2012	2,383	7.2	217	10.7
1642	Ford	Focus[1]	2012	5/24/2012	2,588	7.8	235	20.4
1643	Ford	Focus[1]	2012	5/30/2012	296	1.4	27	11.8
13800	Ford	Focus[1]	2014	9/17/2013	1,177	3.8	107	12.3
13801	Ford	Focus[1]	2014	9/17/2013	3,086	9.2	281	12.2
14804	Ford	Focus[1]	2014	9/01/2014	1,714	5.1	156	14.1
14802	Ford	Focus[1]	2014	9/01/2014	1,397	5.1	127	14.0
14807	Ford	Focus[1]	2014	9/01/2014	982	3.0	89	13.0
14808	Ford	Focus[1]	2014	9/01/2014	2,616	7.8	238	12.7
14805	Ford	Focus[1]	2014	9/01/2014	754	2.3	69	11.9
14803	Ford	Focus[1]	2014	9/01/2014	481	4.8	44	11.7
14806	Ford	Focus[1]	2014	9/01/2014	681	2.1	62	11.5
14801	Ford	Focus[1]	2014	9/01/2014	662	2.4	60	11.1
15800	Ford	Focus[1]	2015	7/09/2015	671	2.2	61	16.7
15801	Ford	Focus[1]	2015	7/09/2015	693	2.4	63	15.8

Department Average Daily Usage (mi)	Vehicle Class	Average MPG
243	CAR COMPACT[2]	14.7
Total Emissions from Department Vehicles	**Average Daily Department Total Vehicle Usage**	**Average Idling**
22.75 MT CO_2e		

Department	Days		
100% of vehicles used	0% (0 of 336 days)	47%	42%
≥80% of vehicles used	0.3% (1 of 336 days)		
<50% of vehicles used	34% (114 of 336 days)		

Data overview that was presented to the Building Department along with the information in the following slides.

DATA OVERVIEW BY DEPARTMENT

Building Department
6/30/15 – 5/30/2016

- High range of miles travelled: 2,968 – 10,632 miles
- Low range of miles travelled: 481 – 1,714 miles

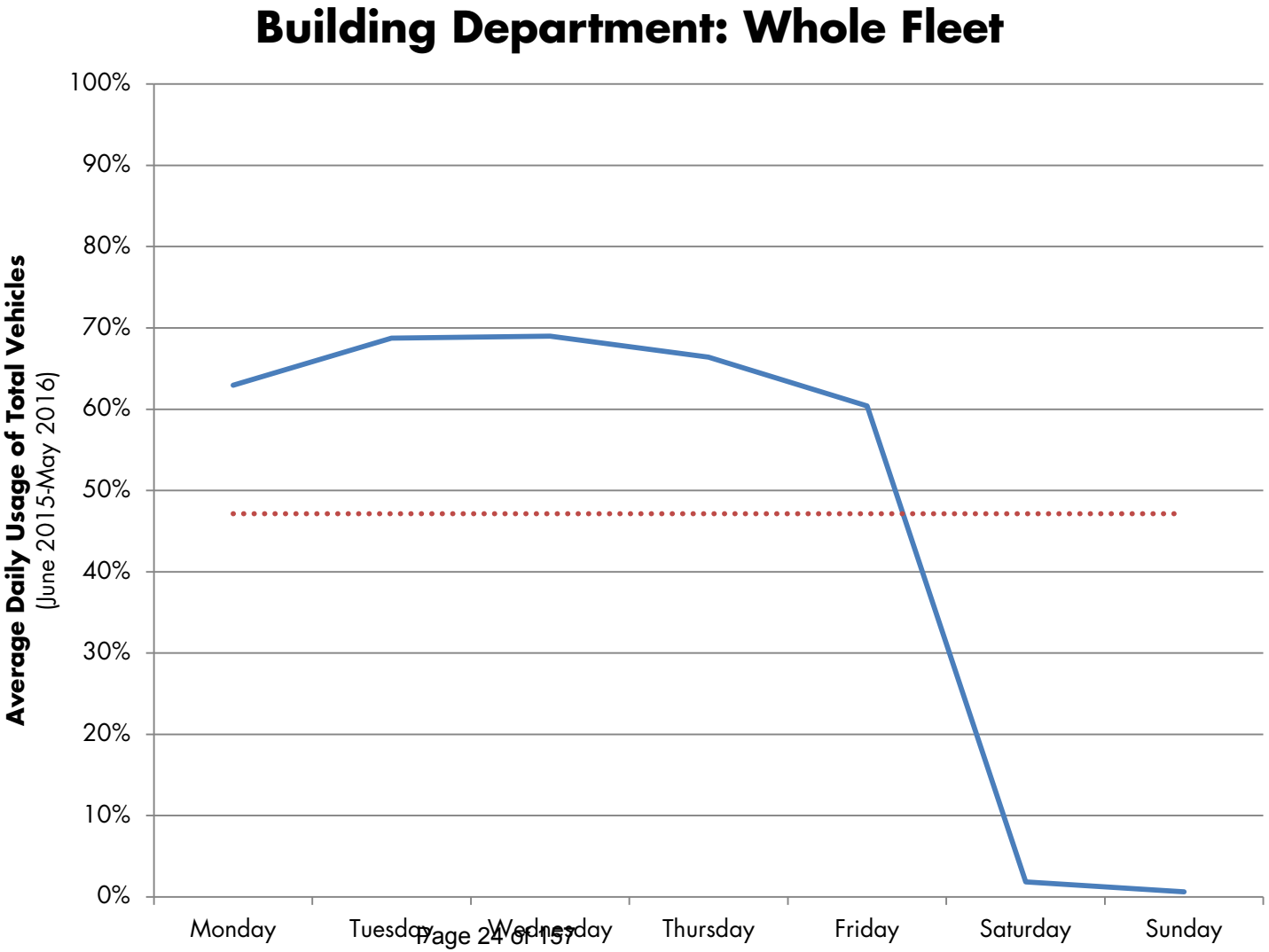
- High range of fuel efficiency: 15.7 – 29.4 MPG
- Low range of fuel efficiency: 10.7 – 12.1 MPG

- Total emissions from department: 22.75 MT CO2e
- Equivalent to: 583 tree seedlings grown for 10 years

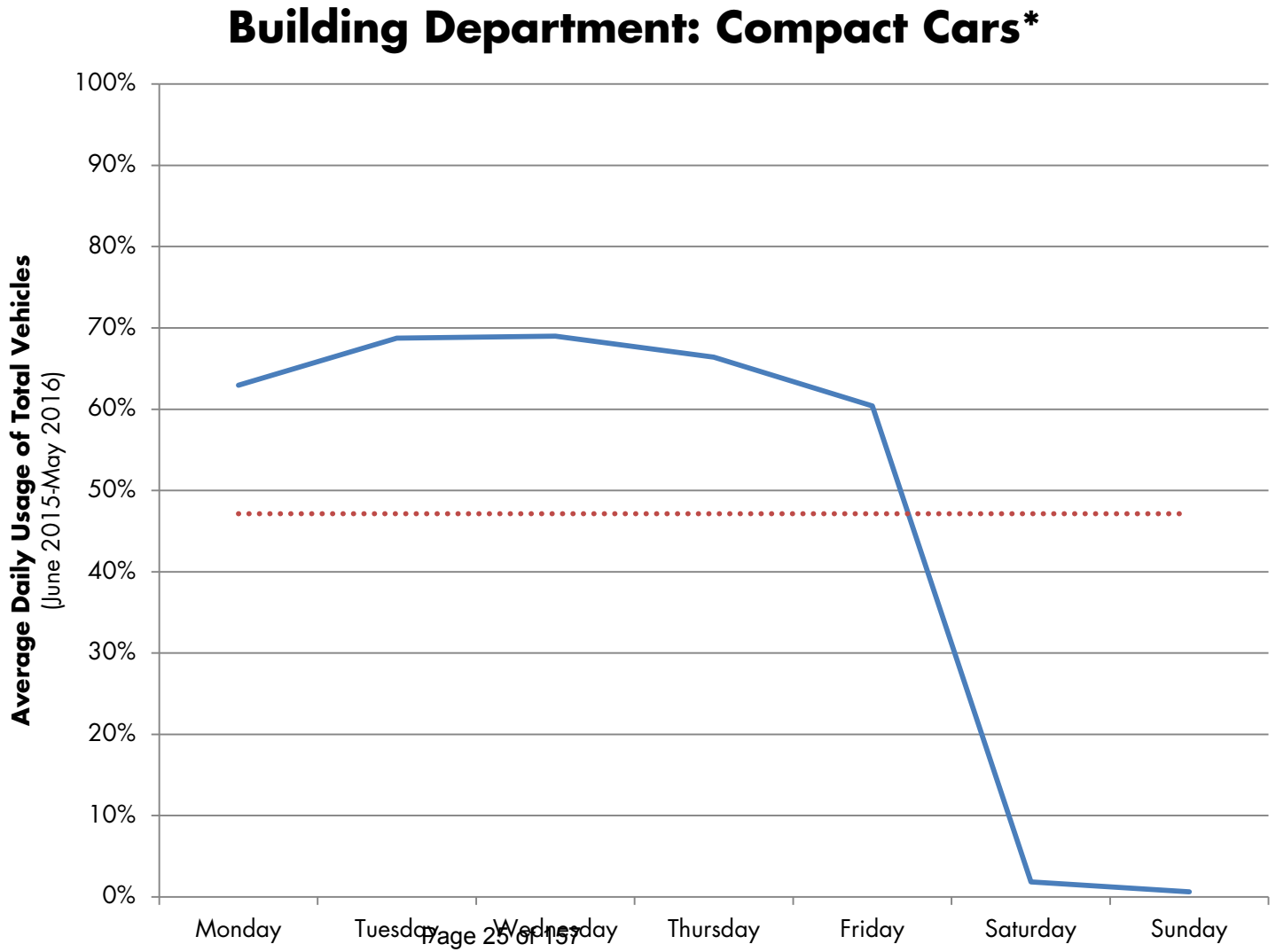
- Average idling duration: 42%

- Average daily usage of department fleet: 47%

AVERAGE DAILY USAGE OF FLEET



AVERAGE DAILY USAGE OF FLEET



*all vehicles in the Building Department fleet are compact cars.

DATA OVERVIEW BY DEPARTMENT

CIP Department
6/30/15 – 5/30/2016

- High range of miles travelled: 2,491 – 3,373 miles
- Low range of miles travelled: 521 – 695 miles

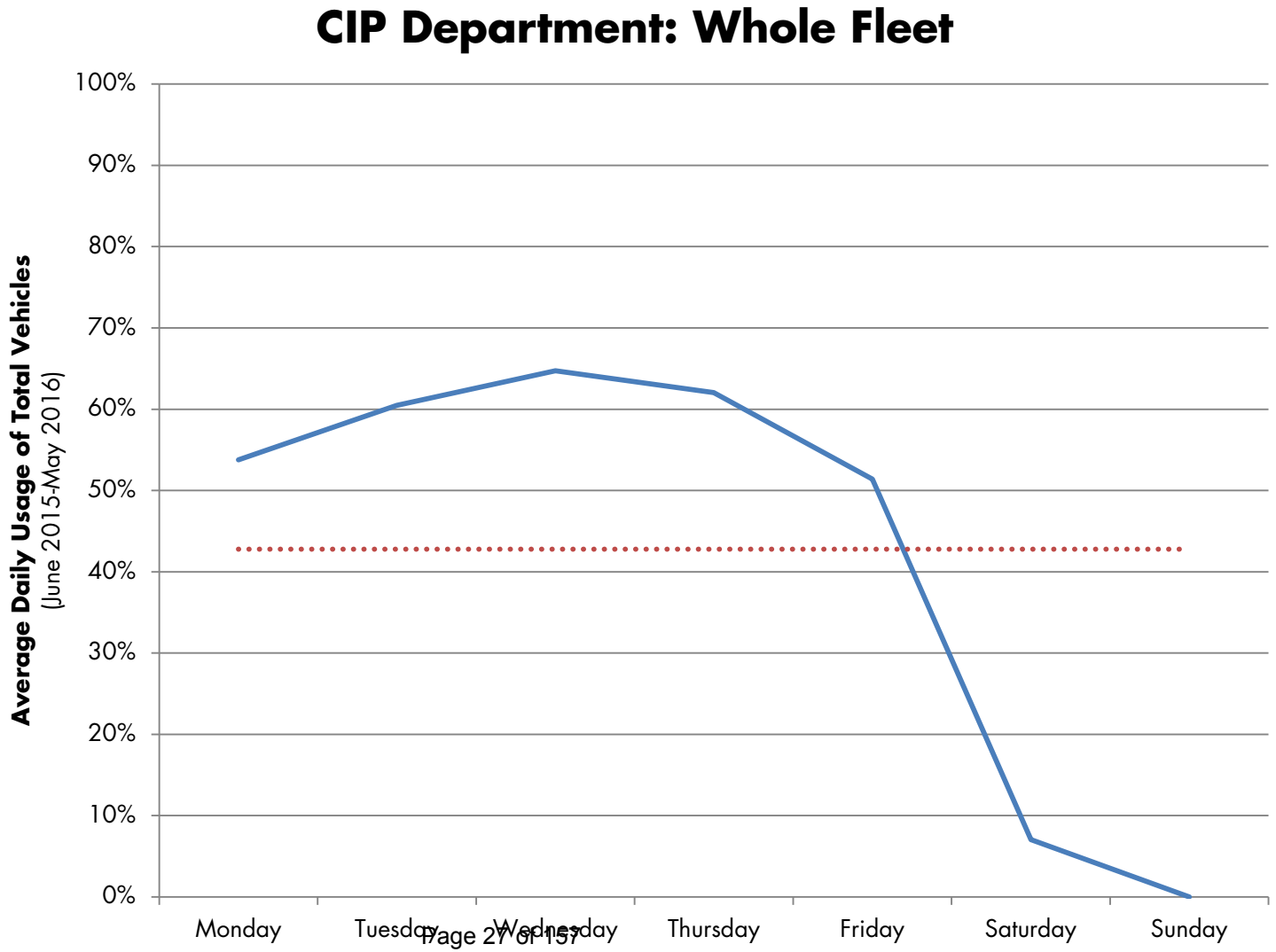
- High range of fuel efficiency: 14.7 – 15.0 MPG
- Low range of fuel efficiency: 6.8 – 9.2 MPG

- Total emissions from department: 4.7 MT CO2e
- Equivalent to: 121 tree seedlings grown for 10 years

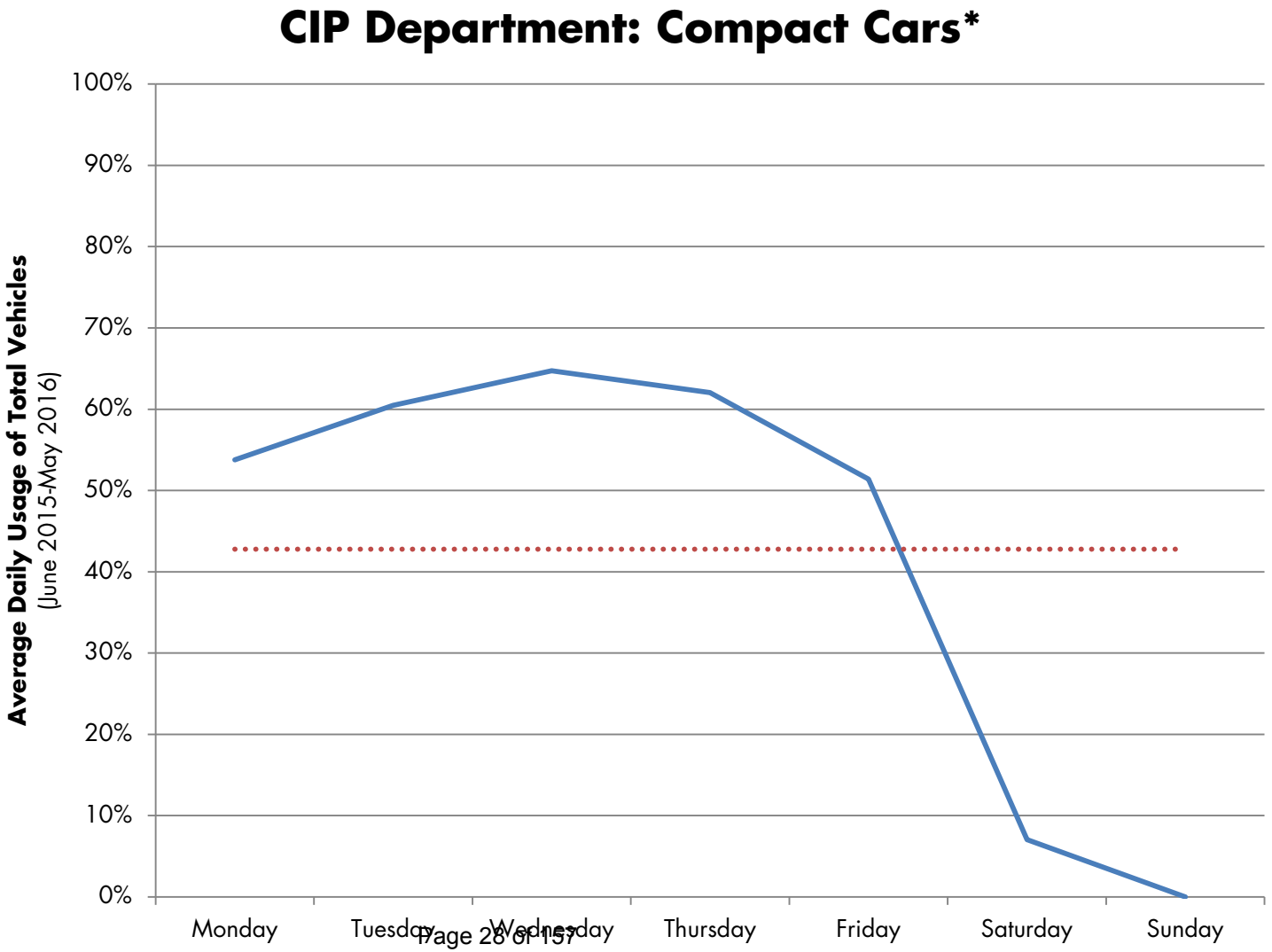
- Average idling duration: 43%

- Average daily usage of department fleet: 43%

AVERAGE DAILY USAGE OF FLEET



AVERAGE DAILY USAGE OF FLEET



*all vehicles in the CIP Department fleet are compact cars.

DATA OVERVIEW BY DEPARTMENT

Code Compliance Department
6/30/15 – 5/30/2016

- High range of miles travelled: 5,518 – 12,177 miles
- Low range of miles travelled: 505 – 1,490 miles

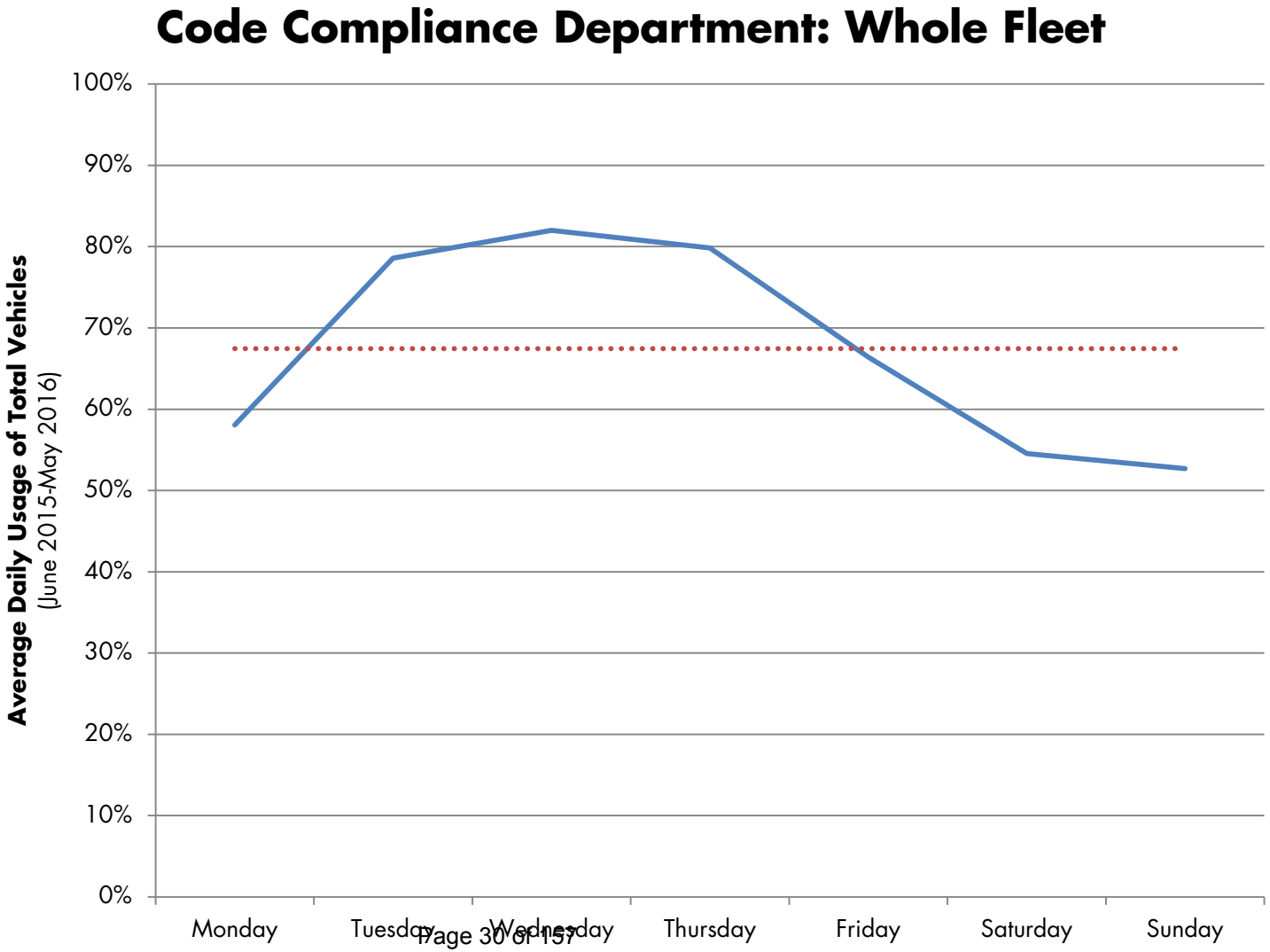
- High range of fuel efficiency: 12.2 – 17.7 MPG
- Low range of fuel efficiency: 7.6 – 8.3 MPG

- Total emissions from department: 27.5 MT CO2e
- Equivalent to: 705 tree seedlings grown for 10 years

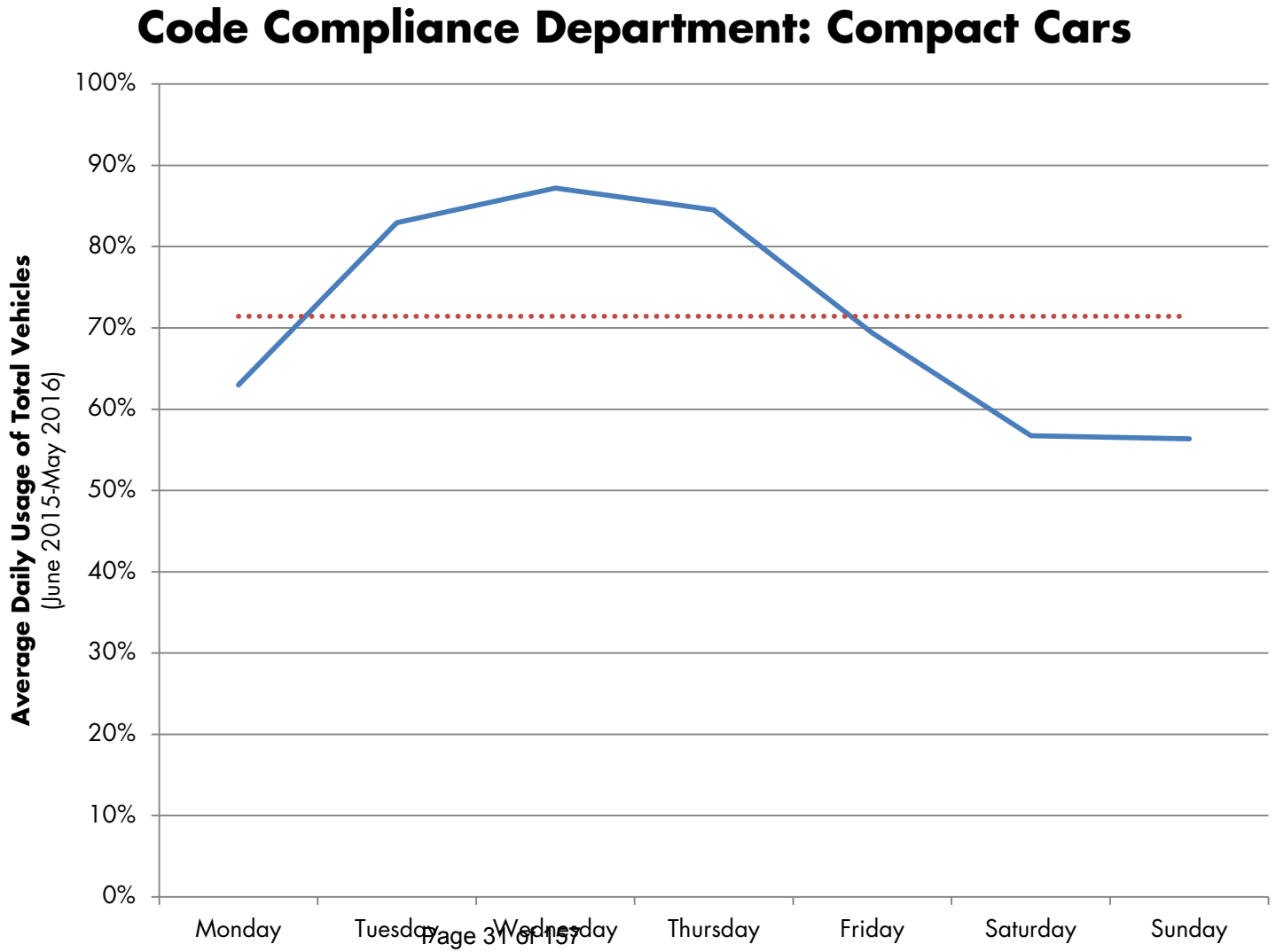
- Average idling duration: 52%

- Average daily usage of department fleet: 67%

AVERAGE DAILY USAGE OF FLEET



AVERAGE DAILY USAGE OF FLEET



DATA OVERVIEW BY DEPARTMENT

Fire Department
6/30/15 – 5/30/2016

- High range of miles travelled: 7,911 – 31,918 miles
- Low range of miles travelled: 13 – 2,808 miles

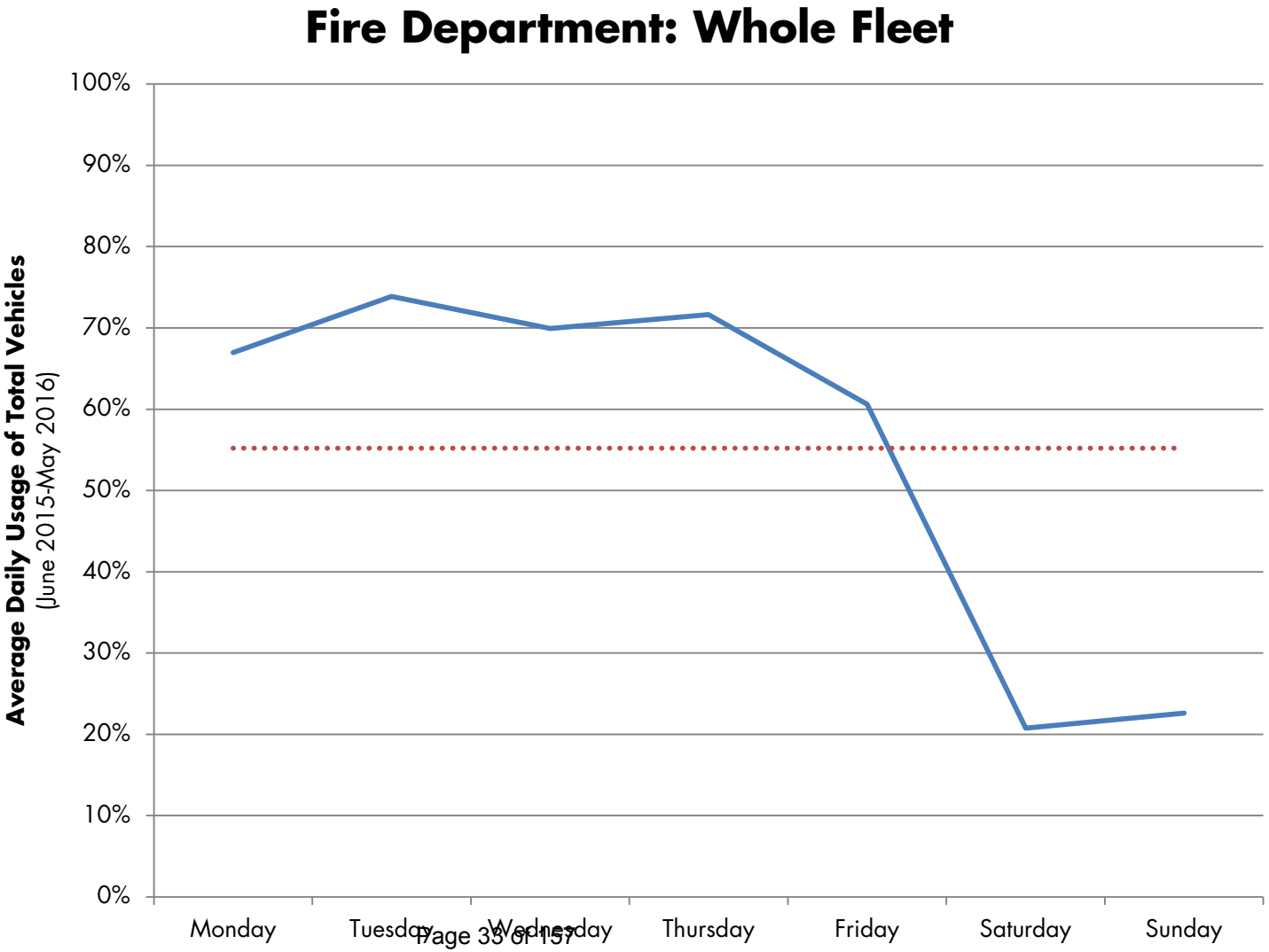
- High range of fuel efficiency: 18.9 – 31.3 MPG
- Low range of fuel efficiency: 6.4 – 13.1 MPG

- Total emissions from department: 84.85 MT CO2e*
- Equivalent to: 2,176 tree seedlings grown for 10 years

