August 2021

GREATER ROCKAWAY

COMMUNITY & SHORELINE ENHANCEMENT PLAN

WXY RISE

Acknowledgments

We would like to thank the many participants who contributed to this process, and without which this plan would not be possible.

Steering Committee

Brandon Jeffries (Queens Defenders)
Brendan Newell (US Army Corps of Engineers)
Bridgit Klapinski (Rockaway Beach Civic Association)
Charles Jacob (Dred Surfer)
Christopher Wassif (NYC Dept. of City Planning)
Daniel T Falt (US Army Corps of Engineers)
Daris Garnes (Rockaway Queens Podcast, RISE Volunteer, Local Resident)
Denean Ferguson (Far Rockaway Arverne Nonprofit Coalition)
Don Riepe (American Littoral Society)
Erik Peterson (NYC Parks)
Gerard Romski (Arverne by the Sea)
Jose Velez (Community Board 14)
Kevin Parris (NYC Housing Preservation & Development)
Lida Aljabar (NYC Housing Preservation & Development)
Mitchel Loring (NYC Parks)
Office of Assemblymember Stacey Pheffer Amato
Office of Council Member Selvena Brooks-Powers
Sara Levenson (L&M Development Partners)
Susan Maresca (NYS Deptartment of Environmental Conservation)

Other Contributors

Aashna Bajaj
Adia Joseph
Adrienne Bradford
Aidan Lane
Alec Kugler
Alex Zablocki
Alexis Foote
Alfred Akhere
Alice Ostrowsky
Amber Ortiz
Angela Mananghaya
Anna Basile
April Turner
Ashley Prevot
Ashley Turner
Ashley Wolverton
Ava Gugliemo
Avangeline Greco
Azizat Ladipo
Barbara J Kelly
Blessing Ogunsola
Blossom Jaurey
Brett Branco
Brianna Francis
Bridget Klapinski
Charlene Lee
Cherry Jacobs
Cherryann Ferguson
Chris Allieri
Christine Dimmick
Christopher Wassif
Cliff Skudin
Colin Ackers
Daniel Olton
Daniel Randell
Daniela Rico
Danielle Berger
Daphne Lundi
Delaney Morris

Greater Rockaway Community and Shoreline Enhancement Plan
August 2021

Prepared by:
RISE (Rockaway Initiative for Sustainability and Equity)
W X Y architecture + urban design
eDesign Dynamics
Ana Fisyak Consulting

Photo credit: Giles Ashford

With support from the National Fish and Wildlife Foundation

Des Tetrault
Doris McLaughlin
Dr. Edward Williams
Eden Chan
Eileen Maloney
Elena Lunyova
Elizabeth Cook
Enid Glabman
Eric Peterson
Eric Tien
Ethan Long
Exahalia Lawrence
Eyinju Oni
Felicia Singh
Florence Chong
Fran Tuccio
Giselle Herrera
Gita Nandan
Gordon Bell
Hallah Saleh
Hannah Kehn
Helen Forgione
Hugorochard
Irene Dougherty
Isa Mitchell
James Bing
Jane Canner
Jean Belford
Jeanette Klopchin
Jeannette Kumsi
Jenna Tipaldo
Jennifer Jones
Jenny Liu
Jerry Rivers
Jessica And Hannah Rothkuo
Jhordan Channer
Jodi Silver
Joe S
John Signorelli
Jose Velez
Josh Otero
Juliet Johnson
Karen Ingram
Karl A. Valere
Katherine Kordaris
Kathleen Bryant
Kathleen Tiller
Katie Graziano
Kerry Hynes
Kevin Alexander
Kevin Torres-Jurado
Klaus Jacob
Larry Hughes
Lindsay Campbell
Lisa George
Luca Calomarde
Madison Amos
Maggie Minieri
Mairead Mikell
Majida Ritter
Manuel Moses
Margaret Pacaud-Hartley
Mary Aleffi
Matt Ford
Matt Gove
Matthew Horgan
Maureen Williams
Maya Harper
Melina Chin
Michelle Micca
Mike Feller
Minghui Cai
Mirella Laure
Moe Magali
Nadej Hocini
Nick Rada
Nicolette Peters
Nyssa Clarke-Griles
P. Lee
Palma Genovese
Pam Williams
Prerana Reddy
Priscilla Ruggiero
Rachel Todd
Rafeena Ahmad
Rebecca Fischman
Rh Woo
Rizwana Uddin
Ron Shiffman
Rosetta Williams
Sadiqah Quadery
Samara Lebron
Saylor Pochan
Seamus King
Seasn Telemaque
Sebastian Arteaga
Shamika Simmons
Shanna Blanchard
Stephanie Samoy
Stephanie Trache
Steven Handel
Taüs Jafar
Thomas Panzella
Tiffany Loncke
Tijon Dembo
Tom Finkelpearl
Tyler Serrano
Valerie Amor
Valeska Saleh
Veronica Olivotto
Vianka Pena Peralta
Yamerin Gonzalez
Yarden Flatow
Yasemin Tunca
Zahir Shadick
Zahria Questelles
Zakhia Grant
Zali Lawrence

The residents of Ocean Bay and Oceanside Apartments and the staff at Oceanside Cornerstone Community Center, The Child Center for New York.

Land Acknowledgement

We would humbly like to recognize and acknowledge the land in the following plan and accredit the indigenous people: Munsee Lenape; Leckawe (Rockaway), Canarsie.

This plan seeks to better understand and re-address the needs of the land and current population in the Rockaways. Therefore, we must reflect on its origin: Reckouwacky meaning ‘place of our own people’ in the Lenape language. While a land acknowledgment is not enough, it is an important practice that promotes indigenous visibility and a reminder that we are on settled indigenous land. Let this acknowledgment be an opening for all of us to contemplate a way to join in de-colonial and indigenous movements for sovereignty and self-determination.

Acronyms

BIPOC – Black, Indigenous, and People of Color
CDC – U.S. Center for Disease Control
CUNY – City University of New York
DCLA – New York City Department of Cultural Affairs
DOHMH – New York City Department of Health and Mental Hygiene
DYCD – New York City Department of Youth & Community Development
EDD – eDesign Dynamics
FRANC – Far Rockaway/Arverne Nonprofit Coalition
GSI – Green Stormwater Infrastructure
HPD – New York City Housing Preservation and Development
JBRPC – Jamaica Bay Rockaway Parks Conservancy
NFWF – National Fish and Wildlife Foundation
NPCC – New York City Panel on Climate Change
NYCHA – New York City Housing Authority
NYS DEC – New York State Department of Environmental Conservation
RBCA – Rockaway Beach Civic Association
RISE – Rockaway Initiative for Sustainability and Equity
SRIJB – Science and Resilience Institute at Jamaica Bay
SWOT – Strengths, Weaknesses, Opportunities, and Threats
USACE – U.S. Army Corps of Engineers

CONTENTS

INTRODUCTION

Foreword

Jeanne DuPont
Executive Director, RISE

With eleven miles of beach along the Atlantic, the Rockaway Peninsula's southern shoreline is the largest urban beach in the United States and provides important habitat for local plants and wildlife. It is also the social and economic heart of the Rockaways.

As residents were reminded in 2012, when Superstorm Sandy inundated the Rockaway shore, the beach serves as the first line of defense for homes and businesses against flooding, which will only grow in importance in the future due to climate change.

Over the past 15 years, I have come to understand the vital importance of "local knowledge" in any planning work. This report outlines much of the technical plans and work being done by the U.S. Army Corps of Engineers (USACE) but also includes input from a wide swath of local stakeholders, who have an authentic, personal connection to the land, to address the needs of the community itself.

The Greater Rockaway Community & Shoreline Enhancement Plan builds on our mission with the goal of creating an extensive, bio-diverse, and habitat-rich dune system along the Atlantic shoreline of the Rockaway Peninsula. Integral to this plan are initiatives that provide more economic, social, and educational opportunities for residents, as equity and economic empowerment are a central goal of this effort.

I hope our work will serve as an example for other coastal communities and give more opportunity for collaboration and dialogue between local stakeholders and city agencies about the nature of our shoreline and the effects of climate change.

Thank you to everyone who participated in this process including the National Fish and Wildlife Foundation / National Coastal Resilience Fund, and our amazing project team: WXY architecture + urban design, eDesign Dynamics, and Ana Fisyak Consulting. I would also like to thank the Greater Rockaway Steering Committee, RISE Shore Corps Interns, and all the residents and community members who participated. Without these collective efforts, this work would not have been possible.

Sincerely,

Jeanne DuPont
Executive Director, RISE

Letter from Shore Corps

Melina Chin
Urban Planning Teaching Assistant, RISE

Reflecting back on the process and training for the Greater Rockaway Community & Shoreline Enhancement Plan, I loved how collaborative and inclusive it was. It drew in people from different skill levels and different educational backgrounds. Even though we were working with professionals (architects, ecologists, urban planners, etc.), there was clear communication of how we can all figure this out together. We're building the foundation together, this one framework.

I saw a change in the Shore Corps students in how they thought about the process of planning. Instead of wanting a perfect world, they thought about the people involved, the City Council members to reach out to, and community initiatives to build on. We were inspired to reframe things with a bigger, yet more detailed lens.

We learned that the inclusion of Black voices and underrepresented groups is so often missing in planning, yet so important in a predominately non-white city. We still have a long way to go in this regard. I also found everyone in the community workshops, regardless of their educational background or skill level, had brilliant and amazing ideas. You can never doubt what the community says, even though they may not have the same professional background. There is intelligence from knowing your neighborhood. It's underrated and often overlooked.

I hope that this plan will empower and uplift young voices to continue to advocate for Rockaway. Community improvement never stops, and young people are going to be the leaders. This project speaks to the Green New Deal and the work of Rhiana Gunn-Wright, who as a young Black woman, wrote it. She is so inspiring for us. She advocates for her communities and shows us how we can advocate for ours. And in terms of tackling and dealing with climate change, we must be united and work from the community up. We need to stress our needs and what we need in our communities because we know our communities best. Environmental issues are connected to race, politics, and class. The climate crisis is socio-economic, it's political.

In creating the plan, we worked with engineers, urban planners, architects, artists, residents, and young people. It shows you that there are many ways that you can be involved, even if you don't think you can. Whatever is stopping you from entering and being involved in the process, don't let it, because there are so many ways to be involved. ***Your voice is valuable, don't take it for granted. For the climate crisis, we need all hands on deck.***

Melina Chin
Urban Planning Teaching Assistant, RISE
Hunter College, Urban Studies & Geography, 2021
Shore Corps Alum

Manifesto

Participants at a Shore Corps stewardship event in 2019.

The Shore Corps Community Stewardship and Design Manifesto

This manifesto was developed by RISE's Shore Corps' Urban Planning Group, fourteen high school students in their fourth year with the program. By year four of this four-year educational program led by RISE, each Shore Corps intern has learned about and developed community service projects on environmental justice, food justice, environmental science, and in their last year, urban planning. Shore Corps were close collaborators in developing the plan and the manifesto served as a guide to reflect upon and improve the initiatives that emerged from the community engagement process. Each community design workshop opened with a reading of the manifesto.

Shore Corps Manifesto Introduction

by Melina Chin

For our manifesto, Daphne Lundi of Black Space inspired us. She explained that it took a year to make their manifesto, it didn't happen overnight. And our manifesto is a framework to help us feel empowered and make a commitment to Rockaway and for advocating for our community. It made us reflect and broaden the way we thought about dune enhancement. Coming into this project, students saw dune enhancement as planting plants, but it's so much more than that. It's not just environmental. It's a way to advocate for racial and environmental justice. That we need to think about the history of Rockaway and all the entities involved and who lives here. It's not only protecting our communities. It's beautification. It's bringing native species back and supporting ecosystems and social aspects of where we put it and who has access to it.

The manifesto followed us all the way through. Drafting it, editing it, reflecting on the tenets in our collages, and then evaluating and reflecting on the programs and what was thought up in the community workshops. It made us ask questions: does this include youth empowerment? Does this deal with racial and environmental justice in the way we want it to? How can we make this more holistic and inclusive? Is it sustainable for years to come for future generations?

Manifesto

Through this manifesto, we commit to...

1

EDUCATE OURSELVES AND EACH OTHER ABOUT HISTORY AND SYSTEMIC RACISM.

2

ACTIVELY LISTEN TO OUR COMMUNITY.

5

RESTORE AND PROTECT THE LAND FOR PEOPLE, CREATURES, AND PLANTS.

6

CENTER AND ACTIVATE YOUTH AND THE MOST VULNERABLE.

3

REFLECT ON THE PAST BEFORE WE REBUILD.

4

COMMIT TO ENVIRONMENTAL AND RACIAL JUSTICE.

7

UPLIFT LOCAL AND DIVERSE VOICES.

8

MOBILIZE VOTERS, RECOGNIZING OUR ELECTED OFFICIALS NEED TO REFLECT OUR VALUES.

Manifesto

9

INVEST AND BUILD OPPORTUNITY LOCALLY.

10

SEEK OUT BEAUTY IN NATURE.

13

HONOR DIFFERENT WAYS OF BEING.

14

CELEBRATE OURSELVES, EACH OTHER, AND OUR ACCOMPLISHMENTS.

11

FOSTER COMMUNITY AND CONNECTION.

12

CREATE SAFE SPACES (LIKE RISE) BOTH PHYSICALLY AND EMOTIONALLY.

Pictured: Group photo of Shore Corps

Original collages: All original collages on this page and previous page made by Shore Corps students

Pictured: A community member participates in a beach clean-up organized by RISE (June 2021)

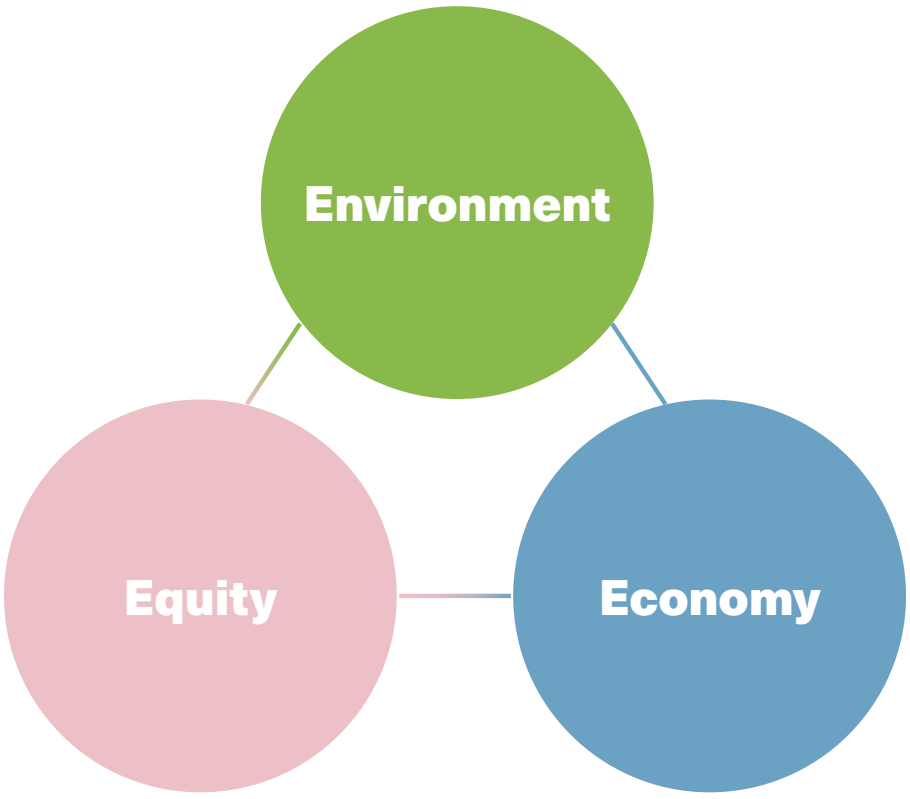
Project Overview

The Greater Rockaway Community and Shoreline Enhancement Plan (formerly The Rockaway Dune Enhancement Project) is an effort led by the Rockaway Initiative for Sustainability and Equity ("RISE") and a team of sub-consultants including WXY architecture + design, Ana Fisyak Consulting, and eDesign Dynamics (EDD), and supported by the National Fish and Wildlife Foundation (NFWF). The initiative seeks to create and implement a community-centered plan for the restoration of the dunes along the Atlantic shoreline in the Rockaway Peninsula. Responsive to the ecological and socio-economic conditions of the Rockaways, the initiative seeks to:

- Grow out of an inclusive engagement and community design process
- Foster consensus-building among the various public agencies charged with managing the shoreline and between the diverse residents of the peninsula
- Envision an adaptation and stewardship plan that promotes equity, supports economic growth, and enhances the natural environment

The Rockaway Community and Shoreline Enhancement Plan focuses on an approximately four-mile stretch of shoreline in the Rockaway Peninsula, extending from Beach 9th to Beach 109th Streets. The Rockaway Peninsula is a narrow barrier island 11 miles long, with Jamaica Bay to the north and the Atlantic Ocean to the south. A five-mile boardwalk and adjacent dune system creates a dynamic spine for recreational, social, and economic activities and natural habitat along much of the peninsula and plan area.

This plan is guided by a commitment to three intersecting pillars: environmental resilience, economic empowerment, and equity and access, or as the project team calls them, "the three E's." At every step of the way, we considered how this plan was addressing local concerns related to the three E's, and how each of these pillars relates to one another. For this effort to be a success, it is key to consider each of the three E's, and to recognize that our environment, economy, and community equity and well-being are intertwined.



THE THREE E'S

Project Process

The plan was developed over the course of a year-long process, beginning in August of 2020, and culminating with the release of this plan in August-September 2021. The process consisted of analysis, engagement, and planning, with the goal of developing a plan for community and shoreline enhancement in Greater Rockaway:

01. Assess existing conditions, challenges, and opportunities.

At the outset of the process, the team built an initial understanding of existing conditions in the Rockaway peninsula, with a focus on environment and ecology, socio-economic factors (such as race and ethnicity, income, and social infrastructure), and local economy (including employment, local businesses, and the impacts of Covid-19). Through this assessment, and in coordination with partner agencies, we were able to specify the project plan area, gain a strong understanding of ecological and socioeconomic context in and around the plan area, and develop targeted questions to deepen this understanding in engagement.

02. Analyze gaps in past planning efforts to address current challenges and opportunities concerning the environment, equity, and economy.

The team conducted a review of 24 recent community plans and studies published in the Rockaways, with a focus on gaps in analysis, recommendations, and engagement. Analyzed plans included community planning, retail, and culture; community health and access; and resilient design and stewardship.

Through this gap analysis, we identified a set of key gaps that this process would seek to address, including local workforce development and entrepreneurship, racial equity and inclusion, health equity and environmental justice, and geographic and community alignment across the west and east sides of the peninsula.

See the gap analysis matrix in the Appendix on page 156 for more on this analysis.

03. Engage diverse stakeholders, including city agencies, business owners, civic associations, landowners, students, and a broad swath of Rockaway residents.

Overall, the engagement process engaged **1,068 residents** and **33 community stakeholders and leaders**, through interviews, community design workshops, an online survey, public presentations, ongoing meetings with the Shore Corps and Steering Committee, and more. The engagement approach was guided by three core objectives:

- **Build consensus around the strategy for dune enhancement:** in order to ensure that the strategy reflects a broad range of community priorities and values, our engagement approach included many entry points, ranging in format and level of commitment. Steering committee members and Shore Corps students were engaged at several points throughout the process to draw upon their experiences and expertise and advise the project. The Community Design Workshop and survey provided lower commitment engagement opportunities to the general public and were widely publicized. To complement both of these engagement formats, focus groups and interviews were used to gain input from key participants (i.e. subject matter experts, historically underrepresented groups).

- **Align with community development goals:** to align this plan with local community development goals, we engaged directly with key stakeholders involved in planning and development on the peninsula, including NYC Parks, NYC Housing Preservation and Development (HPD), key landowners and developers (including L+M Development Partners, Goldfarb Properties), and the U.S. Army Corps of Engineers. These stakeholders worked directly with the project team to shape the plan and identify opportunities for partnerships.

- **Develop a model for dune enhancement and adaptation planning with communities that is replicable and scalable:** involving community members and stakeholders in the development of the plan provided the

opportunity to test ideas with groups and individuals who will be directly impacted by the plan and may be directly involved in its realization. Participants provided input not only on the priorities and principles guiding the plan, but also on questions of implementation: Which sites should be prioritized? Who should be involved? How do we reach them? What logistical hurdles should we consider?

See the Community Engagement section, starting on page 47, for more on the role of engagement in this plan.

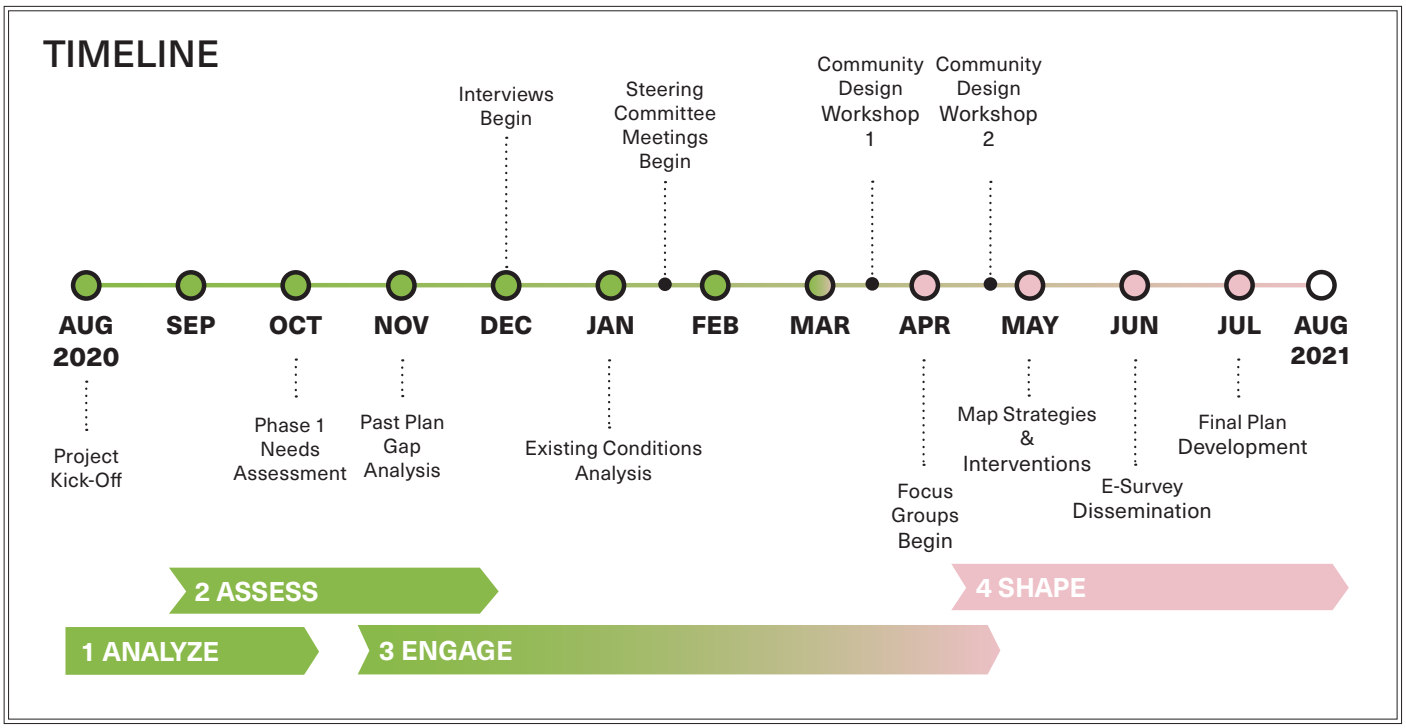
04. Shape a series of stewardship projects in collaboration with the Rockaway Community.

Through a multi-faceted engagement process, including coordination with key stakeholders and landowners, along with ongoing analysis from the project team, four pilot projects emerged from this process. The plan's framework and implementation will be guided by these four projects, which reflect a set of critical goals identified during assessment and engagement:

- **Green economy:** expand opportunities for Rockaways community members to engage in entrepreneurship that promotes a healthier, more sustainable shoreline.
- **Community stewardship:** engage civic groups and individuals in shoreline preservation and restoration, including clean-ups, planting, and monitoring efforts.
- **Education and awareness:** equip young people and residents with vital information about local ecology and skills for careers in the natural sciences.
- **Youth employment:** expand opportunities for meaningful paid work for young residents to address a gap in opportunities identified by many community members and advocates.

Each of these project objectives also considers the role of the "three E's," seeking to enhance the natural environment, boost local economic opportunity, and ensure equity by centering the engagement groups who have been historically excluded from shoreline enhancement and maintenance efforts. The resulting four pilot projects each emphasize one of the four objectives, but attempt to capture all four objectives as part of a holistic vision for community and shoreline enhancement in the Rockaways.

See the Community Stewardship Training Guide, starting on page 71 for more on these projects and the Greater Rockaway community stewardship framework.



Planning Context

Superstorm Sandy made landfall in New York City on October 29th, 2012. The storm surge pummeled the city's shores flooding streets and tunnels and producing record-breaking 30-foot waves. Communities along the Rockaway peninsula were devastated as the storm destroyed homes leaving hundreds of residents displaced and thousands without power. It also washed away an estimated 1.5 million cubic yards of sand. This event sounded an alarm about how a warming planet is leading to more extreme climate events and presenting a risk not only to communities, but to the local ecology and habitats that protect them. The devastation of Sandy was compounded by the disparity in impacts felt by low-income communities of color across the boroughs.

After Sandy, the Rockaway peninsula is still susceptible to flooding, and without sustainable dune habitats, that flooding could once again inundate roads and homes in a major storm event. This plan grows out of and responds to the many efforts in the wake of Sandy to restore the Rockaways shoreline, improve its resilience to future storms and sea level rise, and promote equity to ensure residents across the peninsula are meaningfully involved in shoreline enhancement efforts—and that these efforts create opportunities for them to thrive and prosper.

Since Superstorm Sandy, the United States Army Corps. of Engineers (USACE) has been working to restore the Rockaways shoreline, including through the restoration of dunes south of the boardwalk. USACE released an Environmental Impact Study in 2019, which summarized their planned dune interventions (to be carried out over three contracts) at a conceptual level. Contract 1 (under construction) will restore existing and add new groins on the beach. Contract 2 (which USACE will bid out in June) addresses dune reconstruction south of the boardwalk. And Contract 3 will consider filling sand at low points south of the boardwalk.

Top: Rockaway dunes, pictured in May, 2021; **Right**: Earth Day event at the RISE Center, 2017.

As the peninsula's first line of defense from flooding, it will be critical to protect the dunes in years to come, including through the planting and maintenance of a diverse habitat of coastal grasses and scrub shrub. In coordination with the ongoing work of USACE, the key opportunity for intervention for this plan is concentrated on the north or land-side of the boardwalk. The plan area includes areas that fall outside of USACE's restoration efforts, which present opportunities for dune plantings and related programming for community stewardship and empowerment.

RISE: Stewards of the Plan

The development of this plan--and its future implementation--, is led by RISE, a community organization that has been a cornerstone of Rockaway's community and environmental programming for close to two decades. Established in 2005, RISE (Rockaway Initiative for Sustainability and Equity) leads initiatives created "by the community for the community." Recognizing the potential in places and people that are often overlooked or marginalized, RISE's purpose is to inspire all generations of Rockaway residents to care for their environment and community. They provide civic engagement and youth development programs that advance social equity and the physical well-being of their vibrant, coastal community. RISE transitioned to its current name from Rockaway Waterfront Alliance in 2019.

In 2016, RISE established the RISE Center: a central hub for community programs and collaboration focused on environmental concerns in the region that affect the environmental, economic, physical health and well-being of the Rockaway community. The RISE center is based in a renovated former FDNY firehouse at Beach 59th St. & Rockaway Beach Blvd. RISE's programming includes a farm share, regular beach clean-ups and planting days, and ongoing youth engagement programs, including Shore Corps., a program for high school students focused on environmental stewardship, civic engagement and community planning that was integrally involved in the development of this plan.

A Plan Backed by NFWF

The National Fish and Wildlife Foundation (NFWF) is the largest grant-maker for conservation projects in the United States. Created by Congress in 1984, NFWF's mission is to is sustain, restore, and enhance the nation's fish, wildlife, plants and habitats for current and future generations. [1] They do this by partnering with the public and private sectors to support conservation efforts across the country, which range from endangered species protection, to strengthening natural infrastructure, to restoring urban waterways. In 2019, RISE applied for a grant from NFWF's National Coastal Resilience Fund to support a community-based plan for 'Rockaway Dune Enhancement.'

A generous grant from NFWF has funded the development of this plan, and related engagement and planning work. To develop this plan, RISE assembled a team of consultants, headed by WXY architecture + design, along with eDesign Dynamics (EDD) and Ana Fisyak Consulting. RISE has applied for an additional grant from NFWF to fund the second phase of this project, focused on design and implementation.

1. For more on NFWF, visit https://www.nfwf.org/.

Defining the Plan Area

While this plan presents a framework for community stewardship and shoreline enhancement that can be applied throughout the Rockaways (and beyond), it is focused on activating a particular plan area within the peninsula. This plan area has been defined through coordination with agency partners and stakeholders, and an understanding of where community stewardship has the greatest potential to complement the restoration work being undertaken by USACE.

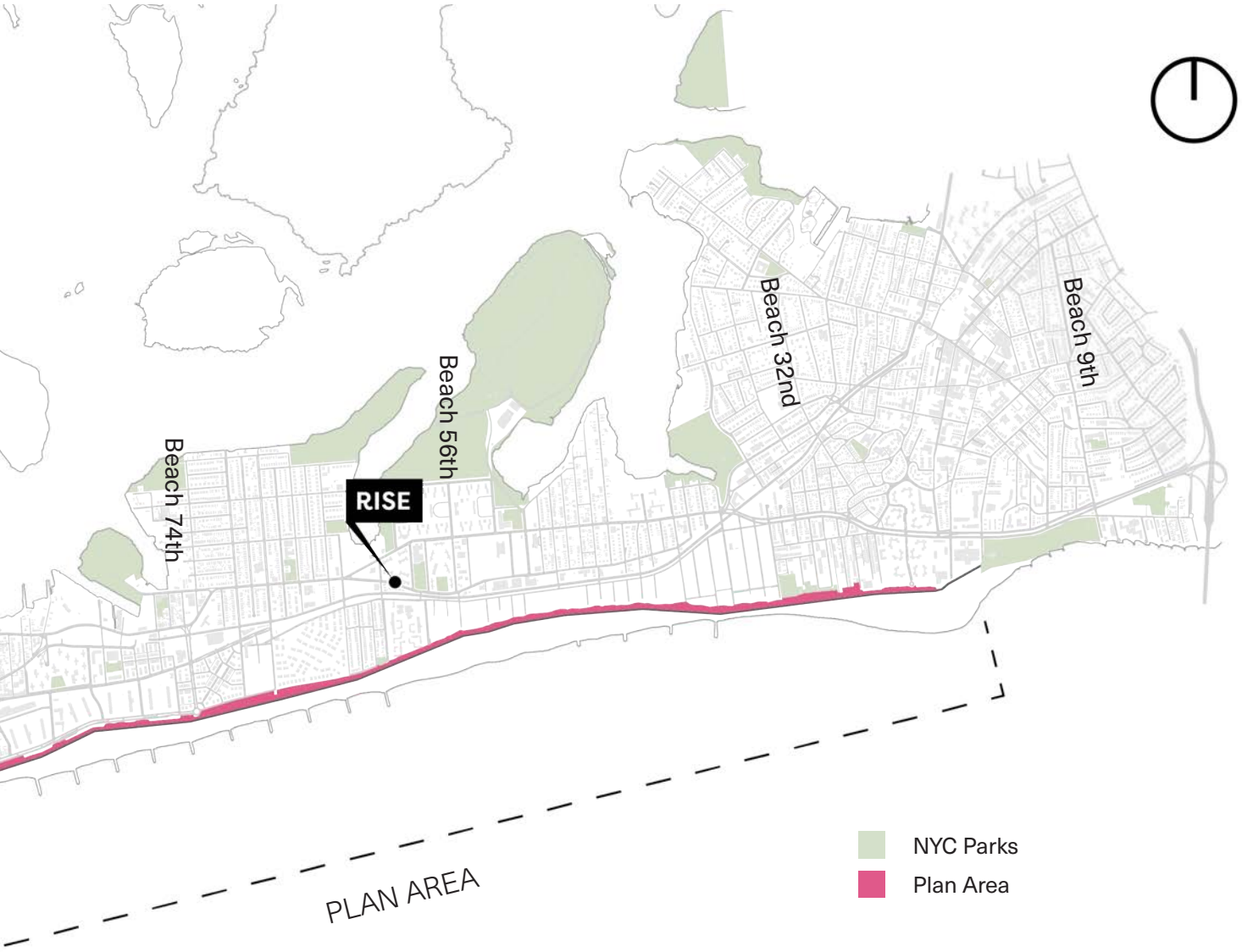
The original plan area boundary was defined by the seven mile stretch from Beach 9th Street to Beach 149th Street, where USACE's dune enhancement work would take place. After engaging USACE, the

project team understood that our greatest potential impact would be in the landward area north of the boardwalk. Throughout our subsequent site surveys and engagement, we have narrowed down the plan area to focus on the areas of highest impact for community planting and stewardship.

The plan area is comprised of a four-mile strip of land north of the Rockaway boardwalk, extending from Beach 17th to Beach 109th Streets. About 42-acres in area, the plan area can be seen as a potential protective buffer north of the boardwalk. It ranges in depth from 20-feet north of the dune edge to 100-feet north, depending on who owns the land, the current condition of the land, preexisting development plans, and the owner's interest in partnering on stewardship and planting on that land.

Natural and built features vary across the plan area, from vacant lots filled with grasses and shrubs, to sidewalks with planted vegetation, to paved parking lots and residential developments. A range of shrubs, grasses, and forbs can be observed across the area—including dune grass, carolina rose, sweet fern, mugwort, seaside goldenrod, and many more.

To effectively plan for community and shoreline enhancement, it is important to understand not only the site's physical conditions, but also practical considerations such as land ownership and management. The plan area includes a mix of privately and publicly owned parcels. Two city agencies, NYC Parks and NYC Housing Preservation and Development (HPD), own and manage most of the land within the plan area: about 50% is owned by HPD, and 44% by NYC Parks. Other parcels include private residential and institutional lots, as well as a 1.2-mile stretch of land that falls within the Arverne East Nature and Dune Preserves.



How to Read this Report

This report is divided into three sections. You may be interested in reading the full report or only certain sections, depending on who you are and what your relationship is to community and shoreline enhancement in Greater Rockaway.

Right: Residents participate in a RISE workshop and clean-up in May 2021.

1

Context: Existing Conditions & Community Engagement

- **What you will find:** an overview of the conditions in the Rockaways today. This includes social and economic factors (i.e. demographics, transportation, businesses), and environmental ones (i.e. natural species and habitats).
- **Who should read this?:** anyone interested in learning more about the Rockaways, including the physical environment and the communities who live there. If you are using this plan for educational purposes (whether educating yourself or educating your class or civic association), this section may provide helpful material. If you do are not familiar with the Rockaways and want to better understand the broader context for this plan—or don't have much familiarity with environmental science--this section is also for you.
- **How to use it:** read the text, look at the maps and data, and familiarize yourself with environmental concepts. Draw from this section to provide context if you are building curriculum or educating others using this plan.

2
Stewardship Training Guide

- **What you will find:** an introduction to what community stewardship means in the Rockaways, as well as general concepts that can be applied beyond the Rockaways. This includes a "Community Stewardship 101" guide outlining key concepts for shoreline enhancement and maintenance. You will find a set of recommended pilot projects that grew out of this plan, and a set of recommendations for RISE and the partner agencies and groups carrying out this plan.

- **Who should read this?:** Residents, leaders, and stakeholders in the Rockaways interested in taking part in community stewardship efforts; advocates or organizers living outside of the Rockaways who want to develop a similar plan in your community.

- **How to use it:** explore the recommendations, and learn about the stewardship framework and concepts; apply these recommendations and guidelines either as a partner to RISE in implementing this plan, or in your own community. This section of the report can be used on its own as a guide to community stewardship in the Rockaways.

3
Implementation Plan

- **What you will find:** a breakdown of the recommended immediate, short, medium, and long-term steps to implementing this plan. This includes a discussion of logistical considerations, like funding, personnel, and site/space needs.

- **Who should read this?:** RISE and partner agencies/stakeholders implementing this plan; funders interested in supporting this plan

- **How to use it:** read the tables and accompanying text and incorporate into your planning; adapt the recommended steps in response to feedback, learning, and other considerations, such as access to resources or volunteer interest.

At the end of the report, you will find an **Appendix** which includes additional materials, including additional maps, tables, and documents. Look for references to the Appendix throughout the report for a better idea of how these materials can complement what you find in the main body of the report.

1

CONTEXT

Introduction

Before creating a comprehensive plan for community stewardship and shoreline enhancement, it was important to understand the context of Greater Rockaway. At the beginning of this process, our team spent time learning about today's challenges, opportunities, and key features of the plan area. We continued to build on this understanding through engagement with stakeholders and residents in the Rockaways.

Engagement was central to the making of this plan, from creating a set of objectives, to shaping four pilot projects, to mapping out the places, partnerships, and participants that would make these projects a success in Greater Rockaway. This section describes some of the ways engagement shaped the plan, and what we learned along the way.

EXISTING CONDITIONS

The first part of this section documents existing conditions in Greater Rockaway, focusing on the key themes of equity, economy, and environment. It explores questions like, who lives in Greater Rockaway and what are the socio-economic there today? Where are the important hubs of community and economic activity? And what are the importnat environmental features found in the plan area (plants, animals, and terrain)?

COMMUNITY ENGAGEMENT

The second part of this section shares what our team learned during the community engagement process for this plan. It documents what we did, who was involved, and what the major take-aways were.

Existing Conditions

SHORELINE ECOSYSTEM

Overview

The Rockaway Peninsula stretches over eleven miles bordering Jamaica Bay to the north and the Atlantic Ocean to the south, and constitutes the southmost portion of Queens, New York. Within the Rockaways, the plan area covers a strip of land north of the Rockaway boardwalk, measuring between 20 and 50 feet in depth and extending from Beach 9th to Beach 109th Streets. The following overview of existing conditions will provide relevant context for three themes: context related to local diversity, equity, and inclusion; the current state of the Rockaways' economy; and the plan area's unique environmental challenges and opportunities.

Past Plans / Gap Analysis

To better understand the planning context, our team undertook a 'gap analysis' review of 23 past published plans and reports conducted in the Rockaway Peninsula. This analysis reveals several gaps in past planning which this plan seeks to address. The matrix in Appendix A on page 156 provides an overview of plans analyzed, criteria for analysis, and key findings.

Below is a summary of key gaps in existing projects and plans. These gaps informed this initiative's focus on health equity, environmental justice, disparities between eastern and western areas of the Rockaways, and waterfront identity. Paired with extensive stakeholder and community engagement, these gaps helped inform our approach and priorities in developing this plan.