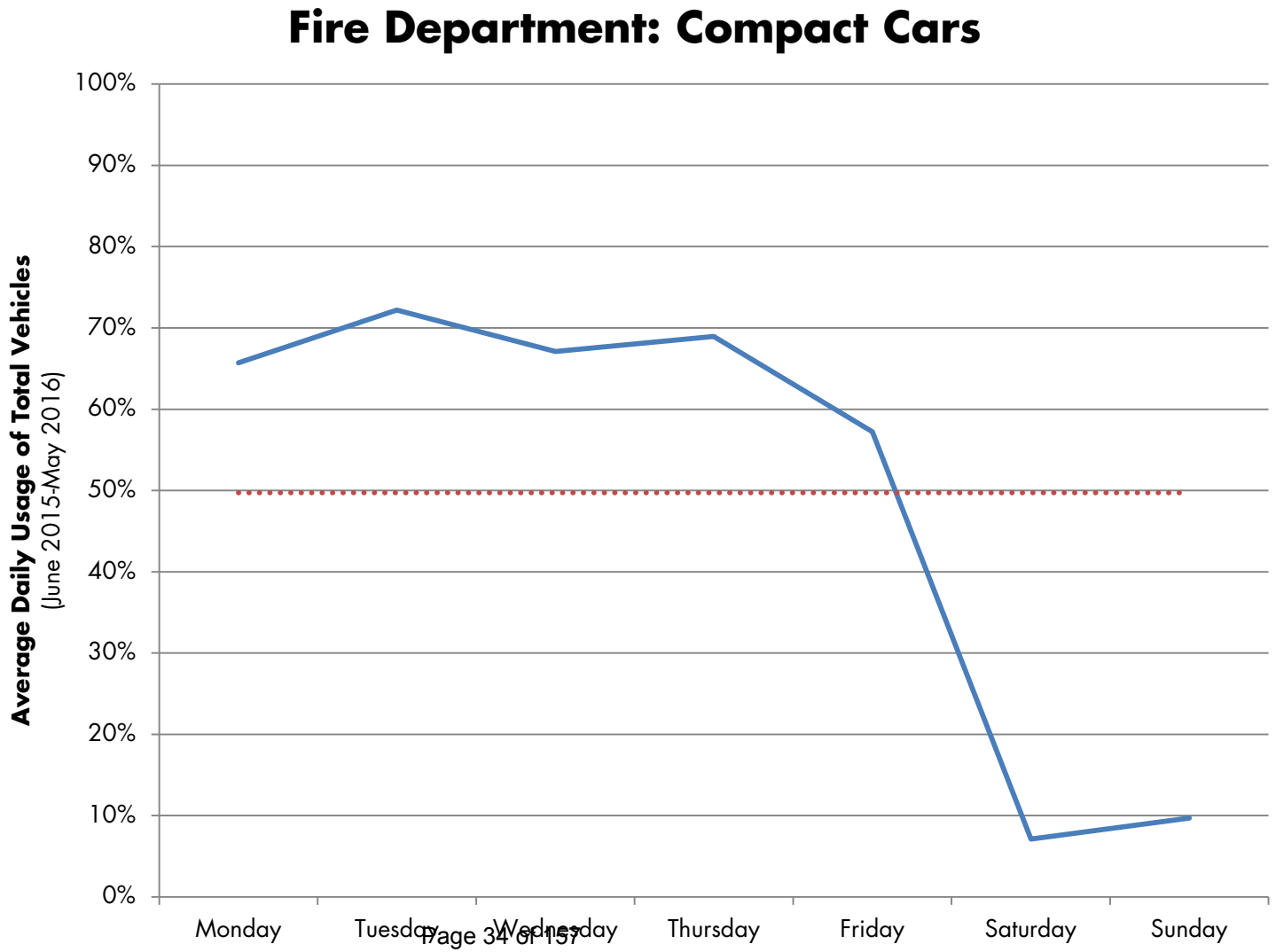
- Average idling duration: 23%

- Average daily usage of department fleet: 55%

AVERAGE DAILY USAGE OF FLEET



AVERAGE DAILY USAGE OF FLEET



DATA OVERVIEW BY DEPARTMENT

IT Department
6/30/15 – 5/30/2016

- High range of miles travelled: 935 – 1,396 miles
- Low range of miles travelled: 160 – 213 miles

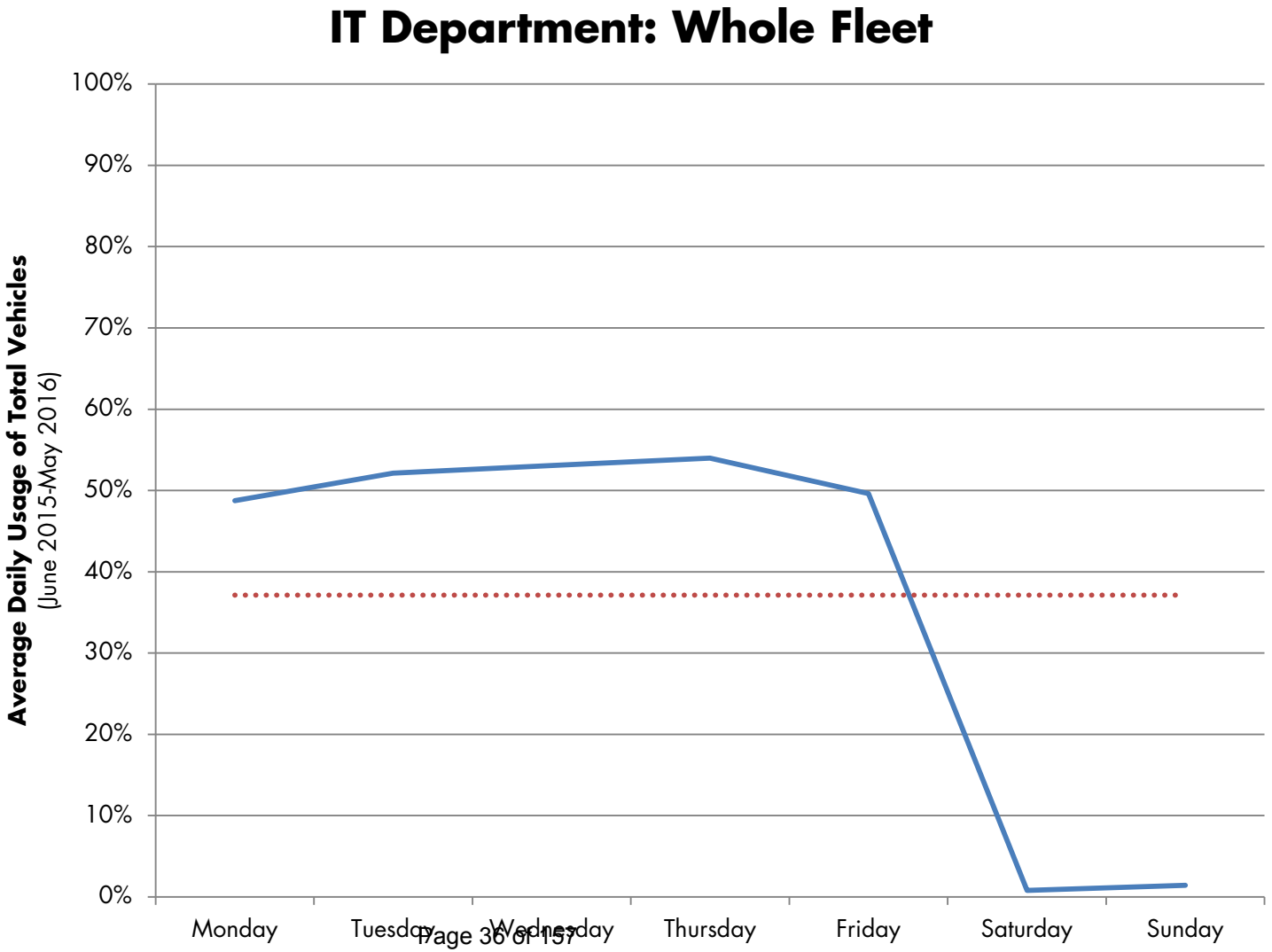
- High range of fuel efficiency: 14.1 – 23.3 MPG
- Low range of fuel efficiency: 10.5 – 11.4 MPG

- Total emissions from department: 2.59 MT CO2e
- Equivalent to: 66 tree seedlings grown for 10 years

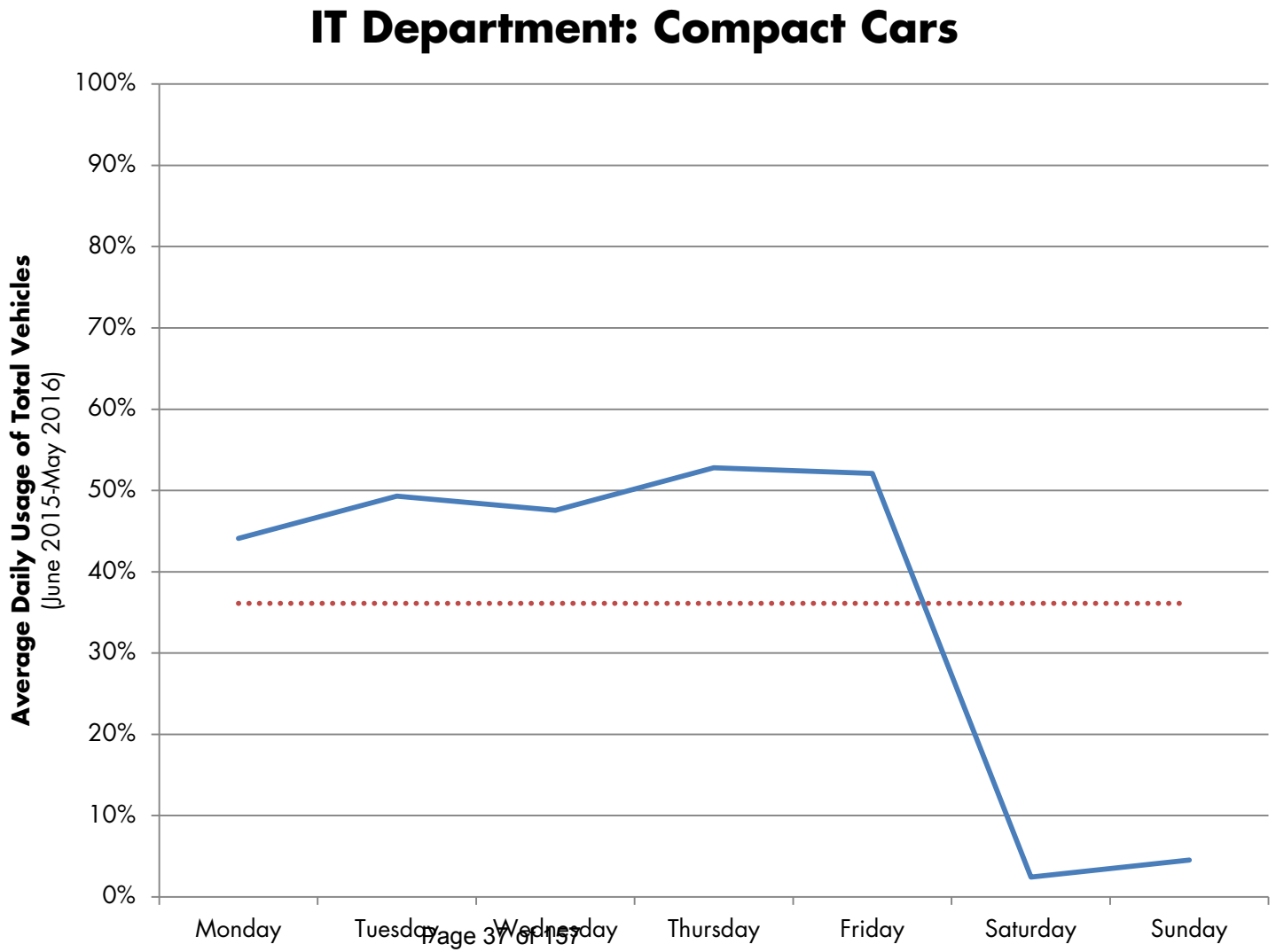
- Average idling duration: 29%

- Average daily usage of department fleet: 37%

AVERAGE DAILY USAGE OF FLEET



AVERAGE DAILY USAGE OF FLEET



DATA OVERVIEW BY DEPARTMENT

Parking Department
6/30/15 – 5/30/2016

- High range of miles travelled: 8,539 – 11,431 miles
- Low range of miles travelled: 302 – 3,201 miles

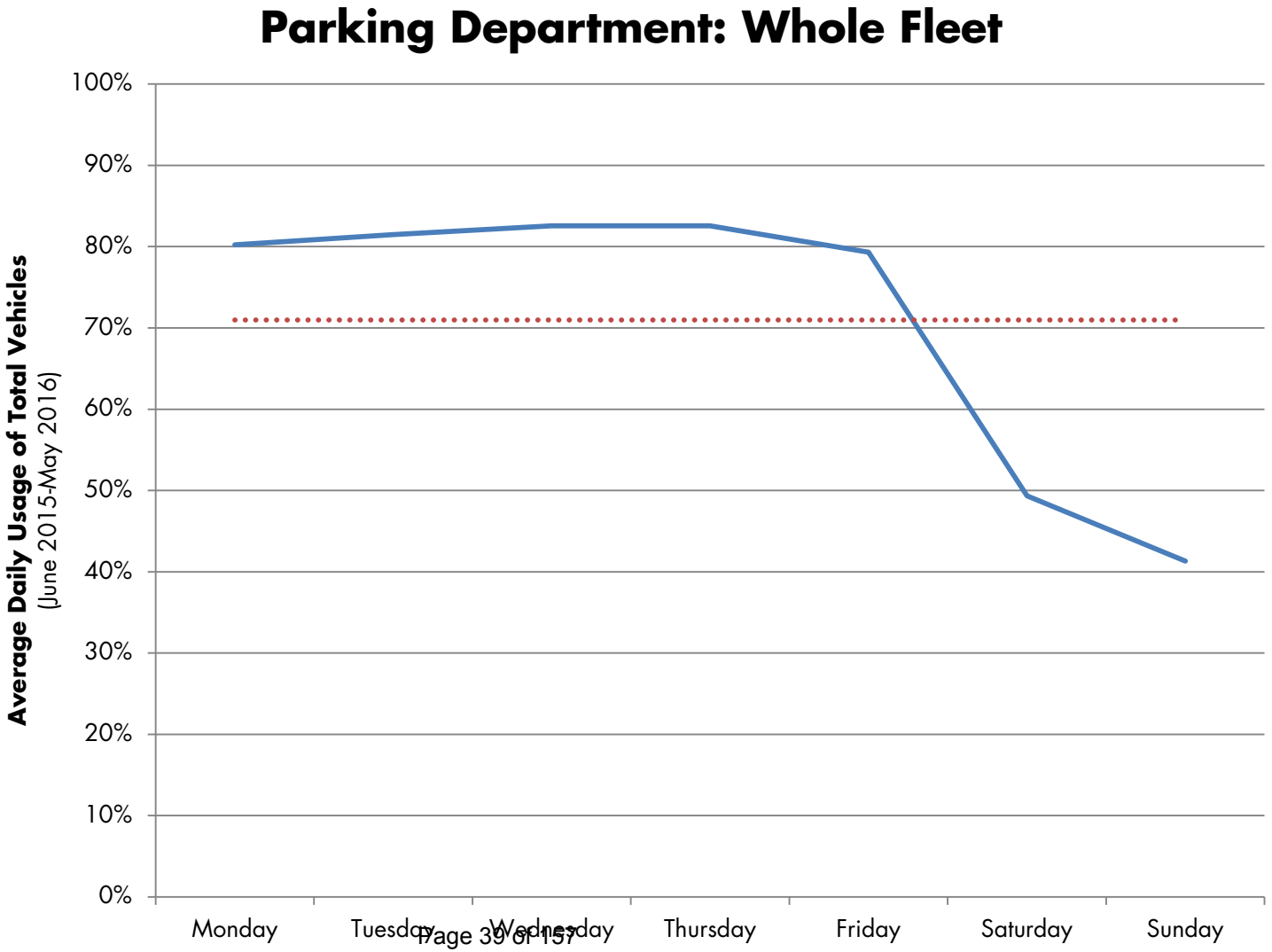
- High range of fuel efficiency: 11.2 – 20.4 MPG
- Low range of fuel efficiency: 3.6 – 8.6 MPG

- Total emissions from department: 108.32 MT CO2e*
- Equivalent to: 2,807 tree seedlings grown for 10 years

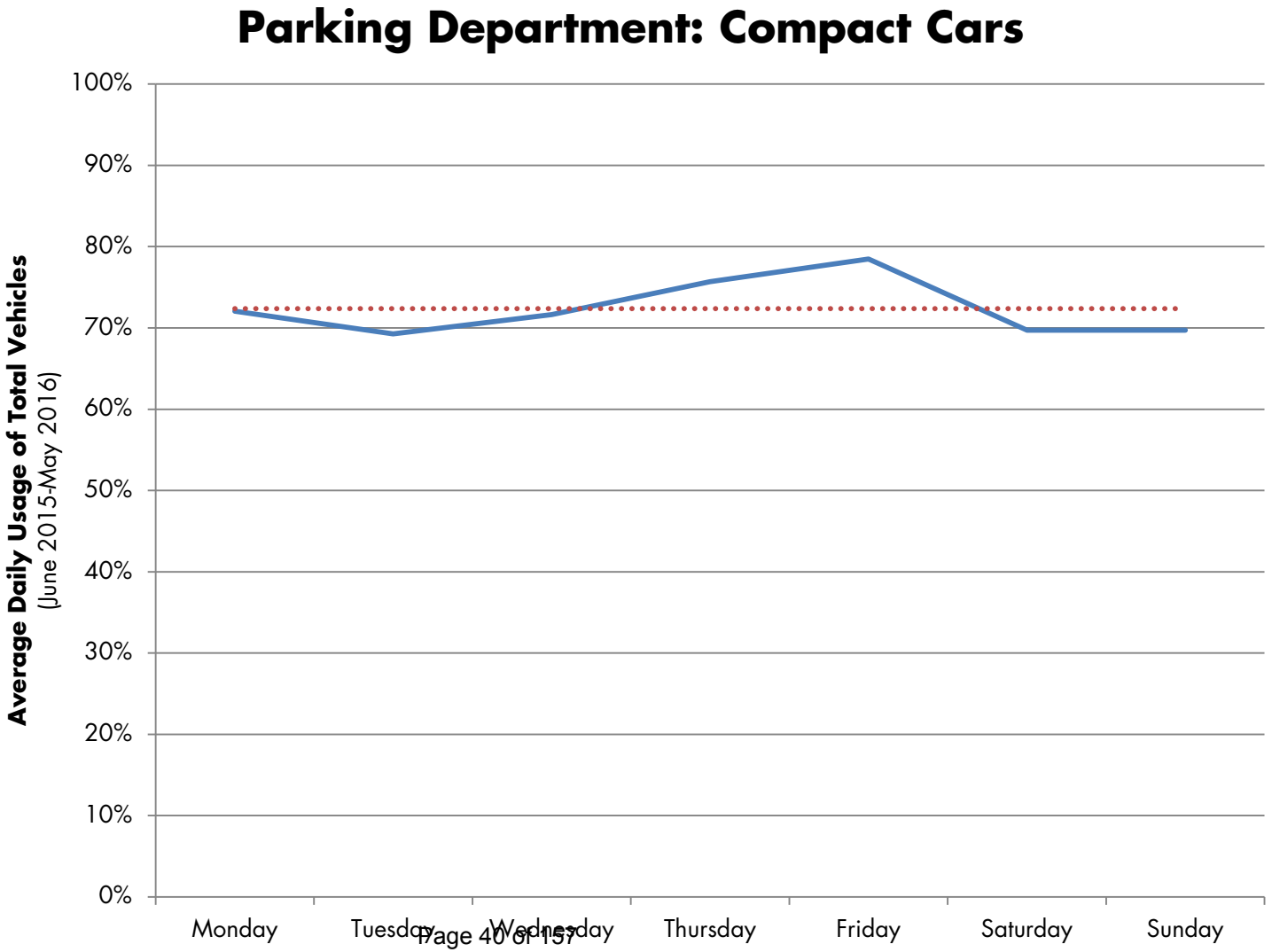
- Average idling duration: 41%

- Average daily usage of department fleet: 71%

AVERAGE DAILY USAGE OF FLEET



AVERAGE DAILY USAGE OF FLEET



DATA OVERVIEW BY DEPARTMENT

Parks and Recreation Department
6/30/15 – 5/30/2016

- High range of miles travelled: 3,877 – 8,331 miles
- Low range of miles travelled: 19 – 370 miles

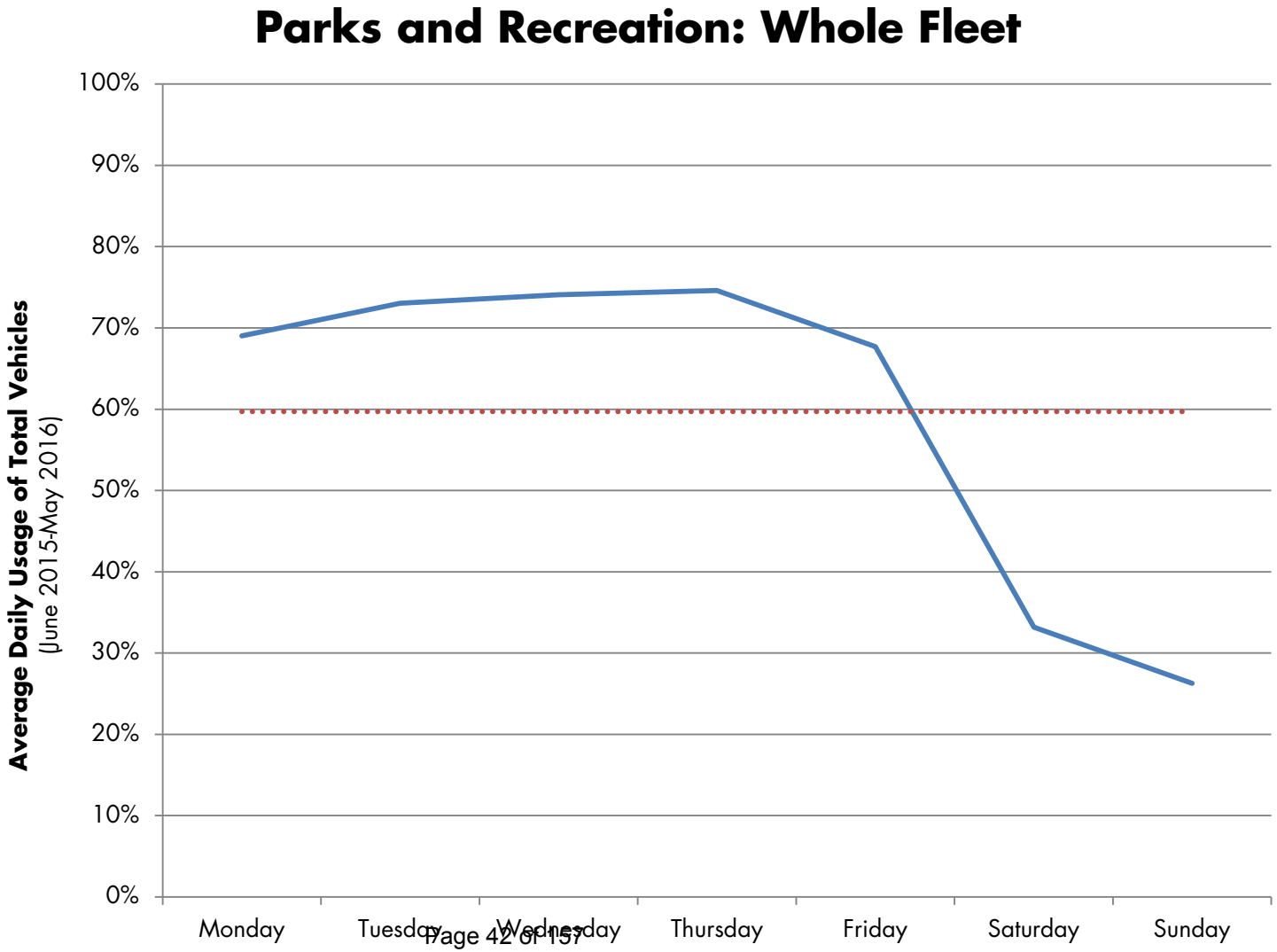
- High range of fuel efficiency: 15.5 – 32.7 MPG
- Low range of fuel efficiency: 2.3 – 4.3 MPG

- Total emissions from department: 71.14 MT CO2e
- Equivalent to: 1,824 tree seedlings grown for 10 years