Figure 1. Plan Area Map

Gaps - Context:

- Habitat Identification: Past habitat identification is lacking, reinforcing its importance to this initiative.
- Demographic Identification: Previous reports show the strong influence of community input on the visioning process, however, many lack detailed demographic records of participating community members.
- Stewardship: Mention of past community stewardship programs is minimal.
- Youth Development: Youth empowerment programming is mentioned only briefly in past reports.
- Education & Awareness: Educational campaigns have been limited only to school curricula; substantial programs to build awareness were not found in any of the past plans evaluated.

Gaps - Recommendations:

- Entrepreneurship: Past reports make no mention of local entrepreneurship; only four discuss workforce development at all.
- Mobility: Mention of connectivity and mobility were absent from all but two reports; these focused on accessibility improvements and public health measures to reduce diesel emissions.
- Equity: Health equity is absent across all 23 reports, and environmental justice is mentioned only once in reference to the Environmental Justice Alliance.
- Diversity & Inclusion: Substantive racial equity & inclusion recommendations have not been identified within any past plans or reports.
- Disparities Between Eastern and Western Rockaway Neighborhoods: Geographic and community alignment across the east & west sides of the Peninsula is mentioned only in the RISE 2019 Neighborhood Arts & Cultural Inventory.

EQUITY

The Rockaways' diverse population has experienced significant growth over the past two decades. The community's population growth was recorded as the second fastest in New York City between 2000 and 2012, according to US Census Data from that period (Office of NYS Comptroller). The Peninsula's population increased overall by 20% during that period, with a slight decline in 2012 due to Superstorm Sandy. The population of the Rockaways has continued to increase as restoration efforts began in earnest in the early 2010s (Office of NYS Comptroller 2018).

Analysis of Census and American Community Survey data reveal significant disparities among neighborhoods in the eastern and western parts of the Peninsula in terms of employment status, household incomes, educational attainment, health impacts, and median age. As is common in the U.S., these divides in income and access to education or health care align closely with shifting racial and ethnic demographics from east to west along the Rockaway Peninsula. Because this project aims to serve the Rockaway community by engaging individuals in citizen science and stewardship programs, it is helpful to know which geographic areas stand to benefit most from the environmental stewardship and workforce development programs that may result from this initiative.

Age & Racial / Ethnic Identity

The community's racial and ethnic makeup shifts as one moves east to west through the Rockaways. Neponsit, Belle Harbor, and Rockaway Park are predominantly white neighborhoods, while Seaside and Rockaway Beach have greater racial diversity; clusters have developed such that most of the Black residents of these neighborhoods reside on the bayside while most of the white and Latinx populations live closer to the Atlantic. Arverne, Somerville, and Edgemere, all of which are predominantly Black and Latinx communities, are also somewhat divided by ethnicity. Far Rockaway shows signs of stratification, but remains a diverse neighborhood compared to others.

The Rockaways (defined here as NYC Queens Community District 14) has a total population of 121,740, as of 2019. That same year, 37% of the population self-identified as Black or African American, 32% as White, 26% as Hispanic and 3% as Asian (ACS).

While the community's median age is 38.5, 30% of residents are minors. The Rockaways' population under the age of 18 grew by 20% between 2000 and 2016, compared to a 7% decline City-wide. For this report, Beach 74th Street is used as the line that defines the eastern and western portions of the Rockaway Peninsula. The placement of this division is attributable to several factors including

existing racial stratification—the Peninsula's racial and ethnic makeup begins to transition around Rockaway Beach, around Beach 94th Street.

The community trends slightly younger east of Beach 74th Street, where 29.7% of residents under the age of 18 live below the poverty line (ACS 2018).

Income & Educational Background

American Community Survey data on income and educational attainment show clear economic gaps between neighborhoods on the Peninsula's east and west sides. For example, Edgemere has the lowest average household income ($30,400) on the Peninsula, while Belle Harbor, only a few miles to the west, has the highest in the plan area ($138,200). Residents of Belle Harbor tend to be older and highly educated; Edgemere and Far Rockaway, by comparison, have a much younger population, and 23% of residents of those communities live below the federal poverty line (ACS 2019). Conversely, only 10.5% of the Rockaways' population residing west of Beach 74th Street have incomes below the federal poverty line.

In the neighborhoods west of Beach 74th Street, including Neponsit, Belle Harbor, Rockaway Park, Seaside, and Rockaway Beach, the median age is 41.4, and 44% of the population above 18 years of age holds a bachelors or advanced degree. The average unemployment rate west of Beach 74th Street is 7%, while this figure rises to 10% east of Beach 74th Street. Notably, unemployment was as high as 18% in Census Tract 972.03 (within Edgemere) in 2019 (ACS). Youth employment remains an issue on the Peninsula as a whole, with New York City's second-highest youth unemployment rate at 24% for residents aged 20-24, a rate double the City-wide average of 12% youth unemployment in 2019 (Citizens Committee for Children: 2019 Youth Unemployment by Community District).

Housing Tenure

The 2018 American Community Survey indicates that homes to the west of Beach 74th Street are predominantly 'owner occupied' (55%), and residents to the east tend to be renters (75.5%). It is important to note the presence of City-owned NYCHA developments to the east.

Languages Spoken at Home

67% of Rockaway Peninsula residents speak only English, and 70% were born in the United States.

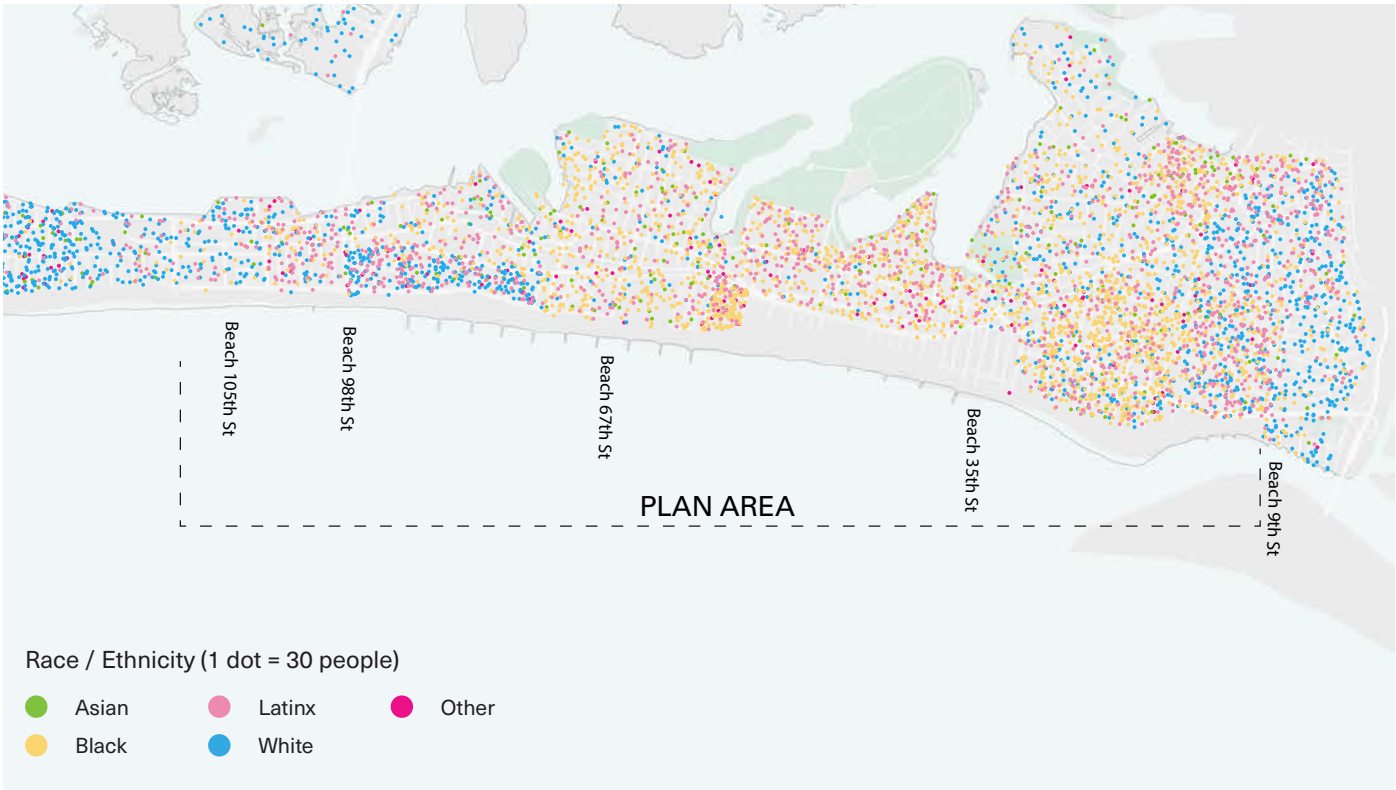


Figure 2. Neighborhood Boundaries with Racial Dot Density

West of Beach 74th Street, 21.6% of the population is foreign-born, mainly from Europe (35.5%). To the west, primary languages other than Spanish include Russian, French Creole, Polish, Hebrew, Italian, French, and Yiddish. As for eastern communities, 30% of residents are foreign-born Spanish-speakers, 71% of whom are immigrants from Latin America (ACS 2019).

Transportation and Mobility

While a combination of bus and subway routes provides access to the entire plan area, there is no subway service west of Beach 116th Street; this lack of subway access to the west would appear correlated with a lack of activity. There are far fewer houses of worship and stewardship programs on the western end of the Rockaways compared to the eastern end of the Peninsula. The bicycle network is fragmented and there are opportunities to improve active transportation (walking, biking, running) pathways throughout the Peninsula.

As for bus and rail lines, there are only two points of entry into (and out of) the Rockaways. Notably, there are no bicycle lanes which cross into the Peninsula, limiting bike transportation between the Rockaways and outlying areas of NYC. The A subway line carries riders into the Peninsula, extending through Far Rockaway on the eastern end, and stopping just before Belle Harbor to the west. Limited subway options could contribute to higher private automobile usage on the western end of the Rockaways. It could also influence the growth of increasingly private and insular waterfront communities on the western end, to be discussed in greater detail in the following pages.
Combining analyses of programming and activity along the peninsula can help foster an understanding of where the beach is used, and for what purpose. “Figure 5. Activity Heat Map (Strava Cycling, Running, and Swimming Data)” illustrates recreational activity by mapping individuals’ walking, running, biking, and swimming paths based on GPS data from Strava. Swimming would appear concentrated mid-way across the plan area, around Beach 96th Street, with a great amount of pedestrian activity along the shoreline and most biking taking place on inland roadways. As described in the following section, community activities are heavily concentrated on the west side of the Peninsula, and the density of local businesses increases dramatically in Seaside / Rockaway Park near the A train and again in Far Rockaway.

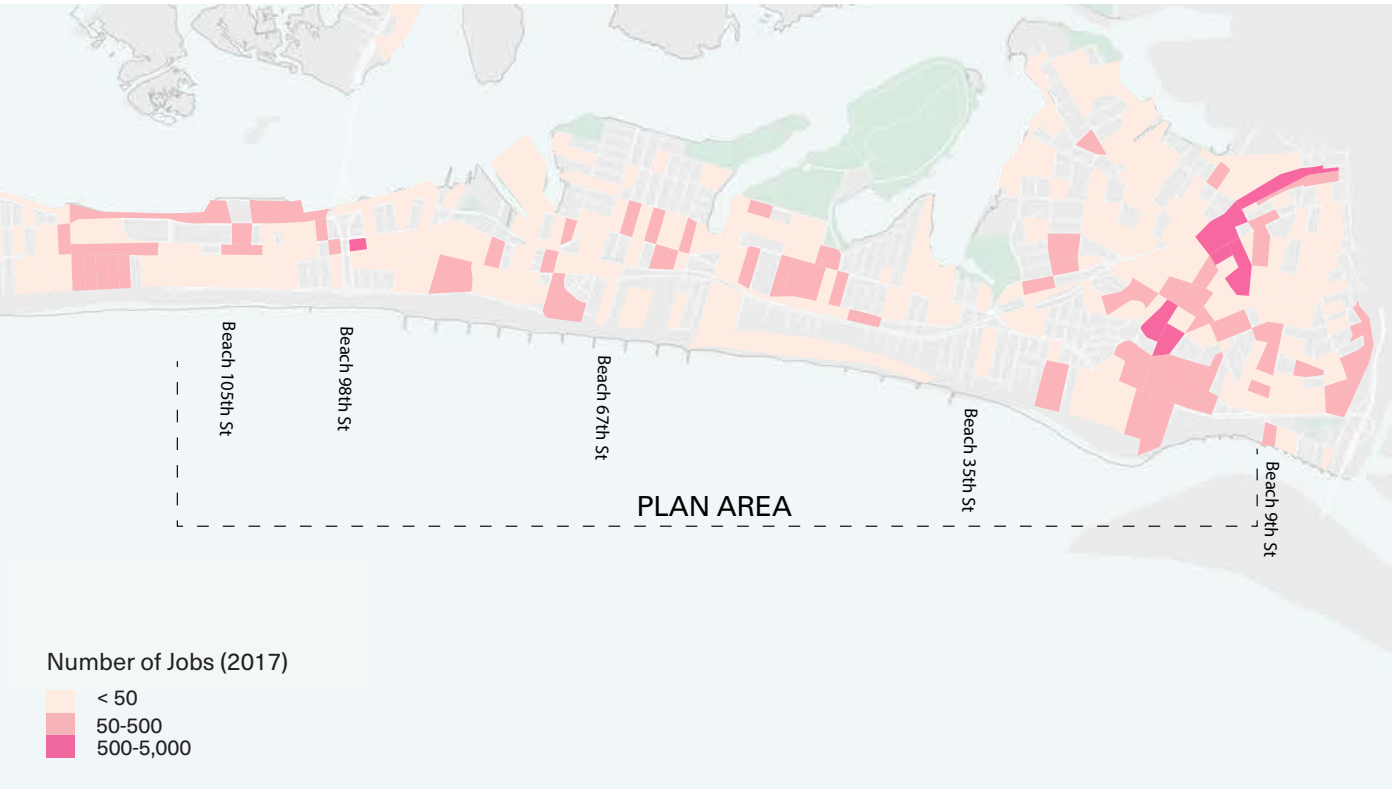


Figure 3. Local Employment (2017)

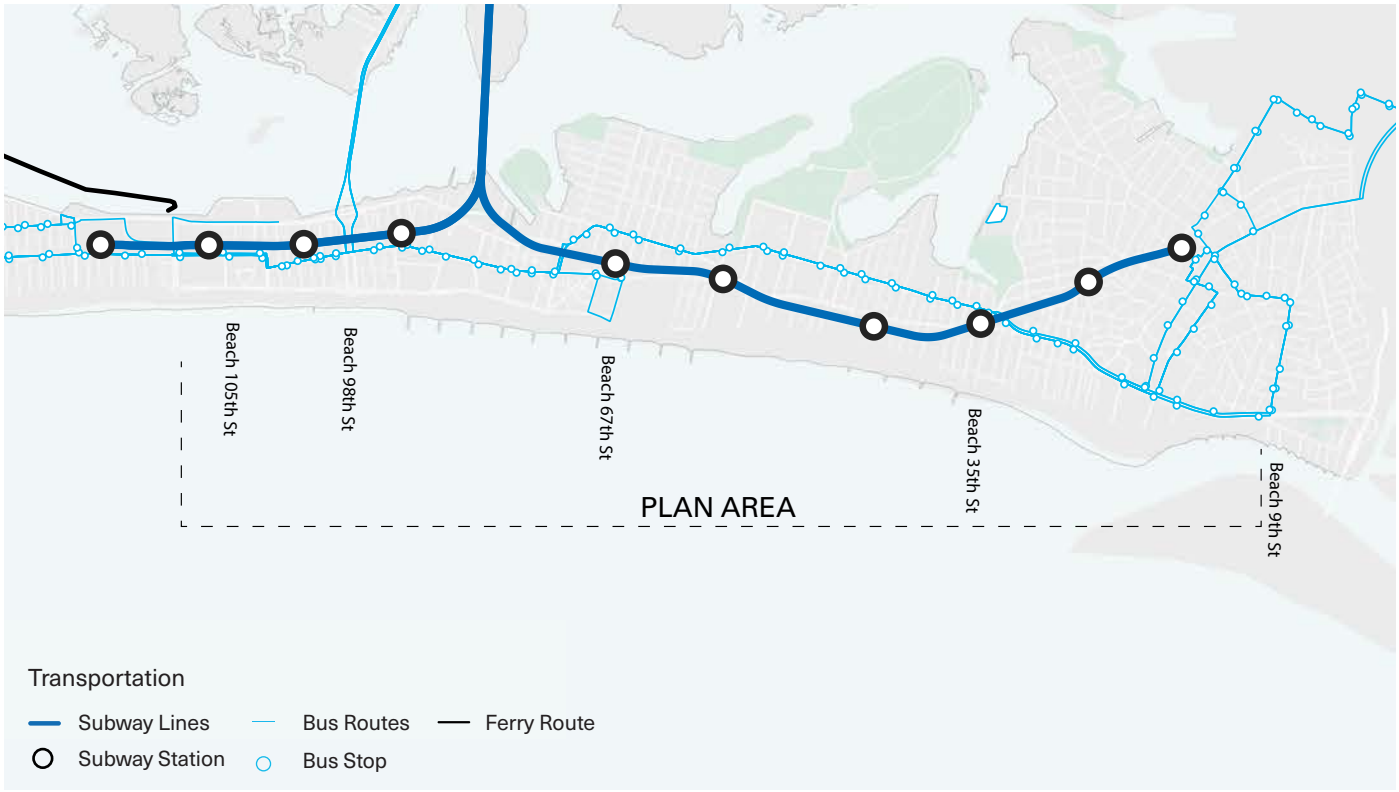


Figure 4. Public Transit

Figure 5. Activity Heat Map (Strava Cycling, Running, and Swimming Data)

ECONOMY

Community Assets

Greater Rockaway features a broad array of community assets—from a mix of educational and community anchors, to a range of local retail options. As illustrated by Figure 6. Retail Activity, business activity decreases as one travels west through the Rockaways. We took into consideration the number of residents (ACS 2018) on the west (34,189) vs. east (80,917) sides of the plan area to make the following assumptions:

- The concentration of businesses drops off traveling west. After the cluster of businesses in Rockaway Park around Beach 116, there is a decrease in community assets as you approach Belle Harbor.
- Most activity congregates along the main east-west streets and the boardwalk, and in the northeast neighborhood of Far Rockaway.

1,796 students are enrolled in local public schools, which are somewhat evenly distributed across the Peninsula's geography; several schools located closer to the shoreline include public health and environmental justice components in their curricula.

Public schools located along the Rockaways' shoreline boast numerous City-wide partnerships to improve the overall quality of not just the ocean, but the human experience of the waterfront. RISE's Living Classroom program stands out for its unique hands-on training and learning workshops to foster an appreciation for nature among youth, and engage the community directly in environmental stewardship efforts.

The Waterside School is another excellent example for its distinctive allies including Solar 1: Green Design Lab, Billion Oyster Project, and Climate Museum; these organizations provide learning opportunities for students to becomes young advocates for sustainability in their own projects at school and in their communities. Stewardship helps students to foster a sense of belonging to their neighborhood, and to become involved in local environmental and community initiatives on an individual level (watersideschool.org).

Several schools have also partnered with the City's CookShop program and GrowNYC to teach students about the impact of food consumption and healthy eating on the mind, body, and environment (NYC EDC: "In Our Community").

Figure 6. Retail Activity

Programming and Activity Levels

There are a greater number of stewardship opportunities in neighborhoods to the east in Rockaway. Beginning at Rockaway Beach (Beach 74th Street) and continuing east, there are at least nine organizations that actively lead stewardship activities, both on the oceanside and the bayside of the Rockaways.