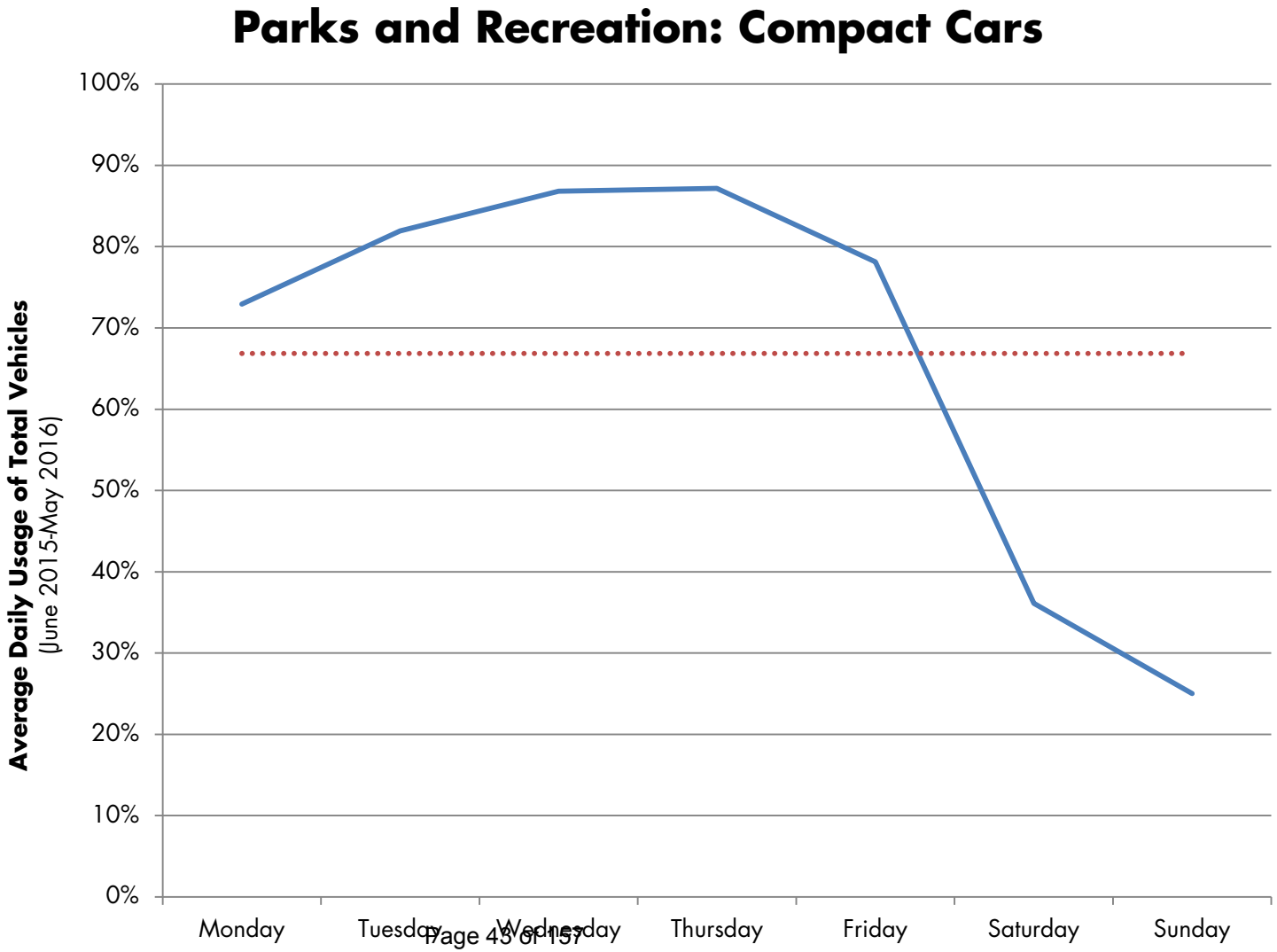
- Average idling duration: 43%

- Average daily usage of department fleet: 60%

AVERAGE DAILY USAGE OF FLEET



AVERAGE DAILY USAGE OF FLEET

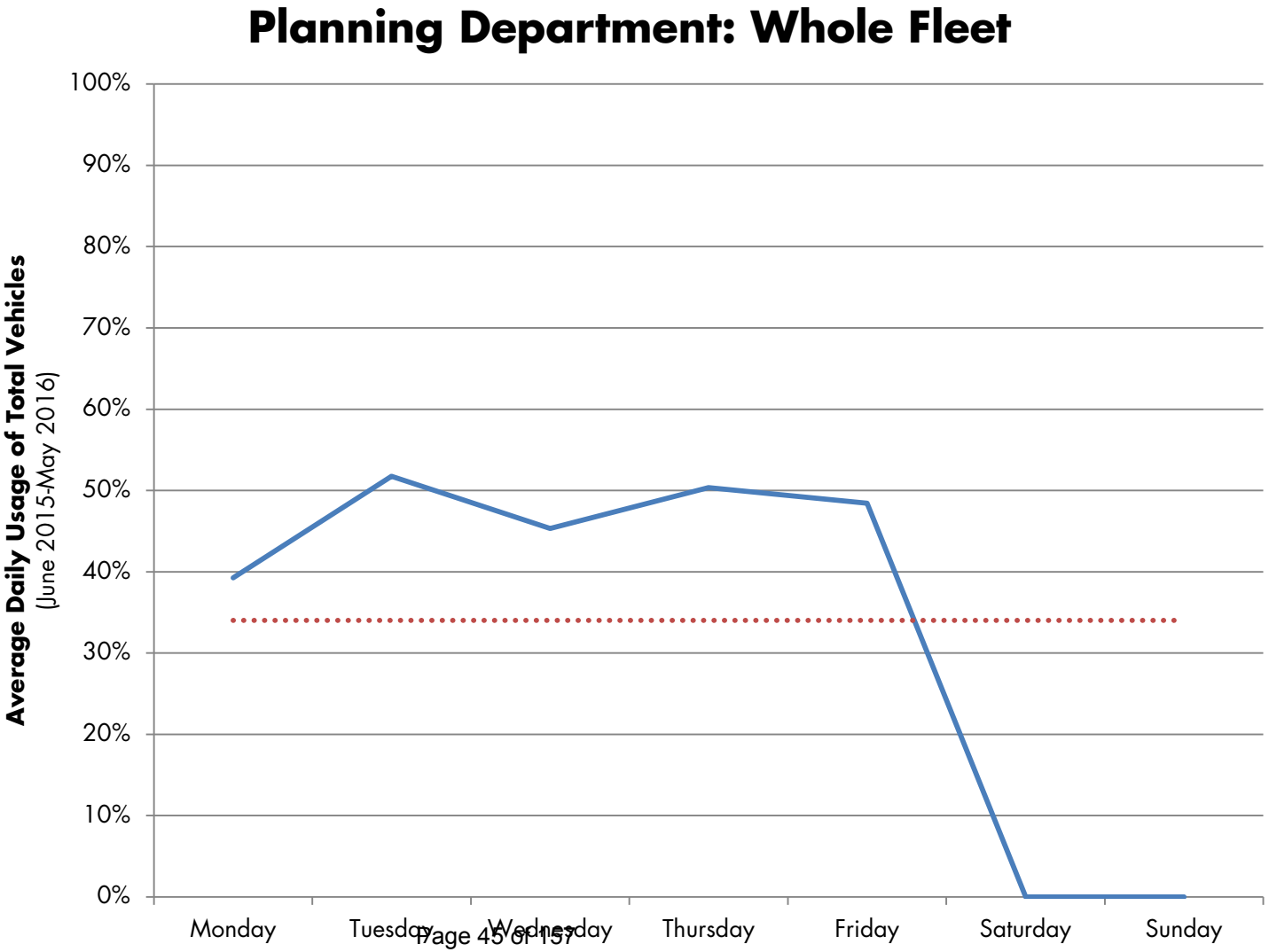


DATA OVERVIEW BY DEPARTMENT

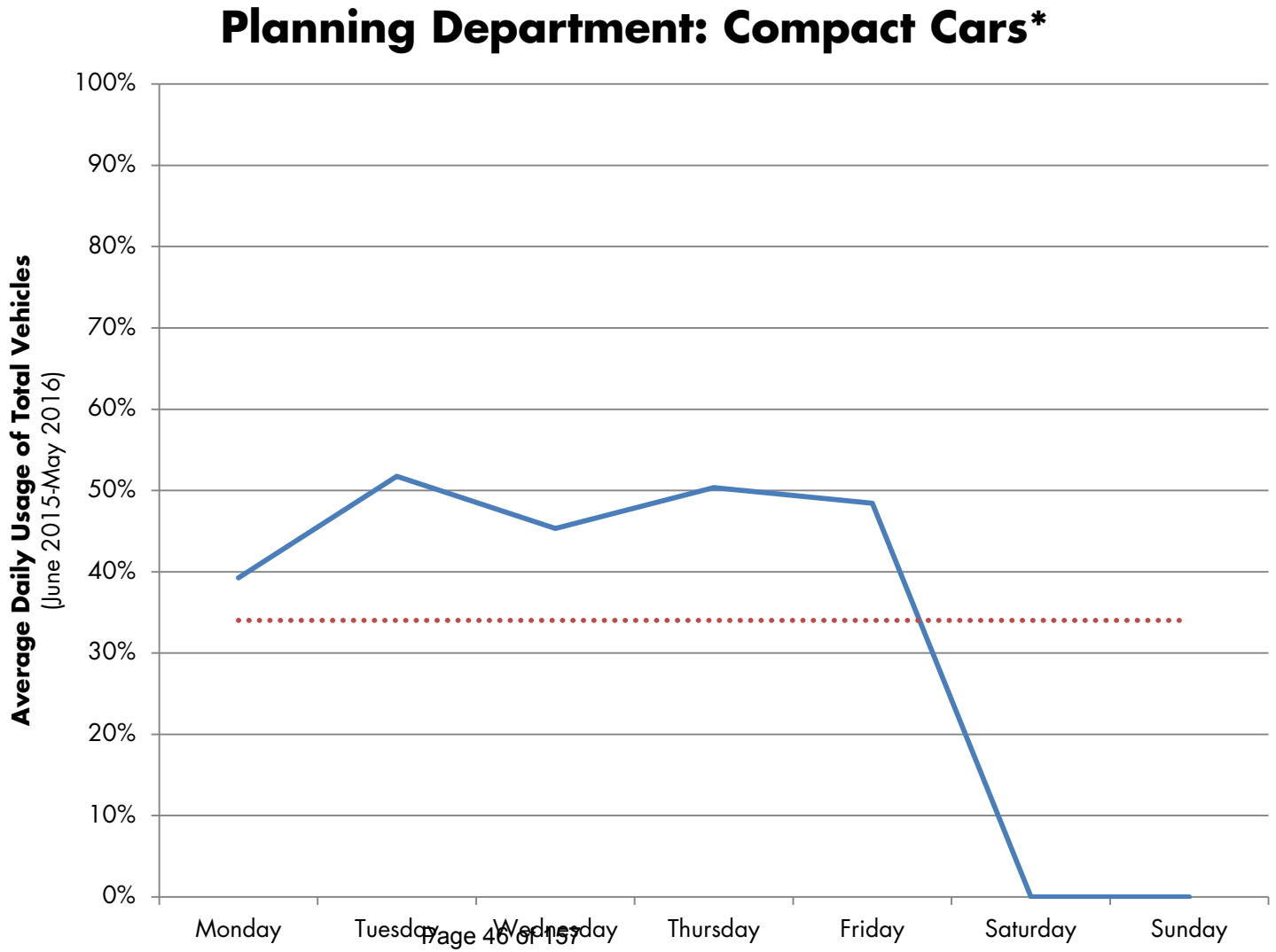
Planning Department
6/30/15 – 5/30/2016

- Range of miles travelled: 594 – 1,774 miles
- Range of fuel efficiency: 2.5 – 7.1 MPG
- Total emissions from department: 1.25 MT CO2e
- Equivalent to: 32 tree seedlings grown for 10 years
- Average idling duration: 31%
- Average daily usage of department fleet: 34%

AVERAGE DAILY USAGE OF FLEET



AVERAGE DAILY USAGE OF FLEET



*all vehicles in the Planning Department fleet are compact cars.

DATA OVERVIEW BY DEPARTMENT

Property Management
6/30/15 – 5/30/2016

- High range of miles travelled: 3,351 – 8,438 miles
- Low range of miles travelled: 37 – 709 miles

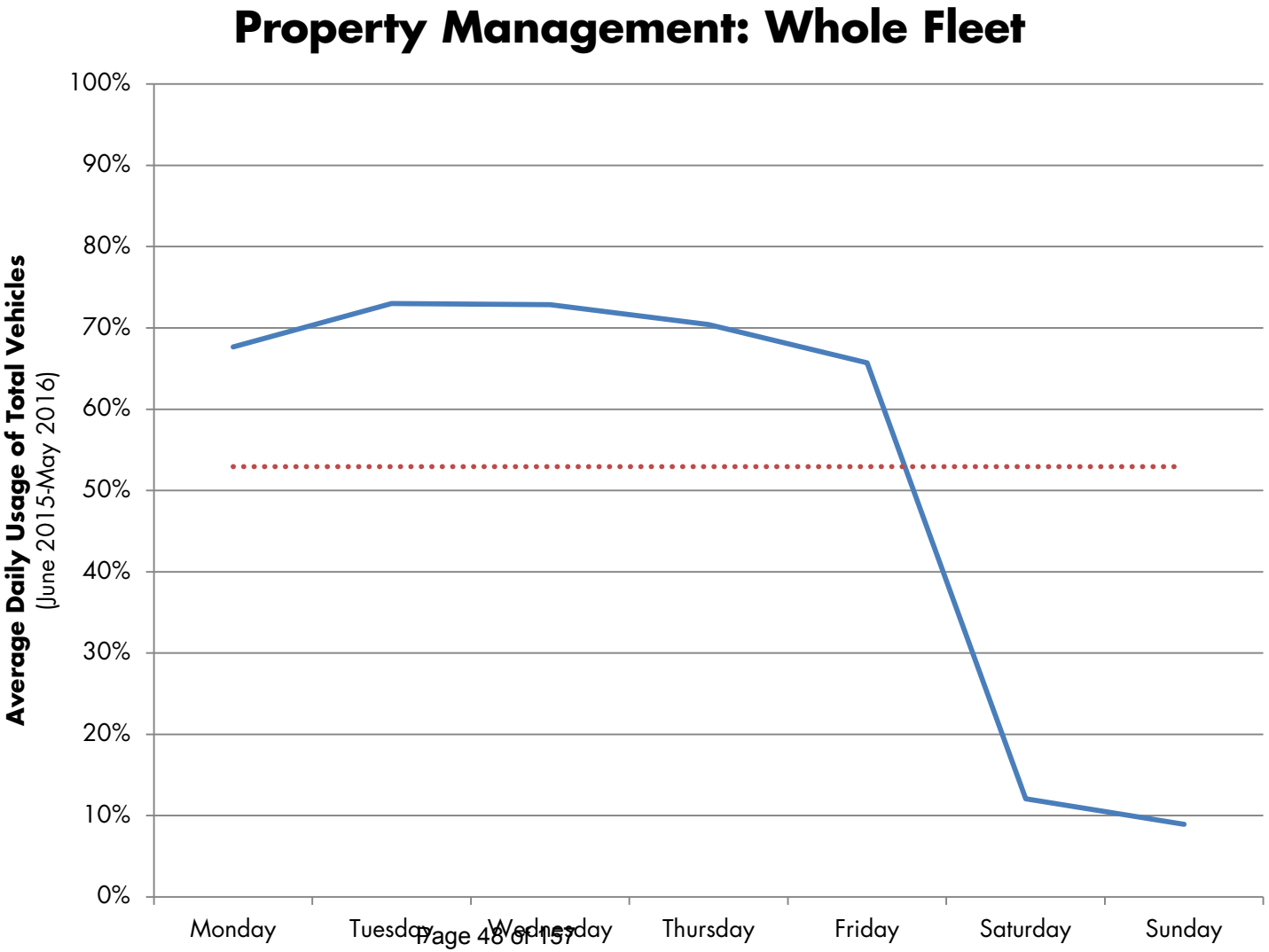
- High range of fuel efficiency: 11.0 – 22.4 MPG
- Low range of fuel efficiency: 2.7 – 5.5 MPG

- Total emissions from department: *38.64 MT CO2e
- Equivalent to: 1,001 tree seedlings grown for 10 years

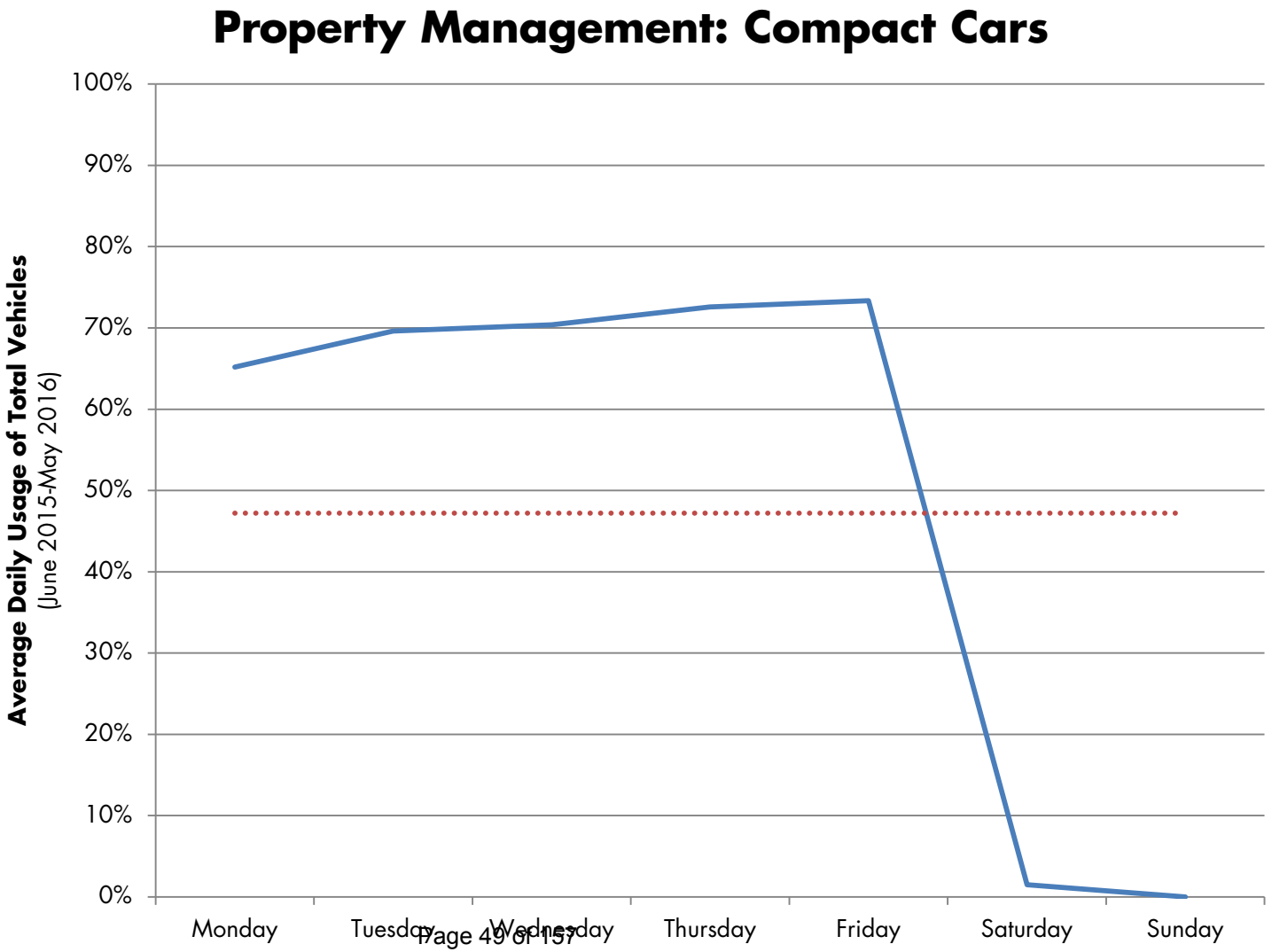
- Average idling duration: 42%

- Average daily usage of department fleet: 44%

AVERAGE DAILY USAGE OF FLEET



AVERAGE DAILY USAGE OF FLEET



DATA OVERVIEW BY DEPARTMENT

Public Works
6/30/15 – 5/30/2016

- High range of miles travelled: 4,063 – 13,861 miles
- Low range of miles travelled: 31 – 3,535 miles

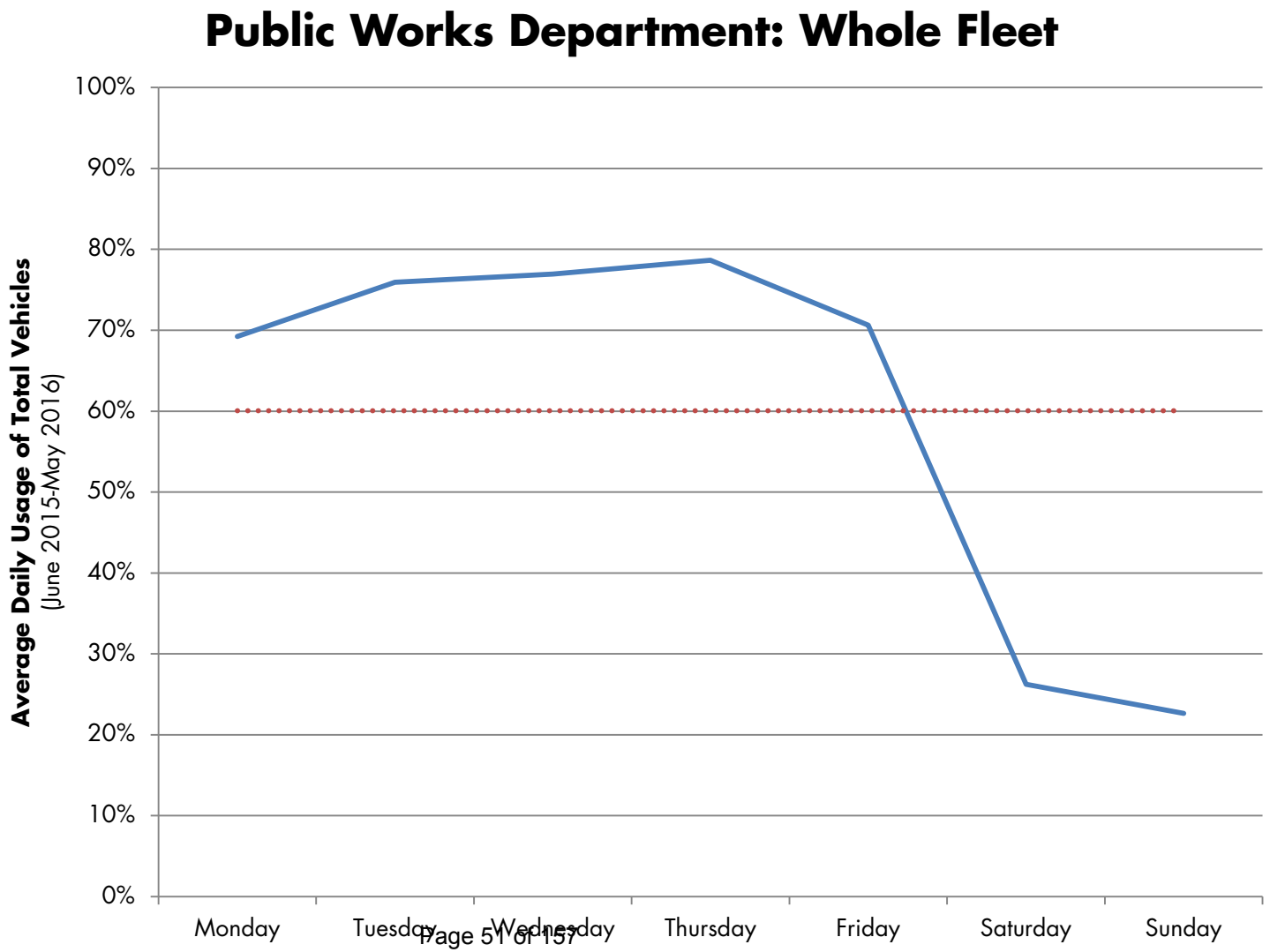
- High range of fuel efficiency: 23.5 – 12.3 MPG
- Low range of fuel efficiency: 2.0 – 5.0 MPG

- Total emissions from department: 202.95 MT CO2e*
- Equivalent to: 5,260 tree seedlings grown for 10 years

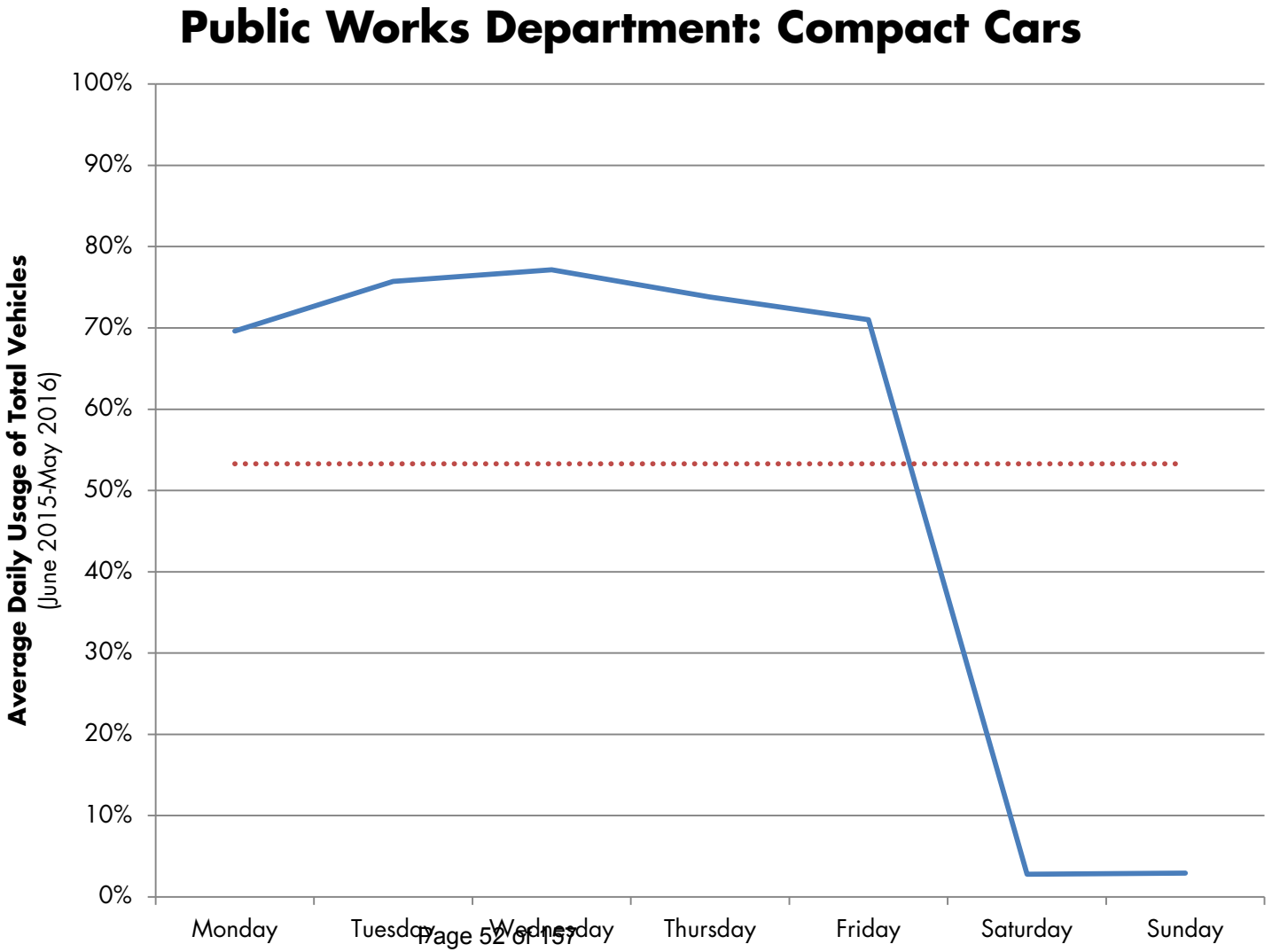
- Average idling duration: 53%

- Average daily usage of department fleet: 60%

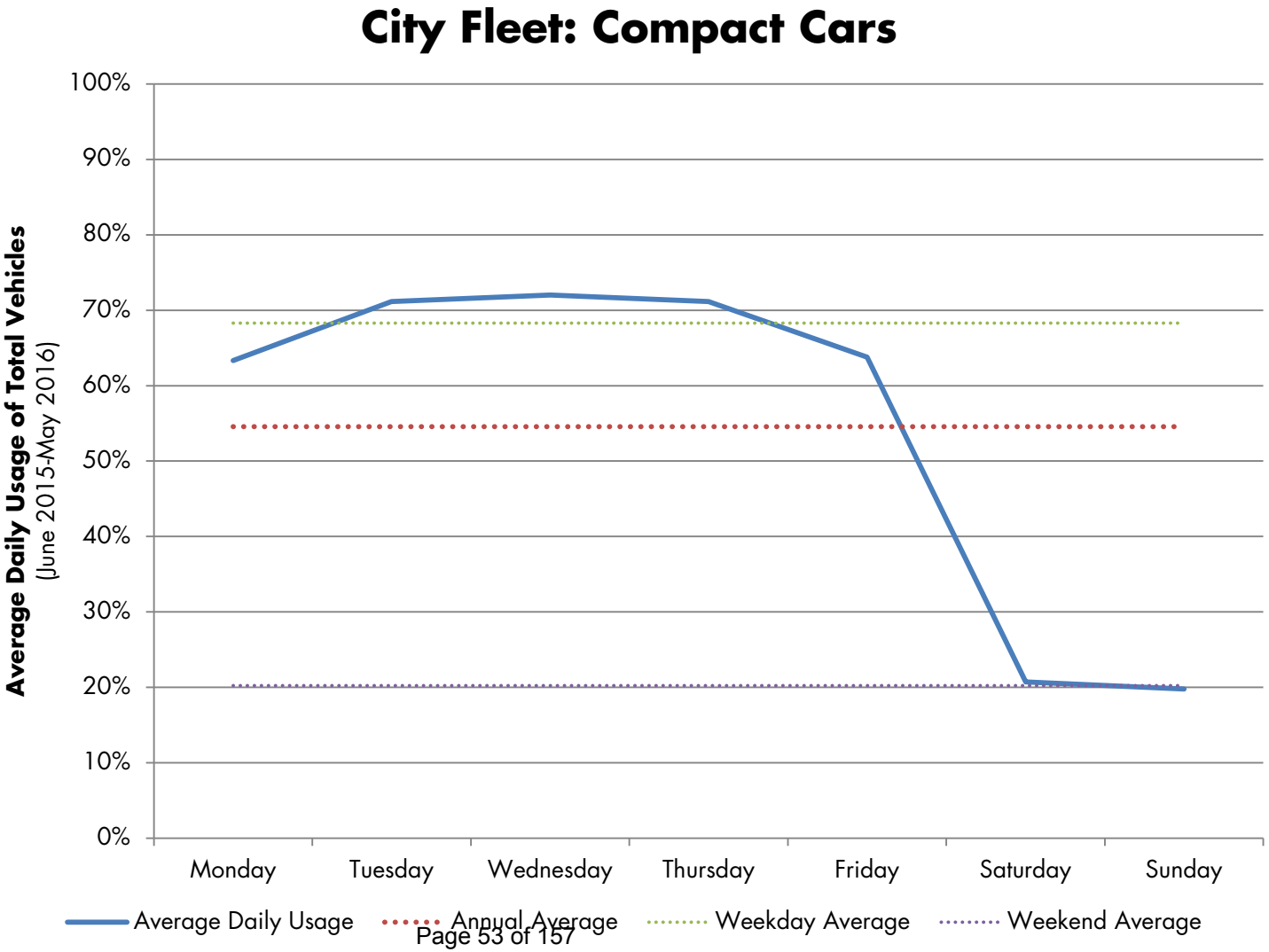
AVERAGE DAILY USAGE OF FLEET



AVERAGE DAILY USAGE OF FLEET



AVERAGE DAILY USAGE OF FLEET



ALTERNATIVES

- Possible alternatives that have been discussed with each department:
  - Uber/Lyft business account
  - Vehicle pool
  - Car share program
  - Bicycle program
  - Electric vehicles
  - Hybrids
  - Neighborhood/Ultra-compact electric vehicles

CONSIDERATIONS

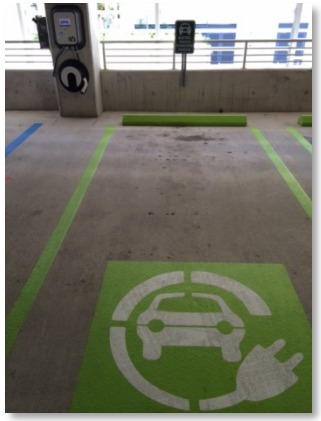
- Storm preparation and recovery:
  - Each department must outline their hurricane preparation procedures, including vehicles to be used
  - The types and amount of vehicles used for storm recovery depends on the extent and type of impact

- Flooding & construction:
  - Certain types of vehicles are not suitable to drive through flooded streets or constructions sites

- Evolving technology:
  - Technology will increase number and types of vehicles with alternative fuel available on the market over time
  - Many technological advances worldwide; some foreign vehicles have no domestic equivalent

CONSIDERATIONS

- Charging network:
  - Before purchasing an EV, must determine where/when they will be charged
    - EVs need about 4-6 hours to completely charge a deplete battery in Level 2 charging stations
  - There is **a charge** of $0.39/kWh (for Blink members) and $0.49/kWh (for non-members) when charging EVs **using the Blink (level 2) stations**
  - Currently 4 garages are equipped with 2 Blink (level 2) charging stations each and there a 3 upcoming installations for **public use**:
    - 12th Street Parking Garage
    - 13th Street Parking Garage
    - City Hall Parking Garage
    - 42nd Street Parking Garage



Parking sport reserved for EV charging in City Hall Garage.

Blink charging station in City Hall Parking Garage.

CONSIDERATIONS

- Car pool program:
  - Many vehicles hold special equipment
  - Although some vehicles are not always used, they are on standby for "emergency" calls
  - Vehicles that need repairs and/or maintenance are out of order for some time, limiting a department's fleet
  - Need a central location to store vehicles
  - Some departments are already sharing vehicles

- Uber/Lyft business account:
  - Ability to restrict access to certain staff and locations
  - Potentially reduce number of vehicles in fleet
  - Cost vs. benefits

- Bicycle program:
  - Only feasible for certain operations
  - Weather-dependent

HIGHLIGHTS

- In FY 17/18, the **Parking Department** purchased the **first EV** in the City's fleet

- **Bicycle pilot program** with **Building Department**.

- **Several departments** have already **transferred one or more** lower usage/surplus **vehicles** from their **fleet to another department** in need.

Building Department employee, Michael Schad, after completing bicycle training with PD.

FINDINGS

- More than **96% of staff vehicles** (excluding Police and Fire first responder units) are compact vehicles with **"Above Average" Green Score** according to the ACEEE GreenerCars Rating:
  - Including 21 hybrid vehicles
  - Compact vehicles are mainly Ford Focus

- High fleet **usage periods** during the week **differ between departments.**

- **Savings and reduction in emissions** from driving a hybrid compared to current compact car **increases the more a hybrid is driven.**

VEHICLE REPLACEMENT PROCESS

- Criteria:
  - Review the replacement cycle for the vehicle class
  - History of costs for maintenance and repair
  - Vehicle condition
  - Validation of the operational needs and vehicle specifications with the user department

- Fleet Management works with client department using replacement criteria and funding availability. Must prioritize which vehicles are going to be replaced.

- Vehicle and equipment quotes are received, reviewed, and approved by client department and Fleet Management.

- Vehicles are purchased.

RIDESHARING COST COMPARISON

# of Rides	Total Distance Travelled (miles)	Ridesharing App	City Vehicle
2	5	$13.90	$2.45
3		$20.32	$2.45
4		$26.34	$2.45
2	10	$20.07	$4.90
3		$25.82	$4.90
4		$28.53	$4.90
2	15	$26.80	$7.35
3		$31.42	$7.35
4		$38.05	$7.35
2	~20	$29.64	$23.02

Uncaptured benefits of ridesharing:

-- time savings

-- ability to work during the ride: answer emails, take calls…

-- reduced stress

The table shows an estimate of the cost of using a ridesharing app (Uber/Lyft) compared to driving a city compact car to travel a certain distance over varying number of trips.

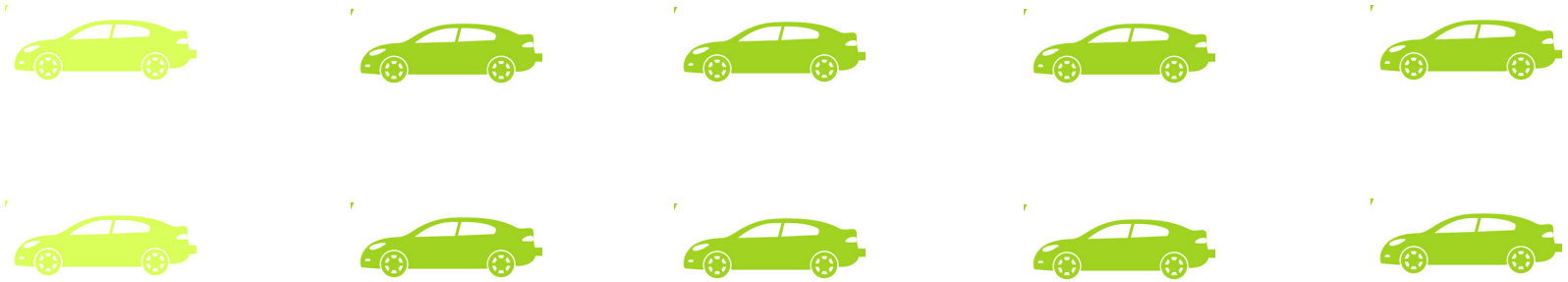
VEHICLE COSTS COMPARISON

VEHICLE MODEL	APPROXIMATE PRICE City Contract Pricing	FUEL EFFICIENCY EPA Rating
Ford Focus (compact)	$19,740	28 MPG
Ford C-Max Hybrid (compact)	$24,334	40 MPG
Ford Fusion Hybrid (midsize)	$25,999	42 MPG
Ford Focus Electric (compact)	$28,324	107 MPGe

POSSIBLE VEHICLE REPLACEMENT SCENARIO

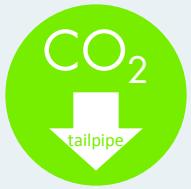
- As departments replace their Ford Focus vehicles, it is recommended that they consider hybrids and/or EVs as possible replacements. Funding allocation for fleet will be essential for this transition.