These activities include a beach clean-up on World Oceans Day and RISE's mentorship program for high school students, in which they conduct authentic environmental research on Jamaica Bay and the Rockaway shoreline with regular volunteering clean-ups throughout local parklands. The American Littoral Society at Dubos Point leads an annual international coastal clean-up, which inspires thousands of people around the world to perform clean-ups in their local areas.

These events provide place-based education programs for local youth and the larger community with the goal of increasing civic engagement and strengthening residents' connection to the waterfront.

Workforce and Entrepreneurship

Workforce trends across the peninsula also vary from east to west. Workers in Far Rockaway predominantly fall within the healthcare, government, and education sectors (36%), with some presence of those working in wholesale & retail trade (8%) as well as hospitality (8%). Neighborhoods to the west of Beach 74th Street are heavily involved in industries including public administration (12%) and healthcare & social assistance (35%), with the remaining 9% of employed Rockaways residents working in finance, insurance, and real estate.

The 2018 American Community Survey shows that 75% of residents in the plan area are private wage or salaried workers, with 18% of workers employed in government jobs.

According to On the Map's analysis of 2017 ACS data, 90% of the employed residents in the plan area travel outside of the Rockaways for employment, with just a select few, 10%, both residing and employed in the Rockaways.

Figure 7. Rockaway Public Schools

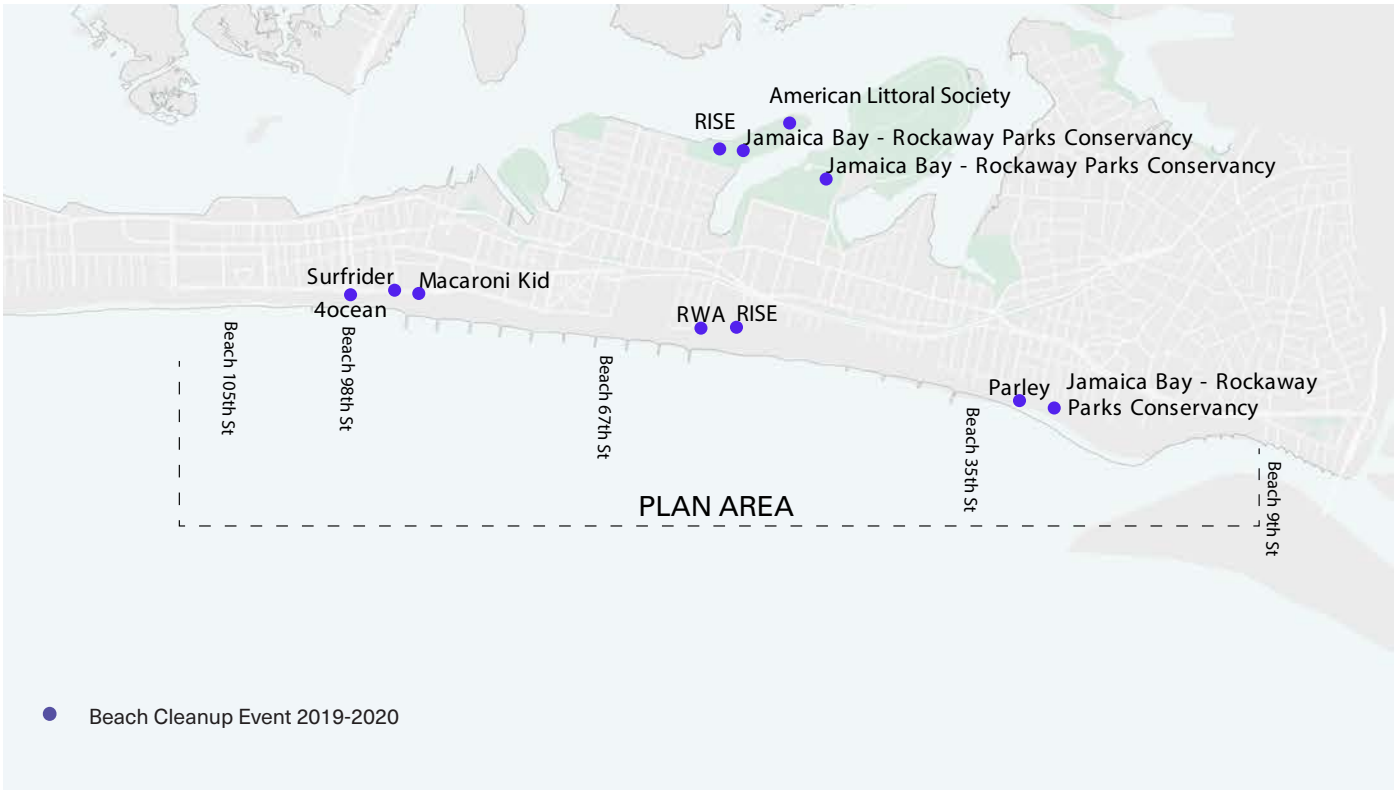


Figure 8. Community Stewardship Programming

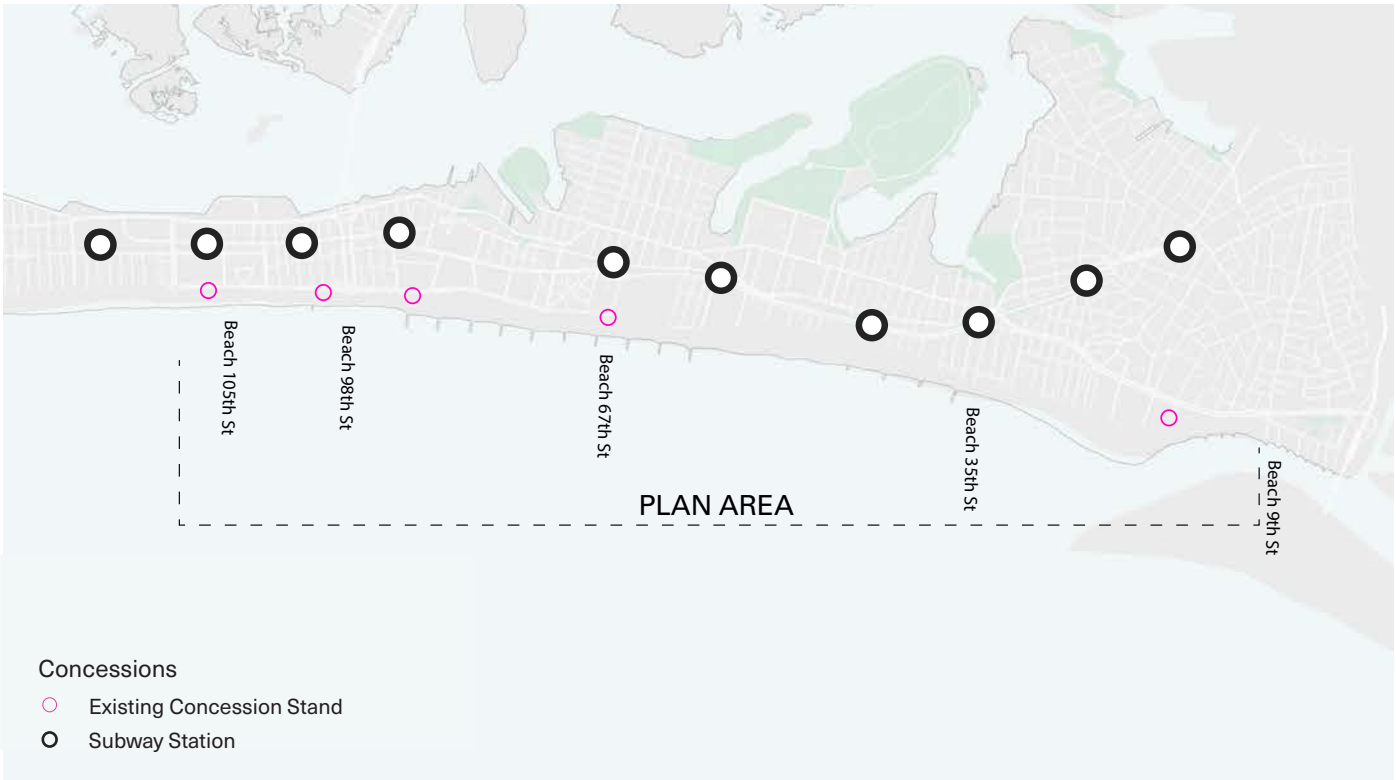


Figure 9. NYC Parks Permitted Concessions Locations

On the Map indicates that 36% of residents are employed in the transport, trade, and utility sector, and travel less than 10 miles from home to their places of work. Within the plan area there exist approximately 60-200 of such jobs spanning between Rockaway Beach and Arverne.

East-west economic disparities in the Rockaways have been compounded by the COVID-19 pandemic. Soaring jobless rates have inspired many residents to take up entrepreneurial efforts, such as selling goods along the shoreline. As recommendations are prepared, it is critical to evaluate both the desire and demand for entrepreneurship opportunities along the shoreline. Only four locations along the shoreline are officially permitted to have concessions; this lack of permitting challenges remaining opportunities for greater activity, including near subway stops on the east side of the peninsula.

Covid-19 Impacts: Health & Employment

The Rockaway Peninsula's existing economic disparities have been compounded by the COVID-19 pandemic. Unemployment rates soared in Queens County, jumping from 3% in February to 22% in June 2020 (NYS DOL: Local Area Unemployment Statistics Program). We may assume that the existing economic disparities between the eastern and western ends of the peninsula (unemployment in 2019 was 5.5% west of Beach 95th Street and 9.7% east of Beach 94th) would have been worsened during this time. Although it is difficult to estimate unemployment rates at the census tract level, statistical analyses by Yair Ghitza and Mark Steitz estimate that unemployment in the Arverne and Edgemere neighborhoods was as high as 30% in August 2020 when the unemployment rate for Queens had dropped back down to 16%. Meanwhile, unemployment rates were estimated at 15% on the Peninsula's western end in August (Quoctrung Bui and Emily Badger, New York Times, August 2020).

The health impacts of COVID-19 have also not been distributed equally. The NYC Department of Health has compiled data on COVID-19 case and fatality rates by zip code across the City. On the western end of the Peninsula, Breezy Point had the highest COVID-19 case rate in NYC, with at one point 9,580 positive cases per 100,000 individuals. The east end of the Far Rockaways was a major COVID-19 hotspot earlier in the pandemic and the health of these residents today remains severely impacted. While Far Rockaway and Edgemere maintained per capita case counts nearly half that of Breezy Point (5,786 cases per 100,000), their rates of pandemic-related death were the second highest in New York City (570 deaths per 100,000). With a fatality rate more than three times that of Breezy Point, despite far lower rates of infection, it is clear that the economic disparities between Far Rockaway and the western end of the Peninsula are also reflected by glaring disparities in public health and access to medical care (NYS DOH - 2019 COVID-19 Tracking).

ENVIRONMENT

The plan area lies north of the boardwalk and behind the primary dunes where restoration is underway by the Army Corps of Engineers (USACE). The area includes a range of environmental conditions, with varying plant and animal species, and levels of disturbance (in other words, the degree to which the environment has been disrupted by development or by natural processes).

USACE Dune Enhancement Plan

To address climate vulnerability on the Rockaways shoreline, USACE is implementing projects that will stabilize the shoreline by constructing "artificial dunes" as a physical barrier to flooding. The plan calls for the construction of a dune, 18-feet tall and at least 60-feet wide, directly south of the **composite seawall**[1]. This construction will result in 1,595,000 cubic yards of beach fill (in other words, replacing sand on the beach where it had eroded).

As part of this project, USACE will also plant native dune grasses and shrubs along the dune and will "nourish" the existing beaches by transporting sand from deeper waters, making the entire shoreline more robust and protecting the peninsula's communities. These will serve as the primary protections, but coastal dune systems consist of more than just long piles of sand. The varied terrain behind the dunes, or secondary dunes, provides added resilience and supports some of the more diverse and productive ecosystems in the region. They are also some of the most disturbed and displaced habitats that have been lost to development and other human activity.
of more than just long piles of sand. The varied

1 Bolded terms are defined in the Glossary on page 44.

terrain behind the dunes, or secondary dunes, provides added resilience and supports some of the more diverse and productive ecosystems in the region. They are also some of the most disturbed and displaced habitats that have been lost to development and other human activity.

Plan area site visit, 2020.

The project team thoroughly reviewed the USACE Dune Enhancement Plan and Environmental Impact Study (EIS) and coordinated directly with USACE to specify the project scope and plan area for this effort. For a full summary of the USACE plan and its impacts on this project, please see Appendix B starting on page 164. The full USACE report can be found online at https://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/East-Rockaway-Inlet-to-Rockaway-inlet/.

HABITAT

Coastal sand dunes are natural barriers separating inland areas from the sometimes-destructive forces of wind and waves; these dunes are our most valuable resource for mitigating coastal storms and beach erosion. Dunes can absorb the impact of storm surges and high waves, preventing or delaying flooding of inland areas and damage to structures located there. Dunes also act as storage areas which supply sand to eroded beaches during storms and provide a buffer for windblown sand and **sea spray**. While the Rockaway dunes are critical for protection and maintenance of beaches, the coastal landscape also serves as a unique habitat and attracts a robust range of migratory wildlife which utilizes the Atlantic Flyway and the Hudson River Estuary. Maintenance of NYC's coastal sand dunes may help to provide critical refuge and breeding grounds for all native plant and animal species, in addition to the dunes' capacity as an important barrier to coastal and climate-related hazards.

Vegetation & Geomorphic Zones

Natural dune systems are formed through a dynamic interaction between wind, sand, and plants. Dune systems consist of four zones: lower beach, high beach/embryonic dune, primary dune, and secondary dunes. The dune system along the Rockaway Beach Boardwalk is interrupted by structures, roads, and the boardwalk itself. Below, we refer to these zones as disturbed or paved landscapes.

While species typical of dunes are present in this area, the natural dune system is severely disrupted. It is important to note that we use these zone labels to loosely differentiate the habitat types observed. They do not reflect the conditions of more natural, undisturbed dune systems. These observations are shown in Appendix C. Plant Habitat (on page 170) and described below.

Lower Beach and Wrack Line

Lower beach consists of an unvegetated (lacking plants and trees) intertidal zone. An intertidal zone is an area that is covered at high tide, and uncovered at low tide. Here, sand is moved by both wind and waves, creating a highly dynamic system in which the sand is in near constant motion. This zone includes the **wrack line**, an area where material (i.e. shells and seagrass) is deposited during high tide. The **wrack line** is located at the upper extent of the lower beach zone where both natural and unnatural debris are deposited.

High Beach and Embryonic Dunes

High beach and embryonic dunes are typically sparsely vegetated. Wind and water still transport and deposit sand in these zones, but erosion is reduced enough that dune grass, sea rocket, and other ecological pioneers persist in these locations. Vegetation buffers wind energy in these zones, leading to deposits of sand. These dunes form as sand accumulates on the beach.

The stretch between Beach 19th and Beach 26th Streets south of the USACE project boundary is made up of high beach and embryonic dunes. The area has recently experienced new growth, likely due in part to the decline of beach visitors amid the COVID-19 pandemic. Nine **herbaceous species** were observed in total, all of which were native and typical of dune habitats. Most notable among these

species are the dune sandbur, which is identified as threatened by New York State (NYS), and seabeach amaranth, which is listed as threatened both federally and by NYS.

Primary Dunes

Primary Dunes typically rise as steep slopes **landward** of high beach. These dynamic dunes are in locations with ongoing cycles of erosion and build-up of sand deposits, and sand grains are generally fine in these areas and create conditions ideal for dune grass growth. Denser dune grass leads to increased sand catchment; as sand builds up, burying stems, it stimulates dune grass colonization resulting in dune expansion. The **seaward** steep slope creates **landward** conditions that encourage more plant species on the gentler slope facing toward the land.

The dune habitat that best matches the above description lies south of the boardwalk within the USACE project boundary. These primary dunes will be replaced and replanted after the construction of the coastal seawall.

Primary dunes between Beach 17th and Beach 21st Streets.

Secondary Dunes

Secondary dunes form on the **landward** side of primary dunes; clusters that are relatively close to the dune front tend to have similar vegetation to the primary dunes, although beach grasses tend to be much less dense and healthy in these areas than on primary dunes, providing the opportunity for a greater diversity of aquatic plant life. Seaside goldenrod is common in this habitat, as are sand spurge and even the occasional sea rocket.

A large contiguous vegetated area sits outside of both the USACE and Greater Rockaway Project boundaries, **seaward** of the boardwalk between Beach 17th Street and Beach 21st Street. This area has been classified as secondary dune despite its position within the East Rockaway Inlet adjacent to the high beach area, a location partially protected by Atlantic Beach to the south. While the steep slope along the southern edge resembles a primary dune, the diverse vegetation along the remainder of the dune indicates its classification as a secondary dune. The area is dominated by broom sedge, a grass-like herbaceous plant, but also contains a diversity of vegetation characteristic of secondary dunes; eight **herbaceous species** were observed in the area, seven of which are native and all of which are typical for dune-like habitats. Three shrub species were also observed, only one of which is native to the region.

Areas north of the edge of the boardwalk to the **toe of the berm** are also categorized as secondary dune habitat. The field survey was divided based mostly on physical obstructions including stairs, ramps, and other infrastructure, and by the existing **planting palettes**. From Beach 32nd Street to Beach 35th Street, the secondary dune species consisted of 5 herbaceous plants, two of which are non-native, and one native shrub species. Some of these species, such as common evening primrose, are often found at disturbed sites. Similar species were observed on the secondary dunes along the boardwalk from Beach 35th Street to Beach 38th Street, consisting of three native **herbaceous species** (mainly dune grass and seaside goldenrod) and one native shrub species. These conditions proceed to Beach 56th Street, where species observed include twelve herbaceous plants, four of which are non-native, and one shrub species. A commonality between some of these species is that they are often found at disturbed sites or habitats with shallow, sandy soils. Dune panic grass was observed at the bottom edge of the **berm** along the **drift fence**, and is listed by NYS as rare.

The stretch between the boardwalk and the residences from Beach 56th Street to Beach 59th Street is characterized by denser, weed-like vegetation. Three non-native **herbaceous species** were observed, as well as two non-native trees, the blue spruce and the Japanese black pine. Dune panic grass was also found in this area. Similar weedy plants were observed through Beach 73rd Street, however this stretch is much less densely vegetated. It appears dune grass and seaside goldenrod plugs had been planted along the boardwalk in recent years, with weedier plants dispersed throughout these plantings.

The dune vegetation from Beach 59th Street through Beach 109th Street is less established than the vegetation of the previously discussed secondary dunes to the west. Plantings appeared recent, likely within the past two years. Spatially, these dunes are considered resting secondary dunes, however the vegetation is similar to primary dune vegetation as it is still in the early stages of development; these dunes are likely to resemble secondary dunes in the coming years. This type of dune habitat was observed from Beach 77th to Beach 81st, Beach 88th to Beach 91st, and Beach 92nd to Beach 95th Streets. The dominant species in these stretches is dune grass, planted 18 inches apart; seaside golden rod has also been planted throughout. Other species identified include one native herbaceous plant and one native shrub. Similar conditions were observed from Beach 98th Street to Beach 103rd Street, where dune grass appears to have been planted relatively recently. Other species present include the native round-headed bush clover and the Canada cocklebur.

South of the boardwalk at Beach 109th Street is a section of recently planted secondary dune which does not fall within the USACE project boundary. At least five native species were identified in this area, three of which are herbaceous (primarily dune grass and seaside goldenrod) and two of which are shrubs (most notably, eastern prickly pear).