- The following slides present an example of a transition of a 20 % replacement of their Ford Focus vehicles to hybrids or EVs and the potential reduction in GHG emissions.

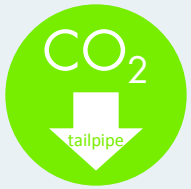


BUILDING DEPARTMENT

Current Fleet	Potential Fleet **Hybrids Replace 20%**	Potential Fleet **EVs Replace 20%**
28 vehicles		
1 Hybrid Ford C-Max Hybrid	6 Hybrids Ford C-Max Hybrid	5 EVs Ford Focus Electric
27 Compact Cars Ford Focus	22 Compact Cars Ford Focus	1 Hybrid Ford C-Max Hybrid
		22 Compact Cars Ford Focus

	2.94 MT CO2e	11.29 MT CO2e
	3.5 acres of U.S. forests in one year	12,352 lbs of coal

CIP DEPARTMENT

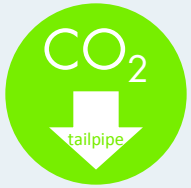
Current Fleet	Potential Fleet **Hybrids Replace 20%**	Potential Fleet **EVs Replace 20%**
10 vehicles		
10 Compact Cars Ford Focus	2 Hybrids Ford Fusion Hybrid	2 EVs Ford Focus Electric
	8 Compact Cars Ford Focus	8 Compact Cars Ford Focus
	0.45 MT CO2e	1.73 MT CO2e
	0.53 acres of U.S. forests in one year	1,893 lbs of coal

CODE COMPLIANCE DEPARTMENT

Current Fleet	Potential Fleet **Hybrids Replace 20%**	Potential Fleet **EVs Replace 20%**
43 vehicles		
2 Hybrids Ford Fusion Hybrid	6 Hybrids Ford Fusion Hybrid	4 EVs Ford Focus Electric
		2 Hybrids Ford Fusion Hybrid
19 Compact Cars Ford Focus	15 Compact Cars Ford Focus	15 Compact Cars Ford Focus
+SUVs, trucks, ATVs	+SUVs, trucks, ATVs	+SUVs, trucks, ATVs
CO_2 tailpipe	0.45 MT CO2e	1.73 MT CO2e
=	0.53 acres of U.S. forests in one year	1,893 lbs of coal

FIRE DEPARTMENT

Current Fleet	Potential Fleet	Potential Fleet
79 vehicles	**Hybrids Replace 20%**	**EVs Replace 20%**
2 Hybrids Ford Fusion Hybrid	6 Hybrids Ford Fusion Hybrid	4 EVs Ford Focus Electric
20 Compact Cars Ford Focus	16 Compact Cars Ford Focus	2 Hybrids Ford Fusion Hybrid
+SUVs, trucks, boat…	+SUVs, trucks, boat…	16 Compact Cars Ford Focus
		+SUVs, trucks, boat…

	3.56 MT CO2e	13.5 MT CO2e
	4.2 acres of U.S. forests in one year	14,770 lbs of coal

IT DEPARTMENT

Current Fleet
11 vehicles

2 Compact Cars
Ford Focus

+SUV, vans

Potential Fleet
Hybrids Replace 50%

1 Hybrids
Ford C-Max Hybrid

1 Compact Cars
Ford Focus

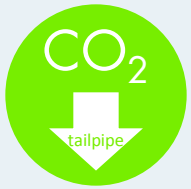
+SUV, vans

Potential Fleet
EVs Replace 50%

1 EV
Ford Focus Electric

1 Compact Cars
Ford Focus

+SUV, vans

	0.09 MT CO2e	0.34 MT CO2e
	0.11 acres of U.S. forests in one year	372 lbs of coal

PARKS AND RECREATION DEPARTMENT

Current Fleet	Potential Fleet **Hybrids Replace 20%**	Potential Fleet **EVs Replace 20%**
93 vehicles		
1 Hybrid Ford C-Max Hybrid	2 Hybrids Ford C-Max Hybrid	1 EV Ford Focus Electric
5 Compact Cars Ford Focus	4 Compact Cars Ford Focus	1 Hybrid Ford C-Max Hybrid
		4 Compact Cars Ford Focus
+trucks, busses, vans…	+trucks, busses, vans…	+trucks, busses, vans…

CO_2 tailpipe	0.31 MT CO2e	1.18 MT CO2e
=	0.37 acres of U.S. forests in one year	1,291 lbs of coal

PLANNING DEPARTMENT

Current Fleet
4 vehicles

4 Compact Cars
Ford Focus

Potential Fleet
Hybrids Replace 25%

1 Hybrid
Ford C-Max Hybrid

3 Compact Cars
Ford Focus

Potential Fleet
EVs Replace 25%

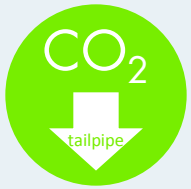
1 EV
Ford Focus Electric

3 Compact Cars
Ford Focus

CO_2 tailpipe	0.14 MT CO2e	0.52 MT CO2e
=	0.17 acres of U.S. forests in one year	569 lbs of coal

PROPERTY MANAGEMENT DEPARTMENT

Current Fleet	Potential Fleet	Potential Fleet
47 vehicles	**Hybrids Replace 33%**	**EVs Replace 33%**
2 Hybrids Ford C-Max Hybrid	3 Hybrids Ford C-Max Hybrid	1 EV Ford Focus Electric
3 Compact Cars Ford Focus	2 Compact Cars Ford Focus	2 Hybrids Ford C-Max Hybrid
+trucks, vans, SUV…	+trucks, vans, SUV…	2 Compact Cars Ford Focus
		+trucks, vans, SUV…

	0.14 MT CO2e	0.59 MT CO2e
	0.17 acres of U.S. forests in one year	646 lbs of coal

PUBLIC WORKS DEPARTMENT

Current Fleet
237 vehicles

15 Compact Cars
Ford Focus

+trucks, SUVs…

Potential Fleet
Hybrids Replace 20%

3 Hybrids
Ford C-Max Hybrid

12 Compact Cars
Ford Focus

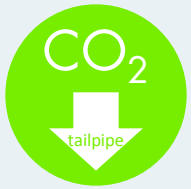
+trucks, SUVs…

Potential Fleet
EVs Replace 20%

3 EVs
Ford Focus Electric

12 Compact Cars
Ford Focus

+trucks, SUVs…

	1.44 MT CO2e	5.64 MT CO2e
	1.7 acres of U.S. forests in one year	6,171 lbs of coal

PARKING DEPARTMENT

Current Fleet	Potential Fleet **Hybrids Replace 20%**	Potential Fleet **EVs Replace 20%**
87 vehicles		
1 EV Ford Focus Electric	1 EV Ford Focus Electric	4 EVs Ford Focus Electric
1 Hybrid Ford C-Max Hybrid	4 Hybrids Ford C-Max Hybrid	1 Hybrid Ford C-Max Hybrid
14 Compact Cars Ford Focus	11 Compact Cars Ford Focus	11 Compact Cars Ford Focus
+SUVs, trucks, vans…	+SUVs, trucks, vans…	+SUVs, trucks, vans…

CO_2 tailpipe	1.72 MT CO2e	8.00 MT CO2e
=	2 acres of U.S. forests in one year	8,753 lbs of coal

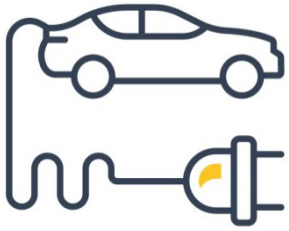
VEHICLE UTILIZATION STUDY

The City has commissioned a comprehensive vehicle utilization and rightsizing study by the Matrix Consulting Group. The goal of this study is to identify the optimal size of our fleet.

INCENTIVES FOR EMPLOYEES

- Many employees are interested in commuting to work through more environmentally conscious means.

- More efficient modes of transportation include:
  - Biking
  - Carpooling
  - Public Transit
  - Hybrid vehicles
  - EVs



RECOMMENDATIONS

- During the vehicle replacement process for Ford Focus vehicles, it is recommended that hybrid vehicles and EVs are considered as options, when suitable and when funding is available.

- It is recommended that a fleet-wide analysis be performed every 5 years to determine if any new opportunities are present to utilize current vehicles more efficiently. This analysis should consider the number and types of vehicles that are projected to be replaced.

- Further analysis is needed to identify a suitable scenario for transition to low-/no-emissions vehicles and policy direction. This analysis would require examination of: financial strategy/platform used to replace vehicles, funding availability, and lifecycle of current compact vehicles and their projected replacement timeline.

RECOMMENDATIONS

It is recommended that departments are provided the option of opening a Uber/Lyft business account.

It is recommended that employees are trained to participate in a bicycle program

It is recommended that the City implement an incentive program for employees that commute to work using more environmentally conscious modes of transportation.

GLOSSARY

Automatic Vehicle Location (AVL): a system that transmits vehicles' location and can gather additional data about the vehicles.

Electric Vehicle (EV): a type of vehicle that use electricity stored in a battery pack as power instead of gasoline or diesel. EVs do not emit any tailpipe emissions.

Greenhouse Gas (GHG): gases that trap heat in the atmosphere.

Hybrid: a type of vehicle that is powered by both an internal combustion engine and one or more electric motors that use electricity stored in a battery pack.

Internal Combustion Engine (ICE) vehicle: a type of vehicle powered by the burning of a fossil fuel in the engine which converts the chemical energy into mechanical energy.

MIAMIBEACH

COMMITTEE MEMORANDUM

TO: Sustainability and Resiliency Committee

FROM: Jimmy L. Morales, City Manager

DATE: September 26, 2018

SUBJECT: **A DISCUSSION TO REVIEW THE NEIGHBORHOOD IMPROVEMENT PROJECT SEQUENCING.**

RESPONSIBLE DEPARTMENT:
PUBLIC WORKS

LEGISLATIVE TRACKING:
Item C4L - June 06, 2018 Commission Meeting

SPONSORED:
Commissioner Mark Samuelian

BACKGROUND:
During the May 16, 2018 Commission Meeting discussion on item R7O, the Commission asked the Administration to take steps to bring forward the next planned Neighborhood Resiliency Project as per the Master Plan.

Analysis
In 2016 the City of Miami Beach partnered with the City of Miami and Miami Dade County to join the 100 Resilient Cities Network, pioneered by the Rockefeller Foundation. This unique three party municipal partnership is in the process of developing an overall Resilience Strategy for the region, Greater Miami & the Beaches (resilient305.com).

Through 100 RC funding and support in 2018, the City sought the Urban Land Institute's expertise and accepted the group's recommendations as it relates to long-term integrated sea-level rise mitigation and stormwater management.

On July 27, 2018, the City issued a Request for Qualifications (RFQ) 2018-312-KB, for a Master Design Consultant for Integrated Water Management to firms with successful experience in developing sea level rise and stormwater mitigation strategies.

Through this RFQ, the City seeks to develop a matrix to determine what areas of the city need to be improved and the sequence that should be followed. Additionally, the City seeks to select a firm to:
1) Provide subject matter expertise to the City on multidisciplinary design approaches inclusive of civil engineering, landscape architecture, urban planning, water quality, drinking water distribution systems, and wastewater collection and conveyance systems;
2) Take the existing engineering and modeling work completed to date by AECOM and City staff, and integrate urban planning, aesthetics, placemaking and other sustainability and quality of life elements so

as to develop a dynamic long-term multi-disciplinary and integrated sea-level rise mitigation and stormwater management plan;
3) Act in the capacity of Design Criteria Package (DCP) Professional for future design-build solicitations; and
4) Act in the capacity of Owner's Representative on various projects as deemed appropriate by the City.

The integrated master plan seeks to build upon the engineering work completed to date and evolve into a more multi-disciplinary and integrated plan that optimizes co-benefits and includes urban planning, aesthetics, placemaking and other sustainability and quality of life elements important to the residents of Miami Beach.

The audience for the master plan would not only be technical engineering City staff, but also elected officials, residents, business owners and other city departments. It would not only lay out the plan moving forward, but also to reasons and rationale for each recommended project.

It will take a few months to award a contract for the aforementioned service and one of the deliverables will be to determine the neighborhood improvement project sequencing.

CONCLUSION:
The following is provided to the members of the Sustainability and Resiliency Committee for discussion and further direction.

ATTACHMENTS:

Description	Type
No Attachments Available	

MIAMIBEACH

COMMITTEE MEMORANDUM

TO: Sustainability and Resiliency Committee

FROM: Jimmy L. Morales, City Manager

DATE: September 26, 2018

SUBJECT: **DISCUSSION REGARDING CITY OF MIAMI BEACH STREET RAISING RESILIENCY POLICY**

RESPONSIBLE DEPARTMENT:
Public Works

LEGISLATIVE TRACKING:
Item R9L - June 06, 2018 Commission Meeting

SPONSORED:
Commissioner Mark Samuelian

BACKGROUND:
Commission and Committee discussions have taken place with regards to the policy of the minimum crown of roads being 3.7 NAVD, including that of the July 11, 2018 Sustainability and Resiliency Committee, that inquired about additional policy and potential road raising alternatives.

Analysis
The City's Stormwater Management Master Plan (SWMMP) was adopted, Resolution No. 2012-28068, on November 14, 2012.

The SWMMP was intended to be a guide for improving the City's stormwater management system performance for the next 20 years, while taking into consideration potential sea level rise over the next 20-years and the impacts sea level rise would have on the City's stormwater infrastructure.

Since its adoption in 2012, the SWMMP has been amended to better suit the recent projections of sea level rise. In 2016, the City passed Resolution No. 2016-29454 to incorporate AECOM's recommendations to define "Future Grade" and "Future Crown of the road," and set a minimum future crown of road at an elevation of 3.7 feet NAVD.

In 2016 the City of Miami Beach partnered with the City of Miami and Miami Dade County to join the 100 Resilient Cities Network, pioneered by the Rockefeller Foundation. This unique three party governmental partnership is in the process of developing an overall Resilience Strategy for the region, Greater Miami & the Beaches (resilient305.com).

Through 100 RC funding and support in 2018, the City sought the Urban Land Institute's expertise and accepted the group's recommendations as it relates to long-term integrated sea-level rise mitigation and stormwater management.

On July 27, 2018, the Procurement Department issued a Request for Qualifications (RFQ) 2018-312-KB, for a Master Design Consultant for Integrated Water Management to firms with successful experience in developing sea level rise and stormwater mitigation strategies.

Through this RFQ, the City seeks to include a review of the City's current road elevation raising policy and recommend any changes deemed appropriate. Additionally, the City seeks to select a firm to:

1) Provide subject matter expertise to the City on multidisciplinary design approaches inclusive of civil engineering, landscape architecture, urban planning, water quality, drinking water distribution systems, and wastewater collection and conveyance systems;

2) Take the existing engineering and modeling work completed to date by AECOM and City staff, and integrate urban planning, aesthetics, placemaking and other sustainability and quality of life elements so as to develop a dynamic long-term multi-disciplinary and integrated sea-level rise mitigation and stormwater management plan;

3) Act in the capacity of Design Criteria Package (DCP) Professional for future design-build solicitations; and

4) Act in the capacity of Owner's Representative on various projects as deemed appropriate by the City.

The integrated master plan seeks to build upon the engineering work completed to date and evolve into a more multi-disciplinary and integrated plan that optimizes co-benefits and includes urban planning, aesthetics, placemaking and other sustainability and quality of life elements important to the residents of Miami Beach.

The audience for the master plan would not only be technical engineering City staff, but also elected officials, residents, business owners and other city departments. It would not only lay out the plan moving forward, but also to reasons and rationale for each recommended project.

It will take a few months to award a contract for the aforementioned service and one of the deliverables will be to determine the potential road raising alternatives.

CONCLUSION:

The following is provided to the members of the Sustainability and Resiliency Committee for discussion and further direction.

ATTACHMENTS:

Description	Type
No Attachments Available	

MIAMIBEACH

COMMITTEE MEMORANDUM

TO: Sustainability Resiliency Committee Meeting

FROM: Jimmy L. Morales, City Manager

DATE: September 26, 2018

SUBJECT: **DISCUSSION REFERRING A TASK TO THE CITY MANAGER'S READY TEAM: IN ORDER TO BOTH OPTIMIZE PUBLIC ENGAGEMENT AND FACILITATE TIMELY COMPLETION OF PROJECTS**

RESPONSIBLE DEPARTMENT:
Amy Knowles, Deputy Chief Resiliency Officer

LEGISLATIVE TRACKING:
Item C4V - July 25, 2017 Commission Meeting

SPONSORED:
Commissioner John Elizabeth Aleman

BACKGROUND:
VERBAL DISCUSSION AT COMMITTEE MEETING.

Analysis

ATTACHMENTS:

Description	Type
No Attachments Available	

MIAMIBEACH

COMMITTEE MEMORANDUM

TO: Sustainability Resiliency Committee Meeting

FROM: Jimmy L. Morales, City Manager

DATE: September 26, 2018

SUBJECT: **DISCUSSION ON CONSIDERING A NEIGHBORHOOD BIRD SANCTUARY PROJECT**

RESPONSIBLE DEPARTMENT:
Elizabeth Wheaton, Environment and Sustainability Director

LEGISLATIVE TRACKING:
Item C4G - July 25, 2018 Commission Meeting

SPONSORED:
Commissioner John Elizabeth Aleman

BACKGROUND:
At the City Commission meeting on July 25, 2018, the Mayor and City Commission referred a discussion to the Sustainability and Resiliency Committee (SRC) on considering a neighborhood bird sanctuary project. The item was sponsored by Commissioner John Elizabeth Aleman.

The City of Miami Beach was declared a Bird Sanctuary in 1959 (Ordinance 1331) and has worked with local organizations to support bird conservation. As part of the city's efforts to support bird protection, the city awarded the Pelican Harbor Seabird Station with its environmental grant, which assisted with the treatment of 1,484 native seabird and wildlife patients in 2017 and 740 patients in 2018. In addition, the city supported two operation rescue trainings with attendance of sixty participants. Through this partnership, the Pelican Harbor Seabird Station has provided environmental outreach to the community and city employees.

Analysis
According to the Florida Fish and Wildlife Conservation Commission (FWC), bird conservation has advanced over the past several decades within several organizations and initiatives supporting bird protection efforts. FWC hosts the Florida Bird Conservation Initiative (FBCI) which promotes the conservation and restoration of native Florida birds and their habitats through coordinated efforts amongst several organizations (Florida Department of Environmental Protection, National Park Service, Florida Fish & Wildlife Conservation Commission, South Florida Water District Management, The Nature Conservancy, University of Florida, Audubon of Florida, amongst others). FBCI tackles critical needs related to conservation planning, implementation of conservation programs, research and monitoring, education and outreach, and public policy.

The U.S. Fish and Wildlife Service has an Urban Bird Treaty (UBT) program for cities in urban and suburban areas with the goal to promote the conservation of migratory birds through habitat conservation, hazard reductions, citizen science, and outreach and education. The program is currently

undergoing an evaluation to address modifications to the designation process to improve the program. Once the process is finalized, staff will follow up with FWC to understand the process to become a designated UBT city.

Cities can also get designated as a Bird City U.S.A. with the International Sustainability Council (ISC) Audubon. In order to become a Bird City U.S.A., a city would need to submit an application (Attachment A) and pursue the following requirements:

- Create a Natural Resource Advisory Group, consisting of no less than six regular members, with a designated chairperson responsible for coordinating the Bird City U.S.A. efforts and actions. The Advisory group would meet at least once a year and would be responsible for outreach opportunities to educate the public about bird conservation and their habitat.

- Recognize International Migratory Bird Day by:

    a) Creating a declaration stating the importance of the International Migratory Bird Day, as well as the importance of bird conservation and wildlife habitat protection. The declaration should be located in visible public location (examples of locations include City Hall and libraries);

    b) Host an annual event for the recognition of the International Migratory Bird Day.

- Select a municipally managed location for the implementation of the Bird & Wildlife Sanctuary Program and use the Bird & Wildlife Sanctuary Program as a guide for sustainable landscaping practices, including the incorporation of plants, shrubs, and trees that will assist with maintenance costs reduction, while protecting the environment.

In addition, the City would need to enroll for a Platinum Membership with ISC Audubon to become a Bird City U.S.A. The membership fees include a one-time registration fee of $250 and a $100 annual fee.

With the goal of developing a Bird Sanctuary Program for Miami Beach, the Lacko Illustration Organization recently applied for the Miami Foundation-Public Space Challenge and the ArtCenter South Florida grants for about $10K to develop the project “Miami Beach Bird Sanctuary” (Attachment B). The goal of the project is to develop a series of safe havens for birds to nest and rest and for migratory species to use as a temporary home. The project selected twelve parks located in different neighborhoods within the city to establish these areas as bird sanctuaries. Each location would have one or more birdhouses (different layouts of birdhouses are presented within the proposal) and a wooden placard with educational outreach for visitors and residents. The placard would include information on each bird sanctuary location, bird species in the area, location of the birdhouses within the park, the importance of bird conservation and protection, bird watcher’s photo gallery, amongst other information (Attachment B). Combining art in public space with an environment component could potentially attract the visitors and residents to the parks and increase their connectivity to the city’s natural ecosystems.

Although it is important for the city to incorporate a Bird Sanctuary program, as well as educate its residents and visitors about bird conservation and wildlife habitat protection, there are some considerations that should be taken, depending on which program the city decides to pursue:

1) Aesthetics, cleanliness and associated health impacts: Having birdhouses at a park would attract birds and potentially increase the amount of bird excrement, which could affect the cleanliness maintenance of the park (ex. playgrounds, benches, etc). Cleanliness is fundamental not only for the aesthetics of the parks, but also for potential health risks associated with diseases from organisms that can grow in the nutrient-rich accumulations of bird excrement. A maintenance service plan to clean the surrounding areas of the birdhouses would need to be defined in order to try to

maintain park cleanliness;

2) Location and active areas within the parks: The placement of birdhouses would not be recommended in parks with high usage or within the proximity of hard surfaces (ex. areas with playgrounds, tennis or basketball courts, etc) since it would present an issue for cleanliness maintenance of these areas. In addition, the locations for bird sanctuaries should be considered to not pose limitations on its current and or future use or potential development;

3) Tree damage: Installing the birdhouses in trees could potentially damage trees (depending on the trees species and installation method) and therefore this would need to be reviewed and approved by the Urban Forestry Division. In addition, there should be considerations regarding trees hosting the birdhouses that may go into decline and/or may need to be removed. The tree removal could pose a problem depending on the bird species nesting in the bird house.

CONCLUSION:

The following is presented to the members of the Sustainability and Resiliency Committee for discussion and further direction.

ATTACHMENTS:

Description	Type
Attachment A: Bird USA Fact Sheet	Other
Attachment B: Miami Beach Bird Sanctuary Proposal by Lacko	Other

ISC AUDUBON

35246 US Hwy 19 #299
Palm Harbor, FL 34684
(727) 733-0762
www.isc-audubon.org

Why should your municipality get involved and become a Bird City U.S.A?

Birds and Wildlife

First and foremost, it's simply the right thing to do. In addition to the ongoing threat of loss of habitat, staggering numbers of birds are directly killed due to a number of other human-related causes, and they need our help.

The Economy

Protecting and helping birds is not only the right thing to do, it is also good for the economy. Birds are invaluable as controllers of insect pests, as pollinators of crops, and dispersers of native plant seeds, and they also generate tremendous economic revenues through the pastimes of bird feeding and bird watching.

Citizen Pride

Pride is sometimes a less tangible benefit, but gaining and retaining Bird City U.S.A. recognition is an award to the managers, volunteers, board members and others who work on behalf of better care of a community. Non-involved citizens, too, often share a sense of pride that theirs is a Bird City U.S.A.. This may translate to better care of habitat areas on private property or a willingness to volunteer in the future.

Public Image & Recognition

A community's public image is very important. Being a Bird City U.S.A. helps present the kind of image that most citizens want to have for the place they live or conduct business. The Bird City U.S.A. signs at community entrances tell visitors that here is a community that cares about its environment, birds, and community. It is also an indication to prospective businesses that the quality of life may be better here.

Community Engagement & Education

Education begins with discussion of the requirements and getting organized to apply for Bird City U.S.A. status. In turn, this can set in motion aid from a variety of professionals in the form of technical advice, literature, films, and other assistance. Presentation of the Bird City U.S.A. award offers excellent publicity opportunities. This results not only in satisfaction for the individuals involved and their families, but also provides one more way to reach large numbers of people with information about birds.

The Bird City U.S.A. program provides direction, technical assistance, public attention, and national recognition for municipalities and communities throughout the United States.

Getting designated as a Bird City U.S.A. is fun, educational and provides enormous benefits that include: environmental improvement, economic benefits, citizen pride, public relations, citizen pride, recognition & publicity, and community engagement and education.

bird CITY U.S.A.

Program Process & Requirements

Requirement #1
Creation of a Natural Resource Advisory Group
Create a Natural Resource Advisory Group, if one does not presently exist, and designate one member of this group as chairperson. The chairperson is responsible for coordinating Bird City U.S.A. efforts and actions.

- Creation: Create a Natural Resource Advisory Group for your municipality consisting of no less than six regular members.
- Qualifications: No less than a majority of the members of the Natural Resource Advisory Group shall be residents of the municipality.
- Duties: The group's primary role should be to facilitate and encourage educational opportunities that lead to an informed citizenry on topics such as natural resources, ecosystems, open space, and natural corridors that provide habitat for migratory birds. The group should meet at least one time per year to coordinate, facilitate, and promote International Migratory Bird Day.

Requirement #2
Recognize International Migratory Bird Day
In its simplest form, International Migratory Bird Day is a one day celebration of migratory birds: their beauty, their amazing abilities, and the benefits they provide people. What exactly is International Migratory Bird Day?

- Create a declaration for your municipality declaring the importance of International Migratory Bird Day, bird conservation or protecting wildlife habitat.
  This declaration should be clearly visible in a public location such as a town or city hall, or library.
- Host an annual event in recognition of International Migratory Bird Day
  A community event or observance should be held on International Migratory Bird Day. Such events may include: hosting or coordinating a bird watching tour, coordinating a group nesting box effort, participation in a bird count, hosting an education workshop on bird identification.

When is International Migratory Bird Day (IMBD)?
IMBD officially takes place on the second Saturday in May of each year. However, we recognize that this date doesn't work well for all bird event and bird festival organizers, or for the migratory birds themselves. To the south, migratory birds have left, heading for breeding sites to the north. Farther north, the birds haven't arrived. To correct this problem while reminding groups that "every day is bird day" and that IMBD should be celebrated year-round, most U.S. events take place on any day between the months of March and May. We recommend that the Natural Resource Advisory Board select a day that is most appropriate given the climate that the municipality is in.

Requirement #3
Complete the Requirements of the Bird & Wildlife Sanctuary Program at one public municipally managed location
By Using the Bird & Wildlife Sanctuary Program as a guide, your landscapes will not only become a haven for birds and wildlife to enjoy, but will also reduce natural resource depletion, reduce waste and pollution problems while also improving the health of the landscape in an aesthetically-pleasing and cost-effective manner. Sustainable landscaping practices incorporate beautiful plants, shrubs, and trees and reduce maintenance costs, while at the same time protect the environment. Using sustainable landscape maintenance practices also makes good business sense, and saves money.

Bird City U.S.A. Application

☐ **Requirement #1 - Creation of a Natural Resource Advisory Group**

Create a Natural Resource Advisory Group and designate one member of this group as chairperson. The chairperson is responsible for coordinating Bird City USA efforts and actions. List group members below, listing the chairperson's name first on the list.

name	email	phone

☐ **Requirement #2 - Recognize International Migratory Bird Day**

In its simplest form, International Migratory Bird Day is a one day celebration of migratory birds, their beauty, their amazing abilities, and the benefits they provide people.

☐ Create a Declaration for your municipality stating the importance of International Migratory Bird Day. This declaration should be clearly visible in a public location such as a town or city hall or library.

- Include a photograph of the declaration displayed in a public location
- Include a copy of the declaration.

☐ A community event or observance should be held on International Migratory Bird Day. Such events may include: hosting a bird watching tour, coordinating a group nesting box effort, participation in a bird count, and/or hosting an education workshop on bird identification.

☐ **Requirement #3 – Complete the Requirements of the Bird & Wildlife Sanctuary Program at One Location**

By Using the Bird & Wildlife Sanctuary Program as a guide your landscapes will not only become a haven for birds and wildlife to enjoy, but will also reduce natural resource depletion, reduce waste, and pollution problems while also improving the health of the landscape in an aesthetically-pleasing and cost-effective manner.

The Bird City U.S.A Program is free for municipalities enrolled as ISC-Audubon Platinum Members. *Platinum Membership fees include a one-time registration fee of $250 (first year membership included), and then only $100 annually. Maintaining Platinum Membership is required in order to retain The Bird City U.S.A. designation. To begin participation in the program mail, fax or email this application form with Platinum Membership (if applicable) and registration fee (check or credit card).*

Municipality Name _____

Municipality Address _____

_____

Name on Credit Card _____

Credit Card Number _____ Exp. Date _____

MIAMI
BEACH
BIRD SANC+UARY

MISSION STATEMENT

Create awareness and build support for the City of Miami Beach as an official bird sanctuary by crafting and installing unique birdhouses in city green spaces and public parks to expand safe habitats for local and migratory bird populations.

INTRODUTION

The City of Miami Beach is an officially designated bird sanctuary, but there are currently no protected habitats in public parks or green spaces for birds to nest and thrive. Few city residents take the time to consider the wildlife living within a few feet of their homes, believing instead that South Florida wildlife begins in the Everglades.

The Miami Beach Bird Sanctuary Project hopes to develop a series of safe havens for birds throughout Miami Beach's neighborhoods and parks. The hope is for these habitats to encourage bird species to move out of urban areas and into more naturally suited green space environments. The expectation is that these habitats will also provide places of rest and temporary homes to migratory birds passing through our city.

Many factors affect the natural balance of wild bird habitats, displacing bird populations and forcing them to migrate to areas with unsuitable conditions and unforeseen predators. South Florida's expanding development footprint impacts our ecosystem and threatens area wildlife. Moreover, increasingly high-velocity storm systems moving through our communities destroy the natural canopy where our smallest creatures live and breed.

"Ecosystem Services" is the collective term for the many ways birds support and improve human life. Birds impact our community and benefit humans in many ways. Some birds are considered insectivores and naturally hunt flies, mosquitoes, beetles and other pests. They contribute to public health, protect our drinking water by preventing erosion, slow the spread of disease, aid in seed dispersal and even contribute financially by enhancing South Florida Ecotourism.

With the natural habitat of birds being reduced each year, providing safe nesting spaces will help support bird populations throughout Miami Beach. Providing artful bird housing in our public parks and green spaces will also build awareness, inspiring mindful conversations about the world around us and our responsibility to protect the abundant natural resources found in every neighborhood.