The undeveloped Arverne East property is located north of the boardwalk from Beach 32nd Street to Beach 56th Street. While this area was not part of the initial survey, the location boasts a notable amount of vegetation and dune-like habitat. This area includes the land between the Rockaway Beach Boardwalk and Edgemere Avenue from Beach 32nd Street to Beach 56th Street. Although it was not surveyed during site visits, prior documentation provides insight to the conditions of this site. Based on aerial imagery and a previous EIS from NYC HPD it appears a large portion of this site is composed of maritime dunes intermixed with shrubland. The dune habitats are separated into sections by streets connecting the boardwalk to Edgemere Avenue, some of which are paved as well as others made of compacted dirt. There are also larger paved lots and sections of unvegetated compacted sand dispersed throughout the site.

Some of these areas appear to be storage sites for construction equipment, or dumping sites. The vegetation is noted as a mix of native species (i.e. camphorweed, milkweed, American beachgrass, evening primrose, seaside goldenrod) and non-native invasive species (i.e. Phragmites, mugwort, Autumn olive). Rare, threatened, and endangered species include seabeach knotweed, dune sandspur, New York aster, bottle brush grass, and seabeach amaranth.

Disturbed or Paved Landscapes

The stretches along the boardwalk from Beach 73rd to Beach 77th, Beach 81st to Beach 88th, Beach 91st to Beach 92nd, and Beach 95th to Beach 98th Streets are mostly paved. These areas contain playgrounds, sports courts, concessions, and a skate park, with little vegetation between these facilities. Some non-native, invasive mugwort was noted. The area from Beach 103rd Street to Beach 109th Street is mostly paved and consists of additional recreational facilities and concessions. North of the boardwalk from Beach 109th Street is mostly paved beyond small strips of vegetation consisting primarily of non-native **herbaceous species.**

West of Beach 109th Street there is little vegetation north of the boardwalk—primarily landscaped lawn and bushes belonging to residences.

Threatened and Endangered Plant Species

Plant species observed were cross referenced with the NYS Department of Environmental Conservation (NYSDEC) Natural Heritage Program (NHP) list for threatened and endangered (T&E) species for Queens County, NY. Seabeach amaranth is the only federally protected plant species in this region; as stated previously, this species was identified during evaluations on site. NYS protected species include 125 flowering plants for Queens County, only one of which was observed on site (Canada cocklebur). Dune panic grass, while not listed as threatened or endangered, is considered rare state-wide according to the NYSDEC NHP.

FAUNA

The dunes and beaches of the Rockaways support a diverse range of animal life, or fauna, including a range of migratory birds. Most of the fauna observed during surveys were sighted on the beach along the shoreline from Beach 17th Street to Beach 30th Street. Species observed during site visits include the American oystercatcher, black skimmer,

willet, and osprey, as well as a variety of common gull species. The only bird species observed in the dune-like habitats north of the boardwalk were warblers.

Threatened and Endangered Animal Species

The NYSDEC NHP list for threatened and endangered (T&E) species in Queens includes a total of six federally protected species and 14 NYS protected species, none of which were found on site. Of these species, piping plovers and red knots are known to nest within the project area. The dunes and oceanfront from Beach 9th Street to Beach 77th Street are considered an Important Bird Area by the Audubon Society; every summer in the Arverne neighborhood of Rockaway Beach an area between Beach 44th and Beach 57th Streets is cordoned off to limit disturbances to the piping plover mating season.

Habitat Opportunities

To complement USACE's efforts, this plan concentrates on the area north of the boardwalk, emphasizing community empowerment through stewardship, youth education, and habitat restoration. The Arverne East property, the largest contiguous dune habitat in the Rockaways, has been opened to RISE for education and restoration planning, creating an opportunity for significant improvement of the coastal dune habitats north of the boardwalk. Larger, connected habitats are far more valuable and productive than smaller fragmented pieces, making Arverne East an ideal site for restoration planning within the Rockaways.

This plan provides a foundation for a complete actionable plan for the habitats described above. The project's second phase will include physical field assessments of the Arverne East property and the smaller dune habitats along the boardwalk. These field assessments will include evaluation of soil conditions, **hydrology**, and **light regime**, as well as an inventory of vegetation. Data gathered from these field assessments will provide information necessary to plan habitat restoration measures including changes to the soil, invasive species removal, and introduction of new plantings.

The greatest potential for wildlife habitat creation is in the Arverne East dunes and the areas along the boardwalk with greater proportions of invasive species, specifically the secondary dunes south of Arverne East from Beach 32nd Street to Beach 56th Street and continuing east through Beach 73rd Street.

DRAINAGE & INLAND FLOODING

The Rockaway **Sewershed** is serviced only by separated sewer systems. A municipal separate storm sewer system (MS4) is a system of conveyances (including but not limited to streets, ditches, catch basins, curbs, gutters, and storm drains) that is designed for collecting stormwater and discharging it into State surface waters. While these discharges are not generally mixed with sanitary sewage, some contaminants and other particles from roadways are moved along with runoff to water bodies, exacerbating water quality concerns. The remainder of the Rockaway peninsula that is not serviced by the MS4 experiences direct drainage, which is typical of low-lying areas near the coastline. The stormwater runoff from these neighborhoods directly drains into waterways without travelling through any sewer system.

According to the Open Sewer Atlas NYC, a large portion of the Greater Rockaway plan area lies within a MS4 drainage area, indicating that stormwater within this area drains north directly to the MS4 **outfalls** along the bay. This area includes the following stretches within the Greater Rockaway Project boundaries: Beach 9th to Beach 21st, Beach 47th to Beach 48th, Beach 54th to Beach 60th, Beach 73rd to Beach 90th, and Beach 98th to Beach 149th Streets. Given the elevation of the boardwalk, it would not be possible for the dunes and beach south of the boardwalk to be included among these drainage areas.

Another potential contradiction with the MS4 drainage areas on Open Sewer Atlas NYC is that stormwater runoff from the boardwalk and areas to the north likely drains south towards the Atlantic. While the Open Sewer Atlas indicates these areas are draining towards the bay, specific **sewersheds** are not shown. The Open Sewer Atlas suggests that the remainder of the Greater Rockaway Project areas (Beach 21st to Beach 47th, Beach 49th to Beach 54th, Beach 60th to Beach 73rd, and Beach 90th to Beach 98th Streets) experience direct drainage. However, there is no indication whether areas designated as direct drainage sites drain south to the Atlantic or north into the bay. On undisturbed coastal barrier islands and peninsulas, elevations typically peak immediately inland of the

beach and gradually slope down to backwaters; due to disturbances to the natural topography, it is plausible that some runoff drains towards the Atlantic in the Rockaways.

Open Sewer Atlas information for the Arverne East property may also contradict field conditions. Typically, when land is developed, roads and drainage pipes are among the first infrastructure to be implemented. The level of development of the Arverne East property is unclear: Open Sewer Atlas indicates that areas from Beach 32nd to Beach 47th and Beach 49th to Beach 54th Streets are connected to the MS4 network, and that the remainder of the property is not connected to any sewer network. Further investigation may be necessary to determine where stormwater infrastructure is present and / or functioning.

Green Stormwater Infrastructure Opportunities

Green stormwater infrastructure (GSI) north of the boardwalk could help mitigate potential drainage challenges presented by the seawall, discussed below, as well as from the boardwalk itself. GSI practices are typically situated at the base of sloped areas in order to maximize tributary drainage and the volume of runoff reaching the infrastructure. Alternatively, sloped areas can be terraced, or 'keylined,' the practice of distributing runoff across larger areas to improve infiltration and irrigation.

While single-purpose, 'grey' stormwater systems—conventional piped drainage and water treatment systems—are designed to move urban stormwater away from the built environment, GSI is a resilient approach to managing stormwater which reduces and treats runoff at its source while delivering environmental, social, and economic benefits. The main benefits of GSI include:

1. Combined Sewer Overflow (CSO) abatement: stormwater runoff is diverted away from the City's combined sewers for management within the greenway;

2. Treatment of Separated Stormwater: incorporation of plant-based treatments for polluted stormwater runoff which discharges directly into surface waters; and,

3. Public accessibility: sidewalk and parkland stormwater runoff are better managed to prevent **ponding** within public access areas.

COASTAL FLOODING & SEA LEVEL RISE

Dunes play a critical role is protecting against storm surges and coastal flooding, and the USACE project aims to help secure these critical barriers. As sea level rise continues, the frequency and severity of coastal storm surges may further threaten the stability of coastal dunes and the inland areas they protect.

As illustrated by Figure 9. New York City Sea Level Rise (90%), most of the Rockaways lies within the 100-year flood zone. This figure shows the 100-year and 500-year flood zones as designated by the Federal Emergency Management Agency (FEMA) 2015 Preliminary Flood Insurance Rate Maps. The term "100-year flood" is used to refer to a flood which, statistically, has a one percent chance of occurring in any given year. Also illustrated is the 500-year flood zone, relating to hazardous water surges with an annual likelihood of occurrence of one fifth of one percent.

The Rockaways are home to a large population, critical infrastructure, and iconic natural, economic, and cultural resources. These areas are currently exposed to coastal flooding by warm season tropical storms like Superstorm Sandy as well as cold-season nor'easters. Sea level rise will likely increase the frequency and intensity of coastal flooding.

These intense effects were demonstrated by Superstorm Sandy in 2012. According to the New York City Panel on Climate Change (NPCC) 2015 Report, it is likely that the roughly 12 inches in sea level rise which occurred in NYC from 1900 to 2008 expanded the storm's flood area by nearly 25 square miles, devastating the homes of more than 80,000 additional residents.

The global average for sea level rise ranged from 0.5 to 0.7 inches per decade since 1900, however New York has experienced an average increase in sea level rise of 1.2 inches per decade over the same period.

The NPCC's 2015 Report published sea level rise projections based on global climate models which outline three levels of severity: low, middle range, and high estimate.

As shown in the table below, the middle range (25th to 75th percentile) sea level rise projection in New York City is an increase of 4 to 8 inches in the 2020s, 11 to 21 inches by the 2050s, 18 to 39 inches by the 2080s, and 22 to 50 inches by 2100. Sea level rise is projected to accelerate as the century progresses and could reach as high as 75 inches by 2100 were the high estimate (90th percentile) scenario to occur.

This is illustrated by **"Figure 10. New York City Projected Sea Level Rise: 90%"**, which shows the areas which may be affected by sea level rise in the upcoming decades according to the high NPCC estimate. High tides are projected to reach the Rockaway Beach Boardwalk within the coming decades.

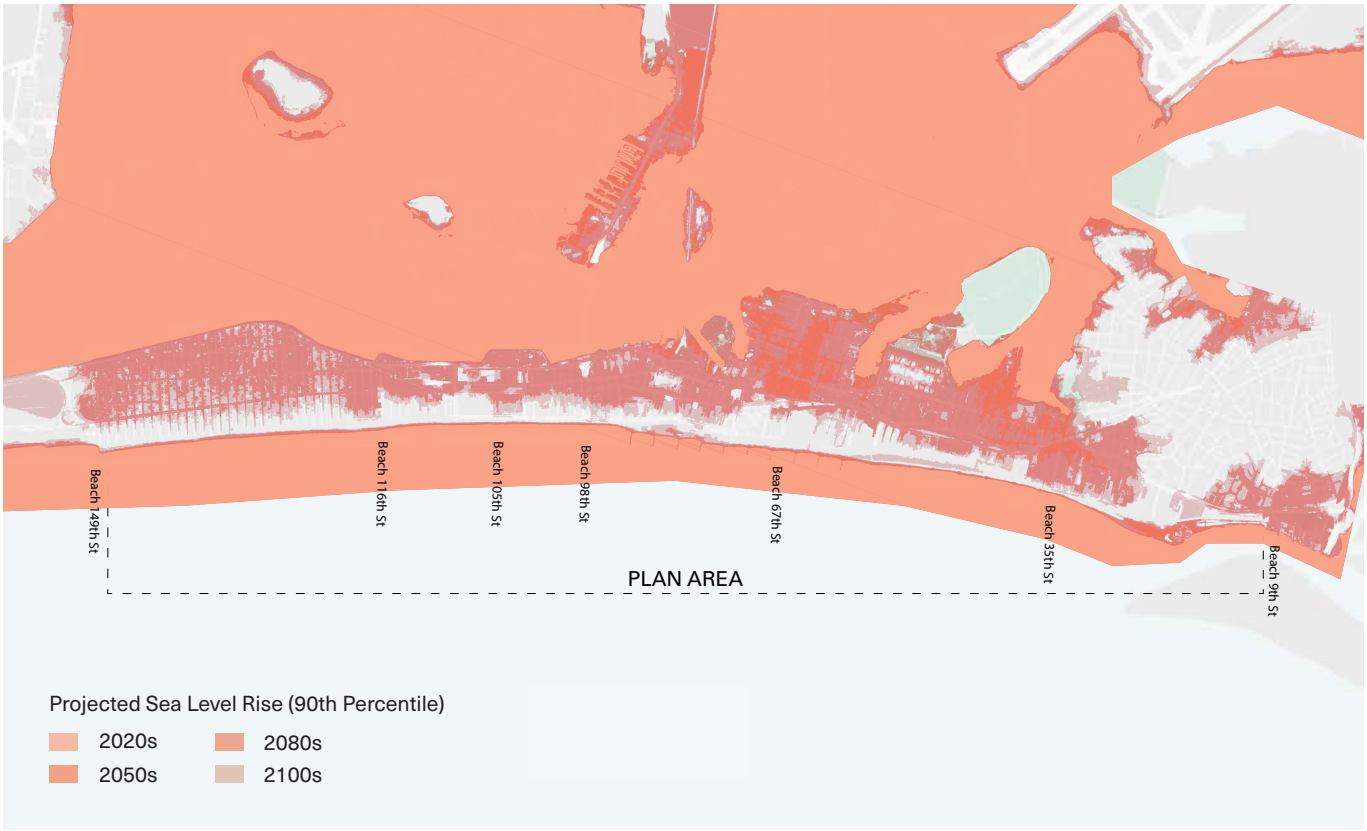


Figure 10. New York City Projected Sea Level Rise: 90%

NEW YORK CITY SEA LEVEL RISE PROJECTIONS			
Baseline (2000-2004) 0 in	Low estimate (10th percentile)	Middle range (25th to 75th percentile)	High estimate (90th percentile)
2020s	2 in	4-8 in	10 in
2050s	8 in	11-21 in	30 in
2080s	13 in	18-39 in	58 in
2100	15 in	22-50 in	75 in

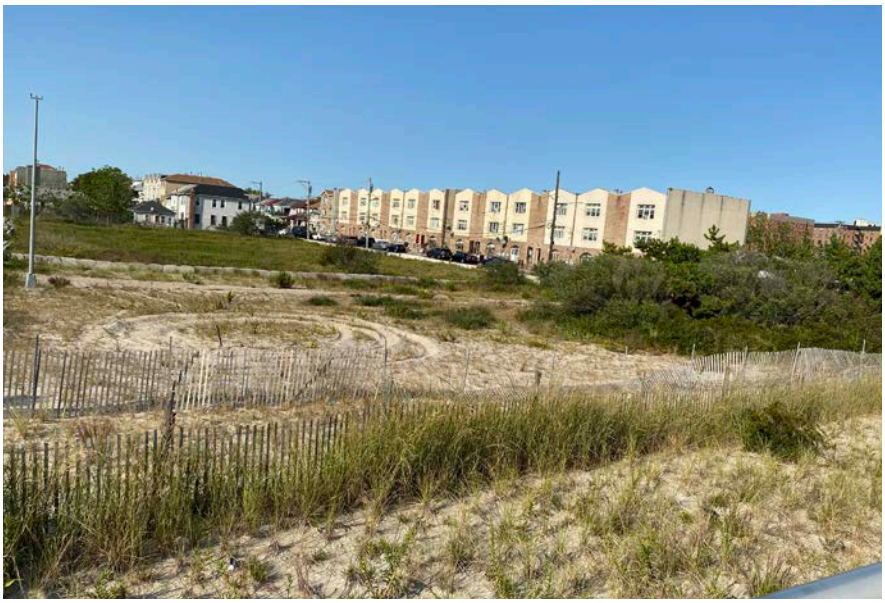
Figure 11. New York City Sea Level Rise Projections Table

By the 2050s, the middle range sea level rise projections are associated with approximately a doubling of the occurrence of a 100-year coastal flood. By the 2080s under the middle range, historical 100-year flood events are projected to occur approximately 2 to 4 times more often. Even under the low sea level rise estimate, coastal flood frequency would approximately double by the 2080s.

The Rockaways continue to be particularly vulnerable as sea level rise is projected to exceed the global average due to **land subsidence** and changes in ocean circulation. Although projected changes in coastal storms are uncertain, the NPCC has stated with a greater than 99% probability that sea level rise alone will lead to a greater frequency and intensity of coastal flooding as the century progresses. The increasing hazard posed to the New York Metropolitan Area's coastal populations, infrastructure, and other built and natural assets emphasizes the importance of designing for resilience and ensuring future coastal projects are built with these factors in mind.