PROJECT GOALS:
DETAILS + EXPECTATIONS

PROTECTION

Create + install a series of permanent, protective birdhouse habitats throughout Miami Beach's neighborhood parks + green spaces.

Provide a safe haven for native + migratory birds that supports their numbers and also encourages park visitors to protect area wildlife.

Add an element of visual interest to Miami Beach parks + green spaces to expand awareness about the city's designation as an official bird sanctuary.

EDUCATION

Design + build an accompanying set of wooden placards to provide each park with useful information including a QR coded access point to an online portal filled with educational resources.

Develop a series of educational activities + projects (from aggregated sources) for educators and the general public . Provide free, downloadable PDF projects to perpetuate the Miami Beach Bird Sanctuary Mission.

SHARING

Use the existing Miami Beach Bird Sanctuary Project map to promote park attendance, finding ways to work in concert with other outdoor public events.

Develop a social network of locals + city visitors to upload and share park photos and comments about their experience with the project.

Encourage other cities in Miami-Dade County to support natural bird sanctuaries + adopt the Miami Beach's Bird Sanctuary Project within their community parks and green spaces.

MIAMI BEACH NEIGHBORHOOD MAP LOCATIONS:

The map below features 12 parks and 1 home base as recommended locations for the Bird Sanctuary habitats across Miami Beach's neighborhoods. To visit any of these park locations use this Google map to get directions : Bird Sanctuary Parks + Green Spaces Map

MIAMI BEACH
BIRD SANC+UARY

- HB City Center: Botanical Garden
- 01 Biscayne Point: Crespi Park
- 02 North Shore: North Shore State Park
- 03 Normandy Shores + Isle: Normandy Monument
- 04 La Gorce: Fisher Park
- 05 Nautilus: Pinetree Park
- 06 Ocean Front: Indian Beach Park
- 07 Bayshore: M. Gibb Memorial Park
- 08 City Center: Lincoln Rd
- 09 Venetian Islands: Belle Isle Park
- 10 Flamingo / Lummus: Lummus Park
- 11 South Point: South Point Park
- 12 Star, Palm Hibsc Island: Palm Island Park

PROJECT GOALS: LOCATIONS

The photos below show recommended tree spots from 6 of the 12 parks where the birdhouse habitats can be installed.

City Center: Botanical Garden

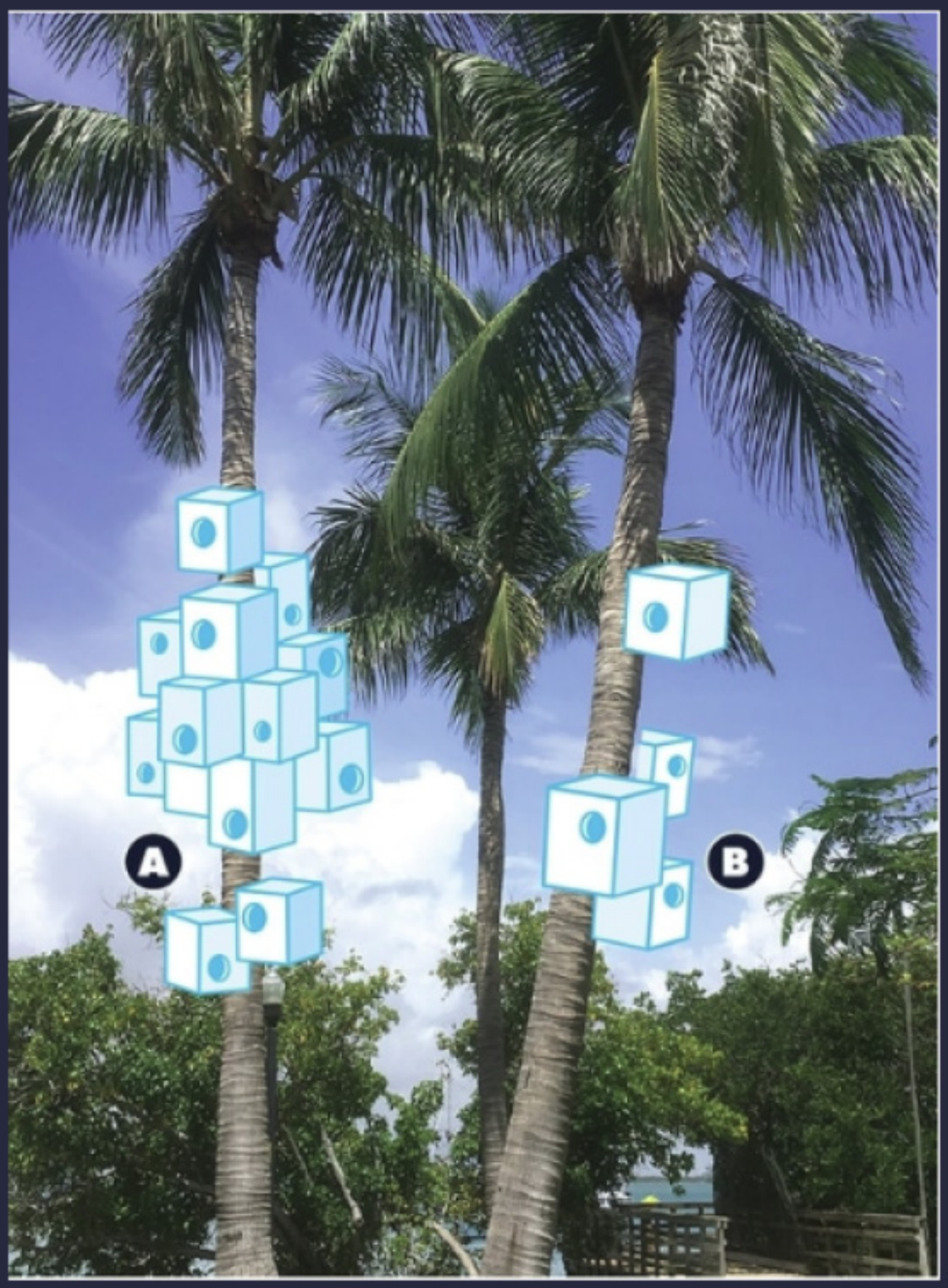
Venetian Islands: Belle Isle Park

Nautilus: Pinetree Park

Ocean Front: Indian Beach Park

Bayshore: Gibb Memorial Park

La Gorce: Fisher Park



BIRDHOUSE LAYOUT OPTIONS

OPTION A :

This option shows a mock-up layout of the birdhouse habitats installed in tightly clustered groups on a more centralized tree location in the park.

OPTION B :

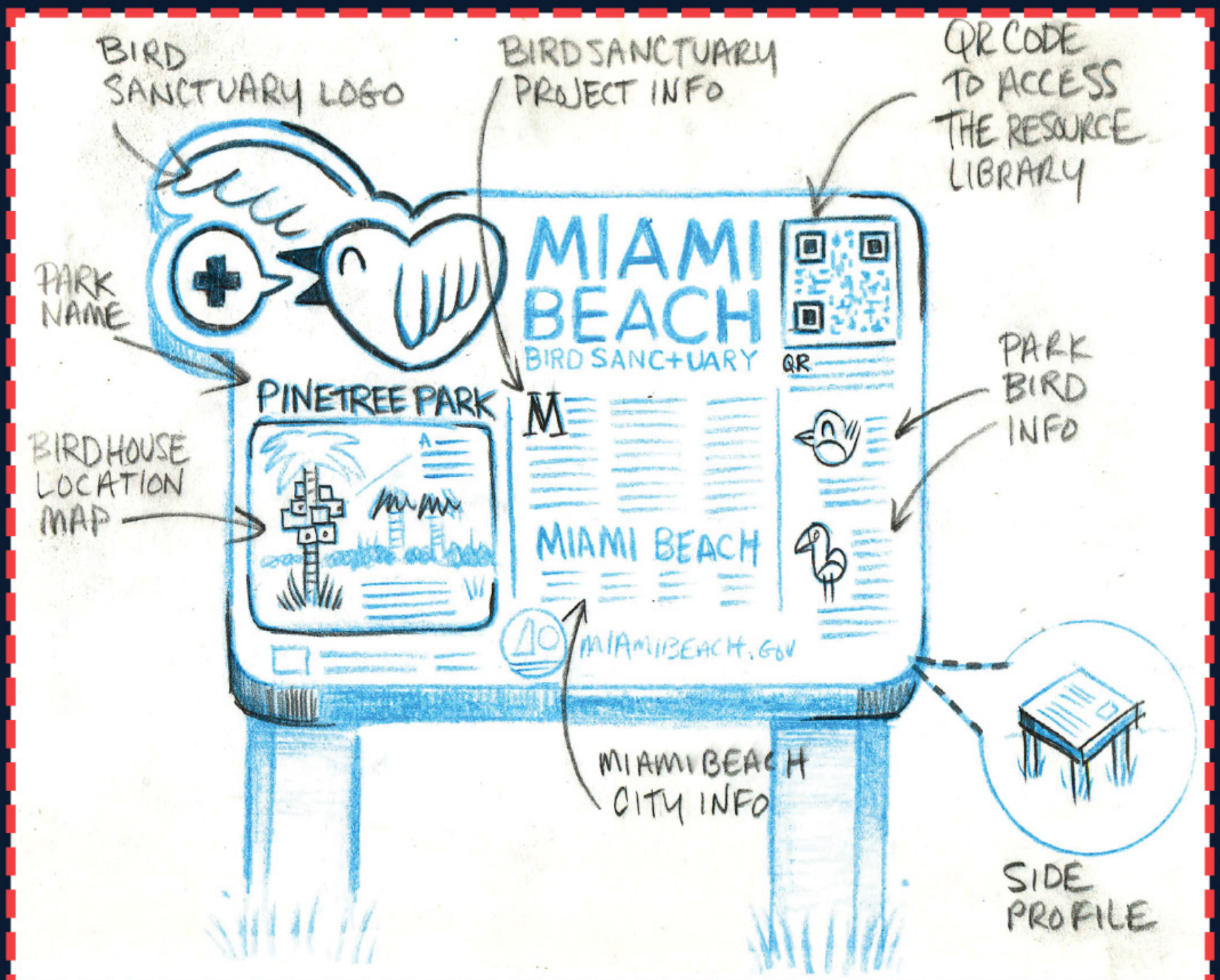
This option shows a mock-up layout of the birdhouse habitats installed in a more loosely spaced out configuration across multiple trees within the park.

ADDITIONAL CONCEPT PHOTOS

The two photos below feature extreme examples of option A.

PROJECT GOALS: WOODEN PLACARD

The sketch below represents a concept for a wooden informational placard to be used in conjunction with each bird sanctuary habitat. These placards would act as an informational access point to an online portal of resources. Each sign would be equipped with a unique QR code for accessing digital information from a smart device to discover an online library of free, bird-friendly resources.



Library content could include:

• PDF documents + drawings of birdhouse designs with instructions for visitors to download schematics, build their own birdhouses and install them within home gardens and participating schoolyards. Creating personal bird sanctuaries helps spread the sanctuary mission throughout the community.

• Photos and documents about the development of the Miami Beach project, the installation of the boxes in select trees and the progress area habitats are making in supporting wildlife.

Link to an interactive Bird Sanctuary Map including all locations across the city.

• Site maps to the locations of birdhouses within each green space to help visitors find and watch birds.

• A bird watcher's photo gallery featuring common area birds to help identify species spotted at area parks.

• Details about migrating bird species visitors might discover in the green spaces each season.

• Educational information for children about area birds and ecosystem preservation that encourages empathy for wildlife.

• A moderated photo page where visitors can upload and view photos taken at area sanctuaries.

• Educational resources about South Florida Ecology and Ecosystems, ways to support wildlife through conservation, recycling, coordinating neighborhood clean-up activations etc.

• Links and information to join the Audubon Society's "Great Backyard Bird Count." The information provided by the community at the • Bird Sanctuaries can assist the Audubon Society with the tracking and counting of the bird population in South Florida.

• Links to area bird rescue centers and animal advocacy services like the Florida Fish and Wildlife Conservation Commission + Pelican Harbor Seabird Station.

ADDITIONAL INFORMATION

The City of Miami Beach's Natural Bird Sanctuary Documentation

Below are additional details about the City of Miami Beach's policies and links to PDF documentation that define and designate the city as a natural bird sanctuary.

MIAMI BEACH SUSTAINABILITY PLAN

- **Biodiversity Section Overview:**

In a number of programs promoting species protection, Miami Beach is designated as a bird sanctuary.

An overview of this policy can be found on page 15 of the Miami Beach Sustainability Plan.

PDF DOC

MIAMI BEACH COMPREHENSIVE PLAN: POLICY 2.3

Conservation Coastal Zone Mgt. Section / Objective 2 :
Natural Resource Protection

Policy 2.3
In conformance with the City Charter establishing the City as a bird sanctuary, it is prohibited for any person to injure, kill, hunt, destroy, capture or molest any endangered, threatened, rare, or species of special concern or any bird in the City of Miami Beach; except those persons holding a valid permit to destroy birds for scientific purposes issued by the U.S. Fish and Wildlife Service, Department of the Interior and issued a special permit by the Chief of Police.

MIAMI BEACH COMPREHENSIVE PLAN: POLICY 2.4

Conservation Coastal Zone Mgt. Section / Objective 2 :
Natural Resource Protection

Policy 2.3
Maintain the area known as "Pelican Island" as a special bird sanctuary.

An overview of this policy 2.3 + 2.4 can be found on page 115 of the Miami Beach 2025 Comprehensive Plan.

PDF DOC

MIAMIBEACH

COMMITTEE MEMORANDUM

TO: Sustainability and Resiliency Committee

FROM: Jimmy L. Morales, City Manager

DATE: September 26, 2018

SUBJECT: **DISCUSSION ON FUNDING AND DEPLOYMENT OF TEMPORARY PUMPS**

RESPONSIBLE DEPARTMENT:
PUBLIC WORKS

LEGISLATIVE TRACKING:
Item R7K - July 25, 2018 Commission Meeting

SPONSORED:
Commissioner John Elizabeth Aleman

BACKGROUND:

A resolution regarding the utilization of temporary pumps and generators was placed on the City Commission meeting agenda for July 25, 2018.

Analysis

To meet the stormwater needs of the City, the City is investing over $650 million in various infrastructure improvements, which improvements will need to be made over an estimated span of 10 years. The infrastructure improvements include installing larger, pipes, pump stations, and raising roads to ensure that the roads do not flood in future tidal and rainfall events.

In 2017, $456,352 was spent on temporary pumps and generators. To date, for fiscal year 2018 temporary pump expenditures have been estimated at $707,520.

During King Tide events, to prevent localized street flooding in areas where the roadway elevation is lower than the high tide levels, temporary pumps have been installed at the lowest points and the water has been pumped to the adjacent canal or Biscayne Bay. Typically, 23 pumps have been deployed in these lower areas such as upper North Bay Road, 44th and Chase, along the Tatum Waterway, and a few more in North Beach. All locations have been permitted through DERM which incorporates best management practices to protect water quality, including cleaning of the stormwater system in the area to remove potential pollutants.

The City does not have a sufficient dedicated funding source, to continue to fund the temporary pump and generator rentals. The stormwater rate increases being paid by the residents did not include such funding. Without a renewable funding source, as the stormwater bonds cannot be used for temporary pumps and generators, the City cannot afford to continue to fund such temporary relief from flooding and

sea level rise.

Annually, the City faces King Tides, hurricanes and heavy rain events and the City needs to continue with its infrastructure improvements to provide permanent relief from these types of events.

The Commission took up the item and after several members provided comments with regards to the draft resolution, Commissioner Aleman moved to refer the discussion to the Sustainability and Resiliency Committee; seconded by Commissioner Gongora. A voice vote was taken and the item passed 6 – 0 with Commissioner Rosen Gonzalez absent.

ATTACHMENTS:

Description	Type
July 25, 2018, R7K Afteraction	Other
July 25, 2018, R7K Memo	Other
July 25, 2018, R7K RESO	Other
Pump Station Map	Other

4:20:59 p.m.
SUPPLEMENTAL MATERIAL 3: REVISED RESOLUTION

R7 J A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF MIAMI BEACH, FLORIDA, DIRECTING THE CITY ADMINISTRATION TO IDENTIFY GREEN AND BLUE INFRASTRUCTURE TECHNOLOGIES, STORMWATER STRATEGIES AND OTHER INNOVATIVE WATER SOLUTIONS, THAT CAN UTILIZE THE GOVERNMENTAL ACCOUNTING STANDARDS BOARD (GASB) GUIDELINES FOR FUNDING; AND DIRECTING THE CITY MANAGER TO GO OUT INTO THE MARKETPLACE FOR FUNDING SOURCES, INCLUDING, BUT NOT LIMITED TO, SEEKING MUNICIPAL BOND PROCEEDS TO PAY FOR CONSUMER REBATES, INSTALLATIONS AND OTHER DISTRIBUTED INFRASTRUCTURE INITIATIVES; AND DIRECTING THE ADMINISTRATION TO WORK WITH THE CITY'S EXTERNAL AUDITOR, FINANCIAL ADVISOR, AND BOND COUNSEL TO ENSURE COMPLIANCE WITH THE CITY'S BOND RESOLUTIONS AND ACCOUNTING STANDARDS.

Public Works
Commissioner John Elizabeth Alemán

ACTION: Resolution not adopted. Item heard with items R7 M and R7 N. Item deferred to the September 12, 2018 Commission Meeting by acclamation. Lilia Cardillo to place on the Commission Agenda, if received. **Roy Coley to handle.**

RECOMMENDATION:

- The Office of the City Attorney to combine similar Items R7 J, R7 M, and R7 N into one Resolution, and bring back to the September 12, 2018 Commission Meeting.

Commissioner Alemán proposed taking Items R7 J, R7 M, and R7 N, and through the Office of the City Attorney work the items into one Resolution that she would co-sponsor with Vice-Mayor Samuelian.

Vice-Mayor Samuelian agreed to merge the items and defer items R7 J, R7 M and R7 N to the September 12, 2018 Commission Meeting.

8:11:27 p.m.

R7 K A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF MIAMI BEACH, FLORIDA, DIRECTING THE CITY MANAGER TO UTILIZE TEMPORARY PUMPS AND GENERATORS TO COMBAT FLOODING ONLY IN EMERGENCY SITUATIONS AFFECTING THE HEALTH, SAFETY, AND WELFARE OF RESIDENTS; REQUIRING THE CITY MANAGER TO OBTAIN CITY COMMISSION APPROVAL IN ADVANCE, WHEN POSSIBLE, OR OBTAIN AFTER-THE-FACT APPROVAL, WHEN ADVANCED AUTHORIZATION IS NOT POSSIBLE, FOR ANY FUTURE DEPLOYMENT OF TEMPORARY PUMPS AND GENERATORS; AND REQUIRING THE CITY MANAGER TO IDENTIFY A DEDICATED FUNDING SOURCE TO CONTINUE TO UTILIZE TEMPORARY PUMPS AND GENERATORS IN EMERGENCY SITUATIONS.

Public Works
Commissioner John Elizabeth Alemán

ACTION: Resolution not adopted. Item referred to the Sustainability and Resiliency Committee. Motion made by Commissioner Alemán to refer the item; seconded by Commissioner Góngora; Voice vote: 6-0; Absent: Commissioner Rosen Gonzalez. **Elizabeth Wheaton to place on the Committee Agenda. Roy Coley to handle.**

REFERRAL:

- Sustainability and Resiliency Committee to discuss funding and deployment of temporary pumps, discuss process and policy.

Commissioner Alemán explained that this is an important item, since they depend on the use of temporary pumps. Last year the City spent over $1 million deploying the pumps as needed. However, there is no funding source for this. This Resolution directs the City Manage to identify a funding source and additionally it requires the City to make the decision. Currently there was no funding for this and prior City Commissions had to tap into the previous rate increase funds that had accumulated, and now they need those funds to pay the debt service. Therefore, there is a need to identify a funding source to deploy the pumps. She requested a color-coded map from Public Works, which code green is for temporary pumps deployed; yellow code are deployed pumps and red are those pumps that are in a future displacement in later stages of the rollout of permanent infrastructure. Of all the temporary pumps, they can see which ones are close to turning off or soon to turn off, and which ones are still pending. The Commission has taken steps so as not to deploy temporary pumps as previously, but it requires that the decisions be made in the Sunshine. She explained that Ocean Park floods during king tides and neighbors can expect serious flooding, and they are a couple of years away from getting a solution, so in this case the Commission knows that they will have to deploy one or more temporary pumps. The need for those pumps will come in front of the City Commission for action. This Resolution also allows the City Manager, in an emergency, to decide deployment. However, he would have to circulate that information to the City Commission. With the map, they can see the progress.

Commissioner Góngora agrees with many of the points his colleague raises. However, he thinks the Resolution goes too far. The Commission needs first to identify funding resources; they need to let people know the cost associated to keep the temporary pumps running. He understands that part of this is to let some of the neighborhoods know to stop fighting the City's permanent solution as they do not have the money to keep the temporary pumps going, and he agrees in letting this message out. However, he is concerned that this Resolution ties the Administration's hands, since they cannot anticipate when there is a heavy rain, monsoon, or a flash rain. He is not in favor of restricting the use of temporary pumps this much and micromanaging at the City Commission level their uses. He suggested carrying this item over and receive more information from the Administration as to cost, potential funding sources, and having a more informed discussion rather than what is proposed. He is not prepared to support this tonight.

Commissioner Steinberg added that they are trying to empower staff to be proactive and do what it is important and necessary to avoid micromanaging, but she feels this ties staff's hands somewhat. She believes the term emergency could be defined differently. There is good merit in the Resolution. She thinks the Commission should receive at least quarterly LTCs updates in the Sunshine outlining exactly where and how much is spent, so that it solves the issue of identifying the neighborhoods that are using these pumps, where they are used and trying to limit the uses. She agrees that the City has spent so much money on temporary pumps, which unless it is necessary, people should not rely as part of quality of life to have the generators come in when requested. However, it is important that the Administration outline how much funds are being spent, where it is being spent, and to find the appropriate funding sources. She likes the spirit of where Commissioner Alemán is going with the Resolution thought, but it is going too far in tying the City Manager's hands.

Commissioner Alemán explained that this does not tie the City Manager's hands, as it gives him ultimately authority to deploy as he sees fit. The City Manager just must come back to the City Commission and let them know. She asked Mr. Coley if he had the colored map discussed. They came up with the map and the other one a spreadsheet to see the costs. She understands the

concerns of bringing the item back to the City Commission, and if it makes more sense, she suggested that the item go in front of the Sustainability and Resiliency Committee instead of the full Commission, and maybe do it as a quarterly report rather than a real time dialogue. However, this is more than $1 million unbudgeted spent that does nothing to remediate the root cause of flooding. They need to maintain visibility. She described an incident where the City sent a vacuum truck to dry the streets at upper North Bay Road because someone had the house for sale and they had a showing, and that is unacceptable. Every taxpayer in the City paid for that vacuum truck to dry the street for a mansion to be sold. Therefore, there is absolutely a spirit of wanting to make these decisions in the Sunshine. At this point, they depend on these temporary pumps for simple quality of life, especially during king tides and certainly during storm events. She clearly does not want to take any authority from the City Manager, and she thought she had addressed that, but accepted the suggestion of making it a quarterly report at the Sustainability and Resiliency Committee if there is consensus.

Vice-Mayor Samuelian appreciates Commissioner Alemán putting this on the table. Having unfunded items such as these, do not feel right. She is also trying to bring a policy. He thinks they need to have something like this. He added that there may be unintended consequences and so they want to engage in more of a dialogue at a future time.

Commissioner Alemán moved to refer the discussion of how to do this process to the Sustainability and Resiliency Committee; seconded by Commissioner Góngora; Voice vote: 6-0; Absent: Commissioner Rosen Gonzalez.

Jimmy L. Morales, City Manager, explained that the City has an arrangement with DERM and they have received DERM pre-approval for multiple locations where they know pumps are deployed often, and as part of that agreement, DERM has agreed that the City has the right to deploy the pumps at other locations during emergency.

Commissioner Steinberg agrees that they need to have a formal policy.

Commissioner Alemán added that the City spent $1 million a year on this and currently they have no money for that.

Commissioner Góngora agreed that they cannot have that kind of unfunded item that people do not know about with the temporary pumps going out and they need to have that discussion at Sustainability.

Resolutions - R7 K

MIAMIBEACH

COMMISSION MEMORANDUM

TO: Honorable Mayor and Members of the City Commission
FROM: Jimmy L. Morales, City Manager
DATE: July 25, 2018

SUBJECT: A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF MIAMI BEACH, FLORIDA, DIRECTING THE CITY MANAGER TO UTILIZE TEMPORARY PUMPS AND GENERATORS TO COMBAT FLOODING ONLY IN EMERGENCY SITUATIONS AFFECTING THE HEALTH, SAFETY, AND WELFARE OF RESIDENTS; REQUIRING THE CITY MANAGER TO OBTAIN CITY COMMISSION APPROVAL IN ADVANCE, WHEN POSSIBLE, OR OBTAIN AFTER-THE-FACT APPROVAL, WHEN ADVANCED AUTHORIZATION IS NOT POSSIBLE, FOR ANY FUTURE DEPLOYMENT OF TEMPORARY PUMPS AND GENERATORS; AND REQUIRING THE CITY MANAGER TO IDENTIFY A DEDICATED FUNDING SOURCE TO CONTINUE TO UTILIZE TEMPORARY PUMPS AND GENERATORS IN EMERGENCY SITUATIONS.

RECOMMENDATION

Provided for discussion purposes.

ANALYSIS

Pursuant to Section 403.031 of the Florida Statutes, a stormwater management program is the City's institutional strategy for stormwater management, including regulating urban flooding, and other stormwater effects. The City created its stormwater management system, which system is designed and constructed or to be implemented to control discharges which are necessitated by rainfall events, incorporating methods to collect, convey, store, absorb, inhibit, treat, use, or reuse water to prevent or reduce flooding, over-drainage, environmental degradation and water pollution (or otherwise affect the quantity and quality of discharges from the system). The City's Stormwater Utility created in 1992 is the funding mechanism for the design, construction, and maintenance of the stormwater management program by assessing the costs of the program to the beneficiaries based on their relative contribution to the system's needs. The City stormwater policy requires property owners to construct on-site stormwater management systems to handle their stormwater volume.

To meet the needs of the City, the City is investing over $650 million in various infrastructure improvements, which improvements will need to be made over an estimated span of 10 years. The infrastructure improvements include installing larger pipes, pump stations, and raising roads to ensure that the roads do not flood in the future for 10-year rainfall event.

On October 1, 2016, the City increased its stormwater rate in order to support the debt service for the 2017 Stormwater bonds for the principal purposes of paying a part of the costs of certain improvements to the stormwater utility. The rate increase was expected to generate and contribute approximately $7.8 million per year to cover annual debt service of approximately $16.7 million on stormwater bonds. The 2017 stormwater bonds were issued in December 2017. The first 12 months prior to the issuance of the 2017 stormwater bonds provided approximately $7 million that was placed into reserves for the period ending September 30, 2017.

In Fiscal Year 2017, $469,352 was spent on temporary pumps and generators. For Fiscal Year 2018, temporary pump expenditures have been anticipated at $1,100,000. The temporary pump rental fees for the actual pumps and back-up generators, are not an eligible expense under the stormwater bonds.

The City does not have a sufficient dedicated funding source to continue to fund the temporary pump rentals, including the temporary pumps and generators. The stormwater rate increases being paid by the residents are solely to fund the debt service for the Series 2017 stormwater bonds. As the stormwater bonds cannot be used for temporary pumps and generators, it may not be fiscally prudent to continue to fund such temporary relief from flooding and sea level rise. Annually, the City faces King Tides, hurricanes and heavy rain events. Proposed infrastructure improvements will provide permanent relief from these types of events.

The Mayor and City Commission may direct the Administration to cease utilizing the temporary pumps and generators, as it would be fiscally irresponsible to do so without a dedicated funding source, and the Administration be directed to solely use the temporary pumps and generators under the following circumstances: (1) if a water event can be predicted, for example, a King Tide event, then the Administration is to place an item on the City Commission agenda requesting the City Commission to authorize the expenditure for temporary pumps and generators to combat the King Tide, with an identifiable funding source; or (2) if there is an emergency situation, for example, a hurricane event, then the Administration may use its discretion to protect the health, safety, and welfare of the residents and visitors of Miami Beach, and utilize temporary pumps and generators, provided, however, the Administration, at the next City Commission meeting, bring to the City Commission a resolution to authorize, after-the-fact, the emergency expenditure on temporary pumps and generators, with an identifiable funding source.

The temporary pumps and generators would not be utilized for routine flooding or maintenance purposes, as the City needs to ensure that the capital projects proposed under the City's Stormwater Master Plan, and as funded through the various stormwater bonds, are timely constructed.

CONCLUSION
The Administration is providing a draft resolution for discussion purposes.

Legislative Tracking
Public Works

Sponsor
Commissioner John Elizabeth Aleman

ATTACHMENTS:

	Description
D	Form Approved Resolution

RESOLUTION NO. _____

A RESOLUTION OF THE MAYOR AND CITY COMMISSION OF THE CITY OF MIAMI BEACH, FLORIDA, DIRECTING THE CITY MANAGER TO UTILIZE TEMPORARY PUMPS AND GENERATORS TO COMBAT FLOODING ONLY IN EMERGENCY SITUATIONS AFFECTING THE HEALTH, SAFETY, AND WELFARE OF RESIDENTS; REQUIRING THE CITY MANAGER TO OBTAIN CITY COMMISSION APPROVAL IN ADVANCE, WHEN POSSIBLE, OR OBTAIN AFTER-THE-FACT APPROVAL, WHEN ADVANCED AUTHORIZATION IS NOT POSSIBLE, FOR ANY FUTURE DEPLOYMENT OF TEMPORARY PUMPS AND GENERATORS; AND REQUIRING THE CITY MANAGER TO IDENTIFY A DEDICATED FUNDING SOURCE TO CONTINUE TO UTILIZE TEMPORARY PUMPS AND GENERATORS IN EMERGENCY SITUATIONS.

WHEREAS, pursuant to Section 403.031 of the Florida Statutes, a stormwater management program is the City's institutional strategy for stormwater management, including regulating urban, and other stormwater effects; and

WHEREAS, the City created its stormwater management system, which system is designed and constructed or to be implemented to control discharges which are necessitated by rainfall events, incorporating methods to collect, convey, store, absorb, inhibit, treat, use, or reuse water to prevent or reduce flooding, over-drainage, environmental degradation and water pollution (or otherwise affect the quantity and quality of discharges from the system); and

WHEREAS, the City's Stormwater Utility created in 1992 is the funding mechanism for the design, construction, and maintenance of the stormwater management program by assessing the costs of the program to the beneficiaries based on their relative contribution to the system's needs; and

WHEREAS, on October 18, 2000, the City Commission adopted Resolution 2000-24127 referred to as the Master Bond Resolution, for authorizing and securing stormwater revenue bonds; and

WHEREAS, the City stormwater policy requires property owners to construct on-site stormwater management systems to handle their stormwater volume; and

WHEREAS, to meet the needs of the City, the City is investing over $400 million in various infrastructure improvements, which improvements will need to be made over an estimated span of 10 years; and

WHEREAS, such infrastructure improvements include installing larger pipes and pump stations, and raising roads to ensure that the roads do not flood in the future for a 10-year rainfall event; and

WHEREAS, on October 1, 2016, the City increased its stormwater rate from $16.67 to $22.67 or $6 in order to support the debt service for the Series 2017 $100 million stormwater bonds and to cover issuance cost of such bonds.

WHEREAS, the Series 2017 bonds were issued in December 2017, 14 months subsequent to the rate increase; and

WHEREAS, the increase was expected to generate $7.8 million in debt service revenue; and

WHEREAS, the City added approximately $7million generated from the increase rate to its reserves for the period ended September 30, 2017; and

WHEREAS, in 2017, the implementation of temporary pumps culminated in a Fiscal Year 2017 expenditure of $469,352 on temporary pumps and generators; and

WHEREAS, to date, for fiscal year 2018, temporary pump expenditures have been $1,100,000, and it is anticipated that $493,000 will be expended on temporary pumps throughout the remainder of the fiscal year, which is during the heart of hurricane season; and

WHEREAS, the temporary pump rental fees, for the actual pumps and back-up generators, is not reimbursable under the stormwater bonds; and

WHEREAS, the City does not have a dedicated funding source to continue to fund the temporary pump rentals, including the temporary pumps and generators; and

WHEREAS, the stormwater rates being paid by the residents are dedicated to funding the debt service for all stormwater bonds, and to pay for other operating and capital expenses that are included in the fiscal year budget; and

WHEREAS, without a renewable funding source which proceeds can be used for temporary pumps and generators, the City cannot continue to fund such temporary relief from flooding and sea level rise; and

WHEREAS, annually, the City faces King Tides, hurricanes and heavy rain events and the City needs to continue with its infrastructure improvements to provide permanent relief from these types of events; and

WHEREAS, the Mayor and City Commission wants to cease utilizing the temporary pumps and generators as it would be fiscally irresponsible to do so without a dedicated funding source, and to solely use the temporary pumps and generators under the following circumstances: (1) if a water event can be predicted, for example, a King Tide event, then the City Commission could authorize the expenditure for temporary pumps and generators to combat the King Tide, with an identifiable funding source; or (2) if there is an emergency situation, for example, a hurricane event, then to protect the health, safety, and welfare of the residents and visitors of Miami Beach, and utilize temporary pumps and generators, provided that at the next City Commission meeting, the City Commission pass a resolution to authorize, after-the-fact, the emergency expenditure on temporary pumps and generators, with an identifiable funding source.

The temporary pumps and generators are not to be utilized for routine flooding or maintenance purposes, as the City needs to ensure that the capital projects proposed under the City's Stormwater Master Plan, and as funded through the various stormwater bonds, are timely constructed.

NOW, THEREFORE, BE IT DULY RESOLVED BY THE MAYOR AND CITY COMMISSION OF THE CITY OF MIAMI BEACH, FLORIDA that the Mayor and City Commission direct the City Manager to utilize temporary pumps and generators to combat flooding only in emergency situations affecting the health, safety, and welfare of residents; require the City Manager to obtain City Commission approval in advance, when possible, or obtain after-the-fact approval, when advanced authorization is not possible, for any future deployment of temporary pumps and generators; and require the City Manager to identify a dedicated funding source to continue to utilize temporary pumps and generators in emergency situations.

PASSED and ADOPTED this _____day of _____, 2018.

ATTEST:

_____
Dan Gelber, Mayor

_____
Rafael G. Granado, City Clerk

APPROVED AS TO
FORM & LANGUAGE
& FOR EXECUTION

City Attorney 7/17/18
Date

ID	Address
01	85th St. & Byron Ave. (Bridge)
02	82nd Terr. & Byron Ave
03	499 81 St
04	77th St. & Tatum Waterway
05	7632 Dickens Ave
06	7175 Rue Granville
07	1021 Biraritz Dr
08	1076 Marseille Dr
09	Rue Notre Dame & Marseille Dr
10	1300 Marseille Dr
11	1022 Bay Dr
12	6440 N Bay Rd
13	6437 N Bay Rd
14	5860 N Bay Rd
15	5619 N Bay Rd
16	5201 N Bay Rd
17	5161 N Bay Rd
18	4343 N Bay Rd
19	Muss Park
20	4300 Indian Creek Dr
21	37 ST/Indian Creek (DMSI)
22	32 ST/Indian Creek (DMSI)
23	3405 Chase Ave
24	Indian Creek (DMSI)
25	28 ST/Indian Creek (DMSI)
26	26 ST/Indian Creek (DMSI)
27	19th St. & Jefferson Ave
28	Sunset Marina (Purdy Ave/18 Ave) Purdy Ave
29	Sunset Island III (Ricman)
30	Sunset Island IV (Ricman)
31	1261 17th St
32	Di Lido Island North (Lanzo)
33	San Marino Island North (Lanzo)
34	Rivo Alto Island North (Lanzo)
35	Di Lido Island South (Lanzo)
36	Hibiscus Island West (Lanzo)
37	Palm Island West (Lanzo)
38	Hibiscus Island East (Lanzo)
39	11th ST (DMSI)
40	800 West Ave
41	Commerce St. & Alton Rd
42	San Marino Island South (Lanzo)

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M:\$CMB\GIS\Projects\18_PumpStationMapping\ArcMap\PumpStationMapping_24x36_071218.mxd

SHEET NO.		
1	DATE	9/18/2018
1	DRAWN	WORKVerA
	SCALE	1 inch = 1,500 feet
	REQUESTED	Roy Coley
	FILENAME	PumpStationMapping_24x36_071218

Temporary Pump Stations
Miami Beach
Miami-Dade County, FL

- Temporary Pump Station
- Temporary Pump Station Being Replaced By Permanent Pump Station
- Temporary Pump Station Replaced By Permanent Pump Station

GIS GEOGRAPHIC INFORMATION SYSTEMS
MIAMIBEACH

MIAMIBEACH

COMMITTEE MEMORANDUM

TO: Sustainability Resiliency Committee Meeting

FROM: Jimmy L. Morales, City Manager

DATE: September 26, 2018

SUBJECT: **DISCUSSION ON RESULTS FROM THE RESILIENCY ACCELERATOR, TO ENABLE SUCH RESULTS TO BE TIMELY REVIEWED AND CONSIDERED BY THE COMMITTEE**

RESPONSIBLE DEPARTMENT:
Elizabeth Wheaton, Environment and Sustainability Director

LEGISLATIVE TRACKING:
Item C7 AJ - July 25, 2018 Commission Meeting

SPONSORED:
Commissioner Mark Samuelian

Analysis
DISCUSSION AT COMMITTEE MEETING.

ATTACHMENTS:

Description	Type
No Attachments Available	

MIAMIBEACH

COMMITTEE MEMORANDUM

TO: Sustainability and Resiliency Committee

FROM: Jimmy L. Morales, City Manager

DATE: September 26, 2018

SUBJECT: **SUSTAINABILITY COMMITTEE**

RESPONSIBLE DEPARTMENT:
Dave Doebler, Committee Chair

Analysis
VERBAL REPORT OF THE JULY 31, 2018 SUSTAINABILITY COMMITTEE MEETINGS.

ATTACHMENTS:

	Description	Type
🗋	July 31, 2018 Draft Minutes	Memo

Sustainability Committee Chairperson
David Doebler – Appointed by Commissioner Micky Steinberg

Members of the Sustainability Committee
Jeremy Waks- Appointed by Mayor Dan Gelber
David Doebler – Appointed by Commissioner Micky Steinberg
Mohammed Islam - Appointed by Commissioner Mark Samuelian
Luiz Rodrigues- Appointed by Commissioner Michael Góngora
Richard Conlin – Appointed by Commissioner Kristen Rosen-Gonzalez
Mike Gibaldi - Appointed by Commissioner Ricky Arriola
Max Litt - Appointed by Commissioner John Elizabeth Alemán

DATE: July 31, 2018

SUBJECT: Meeting of the Sustainability Committee

A meeting of the Sustainability Committee was scheduled for Tuesday, July 31, 2018 at 3:00 p.m. in the City Manager's Large Conference Room, 4th Floor, City Hall.

The attendees were as follows: Dave Doebler, Jeremy Waks, Luiz Rodrigues, Mike Gibaldi, Mohammed Islam, and Max Litt

City Staff: Elizabeth Wheaton, Director of Environment and Sustainability; Margarita Wells, Assistant Director of Environment and Sustainability; Yanira Pineda, Sustainability Specialist; and Alyssia Berthoumieux, Sustainability Specialist.

Members Absent: Richard Conlin

MINUTES

1. Committee Responsibilities

    a. **MOTION:** Motion to approve the minutes of the July 31, 2018 Sustainability Committee meeting as amended. Motion made by Luiz Rodriguez, seconded by Max Litt.

    b. Committee Meeting Rules - Dave Doebler discussed establishing committee guidelines that would help with facilitating future meetings. The proposed guidelines included the following:

        - Everyone would be welcome to attend the Sustainability Committee
        - Members and Staff would be allowed to be seated at the conference table and plenty of chairs would be made available around the room for guests
        - At the beginning of the meeting, everyone in the room would be invited to introduce themselves starting from Committee to Staff to Guests
        - Agenda items would be allocated a specific amount of time, and that time would be adhered to by the Committee Chair or a designated timekeeper
        - Agenda items with Staff or 3rd Party attendees would be given a priority speaking slot at the discretion of the committee
        - Presentations would be limited to a maximum of 50% of the allotted time to

allow for questions and committee member discussion

- If committee members or guests have questions during the presentation, they should hold them until the end of the presentation (unless they are for clarification). After the presentation, the floor would be opened for questions with priority given to committee members and then guests
- 20 minutes total with 2 minutes for each for each Committee Member, Staff, and Guests would be allocated at the end of every meeting for public comments and announcements
- 5 minutes would be allocated to discuss future agenda items
- Members, Staff or Guests could submit a request to present or speak at a future meeting via email to staff liaison. Staff would collaborate with the Chair to determine if and when the presentation would be scheduled

MOTION: Motion to approve the committee guidelines made by Jeremy Waks, seconded by Luiz Rodrigues.

2. Sustainability Committee Work Plan

a. 2018 Items

i. Mooring in Sunset Harbour – Captain Dan Kipniss presented on this item and showcased conceptual plans for a visiting yacht mooring field marina in the Sunset Harbour Area. He further explained the concept would help address bay grass degradation and prevent boats from dumping their sanitary waste directly into the bay. The proposed plan would establish a registration and dockage fee which would provide accessibility to marina facilities through the use of a key card. The key card would provide access to toilets, showers as well as trash and laundry facilities. He added the mooring field would limit the amount of stay time allowed and the non-motorized/water tax docking facilities would be free for residents. Mr. Doebler and Max Litt expressed their concerns over displacing the existing permanent residents of that marina. Captain Kipniss suggested engaging the city's Housing and Community Services department to address this issue and obtain their feedback. He added he would like the Sustainability Committee to be actively engage in this concept to help with developing the project. MOTION: Motion to support establishing a yacht mooring field as in Sunset Harbour as outlined by the Marine and Waterfront Protection Authority. Motion made by Mike Gilbaldi, seconded by Jeremy Waks.

ii. Plastic Bag and Straw Ordinances – Elizabeth Wheaton gave an overview of the proposed plastic ordinances that were scheduled to be heard at the following Commission Meeting. She explained the importance of a phased approach for each of the items and how the plastic bag component was dependent on the Coral Gables litigation. She further explained the anti-plastic program for businesses to further encourage the reduction of single-use plastic. She added that an event would be planned to promote and launch the program. Luiz Rodriguez inquired on whether the city considered banning a larger spectrum of single-use plastic. Mr. Doebler explained the plastic free Miami Beach program would build upon the existing plastics momentum and help businesses with accomplishing that goal without being disruptive to their operations. He highlighted the importance of influencing consumer demand. Ms. Wheaton explained if the committee desired to expand on the existing ordinance, this could be accomplished through the help of the committee reaching out to elected officials. She added committee members could also carry out research on how other cities have enacted these types of regulations.

iii. Water Conservation/Reuse – Item deferred to the September 25, 2018

3. Next Meeting
    a. September 25, 2018

MIAMIBEACH

COMMITTEE MEMORANDUM

TO: Sustainability and Resiliency Committee

FROM: Jimmy L. Morales, City Manager

DATE: September 26, 2018

SUBJECT: **REVIEW OF RESILIENCE STRATEGY WORKPLAN - PLANNED AND IN PROGRESS RESILIENCY PROJECTS**

RESPONSIBLE DEPARTMENT:
Amy Knowles, Deputy Resiliency Officer

Analysis
VERBAL REPORT AT COMMITTEE MEETING.

ATTACHMENTS:

Description	Type
No Attachments Available	

MIAMIBEACH

COMMITTEE MEMORANDUM

TO: Sustainability Resiliency Committee Meeting

FROM: Jimmy L. Morales, City Manager

DATE: September 26, 2018

SUBJECT: **DISCUSSION ON STORMWATER BEST MANAGEMENT PRACTICES**

RESPONSIBLE DEPARTMENT:
Margarita Wells, Environment and Sustainability Assistant Director

LEGISLATIVE TRACKING:
Item C4U - May 11, 2016 Commission Meeting

SPONSORED:
Commissioner Micky Steinberg

BACKGROUND:
At the City Commission meeting on May 11, 2016, the Mayor and City Commission referred a discussion to the Sustainability and Resiliency Committee (SRC) regarding stormwater Best Management Practices. This item was sponsored by Commissioner Steinberg. On July 15, 2016, the SRC requested regular updates on the city's stormwater management activities.

Analysis
The city operates a Municipal Separate Storm Sewer System (MS4), meaning the stormwater is separate from the sanitary sewer system. The Miami Beach MS4 is comprised of over 90 miles of pipes that carry rainwater collected from inlets on city streets and discharges it via more than 300 outfalls into our waterways and Biscayne Bay. Stormwater systems are a tool used by cities around the world for managing the runoff from rainfall. The city's stormwater system is designed to reduce the likelihood of flooding and keep streets dry. However, stormwater systems are also point sources of pollutants that carry contaminants picked up by rainwater.
The National Pollution Discharge Elimination System (NPDES) permit program addresses water pollution by regulating point sources that discharge pollutants to the waters of the U.S. The city is one of more than 30 co-permittees with Miami-Dade County for NPDES Permit No. FLS000003, covering a combined total of more than 8,000 outfalls throughout Miami-Dade County. The city's outfalls constitute only 3.8% of the total outfalls that discharge into Biscayne Bay.

UPDATE:
As part of our permit to operate our stormwater system, all permit holders are required to develop a stormwater management program that reduces potential pollution through education and outreach, good housekeeping, as well as the use of cutting edge technology and industry-vetted operational practices. The city has established a program that meets and, where feasible, exceeds the requirements of our permit. One example is the voluntary launch of our water quality sampling program in late 2016, which expands upon Miami-Dade County's existing sampling network.

The Miami Beach water quality sampling program added more than sixty stations to cover areas of Biscayne Bay closer to our shoreline and within our waterways for which data has historically not been collected. The data from this

program gives a more robust snapshot of local water quality and allows city staff to make better informed stormwater management decisions. Earlier this year we completed the first year of data collection and retained an outside water quality expert, Dr. Charles Rowney, to review the data and draw initial conclusions about the health of our waterways. The data collected in the first year will serve as a baseline or control to which we can compare the data collected in future years.

The outside expert has completed his statistical analyses and developed a report with the results, his observations and his recommendations (Attachment A). He will be presenting the report in-person at this meeting and will be leading a technical roundtable with community stakeholders immediately following at the Miami Beach Botanical Gardens. The report is substantially complete and has been left as a draft so Dr. Rowney can incorporate any relevant feedback obtained during the discussions with the committee and technical stakeholders.

CONCLUSION:

The following is presented to the members of the Sustainability and Resiliency Committee as an update.

ATTACHMENTS:

Description	Type
Attachment A: Water Quality Report Year 1	Other

September 21, 2018

City of Miami Beach,
Office of the City Manager,
1700 Convention Center Drive,
Miami Beach, FL 33139

Attention: Jimmy L. Morales, City Manager

Subject: **Scientific evaluation of City of Miami Beach water quality monitoring data.**

Dear Mr. Morales:

I am writing as requested to communicate results of a study we recently conducted on behalf of the City, pursuant to discussions with your Mr. Coley. This study was launched to conduct a scientifically based evaluation of stormwater quality monitoring presently being conducted by the City near outfalls and in adjacent waters. The evaluation was based on an examination of available monitoring data, a field observation of the present stormwater monitoring program, and information provided by City staff.

City staff were most helpful in enabling this analysis. All requests made for data, or for analyses conducted by the City based on those data, were promptly and effectively met. During the field trip, the crew was accommodating and responsive to requests for insights into methods used. As the report for this effort was developed, the City was able to provide additional information on program intent and outcomes, and was entirely receptive to suggestions for improvements for the future.

This summary is not intended to be a definitive detailed technical documentation of the underlying scientific evaluation that was carried out. It has been prepared to communicate the major findings of the scientific evaluation in terms understood by an interested individual with a general understanding of the City and its context, but without a significant expertise in the underlying scientific principles. The findings and opinions highlighted in this summary rest on numerous technical assumptions and judgements made based on the information available and on the statistical testing which was carried out. As data gathering continues, new findings may emerge and old findings my change.

Major Findings and Recommendations

There are a number of findings that emerge from the assessment that was carried out. These are summarized below.

1. *The existing monitoring program was found to be a useful screening level program, implemented in a way which should detect a major and long term discharge of sanitary wastewater into waters of the Bay adjacent to the City.*

   It is not reasonably possible to sample all locations at all times, so a perfect warning system is not a reasonable prospect. However, there are several dozen monitoring locations in place in waters around the City (including locations near stormwater outfalls and locations more removed from those outfalls) which provides a reasonable geographic spread, and sampling is frequent enough to make detection of long term major discharges likely.

2. *The detection program could and should be enhanced if uses of data beyond the present screening level are contemplated.*

For example, if in the future there is interest in using monitoring to detect short term or small scale fluctuations in water quality, or if sources of indicator bacteria are sought, or if for other reasons related to the City's mission a greater level of detail is needed, consideration should be given to revising the program.

3. *Based on the monitoring program as reviewed and the data as received, there is no basis to conclude that there was a gross and persistent sanitary system contamination of the waters of the Bay adjacent to the City during the monitoring period.*

4. *Notwithstanding the above conclusion regarding major sanitary discharges, indicator bacteria were certainly present during the monitoring period. The specific sources of these bacteria are not known, but their presence is not unexpected.*

   It is not surprising that indicator bacteria were present. Numerous sources of indicator bacteria are commonly associated with urban environments, and it is highly probable that they are present within the area of the City or in other nearby areas. For example, stormwater commonly includes some indicator bacteria arising from a range of possible animal and human sources. The present monitoring program was not implemented in a way which enables a firm conclusion as to the presence or absence of sources of these types, but nothing was observed which suggested that during the monitoring period there were sources of indicator bacteria that were substantially worse than or different from what is commonly encountered in urban areas.

5. *In the event that the monitoring program is continued, a standard operating procedure (SOP) to guide monitoring efforts by the City should be developed and followed.*

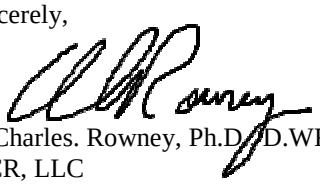
   This finding does not reflect on the field crew or program as such. The field crew that was observed was professional and effective in its actions, and professional staff were clearly knowledgeable and intent on using the data to best effect. However, sampling procedures could be adjusted to provide a better opportunity to understand such things as daily variations (driven by such things as tide and sunlight), stormwater contributions (as compared to dry weather conditions), or other factors, and there are existing activities such as location determination and sampling technique that could benefit from a more clearly defined set of SOPs. Such SOPs would also be helpful to staff charged with conducting monitoring. As SOPs are developed, the need for added staff training and increased routine supervisory review should be considered.

6. *Although development of and adherence to SOPs is suggested as an immediate action, beyond taking that step a moderate approach to enhancing the existing screening level monitoring program is recommended, rather than a pursuit of dramatic changes.*

   Two factors suggest a moderate approach to revision of the screening level program. First, the sampling that has been done has not disclosed a major problem requiring dramatic action. Second, the existing data are not sufficient to confidently suggest what major changes to the program might be indicated. Therefore, a set of initial steps that will significantly improve data and results, while maintaining the essential vision of the present program, is recommended. In the future, if needed, more extensive revisions can be made on a foundation of better information and more clearly demonstrated need. Of course, if wider or different monitoring objectives are set by the City in the near future for other reasons, greater immediate changes to the monitoring program may be appropriate.

Thank you for the opportunity to respond to the needs of the City by completing this evaluation. If you or others at your offices have any questions, please contact me at 407-970-8744 or by e-mail (acr@rowney.com).

sincerely,



A Charles. Rowney, Ph.D., D.WRE., F.EWRI
ACR, LLC

cc: Roy Coley, file

CITY OF MIAMI BEACH SURFACE WATER QUALITY MONITORING PROGRAM REVIEW SEPTEMBER, 2018

Contents

Surface Water Quality Monitoring

Program Review

City of Miami Beach

September, 2018

Executive Summary

This report describes a project that was launched by the City of Miami Beach (City) to develop a scientifically based evaluation of stormwater quality monitoring being conducted by the City at points of discharge (outfalls) and nearby waters. The evaluation was based on an examination of available monitoring data, a field observation of the present stormwater monitoring program, and information provided by City staff.

The existing monitoring program was found to be a useful screening level program, apparently adequate to provide a warning in the event that a substantial (e.g. long term and large) contamination event is experienced. The program is not conducted at a sufficient spatial density to immediately identify all instances of significant contamination, but with several dozen stations located about the City, including locations near stormwater outfalls and locations more removed from those outfalls, it is likely to provide a warning in the event that truly gross and persistent contamination is encountered. It is not reasonably possible to sample all locations at all times, so a perfect warning system is not a reasonable prospect, but the present program is a pragmatic and scientifically defendable approach that provides useful information in a balanced way given the present state of knowledge of the system. In short, the basic characteristics of the program are sound, results are useful, and it is recommended that it be continued and enhanced if a screening program is of continuing interest to the City.

Conduct of the field program was directly observed as a part of this assessment. The field crew that was observed was professional and effective in its actions, professional staff were clearly knowledgeable and intent on using the data to best effect, and the field sampling program over all was found to be well conceived and executed given its role as a screening or warning system.

However, there were some areas where practices could be improved, and a range of enhancements were identified for consideration. These include development of a comprehensive set of Standard Operating Procedures (SOPs) with associated Quality Control elements, encompassing among other things implementation of training standards for staff in the field, increased supervision, and improvements in some specific aspects of field technique.

In addition, recommendations are made for consideration in the event that there is interest in using the data for purposes beyond simple screening/warning functions. Tracking changes over time, for example, would likely best be served by extending and supplementing the current program. Recommendations are made as to refinements to the sampling program which will continue the existing useful monitoring results but better position it for uses beyond basic screening/warning functions.

After the SOPs noted above are developed and implemented, a moderate approach to enhancing the monitoring program is recommended, rather than any immediate dramatic changes. Moderation is suggested for two basic reasons. First, the sampling that has been done has not disclosed a major problem requiring dramatic action. Second, the existing data are not sufficient to confidently suggest what major changes to the program might be indicated. Therefore, a set of initial steps that will significantly improve data and results, while maintaining the essential vision of the present program, is recommended. In the future, if needed, more extensive revisions can be

made on a foundation of better information and more clearly demonstrated need. Of course, if the City develops a need for extended or different data in the short term, a more immediate update to the program may be warranted.

As well as recommendations regarding the conduct of field work, recommendations are made to explore the potential for improved laboratory outcomes; the conduct of the laboratory work carried out to date is not questioned as such, but there may be value in exploring the potential for alternative tests and improved resolution near detection limits.

Once the monitoring program was evaluated in the field, the available data arising from the program were assessed. Despite the limitations discovered during the field component of this assessment, and the screening level nature of the program, it was considered useful to explore the available data to determine if significant trends or other interpretations might emerge. The limited number of available observations made it difficult to demonstrate a cause and effect link between such factors as rainfall and stormwater quality, or to identify causes of observed bacterial concentrations. However some basic information could be developed. For example, a review of the indicator bacteria data suggested the following:

- Statistically, there were few instances where there was reason to conclude that the stations nearest the outfalls differed from those further away. On the contrary, most of the data suggest that there is no statistical difference between these two cases from a cause and effect perspective.

- However, by aggregating data into larger sets, and by partitioning the data effectively, some added indications emerged. Generally, it was determined that in the aggregate, indicator bacteria at stations in close proximity to outfalls do not for the most part behave differently than those further away. There is an apparent increase in excursions from base conditions at locations closer to the outfalls compared to locations further away, but this increase is not universal. This preliminary finding requires further investigation.

- The system for the most part displays water quality characteristics consistent with typical stormwater discharges. Values measured in the field were largely unremarkable from this perspective.

With added data in the future, the present findings may change, and new findings may emerge.

In summary, for the present it seems reasonable to conclude that the available data, interpreted with an understanding of the field procedures employed to date, do not support a conclusion that there is a major difference in behavior during wet and dry periods. Further, the data do not support a conclusion that there is a continuing massive discharge of sanitary flows into this system.

Since the available data are not definitive, it would be appropriate to continue and potentially expand the present program if more concrete statistically defendable conclusions are desired. It is suggested that if monitoring does continue, analyses of the type contained herein should be extended and enhanced as data accumulates. In addition, supplementary monitoring might be indicated if and when the monitoring program begins to define patterns of behavior more certainly than is presently possible. For example, a strategy for targeted sampling at specific catchments is might be suggested for future consideration in cases where a particular outfall is found to discharge objectionable levels of contaminants of interest.

Introduction

This report describes a project that was launched by the City of Miami Beach (City) to develop a scientifically based evaluation of current monitoring practices associated with stormwater quality discharges from the City. Findings include an assessment of the adequacy of present monitoring practices, recommendations as to improvements to monitoring practices that might be considered, and an evaluation of the monitoring data gathered to date.

Approach

This project was carried out in a set of sub-tasks that included review of data provided by the City, site investigations, and analysis, as follows:

Review of Existing Analyses of Monitoring Data:

The City has been gathering water quality monitoring data at numerous stations near points of stormwater discharge, and as City staff have completed some analyses of the data. These analyses were provided by the City, and reviewed as a part of the present evaluation. Initial impressions about the nature of the sampling program were developed based on this content, the conduct of the monitoring program to date was discussed with staff, and a site visit was planned accordingly.

Site Visit:

The site was visited at monitoring locations. With the aid of City staff, sampling locations were visited from the water by means of a boat and crew provided by the City. This was done at a time when sampling was being conducted. Factors relevant to potential sources of contamination were sought, and sampling technique was observed.

Analysis of Existing Data:

The City provided all available water quality data, as well as related meteorological data, obtained in the monitoring program noted above. Those data were examined, with an emphasis on indicator bacteria results, and statistical analyses were employed in an attempt to find meaningful correlations between locations and circumstances prevailing at each sample location. In addition, the data were scanned to determine if a meaningful assessment of positive or negative trends over time could be made.

Interviews:

Discussions were held with City staff to confirm information gained regarding conduct of the monitoring program, to better understand observations made in the field, and to verify related questions that arose as water quality data were examined.

Reporting:

This report was drafted, based on the above site visit, interpretation of data, and information obtained from City staff.

The above series of steps were considered to constitute a useful basis for comment on the monitoring program and present monitoring results; however, wider resources were also available and considered. In particular, in conducting this effort reference was made to a recent report on the adequacy of stormwater control measures at the City (Ref: Stormwater Quality Management Review, City of Miami Beach, 2016). That earlier work included

numerous references and information related to potential sources of stormwater contamination, which constituted a wider knowledge base that was supportive to the present effort.

Over all, it should be noted that the present work was necessarily limited to the interpretation of monitoring data from a program that is in its early stages, and that it cannot be considered to be the final determination of water quality behavior in this system; as time goes on, and added data are obtained, new insights may emerge. The project was not designed to extend or amend any monitoring or stormwater quality plans already in place, or to address questions of engineering design or interpretation. All content developed and communicated in this report is scientifically founded opinion based on information provided to the reviewer supplemented by activity viewed during field observations.

Field Observations

Monitoring Locations and General Observations

The monitoring sites were visited from the water, in a pattern that reflected practices during regular monitoring conducted by City staff with support from PACE. Locations monitored by the City are shown in Figure 1.

General Outfall Observations

All cases observed were on a calm and sunny day with no major rainfall or wind conditions. Although all locations were designated as either 'ambient' or 'outfall' by the City, it was evident that the nature of the outfalls themselves varied considerably from place to place. For reasons related to design, maintenance, and operations, the City outfalls display a range of configurations, and at the time of observation they were affected by a range of temporary operating conditions. Figures 2 through 7, provided by the City, provide a few representative examples of what was observed at the time of the visit. Some general observations are:

- In some cases outfalls were fully submerged, while in others they were fully exposed. This will vary to some extent as affected by tide, but has the potential to impact monitoring results from location to location.
- In some cases, plastic barriers are in place, while in others they are not.
- Some outfalls are pumped, while some are gravity fed (pumping locations were not generally visible during the field visit, but were known to the City and identified as such).
- Active construction in the vicinity of some locations had left significant areas of bare earth and sediment in locations likely to enter the water at or near an outfall.
- Active construction in the vicinity of at least one location included a dewatering pump which discharged in the immediate vicinity of an outfall.
- Watercraft and moorings were adjacent to some outfalls, but were absent or less marked in others.
- Land uses near the points of outfall varied, including grassed areas, slip ways, urban construction, roadways, and so on.

In addition, it was noted that there were apparent outfall pipes (with active discharge observed) that were not among the City stormwater discharges of interest in this project but that nevertheless do, or could, contribute flows to the receiving water system. Over all, it was clear that there is a substantial possibility of variations in monitoring results as a function of the variations in conditions that prevail at each outfall location. The variability observed in outfall characteristics is a common fact of life in coastal environments, since needs and constraints vary from place to place and from time to time, so this observation should not be construed as a negative reflection on City practices. It is, however, a factor that complicates implementation of a comprehensive and consistent monitoring program.

Figure 1 City Monitoring Locations

Figure 2: Submerged outfall

Figure 3: Outfall below grassed right-of-way

Figure 4: Watercraft dockage near outfall

Figure 5: Rip-rap energy dissipation near outfall

Figure 6: Outfall below construction with open soil surface

Figure 7: Outfall with active dewatering under way during sampling

Monitoring Procedures

The monitoring crew which was present at the time of the field observations carried out in this review were visibly experienced in working together and were professional in their conduct. They worked smoothly and efficiently together, and there seemed to be no moments where activities were new, or unusual, or unpracticed. This comfort with established process is a desirable indicator for two major reasons. One is that it suggests that what was observed was indeed what is normally done; steps had been taken to minimize the likelihood that the crew would feel the added participants constituted a performance review, for exactly this reason. The other is that it suggests that the monitoring is carried out in a way that is consistent over time, which is fundamental to obtaining meaningful results in the long term.

It was also noted that there was no sense of a merely perfunctory attention to the monitoring process. Crew members were attentive, observant of each other's actions, and in vocal contact as they each played their part. Each person had a defined set of activities to fulfil, and they seemed to expect each other to follow a sequence of established patterns as samples were taken and results recorded. Field notes were legible and entered with evident care. It seemed apparent that the monitoring process had not degraded into a rote activity, which is a risk in prolonged programs of this type.