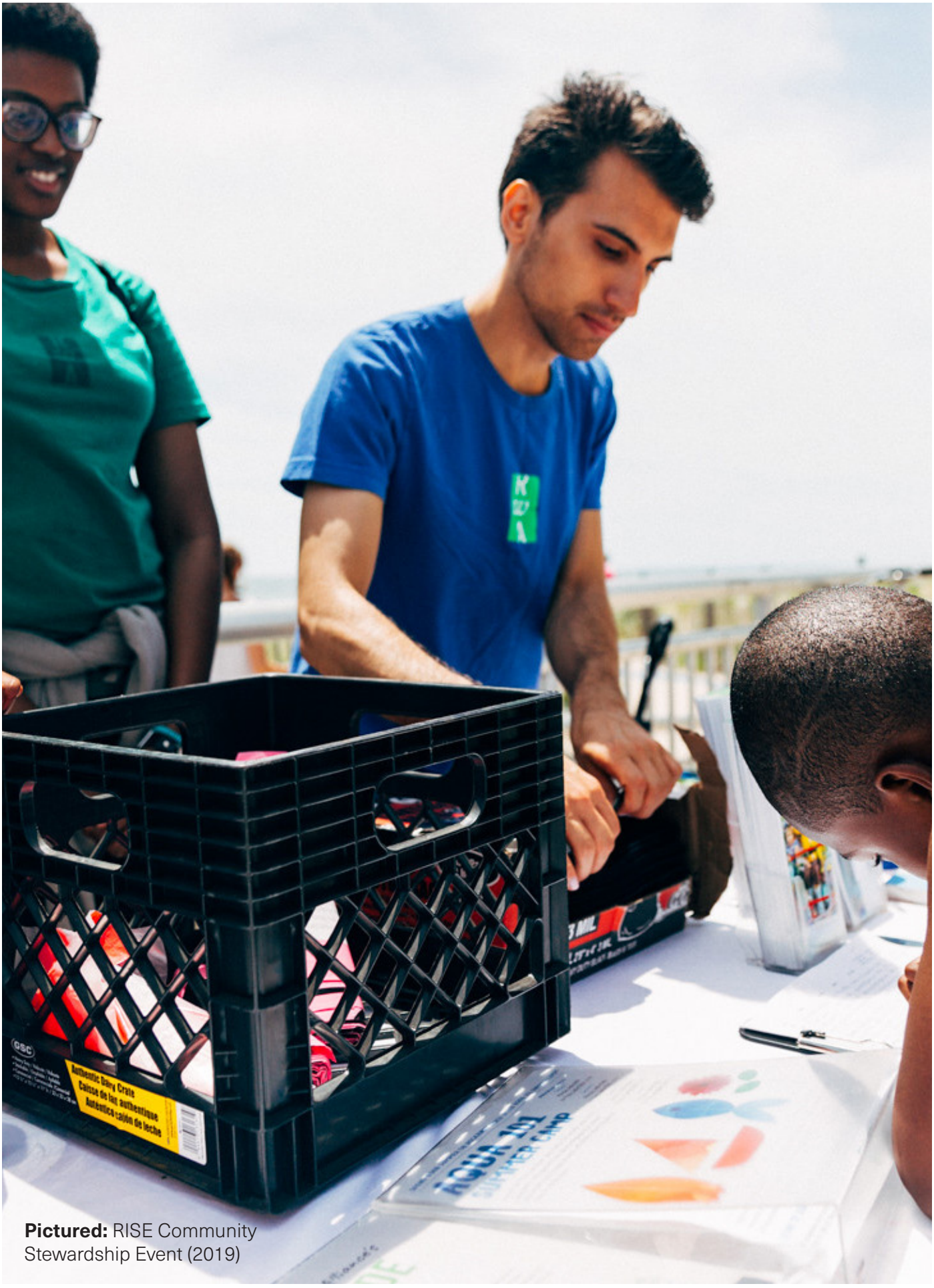
EXISTING CONDITIONS GLOSSARY	
Berm	Raised strip of land on which the boardwalk lies.
Composite seawall	A protective structure adjacent to the boardwalk composed of steel beams/ concrete and covered in a layer of sand to mimic the appearance and function of a dune.
Drift fence	Fences that trap blowing and drifting sand at their location thus causing a sand dune to effectively form and build.
Dune blowouts/ depressions	A gap in a dune caused by strong winds blowing sand out from under and around the vegetation.
Groin	Commonly known as jetty. A long structure that juts out from the beach, usually composed of large boulders, meant to protect the beach from erosion caused by wind, current, and waves.
Herbaceous species	Plants that have the characteristics of an herb, with little or no woody tissue and persisting usually for a single growing season.
Hydrology	Study or practice in the properties of water, especially the movement of water in relation to land.
Land subsidence	A gradual settling or sudden sinking of the Earth's surface due to removal or displacement of subsurface earth materials. (source: USGS)
Landward	Pointing to or on the same side as the land (or away from the ocean).
Seaward	Pointing to or on the same side as the ocean.
Light regime	The variation/shift in light and shade over periods of time.
Offshore borrow area	Location within the ocean from which sand is collected and then deposited on the beach.
Outfalls	Pipes carrying runoff which discharge directly into bodies of water.
Plant Palette	A selection of plant species suitable for planting within designated areas or conditions. Plant palettes often identify herbaceous, shrub, and tree species which are compatible with one another.
Ponding	This occurs when a depression in the landscape or drainage areas are blocked, so that water collects and forms in a small pond.
Seaspray	Aerosol particles formed in the ocean and ejected onto the shore, which contain both organic matter and inorganic salts. Sea spray is responsible for much of the heat and moisture fluxes between the atmosphere and the ocean, thus impacting climate patterns and tropical storm intensity.
Sewershed	An area of land and how water flows through the built environment; over the streets, sidewalks, buildings and how it drains into pipes that carry it to
Toe of the berm	Bottom edge of berm.
Wrack line	A coastal feature where organic material (e.g kelp, seagrass, shells) and other debris is deposited at high tide.

High beach/embryonic dunes between Beach 17th St and Beach 26th St. Dominant vegetation includes dune grass (Ammophila breviligulata). Federally endangered sea beach amaranth (Amaranthus pumilus) present in this area.



Secondary dunes north of the Rockaway boardwalk between Beach 26th St and Beach 32nd St. Dominant vegetation includes dune grass (Ammophila breviligulata), seaside goldenrod (Solidago sempirvirens), and non-native camphorweed (Heterotheca subaxillaris).

Secondary dunes north of the boardwalk near Beach 56th St. Dominant vegetation includes native broom sedge (Andropogon virginicus), and non-native alfalfa (Medicago sativa), Japanaese knotweed (Fallopia japonica) and mugwort (Artemisia vulgaris).



Pictured: RISE Community Stewardship Event (2019)

Community Engagement

The Greater Rockaway Community & Shoreline Enhancement project team, led by RISE, developed a community-centered shoreline restoration plan for the Rockaways shoreline. Our inclusive engagement and community design process sought to foster consensus-building among the various public agencies charged with managing the shoreline, as well as between the diverse residents and stakeholders of the peninsula, and to envision an adaptation and stewardship plan that promotes equity, supports economic growth, and enhances the natural environment.

The plan recognizes that restoration and investment in the shoreline cannot be accomplished without the restoration and investment in the community.

The plan and its projects developed in collaboration with the community seek to direct resources toward communities who will benefit the most from public investment. The approach, aligned with RISE's mission, was structured to create a substantive and inclusive community design process that accomplishes the following objectives:

- Build consensus around a dune enhancement strategy.
- Align with community development goals.
- Develop a replicable and scalable community planning model for dune enhancement and adaptation.

RISE Community Stewardship Event (October 2019)

ENGAGEMENT APPROACH

RISE, as the lead and as a trusted community partner, leveraged an extended community of city, state, and federal agencies, civic associations, New York City Housing Authority (NYCHA) leaders, stewardship groups, nonprofits, academic partners, and others to develop an engagement process. The project team completed exhaustive community research, reviewing 24 local community plans to inform a community engagement approach developed in collaboration with Ana Fisyak Consulting. The approach sought to leverage Rockaway's rich history of volunteerism, engage stakeholders and community members in plan development through a broad array of strategies, and meet stakeholders and community members at their capacity. Essential to the approach was acknowledging and accounting for the incredibly difficult year and the significant impact COVID-19 had on Rockaway.

With all this in mind, community engagement was driven by four key principles:

RISE Community Stewardship Event (June 2021)

1. Discuss Local Concerns without Anticipating Solutions

During the engagement processes, local stakeholders generated design solutions. The project team worked with stakeholders to precisely identify challenges and concerns, which then allowed the design team to work iteratively through a series of potential solutions.

2. Employ Multiple Types of Engagement

Gathering input from the community on large-scale projects requires dexterity in the engagement approach. Our process provided multiple entry points into the dialogue—through workshops, interviews, focus groups, social media, a project website, a survey, and presentations in the local community—to break down perceived barriers to inclusion in the process. For example, to capture input for the NYCHA community without draining the already stretched capacity of tenant organizers, the team garnered input from residents right in their front yard by collaborating on a clean-up event already in the works and supporting the event with a designed flyer. Using various engagement strategies expanded the reach of the process and led to a design approach that responds more directly to the needs of the community.

3. Generate Local Ownership of Recommendations

Engagement serves many purposes. When a community is undergoing the potential for major change, there is an opportunity to create a sense of control over how that change will occur. With facilitation that framed key issues, useful data, and accessible design tools, stakeholders saw both sides of an issue to develop strong ownership that is based on a nuanced understanding of the challenges. These processes were, additionally, an opportunity for capacity-building and creating a shared culture around stewardship. Creating pathways for substantive youth involvement was critical. Youth were a source of innovation and the future keepers and implementers of the plan.

4. Develop Strategies that are Sensitive to Current Events

Based on the ever-changing nature of the political and socio-economic climate, planning efforts must look beyond traditional methods and processes.

Engagement strategies should be sensitive to the environmental, health, and economic challenges of the day. For example, engagement methods needed to be modified during COVID-19 to address public health concerns, especially where in-person engagement is critical in connecting with communities facing barriers to engagement. In response to this challenge, our team developed virtual engagement strategies utilizing tools like Zoom, Microsoft Teams, Miro, Poll Everywhere, and Google Jamboard. Yet, while virtual engagement was a valuable tool, it needed to be reinforced by additional strategies that address the digital divide.

COVID Considerations

The team launched the Community Engagement in October 2020, transitioning the originally planned in-person strategies to an online format. During this time New York City was in the grips of the COVID-19 pandemic with case counts rising. By December, the infection rate climbed exponentially. Rockaway was particularly hard hit with a staggering death rate almost twice that of New York City overall (NYC Department of Health and Mental Hygiene). With CDC Guidelines in mind, the team launched the community engagement entirely remotely. Interviews and community design workshops were held over Zoom. By the spring, however, cases were steadily decreasing with the increasing availability of vaccines, and the team incorporated a few socially distanced in-person events. This included an event at New York City Housing Authority Oceanside Apartments to garner feedback exclusively from NYCHA residents and a site visit on the shoreline in May.

Shore Corps Tour with Mike Feller (May 2021)

SUMMARY OF ACCOMPLISHMENTS & STRATEGIES

The community engagement process for the Greater Rockaway Community & Shoreline Enhancement Plan engaged over 1,068 people, 33 community stakeholders, and 16 young adults through sustained collaboration. The three-tiered approach:

1. **Built community awareness and capacity** through:

- Sustained training and career exploration for youth in RISE Shore Corps program through eight training sessions and one site visit over eight months engaging 16 young adults.
- A four-month social media campaign engaging 375 people (measured through likes and shares) through RISE social media accounts.
- Three public presentations, two at Community Board 14 and one at the Rockaway Beach Civic Association.
- An email listserv of 207 community members.

2. **Garnered input on the development of the plan** through:

- 12 scoping interviews with 13 interviewees.
- Two community design workshops with 37 community members in Community Design Workshop 1 and 34 community members in Community Design Workshop 2.
- Two focus groups: one focused on engaging the NYCHA community and another with technical advisors, civic associations, and stewardship groups, engaging 15 people in total.
- A survey translated into three languages with 176 respondents.

3. **Sustained stewardship of the plan and the shoreline** through:

- Four quarterly steering committee meetings with 13-19 stakeholders representing local businesses, civic associations, public agencies, stewardship groups, community groups, elected officials, and residents.
- Three stewardship events engaging over 50 volunteers.

The community engagement process, launched in October 2020, was complemented by outreach through presentations at local community groups, articles in local papers, a project website, and posts to community social media accounts.

ROLES[1]

Rockaway Community: The role of the Rockaway community was to inform the plan through participation at Community Design Workshops, focus groups, and a survey. The input and feedback collected from community members served as the foundation for the recommendations.

Young Adults in RISE's Shore Corps Program: Local students benefited from the educational and capacity-building aspects of the process, while providing their unique perspective on potential programming. Shore Corps students participated in monthly trainings with the team for two hours. Activities included professional development and site surveying or mapping activities.

Steering Committee Members: The Steering Committee is a group of 19 stakeholders including RISE, NYC Parks, USACE, NYS DEC, FRANC, civic associations, community leaders, and other key community members or organizations. The Steering Committee met four times and was responsible for providing insights into the study area's history, current events, challenges, and opportunities. The project team looked to public agencies sitting on the Steering Committee to provide key data on the plan area.

Interviewees: The team conducted 12 interviews at the beginning of the engagement process. These interviewees, which included community members and representatives from various community organizations and businesses, provided background on their goals for the shoreline. The interviews also provided additional context that helped the team anticipate major community concerns and goals and to ask the right questions during community forums, focus groups, and the survey.

Focus Group Participants: The team hosted two focus groups after the community workshops to garner feedback on the projects emerging out of the engagement process. Focus group attendees responded to ideas generated during the community design workshops and helped guide the project team's thinking around interventions and implementation planning.

- **NYCHA Focus Group:** The first focus group engaged the NYCHA community through an in-person tabling event at Oceanside Apartments in collaboration with the Oceanside Apartments Residents Council, Ocean Bay Resident Council, The Child Center of New York's Oceanside Cornerstone Community Center, Rock Safe Streets, Brothers for Peace & Social Change, and NYPD Community Affairs during a Community clean-up event on April 24, 10am-1pm. The tabling event provided an opportunity to reach NYCHA residents directly in their community while not draining already limited capacities of local tenant organizers. During the event, the team received feedback from nine NYCHA residents in total including five adults, two children, and two seniors.

- **Technical Advisory Focus Group:** During this focus group, the project team received feedback from six attendees representing civic associations, stewardship groups, a surf business, and an organization focused on science and resilience.

1 See Acknowledgements on page 3 for a full list of Shore Corps., Steering Committee, interview, and focus group participants.

ENGAGEMENT GOAL #1

Build Community Awareness and Provide Training and Career Exploration

The primary vehicle for training and career exploration in this process was through the integral involvement of the Shore Corps program. In addition, wider efforts to build community awareness included the use of social media and the project website.

Shore Corps: The training component with Shore Corps found inspiration in RISE's mission to engage all generations of Rockaway residents to care for their community and environment. It is also built from community development goals identified in recent plans and from our partner, NYC Parks. The collaboration sought to engage existing local talent, especially young people, and strengthen the community, provide opportunities for developing the next generation of environmental stewards, grow community involvement in stewardship of the park system, and generate local ownership and strength of stakeholder networks. Shore Corps, a service-learning program for high school youth, provided an opportunity for young residents to meet, learn from, and work with the project team throughout the project while providing critical feedback about the recommendations. From October to May, for two hours a month, 14 Shore Corps students worked with the project team on aspects of the plan. Through this collaboration, Shore Corps students learned about the "wicked problem" of climate change— and about the complex power of community-centered ecology that equally values care for the environment, equity, and the economy. Through collaboration, Shore Corps:

- Took part in career development/exploration opportunities in urban planning, design, environmental restoration, and ecology engaging with experts in resiliency, architecture, urban restoration, and ecology.
- Learned about human ecology, the Green New Deal, sustainable development, resilience, successful eco-restoration, restoration case studies, native plants, and the importance of soils to restoration.
- Reviewed and evaluated community plans, completing a project SWOT analysis.
- Contributed to community empowerment and served as ambassadors for the project through presentation and participation in the Community Design Workshops.
- Grew an understanding of youth as community advocates as the ears and eyes of the Rockaway community, and the role youth play in the health

Shore Corps Members Reflect via Jamboard, February 25, 2021

and integrity of the dune network.
- Developed a manifesto to drive and evaluate the development of the Community and Shoreline Enhancement Plan.
- Developed a native plant planting plan and participated in a site tour of future projects sites with ecologist Mike Feller.

Social Media: The plan was supported by a four-month social media campaign that engaged RISE's community networks virtually to advertise and host community design workshops and share information on native plants and the nature of dunes. Platforms used included Instagram, Facebook, and Twitter. Posts garnered over 375 likes.

Project Website: A project website supported the work and included project information, ways to engage, and an archive of community design workshop recordings.

ENGAGEMENT GOAL #2

Garner Input on the Development of the Plan

To gain input on the development of the plan, the project team conducted interviews, focus groups, public workshops, and an online survey. Together, these strategies offered a complex picture of community and stakeholder priorities that directly shaped the recommendations presented in this plan.

Interviews: Over the course of a dozen interviews with scientists and researchers, stewardship experts, businesses, economic development organizations, public agencies, residents, and civic leaders, the team garnered feedback on key themes: economic empowerment, equity and access, environmental resilience, and public space quality. The interviews set the stage to better understand the context, community needs and priorities, and the "low-hanging fruit" for the plan. The interviews began with a short introduction/ presentation of RISE, project goals, and the site area and focused on a specific set of questions tailored to public agencies; civic associations and property owners; environmental experts; community groups and community-based organizations; and local businesses. Questions covered economic empowerment; equity in housing, race, health, and access; and environmental resilience and public space. Questions included, for example:

- **Access to Jobs and Workforce Training:** How would you describe the universe of economic opportunities for residents along the Rockaway Peninsula? Where do they exist? How can residents typically access these opportunities?
- **Environmental Justice and Health Equity:** How would you describe the ecological environment along the Rockaway shoreline? Are there any areas that are particularly impacted by air or water pollution? Truck traffic, prone to trash, plastics, etc.?
- **General Resilience Concerns:** What are the most significant concerns related to the environmental resiliency of the Rockaway Peninsula?
- **Ongoing Stewardship Efforts:** Do you have ideas for long-term stewardship and monitoring strategies?

Key Takeways from the Interviews

"This is not for us [adults]. Let them be the leaders and stewards...How can we set this up for future generations."

"You have to market the environmental wonders of the Rockaways if you want people to want to preserve them."

"My question is: who is this for?"

"If you don't have a local organization taking local stewardship of it, it doesn't happen...Because honestly, when there is local commitment and involvement, it's like that mantra 'We built this.'"

"There is nothing [concessions or food kiosks] from Beach 17th Street to the 80s."

KEY TAKEAWAYS FROM INTERVIEWS
1. Rockaway's unique environmental assets—the ocean, the bay, the beaches—are economic drivers; investments in climate resilience and nature/nature-based features can be leveraged to solve intractable. economic issues and invest back into the community.
2. There is a lack of local jobs and entrepreneurship opportunities and high unemployment especially among youth. Black and Brown businesses and fledging businesses were also uniquely and disproportionately impacted by the pandemic.
3. Building awareness of Rockaway's unique environmental assets and education on climate change and the environment helps ensure their continued stewardship and protection.
4. The plan must center youth and the next generation of community stewards, providing workforce development and pathways for youth into environmental fields and college. This will help provide jobs now, through, for example, a native plant nursery.
5. The community must be part of the decision-making process, and local organizations must undertake stewardship of the shoreline.
6. When those most affected by institutional racist policies are prioritized, environmental restoration can play a role in combating racism and reversing the effects of these policies of disinvestment in the Rockaways. For example, this work can increase access to greenery and quality open spaces.
7. There are deep social, political, and economic divisions among residents, impacting the community's ability to advocate for themselves. Yet, the beach (the "people's beach") is the great connector, and there are many opportunities for deeper connection through volunteering, training, signage, etc.

COMMUNITY DESIGN WORKSHOP 1: LAYING THE VISION

March 24, 2021, via Zoom

The workshop received over 100 RSVPs and 37 participants joined. The goals for the workshop were to:

- Share information about the process.
- Learn about what other places are doing to make shorelines more resilient, more active, and more welcoming to the whole community.
- Think big and come up with ideas for what projects should result from the plan.
- Discover opportunities for community and youth employment as a core part of the plan's projects.

After welcoming the virtual meeting participants, the project team presented an overview of the project's initial research and findings. To cap off the presentation, Charlene Lee represented the Shore Corps Manifesto and how Shore Corps hoped to align the plan with the Three E's: "Environment, Equity and Economy." This was followed by a presentation on the three pillars of the plan (economic empowerment, equity & access, and environmental resilience), and emerging opportunities that came out of discussions with Shore Corps, steering committee members, and interviewees. The project team shared findings on our analysis of past plans, highlighting the key lesson that past reports lacked a focus on environmental justice, racial equity and inclusion, alignment between the eastern and western side of the peninsula, and the waterfront's unified identity. For the remainder of the workshop, participants broke out into six facilitated groups to discuss precedent projects and develop a shared vision for project outcomes.

Community Design Workshop 1 Flyer

KEY TAKEAWAYS FROM COMMUNITY DESIGN WORKSHOP 1
1. Shoreline stewardship can provide unique opportunities for youth employment.
2. There is a need for greater awareness of the peninsula's environmental risks and more accessible entry points into environmental education, such as interpretive signage, stewardship opportunities, and ecology education.
3. We should use this as an opportunity to improve the economy as a whole and support local entrepreneurship, especially centering Black and People of Color.
Ideas for: 1. **Environmental Workforce Training:** urban gardens, native plant nursery, bioremediation, early eco-literacy programs, interpretative signage, beach restoration strategies, environmental education center, renewable energy, and stewardship models like TAZO Tree Corps or NYC Tree Survey. 2. **Youth Education/Employment:** student-led and community-led beach clean-ups and tours, lifeguard training, school-based workshops, ecology/wildlife curriculum, apprentice opportunities, and employment models centering the contributions of youth. 3. **Local Entrepreneurship:** Rockaway coops with local gardens and farms, opportunities for minority- and women-owned businesses (MWBE), programs like Green City Force, NYCHA-focused programming; increase the number of diverse shops/businesses along the boardwalk, and add bike stations. 4. **Water-based Initiatives/Community-building activities:** activities that bridge economy, education, and employment; faith-based use of the waterfront; water sports such as fishing, boating, surfing, canoeing, and kayaking; visits with field scientists; performances; concessions; and day care especially for smaller children during the summer.