It was not visible that there was a crew chief, although each member carried out their functions in harmony and no intervention was required during the period where operations were observed. How decisions would be made in the event of an anomalous procedural outcome is therefore not known. In terms of boat discipline, however, the operator was clearly in charge and potentially might fill a leadership role in a broader context if needed.

Boat handling itself was masterful, with minimal wake, careful attention to rules of the waterway, and an efficient approach to and departure from each monitoring location. The boat was a highly effective and stable working

platform, and clearly able to support operations in conditions much more adverse than were experienced during this field program. Although not within the scope of this investigation, it is noted that the boat was in good order, with safety devices apparently correct and in place, which speaks in part to the professional foundation of the field activity over all.

Sample labeling and sampling in the field appeared to be consistent with effective practices, with little likelihood of inadvertent mixups between samples or use of inappropriate sample containers. It must be recognized, however, that lab prep prior to field sampling, and transport and analysis after sampling, were not reviewed in the course of this project and cannot therefore be confirmed as adequate for purpose.

One facet of the team composition that was unexpected is that there seemed to be a gap in formal training. The individual doing the actual sampling was very consistent from instance to instance, and evidently intent on effective sampling in each case. However, when questioned, it was determined that the individual had had no formal training, but had been allocated to the crew at one point and had learned by observation bit by bit on the job. The individual in question was seen as a positive, professional, and effective crew member, but the apparent lack of formal training raises questions, not answerable at this time, about the efficacy of SOPs and QC measures guiding the monitoring program. Subsequent discussions with the City suggest that the person doing this aspect of the field work was not formally tasked with this function but was attempting to contribute to the program in an effective way; if so, and if this contribution is to be continued, a formal shift in training and preparation should be considered. If, however, this allocation of resources is not what was anticipated by the City, then it appears a major function is not being fulfilled by whoever was expected to undertake it. Resolution of this point is unclear at the time of writing.

Taken together, the review of field procedures suggests that the program is in most ways appropriate for a screening program which is in place to identify gross excursions of common water quality indicators.

The points of detail below outline factors that should be reviewed and perhaps adjusted, particularly if the monitoring data being gathered might be used at some point in the future for wider purposes than a general screening program.

Factor: Sample location consistency

Explanation

- In some cases, sampling was done immediately in front of an outfall, while in others it was offset by a few feet. Since the potential to sample directly from the outfall itself apparently exists, the reason for this variable designation of location is unknown.

Significance

- If the intent is that monitoring is only intended to provide a gross indicator of conditions in the general vicinity of an outfall, this is not necessarily a major problem. However, the shift in position relative to the outfall itself raises the possibility of sampling a mix of outfall flow and ambient flow, or missing an outfall plume altogether. This raises a question as to what exactly was being sampled in those stations identified as ‘outfall’. It is less of an issue in those stations identified as ‘ambient’.
- For someone attempting to analyze monitoring results, this undocumented variability in orientation relative to the outfall pipes constitutes an uncertainty in the meaning of a particular sample that could materially interfere with the ability to interpret monitoring data.

Factor: Sample recovery

Explanation

- In all cases, the sample recovery was taken by lowering a container into the water and allowing flow from the top inch or so of water to flow into the container.

Significance

- This factor means that surface skimming was generally what was being sampled. With a submerged outfall, particularly where temperature gradients might be significant, or where wind conditions might materially affect the top of the water column, this is a practice that could have the sample less reflective of what is coming out of the outfall, and more indicative of local conditions affected by wind and sunlight.

Factor: Sample cross-contamination

Explanation

- Between samples, the container was seldom rinsed in even a perfunctory way. It was generally emptied after sampling, and then dropped into the boat. It was then picked up and used for the next sample without substantial agitation or cleaning.

Significance

- When measuring such things as nutrients, this practice is probably of more theoretical interest than practical impact. However, when sampling bacteria, or (for example) perhaps when moving from a high turbidity location to a low turbidity location, it could have a consequence of 'blurring' results between one location and the next.

Factor: Sample equipment handling

Explanation

- It was observed that the sample container was at times picked up with the user putting fingers inside the vessel and a thumb outside.
- Particularly when sampling bacteria, and when not otherwise rinsing or cleaning the sampling apparatus between samples, this kind of handling of the container invites false positives arising from contamination not related to local waterway conditions.

Factor: Sediment resuspension

Explanation

- It was observed that in some locations, the propeller on the boat used was close enough to the bottom to mobilize significant visible quantities of sediment, despite care and attention by the operator to reduce or eliminate this effect.

Significance

- This resuspension, if sufficient to reach the surface (it was apparent but unproven that this was the case) could in effect have samples in such a case reflect whatever accumulated on the bottom, not what was discharged from the outfall.

Factor: Sample event selection

Explanation

- It was explained by the team that sampling excursions were planned for a particular sampling date in the future based on calendar availability. There has been no attempt to sample immediately after rainfall events.

Significance

- Lack of a conscious effort to sample during or immediately after rainfall events could be viewed as insignificant in the sense that it is a semi-random way to schedule a sampling event. However, it sharply reduces the opportunity to sample discharge conditions truly representative of a storm. In the very long term, it will probably be possible to estimate post event conditions that are randomly sampled according to the existing protocol, but it will make it a much less efficient process when it comes to determining what happens as a result of storm events.

Factor: Sample event exclusion

Explanation

- In cases where there is a significant rain/thunder/lightning condition, samples are not taken.

Significance

- This is a prudent safety factor. However, it further reduces the opportunity to gather data indicative of storm event conditions and therefore imposes a bias in the data. Auto-sampling, or a commitment to sampling immediately after the weather clears, would reduce this bias. It is not quantitatively known how often wet weather exclusion has been a factor in the past, but it should be avoided if possible in the future.

Factor: Sample sequence timing bias

Explanation

- During discussions with the crew, it was learned that sampling generally (but not perfectly) takes the same pattern each time the crew is deployed. There was a tendency to sample at one end of the system and efficiently work forward from there. The start and end times for each sampling episode were apparently reasonably consistent from instance to instance.

Significance

- Since this is a tidal system, and since sunlight intensity varies during the day, this raises the possibility of inserting a systematic bias into results because sampling at a given location will exhibit a correlation with tidal phase and time of day at different times of the cycle. Also, it suggests that a different crew with a different sampling sequence might inadvertently insert a counter-bias. Consideration should be given to evaluating sample patterns in ways that specifically address the potential of an internal bias based on timing.

Factor: Minimal record keeping during sampling

Explanation

- During sampling, a variety of conditions may be present which could affect results.
    - As shown in figure 7, there may be de-watering under way from activity in the catchment.
    - In some cases plastic silt barriers are in place, in some cases they are not, and in some cases they have failed.
    - There may be maintenance activity at the capture tanks above some of the outfalls.

None of these factors, or other observable factors that might affect water quality, are recorded by the sampling crew.

Significance

- The disturbances identified above, and others (observed waterfowl, marine activity, etc.) have the potential to affect water quality, some of them very significantly. It is a resonable prospect to train crews to identify and record such instances, and such information could be very helpful in interpreting anomalous monitoring results after the fact. A simple photograph of each site at the time of sampling could add to the ability to understand results. It might also make it easier to detect variations in sampling technique from person to person or from time to time during future reviews of the data and monitoring program.

Factor: Sample location resolution

Explanation

- Navigation to each sample point was essentially by visual position estimation. Known points on the shore or nearby were used to establish location along the shore, and visual estimates were used to establish position outward from the shore. Quantitative navigational aids were not observed in use for sample point station keeping, and questioning of the crew suggests that visual reference points are the basis for navigation.
- In some cases, the boat was noted to drift significantly while samples were being taken. In one case, a drift of about 40-50 feet was observed between the time a physical sample was taken, and the time an in-situ probe was read.

Significance

- From a larger perspective, approximating location as has been done might be adequate. As a gross indicator of major events, the lack of a tight definition of known sample location might be acceptable. However, if the data are eventually to be interpreted for modeling or cause/effect assessments, this 'fuzzy' approach to location could easily become problematic. The degree to which this matters is quite case specific. In one case, when the so-called ambient location was substantially off shore and in an open channel area, 50 feet or so might be insignificant. In another case, for example while sampling in a boat docking area where 50 feet was a substantial proportion of the distance to the outfall, or where other physical factors vary over short scales, it may not be. Either way, with location varying substantially during actual sampling, it can be interpreted that more than one point is actually being measured.
- If more than one person does the navigating, the question of interpretive consistency becomes material. It is likely that without quantitative direction, or a long and careful overlap so that a consensus on location is obtained, results developed by one person might reflect a consistently different set of locations from another.
- In any case, it is concluded that actual sample location varies from instance to instance, and that this variability needs to be acknowledged as a part of the monitoring data record keeping.

General Conclusions and Recommendations Regarding the Existing Field Monitoring Program

The overall conclusion gleaned from observation of the monitoring program techniques is that the results are able to deliver a screening level of understanding that there is or is not an episode of gross contamination at the times and places sampled. While the resolution is not fine enough to detect every possible instance of a high exceedance of desirable water quality parameter limits across the extent of the receiving water body, the sampling as it stands appeared to be a reasonable way to track conditions and detect major excursions. There is some likelihood of a false positive from time to time for bacteria, arising from the techniques employed, but there is only a limited chance of a

false negative at the times and locations sampled. It is noted that the approach used might be considered to be inherently conservative method as a result.

Even if the present sampling program is to be supplemented by an expanded or more sophisticated approach, consideration should be given to maintaining it. It is sound in concept and has value in its own right.

Nevertheless, there are several things which should be considered from the perspective of preferred practice.

- If the present general approach to sampling is to be maintained, an alternative nomenclature to 'outfall' and 'ambient' should be considered to avoid confusion or inadvertent misrepresentation of results, and this nomenclature should be fully defined. For example, the stations presently termed 'outfall' might better be termed 'close proximity to outfall' and this new term might be defined as 'within a 15 foot (*estimated for purposes of this report*) radius of the outfall termination point'.
- A written SOP should be devised which formally specifies locations, techniques, QC requirements, and other details of sampling. This is a substantial task but is a necessary co-requisite to this kind of monitoring program. The SOP should include:
    - specific attention to recording observed factors or conditions that might affect water quality, such as the construction and dewatering examples that were observed in this case,
    - protocols for sample container refreshing between sample instances,
    - stated positioning requirements, including positive mechanisms to ensure different crews obtain similar results,
    - reconciliation of duplicate vs split sample techniques (uncertainty exists on the point in the present sampling), and
    - attention to standard QC elements characteristic of this kind of sampling program (there are established protocols for most of the elements of this program).
- Staff should be trained and confirmed fit for purpose before they are allocated to sampling. This training should include a thorough familiarity with the SOP.
- Periodic QC checks of sampling should be implemented, not because of doubts in the crew but because of the inherent need to verify technique in programs of this type. Annual refresher training should be considered.
- Consideration might be given to supplementing the outboard motor on the sampling craft with a trolling motor so that shallow locations can be approached with minimal chance of bottom sediment disturbance.
- If more than one crew is mobilized, periodic cross-appointments should be considered so as to surface possible differences in practice between crews.
- The striking professional motivation of the crew observed in this review should be respected and preserved with careful management, as it is largely attitude that translates an SOP into reality. The starting point in this case is strong, and a good place to build from.

Other aspects that should be considered, particularly if the results of the monitoring are to be used to track progressive changes over time, cause and effect, or other water quality behavior beyond a screening function, are:

- Consider a mechanism to directly sample from the outfall pipe itself. Even though exchange with the surrounding water will be a reality due to tidal swings, this will lead to a better understanding of true outfall contributions. For example, a tube driven by a peristaltic pump might be an effective option (provided suitable purging is implemented) and other techniques are available. It may be that sampling at the most immediate upstream junction is possible, and could be accomplished even in adverse weather conditions.
- Consider implementing a closer positioning protocol, so that a single and repeatable sample point is truly obtained.
- Consider definition of timing for successive sampling episode sequences (potentially a rotating sequence) to better account for periodic phenomena in the receiving system.

- As well as continuing to sample during dry weather, consider improvements leading to better capture of wet weather conditions. Internalizing field sampling by the City so that wet weather events can be reliability captured, or contracting with the current provider in a way that enables sampling immediately after (if not during) storm events, are two options that could lead to a better understanding of stormwater discharge contributions. This stronger discrimination of wet weather conditions could be done as a separate exercise from the screening program, and it could potentially be discontinued once a sufficient understanding of stormwater discharges is obtained.
- Consider adjusting sample points or sampling frequency according to potential contributing land uses and/or likely contaminant sources. There is significant variability in and around the extent of the City, and it is reasonable to consider this in refining sampling strategy.

It is noted that in this technical area, there are a vast number of field techniques that can add understanding to the complex set of factors that govern water quality in the receiving system. These include such things as dye studies, tracers, more complex parameter sets, and even quantitative modeling of transport and ecosystem response. These are not considered responsive to the immediate need as defined for the present assessment. The above list of suggested improvements are all intended to provide improvements in quality and dependability, leading to better and more useful results, without a massive upscale in level of effort.

A moderate approach is suggested for two reasons. First, the existing monitoring has not (as is discussed in the chapters below) disclosed that there is a massive problem to remedy. Second, the existing data do not provide enough information to confidently design a major monitoring program. Until one or both of these conditions is encountered, or until needs of the City change, it is suggested that a prudent and step by step approach is indicated. The set of suggested improvements outlined above constitute such an approach.

Examination of Existing Data

The available data were assessed by a two step evaluation process. First, time series plots and synoptic data for all parameters at all stations were examined in the form of results obtained by City staff. Second, a deeper examination of parameters of interest was conducted, focused on indicator bacteria because of current questions as to potential sanitary discharges. It is noted that the data do not suggest that major sanitary discharges are a present issue, but that this second step was undertaken to determine to the extent possible what can be learned about indicator bacteria behavior in this system given the interest in this subject. Throughout this discussion, it should be noted that the screening level program which is in place, particularly given the early stage of data gathering, is not necessarily a preferred basis for interpretations beyond the immediate use as an indicator of emerging adverse conditions.

Review of Synoptic Data and Charts Made Available by the City

Parameters considered included:

- Fecal coliforms
- Enterococcus
- pH
- NH3
- Salinity
- Specific Conductance
- Dissolved Oxygen
- Total Kjeldahl Nitrogen
- Nitrate plus Nitrite

- Total Phosphorus
- Turbidity

Data and images made available by the City will not be appended to this report, but are available from City sources.

Over all, the available data demonstrate variability over the course of the year. There are instances where the data do suggest some variability in behavior between sites, but statistical tests show that for the most part, the available data are not numerous enough that, when partitioned, confident statements can be made as to the differences between locations or conditions. This limitation does not reflect an inadequacy in the monitoring program. It is a consequence of a short monitoring period, multiple cause and effect mechanisms, and limited sample density.

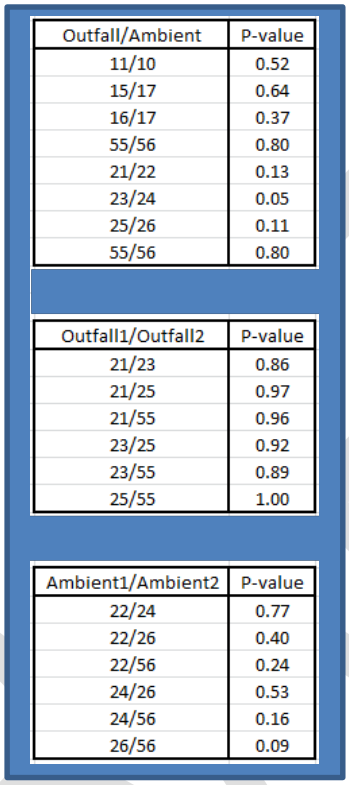
For example, an attempt to assess results in terms of precipitation, which is a major candidate cause of water quality impairment, was statistically undefendable because of the limited number of sample cases clearly associated with rainfall cases. There are few instances where the time lapse between a rainfall event is small enough that the sample can be considered reflective of rainfall conditions. Similar limitations exist with the other parameters. Temperature and salinity vary substantially due to the natural mixing processes in this type of water body, and the chosen sampling methods do not lend themselves to a useful cause and effect evaluation of presence or association with stormwater events. The Nitrogen and Phosphorus species do have short term implications (for example NH3 as a directly toxic constituent) but express themselves in the long term as the nutrient cycle proceeds and a series of complex reactions with biological intermediaries take place. Dissolved oxygen may differ in stormwater and the receiving water, but the surface skimming approach to sampling which has been used makes it difficult or impossible to attribute what is measured to an outfall discharge or to simple reaeration near the surface. It is tempting to present the data none the less, but as the statistical underpinnings are limited, this is a potentially misleading course to take. The underlying causes for this results are discussed in the evaluation of the sampling program provided above. The sampling procedures, for reasons of design and safety, do not reliably occur during periods representative of stormwater discharges except incidentally, and the screening/warning nature of the sampling does not lend itself to cause and effect analysis. With the present sampling program, it will take time for the data base to accumulate substantial numbers of events associated with rainfall. Recommendations have been made to enhance the data base by adjusting the monitoring program if a quicker resolution of this issue is desired. With alternative sampling strategies and SOPs in place, it should be possible to relatively quickly identify stormwater discharges which contribute significant quantities of contaminants of interest.

In the mean time, the overall finding from the data that are available is still a useful one. There are indications of perturbations in the parameters measured from time to time, and some areas where there may be a difference between samples in the near vicinity of outfalls vs conditions further away; however, the clearest outcome is that there is no substantial support for a finding that there is a continuing instance of large discharges of raw sewage into the stormwater system. This result is consistent with the intent of the monitoring program, and inherently effective in that context.

Evaluation of Indicator Bacteria Records

The parameter of most interest in this instance is fecal coliforms (FC). The reality of indicator bacteria survival in the environment is a highly complex and evolving field and will not be explored further in this document, but for present purposes it is noted that FC are the first choice for exploration in this case in part due to the greater likelihood that FC in a sample gathered as a part of the present program reflects recent conditions more effectively. There are still many potential contributing sources of FC, and the elimination of FC due to natural processes (die-off) is still a complex result of many factors, so this remains a complex and difficult problem to assess. Nevertheless, some basic conclusions can be gleaned from the available data.

The first step in assessing the data was to explore the statistical behavior of the available records. Over all, there was little support for the hypothesis that there is a statistical difference between the stations in close proximity to outfalls and those further away. The figure below illustrates this outcome for a set of stations in the south-west quadrant of the system. It is noted that this set displayed the greatest potential differences between so-called 'outfall' and 'ambient' stations; extensive testing elsewhere tended to produce much worse results.



Outfall/Ambient	P-value
11/10	0.52
15/17	0.64
16/17	0.37
55/56	0.80
21/22	0.13
23/24	0.05
25/26	0.11
55/56	0.80

Outfall1/Outfall2	P-value
21/23	0.86
21/25	0.97
21/55	0.96
23/25	0.92
23/55	0.89
25/55	1.00

Ambient1/Ambient2	P-value
22/24	0.77
22/26	0.40
22/56	0.24
24/26	0.53
24/56	0.16
26/56	0.09

Figure 8: P-Values associated with various sample site pairs

As shown, in the first set of pairings, only one of the data sets showed a significant difference at a 5% level, which was marginal, namely stations 23 and 24. Examining the underlying data shows that this difference is statistically reasonable, as there is an apparent factor differentiating the two; the limited numbers of observations, and the significant variations in values, are the reason that the difference is found to be significant but statistically not as strong as it might be. None of the other stations, however, show such a difference. Station 25 and 26, for example, not only fail the statistical test, but an examination of the data shows that the difference which is present is largely due to a few outliers and that part of the data shows one station higher and part of the data shows the other station higher. So there is poor support when considering station pairs (nominally 'outfall' and 'ambient' pairs) to accept the conclusion that there is a difference between outfall stations and ambient stations.

This raised an option for consideration. Another way to view the data is that there are two sets, namely one representative of outfalls, and one representative of ambient conditions. It is physically reasonable to pursue this line of exploration. The second two tables in figure 8 provide added support. None of the permutations of the ambient and outfall stations considered were different enough to reject the notion that they were statistically

unrelated; or in more conversational language, none of the pairs were proven to be different. Hence, there is conceptual as well as statistical support for aggregating outfall and ambient stations, and comparing the results.

It is acknowledged that there are a number of statistical questions raised by this approach, but as noted above it has the virtue that it enables comparison of the data in terms of two basic groups, which might be thought of as 'discharge dominated' and 'receiving system dominated'.

To evaluate this data set, two sets of stations were aggregated.

Ambient	Outfall
22	21
24	23
26	25
28	27
30	29
32	31
34	33
36	35
38	37
40	39
63	62

Figure 9: Groups aggregated as outfall or ambient representatives

These were stations in the general south-west of the area, and were considered to have enough physical similarity to support this aggregation. The result was two sets of 221 readings per group, considerably more significant than the 20 or so readings available in each individual station.

The test which was then performed showed that the groups could be taken as statistically different at a 5% level (P close to 0). A plot of the frequency of the two sets of data appears in figure 10 below.

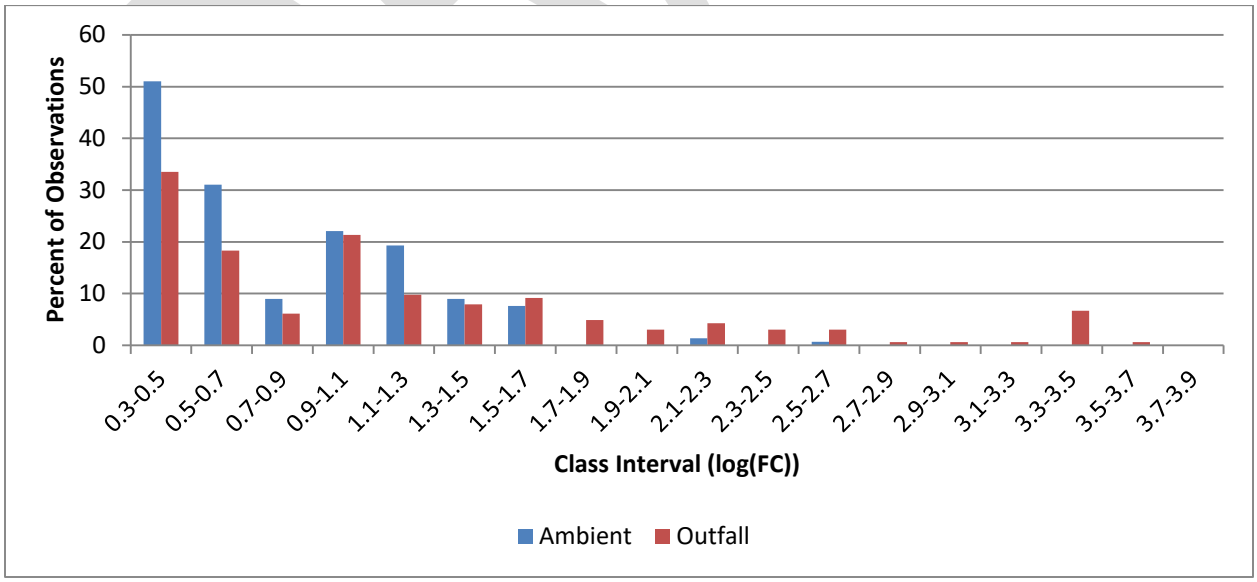


Figure 10: Frequency of FC Readings in Class Intervals

The results suggest that the records in close proximity to outfalls may tend to be higher, more often, than those somewhat removed from outfalls. Given the short duration of the sample set this is not an unequivocal result, but it is at least intuitively reasonable. It is notable that the highest values in this chart (equivalent to about 20,000 no/dL) are consistent with stormwater discharges and well below what might be expected from significant sanitary system discharges.

An interesting element of this graph is that it suggests that the reason for the difference between the two groups is mostly associated with higher values (50 no/dL, about 1.7 on the above graph). This suggestion led to a secondary analysis. The data were split into two groups, one at and below 50 no/dL, the other greater than 50 no/dL). The result is shown below. The data are not statistically distinguishable at a 5% level (P=.31).

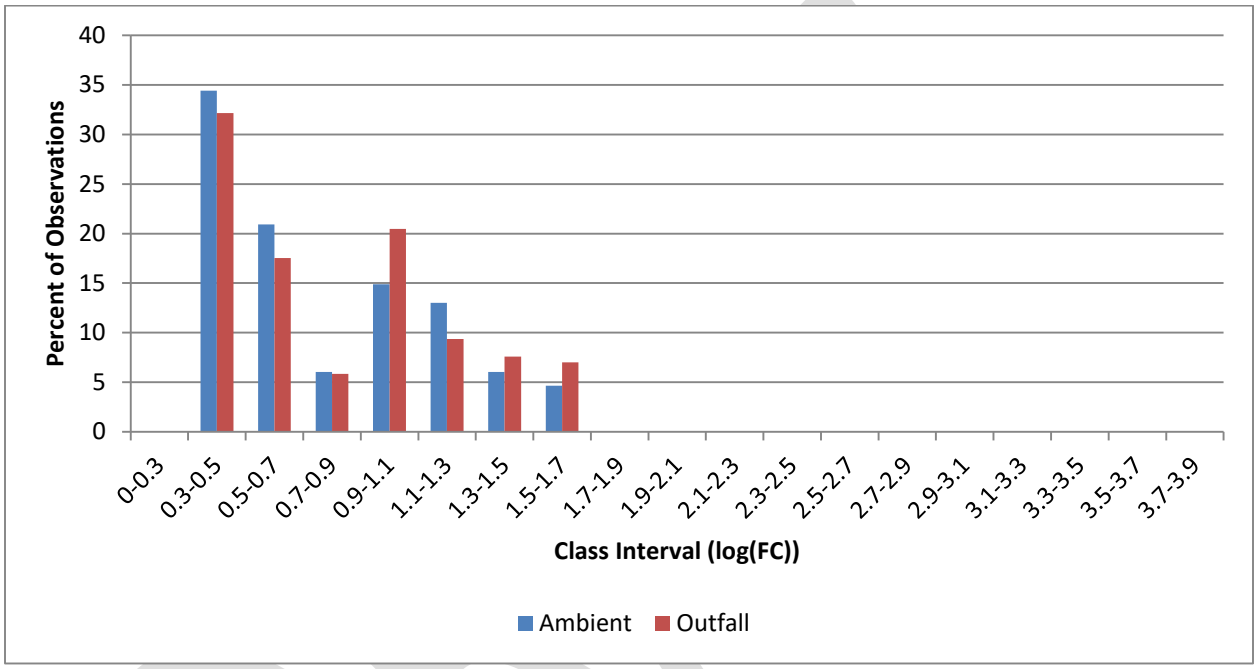


Figure 11: Frequency of FC Readings in Class Intervals,
Data Limited to instances <50 no/dL)

As shown, when the data are partitioned to reflect conditions below 50 no/dL, there is little difference between them. In three intervals, ambient is clearly higher, in three intervals outfall is clearly higher, and in one interval there is a marginal difference in favor of ambient being higher.

Enterococcus was not considered to be a preferred candidate for deeper analysis, it was considered reasonable to assess the data in a manner comparable to what was done with FC for the sake of completeness and comparison. In this case, a close examination of the underlying data showed that both the ambient and outfall stations displayed a large number of values which appeared to be compromised by lower detection limits. Consequently, the data were partitioned to eliminate these values. With that done, the results shown in Figure 12 emerged. In this case, the data nearer the outlet were found to be statistically indistinguishable from the data farther from the outlets. Figure 12 supports this interpretation, in that there appears to be an essentially random tendency for either case (ambient or outfall) to dominate any particular class interval.

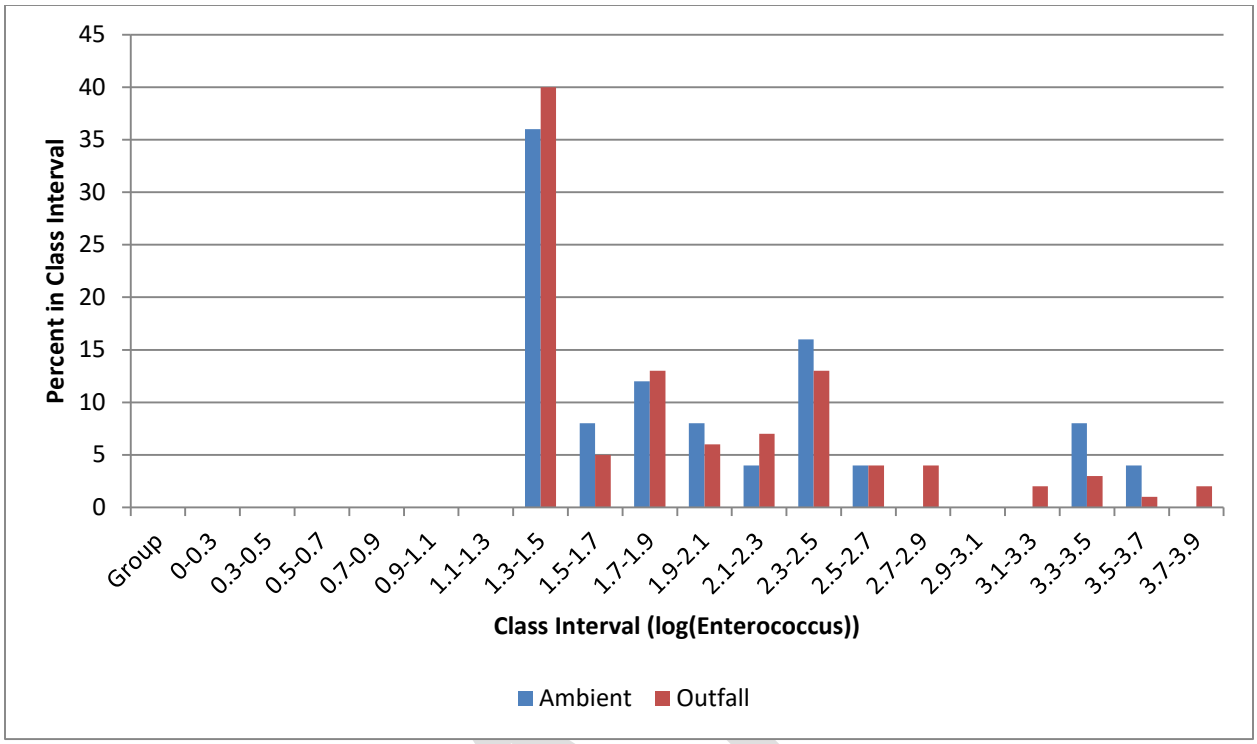


Figure 12: Frequency of Enterococcus Readings in Class Intervals

General Conclusions and Recommendations Regarding Available Data and Laboratory Results

A reasonable interpretation of these results is that the two populations (stations in close proximity to outfalls, and stations further away) behave in ways that are essentially the same, except for instances where the stations in close proximity to the outfalls may show somewhat lower excursions compared to those further away. As noted, these excursions do not tend to extend outside the bounds of what might be expected in stormwater, and tend to be well below levels indicative of substantial sanitary system contributions. Beyond that, however, the data are not adequate to support a meaningful cause/effect interpretation and are marginal in their ability to reflect system state.