COMMUNITY DESIGN WORKSHOP 2: FROM VISION TO ACTION

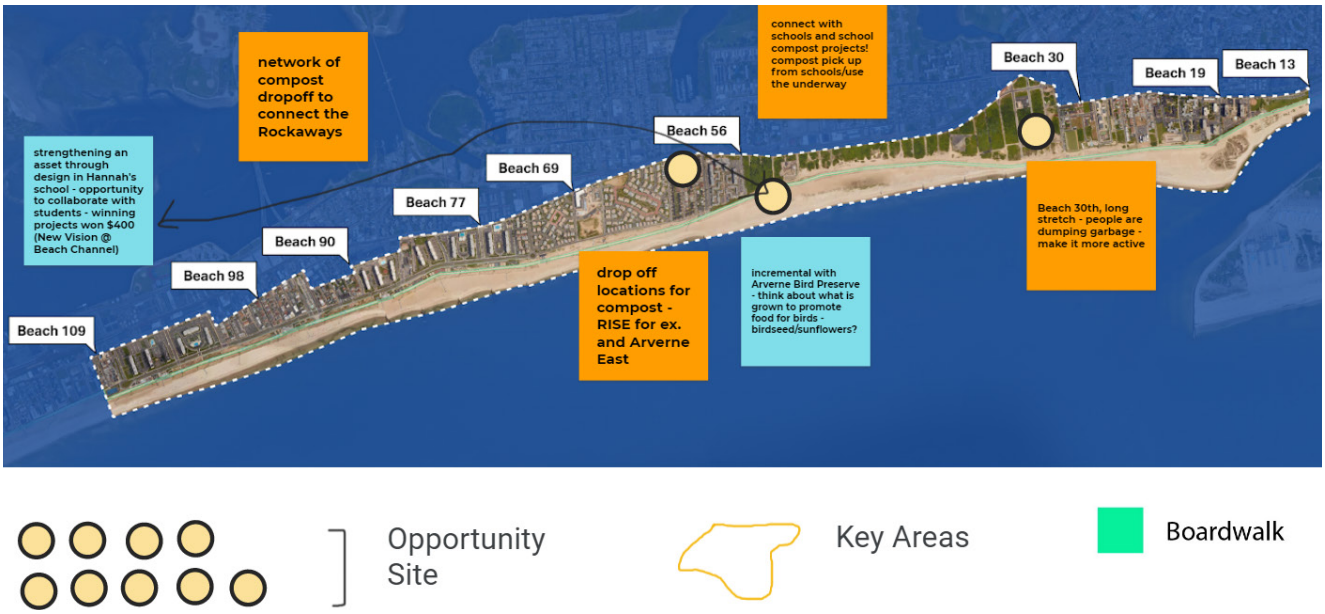
Thursday, April 22, 2021, via Zoom

The second Community Design Workshop received over 100 RSVPs, and approximately 34 community members attended. Participants reported playing a wide range of roles in the Rockaways including as an advocate, volunteer, education specialist, Parks Department ranger, student to parent, to name a few. The goals for the workshops were to:

- Review ideas and questions generated during the first community design workshop
- Refine project ideas for the second phase of design
- Learn directly from participants what the challenges and opportunities will be for each of these potential projects.

RISE kicked off the virtual event by reviewing the project's history and introducing the consultant team. Brianna Francis framed the conversation with the Shore Corps manifesto. The project team then presented an overview of the process so far, and the four project ideas generated through engagement with the Steering Committee and the first Community Design Workshop. For the remainder of the workshop, participants broke out into six facilitated groups to discuss one of the four projects and develop a shared vision for project outcomes.

Community Design Workshop 2 Flyer



Participants Engage via Jamboard during Community Design Workshop #2

KEY TAKEAWAYS FROM COMMUNITY DESIGN WORKHOP 2
1. Participants were strongly supportive of the projects' emphasis on youth employment, environmental education, and opportunities to learn about Rockaway's history including environmental history and Native American history. They saw the projects as a way to create unity across Rockaway and provide programming year-round, not just in the summer.
2. Participants wished that the projects integrated more intentionally with schools, teachers, and students; businesses and community groups (especially to be featured in the tours for the docent program); and NYCHA and the Jewish community in outreach about the programs.
3. Participants proposed expanding the programs to include waste and composting closed-loop systems between businesses, schools, and a plant nursery using bikes for organics pick up; involving schools, faith-based organizations, and businesses to adopt aspects of the project/ shoreline and making sure clean-ups are culturally sensitive (for ex. events on Saturday can exclude the Jewish community).
4. Participants suggested opportunities for learning and exchange, including providing classes, capturing oral history from older Rockaway residents, and integrating murals and art into the projects. Participants also wanted opportunities to learn from experts and educators through panels.
5. Across all projects, participants felt that it was critical to engage NYC Parks, local schools, and local restaurants/concessions. Participants also shared specific community-based organizations and associations that should be involved, such as Rockaway Youth Task Force, the Queens Defenders, Belle Harbour Garden Club, the YMCA, and Jamaica Bay Ecowatchers. Faith-based organizations were also mentioned as important anchor institutions to work with, in addition to existing green or agricultural sites such as Edgemere Farm.
6. Participants were excited to get involved as volunteers and trained docents and to liaise with academic institutions like Pratt Institute. It was also discussed that volunteers and project contributors should be paid for their time.

FOCUS GROUPS

The two focus groups provided an opportunity to reach targeted populations and experts in the plan design.

NYCHA Focus Group

The NYCHA focus group/tabling event brought an adapted version of Community Design Workshop 2 into the community. Ana Fisyak and Delaney Morris, RISE Fellow, introduced the project and walked participants through three large presentation boards. Participants shared what they loved most about the Rockaway shoreline, reviewed existing conditions against their lived experience, and shared their top community priorities (Environmental Resilience and Local Food Systems tied as the top choices, followed by Education on Local Ecology and Youth Employment). After participants reviewed the potential projects, they offered feedback on what they liked/what could be improved, brainstormed possible sites for the project, and discussed who should be involved.

Technical Advisory Focus Group

The Technical Advisory focus group engaged a wide array of expertise including monitoring, stewardship, and civic associations. The focus group opened with an ice breaker on the biggest challenges and/or opportunities for engaging the community in stewardship and monitoring. After a 10-minute presentation from the project team introducing the project, context, existing conditions and emerging themes and projects, participants took turns weighing in on a set of questions. This included, What type of stewardship is needed to support the dunes? What is "low hanging fruit" we can build on? Participants also provided targeted feedback on the projects, including what should be included on signage, how to reach out to organizations about the plan, and how they would like to be involved.

KEY TAKEAWAYS FROM THE NYCHA FOCUS GROUP
1. Top community and shoreline priorities were: • Environmental Resilience / Local Food Systems • Education on Local Ecology / Youth Employment
2. Paid opportunities for youth to get involved and lead are paramount.
3. Rockaway history—how the peninsula was formed and settled, artifacts of the Playland era of Rockaway, lifeguard history, Civil Right history, and Native American history—should be incorporated
4. Projects could focus on the stretch from Oceanside to Hammels (Beach 40s to Beach 80s).
5. Projects should involve NYCHA community centers, schools, and libraries.

KEY TAKEAWAYS FROM THE TECHNICAL ADVISORY FOCUS GROUP
1. To support the dunes, Rockaway needs enriching experiences that go beyond telling visitors to stay off the dunes and clean up trash. This includes stewardship opportunities and signage that educates participants about the role of the dunes and plants in soil stabilization, the dynamic nature of the dunes, and nesting birds as well as youth-led plantings and events in partnership with local schools and libraries.
2. Technical advisors see a role for themselves in the plan: Surfrider Foundation and JBRPC as a partner on educational and planting events, SRIJB as a monitoring partner, Belle Harbor POA and RBCA as places where the team can present on the plan, and Skudin Surf on outreach. Advisors, especially civic associations, were intrigued about the adopt-a-dune program but wanted to know more about what it involved.
3. Align with existing efforts like "Respect Rockaway" campaign, Skudin Surf's large listserv, SRIJB monitoring framework for nature-based features, NYC Audubon's Be a Good Egg campaign, and NYC DYCD's Summer Youth Employment program.
4. Art and geo-targeted social media can expand the reach of the message.
5. Encourage community members to take ownership of the dunes, organize events, and encourage groups beyond the regular players to get involved including Queens Library, St. John's Residence for Boys, and The Laru Beya Collective.

Youth Engaging in NYCHA Focus Group

SURVEY

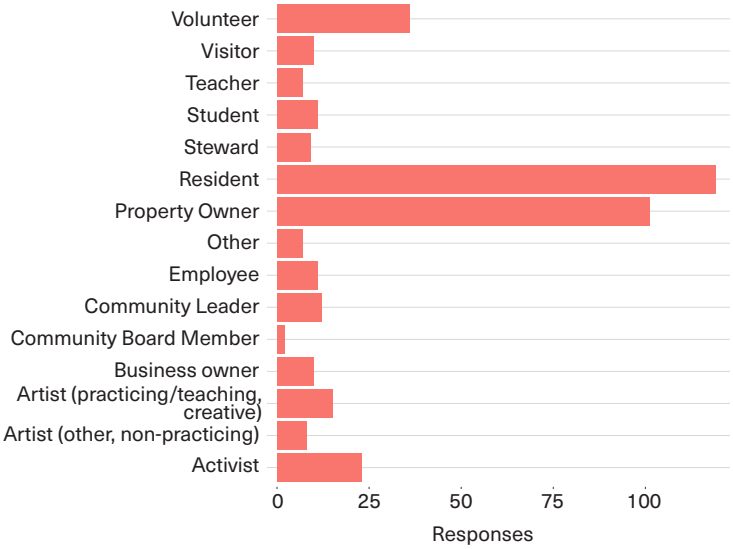
The team developed and distributed a 5-10 minute survey via Google form in English, Spanish, and Russian. The survey was advertised through RISE's e-newsletter, social media, presentations to the Community Board and the Rockaway Beach Civic Association (whose President is a member of the Steering Committee), and posts on Friends of Rockaway, Best Friends of Rockaway, and The Rockaway Wave Facebook groups. The survey was also shared with the steering committee members and community workshop attendees. The survey, which was completed by 176 people, provided an opportunity to get specific feedback on projected projects—signage, docent program, the nursery, the adopt-a-dune program, and demographics—through a lower time commitment engagement option.

KEY TAKEAWAYS FROM THE SURVEY
1. The survey respondents were mostly residents (90% listed a Rockaway zip code) and property owners, women, and captured a racially and ethnically diverse mix of community members. Many also identified as volunteers and activists. Most (84%) had a long connection to Rockaway (6 years+). The survey was slightly overrepresented by older adults, likely because the survey was shared widely with property owners in the Arverne by the Sea development.
2. By far, the primary reason people went to the beach was to be in nature (74%). The shoreline was also an important area for swimming, exercise, and socializing.
3. The top objective among respondents was to make the shoreline more resilient to sea level rise and storms. That was also reflected in the type of signage people wanted to see and the type of careers respondents wanted Rockaway residents to have more access to (59% climate change adaptation; 59% nature conservation; and 56% urban planning).
4. 57% of respondents volunteered in the last two years and respondents heard about the events through social media, email, word of mouth, and local newspapers/magazines. Scheduling conflicts and not hearing about the event in time were the top reasons preventing people from volunteering. Over 64% wanted to volunteer at least once a month. Respondents listed over two dozen groups they are part of that would be interested in stewardship opportunities.
5. Respondents wanted access to tours about Rockaway history, climate change & adaptation, dune ecology, Native American tribes, and biodiversity. They also want to learn through signage, especially about Rockaway history, the dynamic nature of the Rockaways' shorelines, wildlife/birds, and how dunes combat climate change. Respondents stressed that signs should be placed where dunes are the most damaged, where there are the most people, where there are special areas of interest, like the Piping Plovers nesting area, and that signage could be placed along the entire boardwalk with each neighborhood having a different emphasis based on their community and concerns.
6. Most respondents said they had a low understanding of Rockaways' native habitat, but a high interest in taking part in activities to protect/improve the native habitat. Respondents were very interested in purchasing native plants locally and learning about ocean-friendly gardens, native plants, and native plant care.

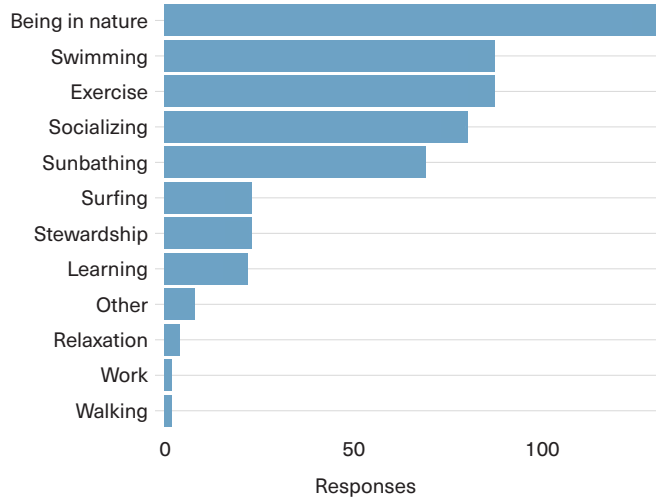
Pictured: Community members participate in a dune planting event organized by RISE (2019).

COMMUNITY SURVEY SNAPSHOT

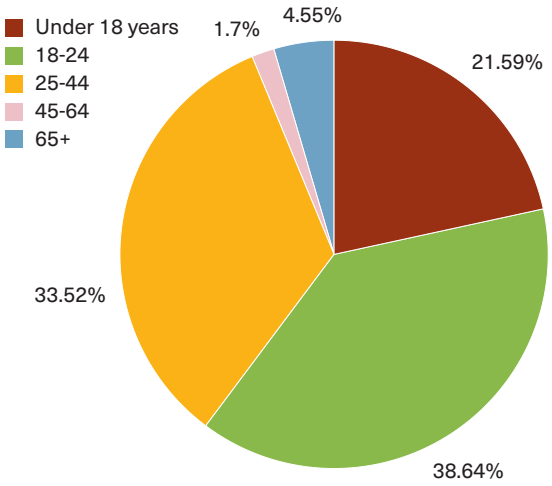
What role do you play in the Rockaway community?



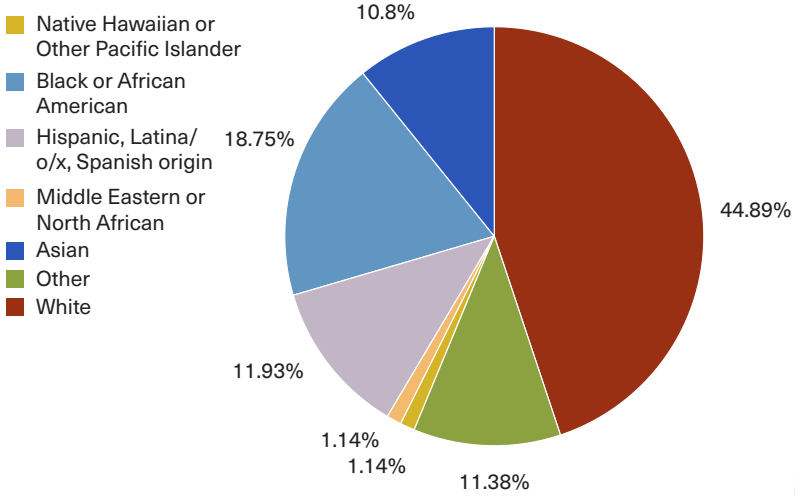
What is your primary reason(s) for going to the beach?



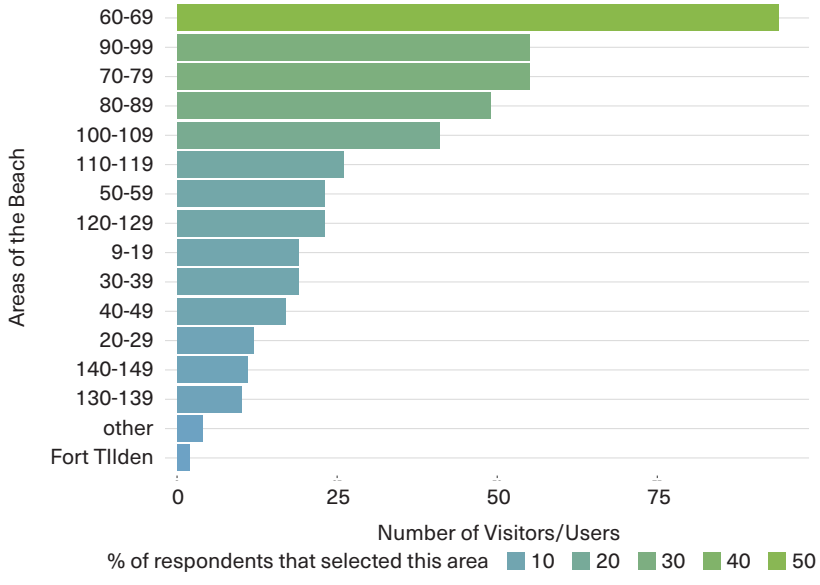
How old are you?



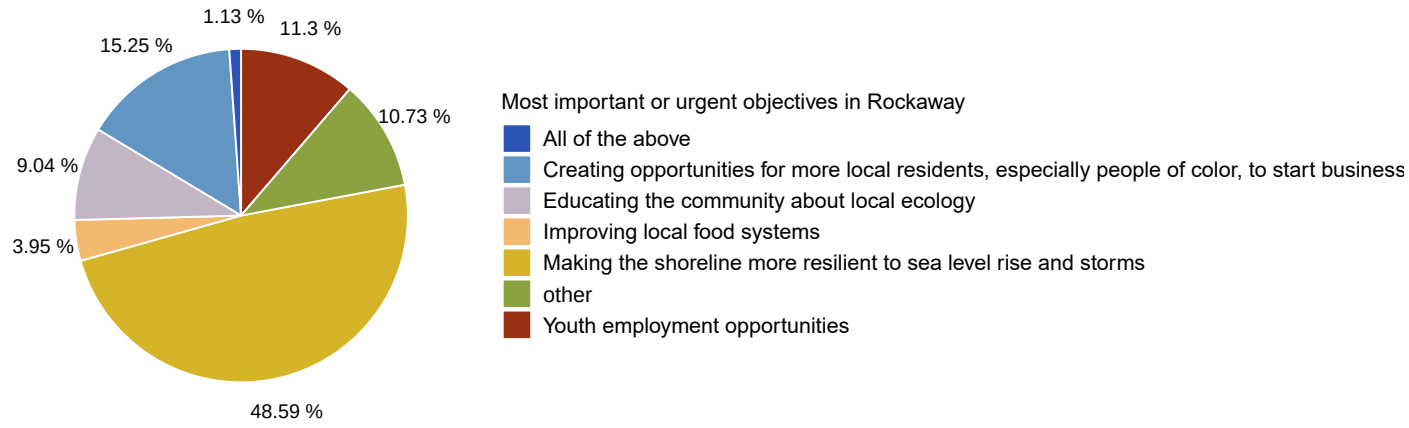
Which categories best describe you? (Race/Ethnicity)



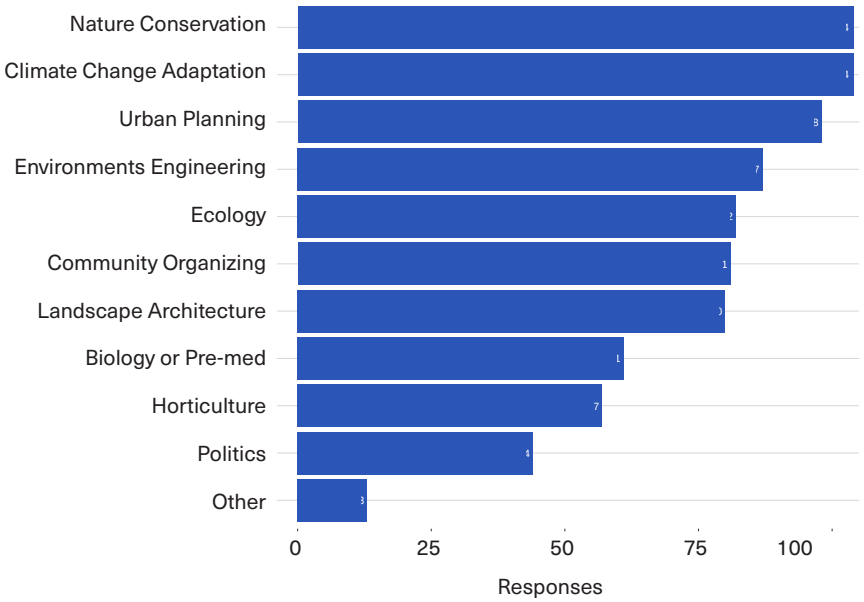
What area(s) of the beach do you visit or use most frequently? (Please check all that apply)



Which objectives do you think are the most important or urgent in Rockaway?