Some improvements to the existing program can be considered:

- While the laboratory analyses carried out in support of the monitoring conducted in this assessment are assumed to be effective, it is suggested that there may be benefits to considering some adjustments to the program.
    - One is that there should be a discussion with the laboratory to evaluate the potential for improved results by specifying different analyses; this may resolve the apparent frequency of questionable results near the end of the analytical scales employed.
    - Another is that there is merit in considering, at least for some period of time, use of more advanced techniques to develop a refined data set better indicative of the likely sources and causes of contamination.
- It is clear that a wide range of statistics and other analytical tools could be further employed using these data. Among other things, the class intervals could be re-defined, partitioning could be re-visited, and alternative tests of significance employed. However, the limitations in data gathering noted above, and the

limitations in the ability to retain statistically significant sample sets with further partitioning of data, both indicate that the present analysis is a reasonable result for the present.
    - It is suggested that as further data accumulate, the present results can be reviewed, and further analyses attempted to add support or to refute the conclusions and interpretations herein.
    - In particular, an attempt may be made to explore excursions (high values) in association with stormwater events.
    - The 'near miss' nature of paired station comparisons in the south-west quadrant suggests that with more data, more convincing interpretations of similarities and differences may emerge. This could be considered in the future as well.
- It is likely that if the enhancements suggested in this assessment are implemented, particularly in terms of better resolving actual outfall contributions, distinct differences in outfall discharges will emerge. These may be elusive to track. In such a situation, an enhanced testing element may prove to be useful (along with more specific laboratory analyses noted above). On a targeted basis, measurement of surface inflows to the conveyance system, together with selected measurements along the system, may make it possible to infer contaminant locations and types, and therefore zero in on specific contaminant sources. This kind of expansion should be considered if and when elevated contaminant concentrations are reliably encountered at specific discharge points.

Finally, for the present, it seems reasonable to conclude that the available data, interpreted in light of the field procedures employed, do not support the notion that there is a major difference in behavior during wet and dry periods, and do suggest that there is no support for the contention that a continuing massive discharge of sanitary flows is present in this system.

Throughout the foregoing discussion, it should be recognized that the monitoring program presently in place is a screening program, and that the use of the data for wider purposes brings with it a range of questions of intent and applicability.

Causes of Elevated Parameters in Stormwater Discharges

As noted throughout the foregoing text, present data do not support an analytical approach to evaluating contributing sources of contaminants. However, the problem at hand is by no means new or unique. It is clear, based on direct observations and on discussions with City staff, that a common range of potential contributors to undesirable discharges are present in this system. For indicator bacteria and many other sources these include:

- parks and greenways
- blueways (at road and bridge crossings)
- dog walkers (apparent commercial and private activity)
- residents (including homeless traffic, and potential illegal residential and/or industrial discharges)
- improper connections (cross connections)
- construction sites and/or unprotected soil surfaces
- waste pile storage and transfer points
- dog waste and trash receptacles in park areas
- formal and managed marine craft mooring areas
- ad hoc marine craft mooring zones
- beaches, dunes and associated vegetative cover areas
- other anthropogenic sources (grease traps, sanitary sewer overflows)

For other contaminants, and to some degree for nutrients and indicator bacteria, other land surfaces (roof tops, parking areas, roadways, urban surfaces etc.) all play their parts.

Some of these candidate sources raise the specter of direct human contamination, some are associated with wildlife (particularly avian, feline or canine sources), and some with other anthropogenic or other activities. The Stormwater Master Plan already in place addresses most of these, and the recent Stormwater Report Card provides a current update to practices followed by the City.

The City is clearly aware of these potential issues and working to eliminate problematic areas; this should be continued and encouraged. In addition, however, it is noted that the monitoring program has the potential to substantially improve the efficacy of measures targeting the above list. If receiving water consequences can be interpreted in terms of specific sources, it becomes reasonable to prioritize remediation efforts in favor of those sources. For this reason, the extensions and improvements in monitoring that are discussed in this report are recommended, not just as improvements in their own right, but as direct ways to more effectively eliminate problem areas within the control of the City.

MIAMIBEACH

COMMITTEE MEMORANDUM

TO: Sustainability Resiliency Committee Meeting

FROM: Jimmy L. Morales, City Manager

DATE: September 26, 2018

SUBJECT: **DISCUSSION OF THE BUSINESS CASE ANALYSIS FOR THE STORWATER PROGRAM**

RESPONSIBLE DEPARTMENT:
Amy Knowles, Deputy Resiliency Officer

SPONSORED:
City Manager's Office

BACKGROUND:
At the January 2017 Sustainability and Resiliency Committee, during the Resilience Strategy Work Plan monthly update, Commissioner Arriola and other the four additional Commissioners present discussed the need for and requested a data-based business case study of our stormwater resilience program. Staff consulted with the 100 Resilient Cities network who were quite intrigued with our complex question. The Network connected us to several subject matters experts, who found this study at the edge of their traditional work, however one firm felt the analysis was feasible.

At the April 2017 SRC, a letter outlining the firm's approach was presented to the Sustainability and Resilience Committee, and staff worked to finalize this with legal. In July 2017, however, the item was brought back to SRC to advise that legal matters could not be resolved. Staff received support to competitively solicit for this solution to test the market, different scenarios and price to seek the best product for the City of Miami Beach.

A competitive process was conducted, and on February 14, 2018, the City Commission accepted the recommendation of the City Manager pursuant to request for qualifications (RFQ) No. RFQ 2017-3000-KB for a Business Case Analysis of the City of Miami Beach Stormwater Program. The City has since negotiated a contract with ICF Incorporated, LLC, as the top ranked proposer. The City also established a pool of qualified contractors.

Analysis
The Business Case Analysis is a complex project and has taken quite a bit of time to develop the recommended scope of services with the consultant team and staff. While reports have been published noting the South Florida risk to sea level rise, analysis to assess the benefits of our adaptation is new. As a 'first of a kind' analysis, staff has worked through multiple (five) draft proposals, with extensive discussions about the tasks, scenarios, data needs and analysis, and geographic study area. We have worked to fine-tune the ways to approach this, from risk analysis to stormwater modelling, to private property adaptation approaches.

ICF has assembled a multidisciplinary team, including AIR Worldwide, Brizaga, Kimley Horn and FAU – to provide expertise in economics, property values, risk management, science, engineering and communications. Multiple departments have been engaged with developing the tasks, including the Chief and Deputy Resilience Officers, the Assistant City Manager and City Engineer for Public Works, the Chief Financial Officer, and the Risk Manager. This item has been discussed at the routine staff READY Team meeting.

In the RFQ, the business case study scope included "economic analysis(es) of the value of our risk reduction investments to address flooding and sea level rise. This analysis should explain the risk cost of inaction (in dollar terms) and the extent to which the risk cost is likely to be reduced as a result of the city's infrastructure investments (also in dollar terms). The work may consider the complex relationship and impact(s) among City investments (that reduce risk to flooding and sea level rise) to the City's property tax base, flood insurance, real estate market and financial mortgage cycles, and City credit ratings, land use issues, or any other factor that may be pertinent to the work".

The primary audience for this analysis is City decision-makers (including city managers and elected officials). Secondary audiences include the general public, community organizations, credit rating agencies, insurers, and others interested in the long-term resilience of Miami Beach. The outcome of this project will be compelling, concise communication materials for City decision-makers articulating the business case for resilience investments, backed by a robust technical analysis incorporating integrated flood modeling and economic analysis. In addition, this project will produce a replicable methodology that can be scaled and used to support future decision-making. The economic analysis is designed to capture a wide range of the costs and benefits of resilience investments. The full draft proposal is attached.

The preliminary limits of the modeled area will be between 1st Street and South Pointe Drive, West of Washington Avenue to the western coastline. This area was selected due to its mix of property use types. The scope of work includes the following step-by-step approach:

Stage 1: Kick Off
- Task 1. User Engagement and Data Collection

Stage 2: Determine Effectiveness of Resilience Investments
- Task 2. Citywide SLR and Storm Surge Risk Modeling
- Task 3. Integrated Flood Modeling (Neighborhood-scale)
- Task 4. Determine Property Value Impacts

Stage 3: Build Business Case for Resilience Investments
- Task 5. Build Individual Property Business Case
- Task 6. Build Neighborhood Business Case
- Task 7. Build City-wide Business Case

Stage 4: Communicate Results
- Task 8. Communication Materials

The deliverable for this work includes a cost/ benefit analysis of multiple scenarios, including a single family home, a neighborhood, and then a citywide analysis. The analysis would include four-storm event types, with no action, with public infrastructure investment, and low, medium, and high cost of private adaptation investment. The initial, highest end cost estimate for this work was $1,595,000. After many meetings and calls to define the scope, the proposed cost for the above tasks is now $395,000. The timeline to complete the full analysis is 12-months. If the Committee would like to proceed, funding will need to be identified, as it is not currently budgeted.

CONCLUSION:

The administration seeks discussion and feedback on the business case proposal. If the Committee

would like to proceed, the item will be forwarded to the October 17, 2018 City Commission Agenda. This could be a great tool for us to talk to our residents and businesses about the value of our programs; show other cities the value of this investment cycle; and communicate true risk and risk reduction efforts to banks and the insurance industry. While this proposal may not answer all the questions generated by this complex issue, it should provide valuable insight.

ATTACHMENTS:

	Description	Type
🗋	Attachment A: ICF Scope of Work	Other

Draft Pilot Project
Scope of Work

City of Miami Beach

Business Case Analysis for the City of Miami Beach Stormwater Resiliency Program

RFQ 2017-300-KB

September 20, 2018

ICF

1. PURPOSE AND VISION

The City of Miami Beach is seeking to understand and demonstrate the business case for resilience investments. This project will help the City pilot-test an approach on a limited geographic scope, starting with the First Street neighborhood, that could eventually be scaled up citywide.

To further focus the analysis, we propose to define the primary audience for this analysis as City decision-makers (including city managers and elected officials). Secondary audiences include the general public, community organizations, credit rating agencies, insurers, and others interested in the long-term resilience of Miami Beach.

The outcome of this project will be compelling, concise communication materials for City decision-makers articulating the business case for resilience investments, backed by a robust technical analysis incorporating integrated flood modeling and economic analysis. In addition, this project will produce a replicable methodology that can be scaled and used to support future decision-making. The economic analysis is designed to capture a wide range of the costs and benefits of resilience investments.

The scope of work below outlines a step-by-step approach to achieve these objectives, organized as follows:

- **Stage 1: Kick Off**
  - Task 1. User Engagement and Data Collection
- **Stage 2: Determine Effectiveness of Resilience Investments**
  - Task 2. Citywide SLR and Storm Surge Risk Modeling
  - Task 3. Integrated Flood Modeling (Neighborhood-scale)
  - Task 4. Determine Property Value Impacts
- **Stage 3: Build Business Case for Resilience Investments**
  - Task 5. Build Individual Property Business Case
  - Task 6. Build Neighborhood Business Case
  - Task 7. Build City-wide Business Case
- **Stage 4: Communicate Results**
  - Task 8. Communication Materials

2. SCOPE OF WORK

Stage 1: Kickoff

Task 1 User Engagement and Data Collection

Purpose

The purpose of this task is:

(1) To clearly define and document the audience for the business case analysis and their communication and analysis needs. This will ensure the subsequent analysis and all final communications products and deliverables are user-driven, and that the City and consultant team have a shared vision for the outcome of the project.
(2) To work with the City to collect necessary data for the business case analysis.

Approach

Step 1. Kickoff meeting.

The consultant team will convene a half-day, in-person kickoff meeting with diverse City staff to officially launch the project. The kickoff meeting will include:

- An overview of project goals and tasks
- Discussion of project audience
- Discussion of data needs
- Review of project communication protocols (we recommend biweekly 30-minute check-in calls)

During the discussion of the project audience, the consultant team will walk through a "Creative Brief," a template we regularly use to guide communication products and ensure a consistent vision for all team members. The Creative Brief includes questions such as:

- What are the goals of the materials?
- Who are the target audience(s)?
- What knowledge gaps do our target audience have?
- What metrics matter to our target audience?
- What is the decision-making or planning time horizon of our target audience?
- What key messages do we want to communicate?
- What defines effective communication for our audience?

The primary audience for this analysis is City decision-makers (including city managers and elected officials). Secondary audiences include the general public, community organizations, the business community, credit rating agencies, insurers, and others interested in the long-term resilience of Miami Beach. The Creative Brief and communication materials will be targeted toward the primary audience.

We also recommend including a walk-through of the study area to discuss planned improvements, adaptation options available, and potential vulnerabilities.

Following the kickoff meeting, the consultant team will provide notes for the City's review and confirmation. The notes from the meeting, including the Creative Brief defining the audience and their needs, will inform the ensuing analysis and communication materials.

Step 2. Data collection.

Prior to the kickoff meeting, the ICF team will develop a data needs list for the analyses in Tasks 2-4. During and following the kickoff meeting, the consultant team will work with the City to collect available data for the analysis. The table below provides an illustrative list of data needs that will be refined and augmented upon inception of the work.

Data Needed	Format	Relevant Task(s)
City-owned building data (GIS) (e.g., location, age, height, construction type, occupancy type, and replacement value)	GIS	2, 3, 4
Parcel-level attributes (GIS) (e.g., boundaries, age, height, construction type, occupancy type, and replacement value)	GIS	2, 3, 4
Updated roadway elevations, incorporating recent improvements	GIS	2

Property tax rate structures and revenues	GIS	2
Digital elevation model	GIS	2,3
Tourism revenues over time	Any	2, 4
ICPR model inputs for existing and proposed stormwater system improvements	ICPR3	3
Location and specifications of current stormwater infrastructure (drainage pipes, ditches, culverts, pumps, catchments, levees, seawalls, etc.), surveys, atlas of structures, geotech, etc.	GIS	3
Historical flood frequency	Any	4
Any information on impacts of past flooding (impacts = operational cost to respond, duration of business scool, road, or other important closures; congestion effects; resident complaints; etc.)	Any	4
AADT for roads in the City	GIS	4

The consultant team will document all data received, including the relevant point of contact in the city, applicable metadata, and other information to ensure transparency and replicability.

If any data are not available, the consultant team will provide a recommended alternate approach.

Roles and Responsibilities

ICF staff will lead Task 1, with support from Brizaga to develop and populate the Creative Brief. AIR, Kimley-Horn, and FAU will provide input to the data needs wish list.

City staff will participate in the kickoff meeting and provide requested data if available.

Outcomes

- Kickoff meeting notes
- Creative Brief documenting analysis objective, audience, and audience needs
- Compiled dataset of available City data to inform business case analysis
- Data tracking spreadsheet

Stage 2: Determine Effectiveness of Resilience Investments

Task 2 Citywide Sea Level Rise and Storm Surge Risk Modeling

Purpose

- Provide risk-based estimates of flood risk city-wide with and without sea level rise
- Provide critical input to subsequent tasks and business case analysis, including:
    - Storm surge risks and boundary conditions for neighborhood-level integrated flood modeling (Task 3)
    - How flood risk varies across the city to inform property value analysis (Task 4)
    - Expected losses and private property damage from flooding (for Tasks 4-7)

This is a one-time, up-front analysis, applicable to future projects.

Approach

AIR will incorporate available City-specific data on building age, height, and other characteristics, and roadway elevations and run the AIR tropical cyclone model to estimate expected losses from tropical cyclones.

The model will be run for two scenarios, to inform the cost of inaction to sea level rise:

- Baseline conditions
- Climate change conditions – elevated sea level (a specific scenario to be finalized with the City, but as a starting point we recommend the 2050 Compact projections) and more intense storms (simulated using AIR's "warm ocean" storm catalog)

For each scenario, the model will output average annual loss and expected loss at different probabilities of storm occurrence (up to the 1-in-100,000 year event), in addition to maps and exhibits summarizing the modeling and results. The "cost of inaction" represents the difference between the two scenarios.

Roles and Responsibilities

AIR will lead this task.

Outcomes

- Excel spreadsheets and maps/shapefiles containing loss information.
- Storm surge extent and depth for specific storm scenarios, for input into the ICPR modeling in Task 3.

These output will be used as input for subsequent tasks.

Task 3 Integrated Flood Modeling (Neighborhood-Scale)

Purpose

- Use an integrated flood model to determine the effectiveness of different resilience strategies to reduce flood risk. The model would integrate groundwater, stormwater, and coastal conditions, consistent with the Urban Land Institute's recommendations.
- Pilot-test an approach/model configuration that could be scaled city-wide
- Provide critical input to the business case analyses of resilience investments (Tasks 5-7)

Approach

For a single neighborhood to be selected with the City (e.g., First Street), the ICF team will use the Interconnected Pond Routing (ICPR) stormwater model, version 4, to model extent and depth of flooding, incorporating improvements the City has already made into its baseline.

To pilot-test the model, we propose the following parameters and assumptions:

- Preliminary limits of the modeled area will be between 1st Street and South Pointe Drive, west of Washington Avenue to the western coastline.
- The ICPR4 model will be run for up to four design storm events that represent a combination of rainfall, sea level rise, storm surge, and tide stage. These design scenarios will be selected and confirmed in coordination with the City. Preliminary scenario are:

Scenario Name	Rainfall	Sea Level Rise	Storm Surge	Tide Phasing
5-year	5 year 24 hour	20” (2050, USACE High)	None	Max*
10-year	10 year 24 hour	20” (2050, USACE High)	None	Max
25-year	25 year 72 hour	20” (2050, USACE High)	Yes (to be extracted from Task 2)	Max
Cat 2 storm	TBD	20” (2050, USACE High)	Yes (to be extracted from Task 2)	Max

*Meaning as he modeling will take a conservative approach and assume that the timing of precipitation occurs at the time of the tide cycle that would maximize flooding

- For the four design storms, Kimley-Horn will model outcomes under three investment scenarios:
    - No investment (i.e., baseline conditions)
    - Public infrastructure investment (i.e., planning stormwater improvements)
    - Private infrastructure investment (e.g. raising finished floor elevation or moving valuable property – exact strategies to be determined on site visit)
- Kimley-Horn will map the resulting flood depths for the 12 scenarios. For flood depths that intersect a building footprint, the maximum flood depth will be noted for the associated building. This information will be provided to the City for their use, as well as as input to the business case.

Roles and Responsibilities

Kimley-Horn will lead this task.

The City will provide necessary input data and verify modeling assumptions.

Outcomes

- Maps showing inundation under four storm and three investment scenarios.

Task 4 Determine Property Value Impacts

Purpose

- Conduct a Miami-Beach specific analysis to capture the effects flood risk and public infrastructure investments on property values. The analysis is intended to capture the many unique features of the Miami Beach real estate market, including universally high flood risk (compared to other cities), high market value, high number of foreign investors, and land use and development restrictions.
- This information will inform the business case for the variety of resilience investment scenarios under Tasks 5-7.

This is a one-time, up-front analysis, applicable to future projects.

Approach

As a major component of the benefits of resilience investments, the ICF team will develop a model to estimate the impacts of flood reduction and public infrastructure investments on property values. Broadly speaking, there are two options for conducting this analysis:

- Use benefit transfer from existing studies or
- Develop a City-specific hedonic pricing model.

We propose to conduct a City-specific analysis of how flood risk affects housing price, controlling for other neighborhood characteristics. This analysis will use housing sales data from the areas of interest and develop hedonic pricing models. The hedonic pricing models will allow estimation of changes in property values from changes in flood risk to the property or nearby roads. The main advantage of using City-specific models is the ability to specify independent variables that would target flood mitigation strategies considered by the City (e.g., reducing flood risk to roads or installing other infrastructure). A benefit transfer approach will rely on existing models and may not be able to support detailed analysis of City's investments impacts on property values. For example, if we use a benefit transfer approach we may not be able to account for benefits associated with changes in flood risk to roads or proximity to seawall or other infrastructure designed to reduce flood risk.

The hedonic pricing analysis would involve analyzing data on housing and land sales, major floods, GIS data on environmental amenities, and tax data from the City which we combine with data of hazard zones.

- **Housing sales and parcel characteristics data.** Based on our initial investigation, the relevant housing sales and parcel characteristics data are available from ParcelQuest in a GIS shapefile format and from CoreLogic. Raw (uncleaned) data are also available the City of Miami Beach. Based on our prior experience, cleaning and linking raw data with spatial datasets can be labor intensive, depending on the state of the raw data. Because the cost of purchasing sales data for can be substantial, we will discuss options with the City for defining the geographic scope of the study.
- **Community-specific characteristics.** These data are readily available from the Census Bureau (e.g., median income, senior population, poverty status, race composition, travel time to work, school district designations), various GIS data layers (e.g., coastal access points), FBI crime reporting statistics, and local data (e.g., school district test scores from the Florida Department of Education).
- **Flood hazard areas.** ICF will work with the City to define differential levels of flood hazard within the City (e.g., locations with a 1% vs 2% vs 5% vs 10% vs 25% vs 50% annual chance of flooding). This may be based on existing information from the City if available or from the output of the AIR Tropical Cyclone model.

We propose to rely on a Difference in Difference (DiD) hedonic price model and separately estimate the effect of flooding on housing prices. The treatment group is composed of housing sales in flood-prone areas during 2007 through 2017. The control group in the first estimation includes houses or land with relatively low flood hazard for Miami Beach. We will use data of housing or land transactions before and after the floods for both flood-prone and non-flood-prone locations.

To estimate changes in property values resulting from the city's investments we will use the estimated equation and the results of the tropical cyclone model to re-assign hazard factors to properties located in the study area.

Roles and Responsibilities

ICF will lead this analysis, with support from FAU.

Outcomes

- Data on how reduced flood risk and public investment increases property values (e.g., for X% decrease in flood risk, property value increases Y%), to be applied in Tasks 5-6 to the flood risk reductions determined from the integrated flood modeling.

Stage 3: Build Business Case for Resilience Investments

Task 5 Build Business Case for Individual Property Owners

Purpose

- Demonstrate the value of public and private infrastructure investments to individual homeowners in Miami Beach.

Approach

To aid its citizens in managing flood risk, including the increasing risk due to sea level rise, the City aims to provide residents with adaptation options to reduce or mitigate their personal flood risk. We propose to develop sample adaptation options that include specific flood mitigation and adaptation options that residents may select based upon the extent of flooding that could be anticipated. We will utilize base-level water level calculations under various sea level rise and weather scenarios, such as those and coordinate amongst the team.

For example, this business case would demonstrate the costs and benefits to the property owner of several adaptation strategies for a hypothetical home that was located in the First Street neighborhood, with benefits in terms of:

- Flooding reduction (e.g., frequency)
- Reduced property damage
- Enhanced property value
- Reduced insurance premium

Benefits will be captured for both public investment and private investment scenarios. For example, this would include the public stormwater improvements modeled under Task 3, as well as a range of low to high cost adaptation strategies (e.g., from French Drains to home elevation).

Roles and Responsibilities

Brizaga will lead this task. AIR will advise on impacts to reduced property damage and insurance premiums. ICF will provide information on enhanced property value (applying findings from Task 4).

The City will provide available data on the cost of the proposed resilience investments.

Outcome

- Summary of the costs and benefits of different investment strategies (see example below).

	5 year 24 hour	10 year 24 hour	25 year 72 hour	Category 2 Hurricane	Total
Investment scenario 1: Public Infrastructure Investment					
Cost (to property owner)					
- Up front (e.g., capital)					
- Ongoing (e.g., O&M)					
Benefits					
- Flooding reduction					
- Reduced property damage					
- Enhanced property value					
- Reduced insurance premiums					
Investment scenario 2: Low Cost Private Infrastructure Investment (e.g., French Drain)					
Cost					
- Up front (e.g., capital)					
- Ongoing (e.g., O&M)					
Benefits					
- Flooding reduction					
- Reduced property damage					
- Reduced property value loss					
- Reduced insurance premiums					
Investment scenario 3: Moderate Cost Private Infrastructure Investment (e.g., Elevate)					
Cost					
- Up front (e.g., capital)					
- Ongoing (e.g., O&M)					
Benefits					
- Flooding reduction					
- Reduced property damage					
- Reduced property value loss					
- Reduced insurance premiums					
Investment scenario 4: High Cost Private Infrastructure Investment (e.g., Reconstruct)					
Cost					
- Up front (e.g., capital)					
- Ongoing (e.g., O&M)					
Benefits					
- Flooding reduction					
- Reduced property damage					
- Reduced property value loss					

- Reduced insurance premiums					

Task 6 Build Business Case for Neighborhood-Level Investments

Purpose

- Quantify the return on investment for the resiliency investments modeled in Task 3, incorporating multiple dimensions of economic impact.

Approach

Using the best available data, the ICF team will quantify and, where needed, qualitatively describe the monetary and non-monetary benefits of the proposed neighborhood resilience investments. Quantified benefits will be limited to the study area. Benefits to the rest of the City from these investments will also be qualitatively characterized. We will also broadly characterize the benefits to the particular neighborhood from potential resilience investments that are made outside that neighborhood. As additional neighborhoods and investments are modeled, a more comprehensive and integrated picture of cumulative benefits and system relationships will emerge.

This business case analysis will address a broad range of potential benefits, such as:

- Reduced property damage (e.g., estimated based on flood depth for individual structures and relevant depth-damage functions)
- Reduced property value loss (e.g., applying relationships from hedonic modeling developed under Task 2)
- Enhanced property tax revenues
- Enhanced tourism revenues (based on potential impacts to hotel capacity, rental property, and retail space)
- Reduced insurance premiums
- Reduced city operational costs
- Reduced traffic-related disruptions
- Reduced business closures

The monetary benefits will be compared against the investment cost to determine a benefit-cost ratio and investment payback period.

Roles and Responsibilities

ICF will lead this task. AIR will advise on impacts to insurance premiums. FAU will advise on investigating tourism and operational costs, and neighborhood sense of place.

The City will provide available data on the cost of the proposed resilience investments.

Outcomes

- Summary of the costs and benefits of different investment strategies (see example below).

Scenario	**5-year**	**10-year**	**25-year**	**Cat 2**	**Total**
Investment scenario 1: Public Infrastructure Investment (compared to no investment)					
Cost					
- Up front (e.g., capital)					
- Ongoing (e.g., O&M)					

Benefits					
- Flooding reduction					
- Reduced property damage					
- Enhanced property value					
- Enhanced property tax revenues					
- Reduced insurance premiums					
- Enhanced tourism revenues					
- Reduced city operational costs					
- Reduced traffic-related disruptions					
- Reduced business closures					
Investment scenario 2: Private Infrastructure Investment (compared to no investment)					
Cost					
- Up front (e.g., capital)					
- Ongoing (e.g., O&M)					
Benefits					
- Flooding reduction					
- Reduced property damage					
- Enhanced property value					
- Enhanced property tax revenues					
- Reduced insurance premiums					
- Enhanced tourism revenues					
- Reduced city operational costs					
- Reduced traffic-related disruptions					
- Reduced business closures					

Task 7 Build Business Case for City-wide Investments

Purpose

- Determine a high-level business case for citywide investments, extrapolating from findings from earlier tasks
- Identify citywide "cost of inaction," and, correspondingly, appropriate level of investment

Approach

Based on the results from previous tasks, the ICF team will calculate and summarize a city-wide cost of inaction to sea level rise in order to characterize appropriate level of investment. We will also draw from the neighborhood-scale findings to communicate the potential benefits and effectiveness if similar measures (with assumed similar effectiveness until more detailed modeling occurs) were applied citywide.

This analysis will include items such as:

- Quantified change in expected losses (from Task 2)
    - Note: the extent of the losses will depend on available data. AIR can model losses to residential and commercial property without additional information from the City. Losses to public structures can be included if required data on public buildings is provided, as outlined under Task 1 (e.g. building footprint and replacement cost)
- Quantified impacts on property values (from Task 4)

- Quantified impacts on City tax base/tax revenues (based on change in property values and property tax rate)
- Quantified impacts to tourism-related tax revenues (assuming sufficient data are available on property types to identify how much hotel capacity, rental property, and retail space would be impacted. We will also review any available data from the City on changes in the hotel occupancy rates and business closures due to flood events in recent years in the study area, existing literature on economic impacts of flood damages on tourism revenues).

In addition to these quantified impacts, the project team will outline qualitative, non-monetized components of the cost of inaction, such as additional impacts to tourism, businesses, transportation services, and sense of place.

Roles and Responsibilities

ICF will lead this task, with support from all team members.

The City will provide input to the specific time frame and sea level rise scenario assumptions for the Tropical Storm model. In addition, the City will provide available data on property tax rates, tourism revenues, etc.

Outcomes

- Summary of the business case for city-wide investments, based on cost of inaction and initial results of neighborhood and property-level resilience investment findings. For example:

Stage 4: Communicate Results

Task 8 Communicate Results

Purpose

- Develop concise communication materials to share the results of the business case analysis with the target audience in a compelling, understandable, and visual format.

Approach

The ICF team will develop communication materials (beyond the technical memoranda described previously) to clearly convey the findings of the business case analysis for the primary and secondary audiences defined in Task 1. These communication materials may include infographics, fact sheets, or digital materials including interactive maps.

In addition to the physical communication materials, we propose to:

- Hold a city staff workshop to share the results and educate staff on the methodology and final outcome to ensure consistent messaging.
- Present the results to the City Commission, if desired.

These communication materials will convey the cost of inaction and the economic tradeoffs of the three investment scenarios.

Roles and Responsibilities

Brizaga will lead this task, with support from ICF.

Outcomes

- Visually compelling, concise materials to communicate findings to key audience

3. ILLUSTRATIVE SCHEDULE

	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Task 1 – User Engagement and Data Collection												
Task 2 – Citywide Sea Level Rise and Storm Surge Modeling												
Task 3 – Integrated Flood Modeling (Neighborhood-scale)												
Task 4 – Determine Property Value Impacts												
Task 5 – Build Business Case for Individual Property Owners												
Task 6 – Build Business Case for Neighborhood-Scale Investments												
Task 7 – Build Business Case for Citywide Investments												
Task 8 – Communicate Results												

4. BEYOND THE PILOT PROJECT

Upon completion of the pilot project, the ICF team will work with the City to refine the approach and identify priorities to enhance the analysis. This could include:

- **Scale up the analysis**, such as by expanding the geographic scope of the integrated flood modeling, number and type of resiliency investments modeled, or depth of economic analysis.
- **Develop an interactive decision-support tool** to help City managers and decision-makers readily compare resilience investment scenarios and understand the return on investment over time.

5. PRICE

Task	**Cost**
Task 1 – User Engagement and Data Collection	$15,000
Task 2 – Citywide Sea Level Rise and Storm Surge Modeling	$50,000

Task 3 – Integrated Flood Modeling (Neighborhood-scale)	$110,000
Task 4 – Determine Property Value Impacts	$100,000
Task 5 – Build Business Case for Individual Property Owners	$10,000
Task 6 – Build Business Case for Neighborhood-Scale Investments	$75,000
Task 7 – Build Business Case for Citywide Investments	$15,000
Task 8 – Communicate Results	$20,000
Total	**$395,000**

*These costs represent rough order of magnitude estimates, to be refined and finalized following confirmation of approach and scale with the City.

Please note that ICF's proposal as presented herein reflects ICF's non-binding estimation of effort required for this opportunity. ICF looks forward to working with the City of Miami Beach to determine a mutually agreed upon scope and level of effort for this task. ICF's proposal is also predicated upon the full execution of the agreement between ICF and the City of Miami Beach for "Business Case Analysis of the City of Miami Beach Stormwater resiliency Program.