What careers do you wish Rockaway residents had more access to?



Now looking to the future, how would you want to advocate or take care of your favorite part of the beach and dunes?

ENGAGEMENT GOAL #3

Sustain Stewardship of the Plan and the Shoreline

A core objective of this engagement process was to set up the plan and the shoreline for long-term success through sustained stewardship. The steering committee closely advised the plan's development and will remain involved in future phases. Additionally, community stewardship events involved the public in learning about and maintaining the plan area's ecology.

Steering Committee

The Steering Committee provided feedback on the project and the community engagement strategies, served as advocates for the project within the community, and were key collaborators on the design of the plan. The steering committee quarterly meetings were guided by active facilitation and included breakout groups to encourage intimate discussion on selected themes. Meetings generally include an ice breaker, presentation, and feedback summaries from community engagement efforts. While RISE and the project team ultimately made decisions about project recommendations, these recommendations were informed by Steering Committee feedback in combination with environmental research and community insights. The steering committee met quarterly:

- **Jan 29 - Project Introduction:** The first meeting reviewed goals for the steering committee and provided project context. The team presented the existing conditions research findings. The committee then provided feedback on the strengths, weaknesses, opportunities, and constraints, considering both the local context and possible technical considerations.
- **Feb 26 - Gathering Input:** In the second meeting, the committee reviewed key takeaways from the interviews and provided feedback on the community design approach. Members mapped opportunities using Miro. After a virtual "walking tour" of the site, members identified opportunity areas for planting, stewardship, community gardening, native plants plantings, concessions, and nature/eco-tourism.
- **April 9 - Testing Ideas:** In the third meeting, the committee reflected on feedback from Community Design Workshop 1 and developed pilot projects based on the themes and project ideas that emerged from the workshop. After reviewing precedents, the committee completed a rapid team challenge to create a project pitch along one of five themes: stewardship, education and awareness, youth employment, green economy, and resilience.
- **June 26 - Discuss Implementation:** In the fourth meeting, the committee provided key feedback on the implementation of the four projects that emerged from the process, particularly looking at the immediate implementation (within 6 months), short term (1-3 years), mid-term (3-6 years), and long-term (6-10 years). The project team received feedback on the steering committee members who wanted to be engaged in future phases (all members did) and reflected on the process to date.

Throughout the process, RISE also continued one-on-one conversations with key steering committee members, particularly those representing NYC Parks, L&M Development Partners, and USACE. The steering committee is core to sustaining the plan through this current phase and into the future phases.

Community Stewardship Days

During the development of the plan, RISE also provided opportunities for the local community to get their hands dirty and to engage in stewardship events, social-distanced, along the shoreline and in upland areas. Events took place on April 17, May 15, and June 12 and engaged over 50 volunteers.

June 12 Community Stewardship Event

ENGAGEMENT IMPACT & LESSONS LEARNED

The plan's three-tiered approach to build community awareness and capacity, garner input on the development of the plan, and sustain stewardship of both the plan and the shoreline itself resulted in a generative and positive process in a time when the community struggled with the trauma and grief of COVID-19. Many community members continue to struggle to recover from the pandemic. Though our survey revealed 49% of respondents have not recovered economically from the COVID-19 pandemic, the number is likely much higher in the community overall. Yet, across all forms of engagement, participants repeatedly expressed their excitement for the plan and the projects that emerged from the process. Here are some lessons we learned:

Design engagement for bi-directionality and iteration without anticipating outcomes.

Bi-directionality refers to the process of mutual learning among governmental agencies, local stakeholders, and local community through the engagement process. In this process, the team used bi-directionality to create a feedback loop to ensure that the plan's projects and recommendations support the priorities and goals of the community and draw upon community expertise to get them done. This expertise included subject expertise in urban planning, environmental engineering, development, regulations, and deep community knowledge. Iteration refers to a process that allows project ideas to develop from vision into action, using successive feedback. By receiving feedback in stages, and then conducting further engagement to refine ideas, the team was able to develop a project design that fits the needs of the community while achieving the environmental goals of the project.

Iteration allowed participants to see the way that feedback and engagement was incorporated, deepening knowledge, improving the design, and growing collective buy-in. One example of this was the development of a docent program. The original idea came out of interviews. The idea came up again in the community design workshop as youth-led and community-led tours. As an emerging project idea, the team looked at possible case studies, particularly the New York Botanical Garden's Explainers' program. The project was further workshopped in the steering committee, which brought up the idea of not only focusing on environmental history, but also the social and Native American history of Rockaway.

This point was further echoed in Community Design Workshop 2 and the NYCHA Focus group.

June 12 Community Stewardship Event- Beach Clean Up

The final project, entitled “Here’s Rockaway” is a docent program that employs and trains youth and residents (especially low-income and BIPOC) as tour guides to inform the public of the historical, cultural, and natural resources of the Rockaway Peninsula.

Vision with action in mind.

Over the past decade, Rockaway has been the focus of dozens of planning efforts. There is also a history stretching back decades of promises made but not kept. Acknowledging that there is planning fatigue is not enough. Visioning with action in mind is the only way to honor the time and support of the community. The steering committee, composed of city agencies, local community-based organizations, civic associations, and residents, was a resource to hold implementation front and center. For example, the relationships built through the steering committee between RISE and NYC Parks led to conversations about establishing pilot maintenance agreements on which to expand in the future. The Technical Advisory Focus Group also provided action-oriented conversations and a place to think through future partnerships for monitoring and stewardship. As the report is being written, RISE is already putting the plan into action. See the “Next Steps” section on page 148 to learn about what’s already in the works.

Equity and economic community needs must be baked in with environmental restoration.

As an environmental justice impact area, the eastern end of the Rockaways already carries an unfair burden of poor health outcomes, environmental degradation, and vulnerability, especially to climate change. Yet, its unique environmental resources provide an avenue to invest in the community while counteracting generations of disinvestment and injustices to improve the health of its natural resources and the surrounding community with it. The fallout from the pandemic only underscored the importance of investing in environmental justice areas. For the plan to be sustainable, it prioritized the environment equally with equity and the economic needs of the community, prioritizing economic opportunities for youth, NYCHA residents, and Black and Brown communities.

Questions of who the plan is for and who is building it are vital.

Early on, one of our interviewees asked a pivotal question, “Who is this for?” With that question ringing in our ears, the project team prioritized stakeholders who have faced barriers to participation, especially engaging youth, Black-owned businesses, Black civic leaders, and NYCHA residents in the process, making sure their voices were front and center.

RISE Community Stewardship Event (June 2021)

Build with stakeholders and expand the number of advocates.

The plan's success, as a stewardship framework, largely rests on widening awareness of who is an environmental advocate and deepening a sense of ownership over the Rockaways shoreline from the bottom up. Throughout the process, in community design workshops, focus groups, and the survey, we asked how participants wanted to be involved and who should be included in the process. This widened the range of stakeholders to teachers, parent/teacher associations, scout troops, faith-based organizations, surfers, and LGBTQ groups. It also raised important questions about how the plan creates job opportunities and supports compensation, without which some community members are unable to take part.

Have multiple access points into the planning process and meet people where they are.

The plan's varied engagement strategies allowed residents, community groups, and other stakeholders to engage at their capacity while ensuring their voice and perspective were included. 2020-21 was a uniquely difficult year as many in the Rockaway community stepped up to take care of sick or grieving loved ones, assisted children in virtual learning, delivered food and supplies through mutual aid networks, got out the vote, and protested in support of Black lives. With that in mind, multiple strategies with varied depth and time commitments allowed us to capture the voices of those who might not have been able to join a workshop for two hours. It was equally important to meet some stakeholders right in their community, as we did through the focus group at Oceanside Apartments.

RISE Community Stewardship Event (June 2021)

RISE Community Stewardship Event (June 2021)

2

STEWARDSHIP TRAINING GUIDE

INTRODUCTION

The Stewardship Training Guide

This guide is meant to be a practical companion for community stewardship and shoreline enhancement in Greater Rockaway, and beyond. The guide is an educational resource that anyone can access. It is intended to be used by a variety of people and groups interested in local community stewardship.

Making the Training Guide

Over the course of nearly a year, our team analyzed reports and data about Rockaway's shoreline and community, and met with a broad range of residents and stakeholders in Rockaway. Through this research, our team gained many insights about **economy, ecology,** and **equity** in Rockaway. Through extensive engagement (meetings and workshops), we took community feedback and research insights and transformed them into a set of recommendations for community stewardship and shoreline enhancement in Rockaway. These recommendations take

EDEN CHAN

"This plan puts an emphasis not only on protecting the Rockaways—in the sense of building up the dunes, our first line of defense—but on investing in the community, growing awareness about Rockaway's history, and creating jobs. Protecting the dunes is a means of protecting the community. It's about equity. We're the richest country in the world, how is it that we're not getting the focus that we need? Instead of waiting around, we're doing it ourselves."

Eden Chan, Shore Corps Alumnus and Leader, RISE & Sophomore, Macaulay Honors College, CUNY

Pictured: Participants in a beach clean-up organized by RISE (May 2021).

the form of four pilot projects, which RISE and its partner agencies will lead in the coming years. The pilot projects each have unique recommendations for locations (sites), partnerships, and implementation in the short, medium, and long-term. During our meetings and workshops, participants prioritized four key objectives that each pilot project should meet: community stewardship, green economy, youth employment, and public education and awareness.

Training Guide Sections

Tying together the four pilot projects, the first part of the guide proposes a comprehensive vision for shoreline enhancement and management in the plan area. It includes three sections: **Plan Area, Pilot Projects,** and **Project Recommendations.**

The second part of this guide, **Stewardship Training Materials**, introduces key stewardship concepts, and offers a roadmap for shoreline enhancement and restoration, including site assessment, invasive species removal, and long-term management. This includes a planting palette for the plan area to guide future stewardship efforts, and inform the development and implementation of a design in the next phase of this project.

Finally, there is a Stewardship Training Guide Glossary at the end of the guide that gives definitions of key words and concepts. Words defined in the glossary are bolded throughout the guide.

The Three E's

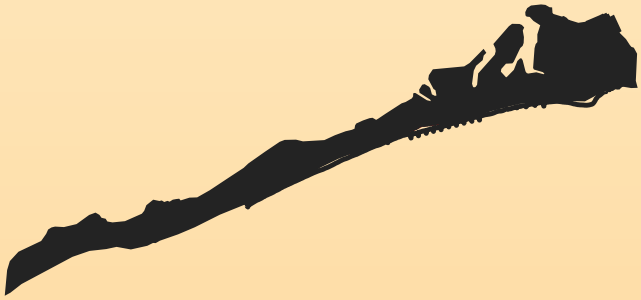
Economy: how individuals and communities survive, thrive, and share; this includes local businesses and retail, employment, housing, and the overall livelihoods of residents and communities.

Ecology: this refers to the health of the Rockaway's environment, including plants, animals, and their habitats, and the relationship between these habitats and the humans who live in and around them.

Equity: this relates to the varying levels of power and access held by different groups of people, both historically and today. Equity is a value that seeks to give more power, access, and resources to those groups who face oppression on the basis of race and ethnicity, ability, language, religion, age, gender, sexual orientation, and more.

For more about the three E's and their role in Rockaway, please see the Introduction section, starting on page 7.

Key Concepts

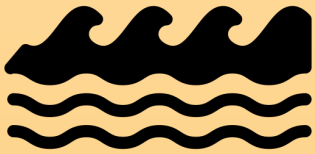


Greater Rockaway

This plan focuses on a section of the beach in Rockaway, a peninsula in Queens, New York with the Atlantic Ocean to its south and Jamaica Bay to the north. We refer to the many neighborhoods that make up this peninsula as "Greater Rockaway."

Community Stewardship

The practice of taking care of a place together. In the case of this plan, we are interested in how different groups and individuals in Greater Rockaway can come together to take care of the shoreline, and make sure Rockaway's plants, animals, and people can thrive now and in the future.



Shoreline Enhancement

Over time, shorelines become damaged as a result of human activity, storms, climate change, and more. Shoreline enhancement is a process to try to repair this damage and improve the health and beauty of habitats near the ocean and other water bodies.

How to Use this Guide

This guide can be used by educators, organizers, and community leaders in the Rockaways to start your own community stewardship projects or to align your efforts with RISE and their partners. It can be used by land-owners and developers in the Rockaways to explore ways to leverage your property to support community stewardship efforts. It can be used by residents in Rockaway or other coastal communities to learn more about shoreline ecology and stewardship, and reflect on how you might want to be involved in such efforts, either as a volunteer or as a future career path. It can be used by educators looking to integrate environmental stewardship concepts and activities into their lesson plans And finally, it can be used by those agencies and civic organizations currently working on the ground in Rockaway to coordinate efforts with RISE and others to bring the plan's vision to life.

If You Are...

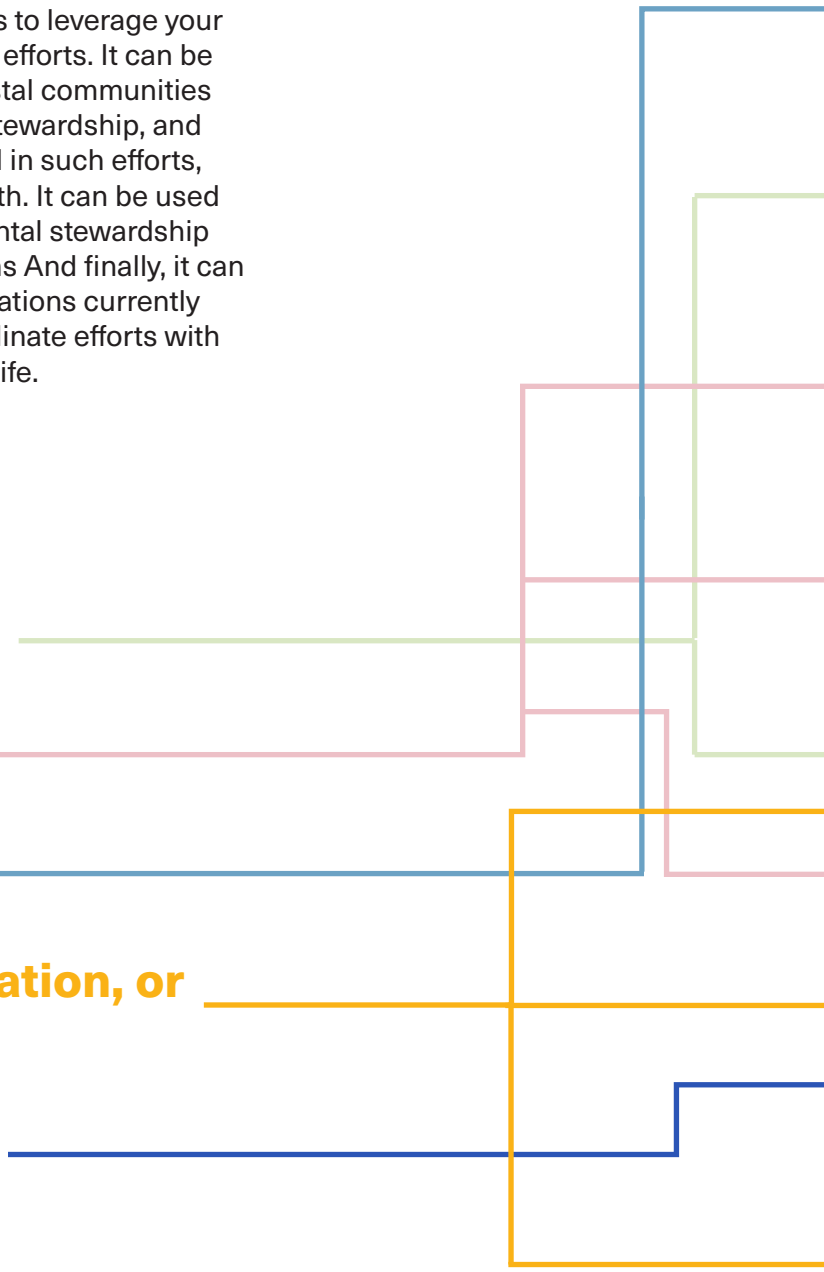
Student or Young Person

Resident

Educator

Non-Profit, Civic Organization, or Community Association

Land or Business Owner



Use It For...

Creating a curriculum
Teach key principles of community stewardship and shoreline enhancement.

Seeking a job or volunteer opportunity
Understand the skills involved in stewardship and shoreline enhancement, and opportunities that may arise in Rockaway to get involved.

Organizing your neighbors
Apply the information and recommendations to create your own projects, in Rockaway or elsewhere.

Being more informed
Get curious about stewardship and restoration, and learn about what is planned in Greater Rockaway.

Strategic Planning
Plan to collaborate with or support aspects of this plan, as a partner, sponsor, or in some other way.

Applying for funding
Seek funding so that your organization can participate in this plan, or related work in Rockaway or elsewhere.

See This Section...

Plan Area*
Starting on page 78. This section provides an overview of the Greater Rockaway plan area, including priority sites for stewardship and planting.

Pilot Projects
Starting on page 84. This section outlines four pilot projects to activate the plan's vision and goals.

Stewardship Recommendations
Starting on page 92. This section offers specific recommendations for implementing the pilot projects, and related stewardship and shoreline enhancement work.

Stewardship Training Materials
Starting on page 106. This section gives a comprehensive introduction to community stewardship and shoreline enhancement. While it offers information specific to Greater Rockaway, the material can be applied in your work in other communities. Make sure to check out the Glossary on page 134 to define key terms and concepts.

**For more on the plan area, see Existing Conditions, starting on page 30 .*

The Greater Rockaway Plan Area

The Greater Rockaway Community and Shoreline Enhancement Plan seeks to activate and enhance a four-mile stretch of shoreline north of the Rockaway boardwalk. The thin strip ranges from 20 to 50 feet in width, and features a range of environmental and human-built features within and along it. For a detailed overview of the plan area, please see **Existing Conditions**, starting on page 28 of this report.

This plan identifies areas of opportunity in the plan area for planting and community stewardship, as well as priority sites for the four pilot projects proposed in this plan. These opportunity areas were identified through many different forms of research, including site visits, GIS (the study and creation of maps), consultation with technical experts, and community and stakeholder engagement.

Each segment of the plan area has key features that shape what can be planned there. As seen in the map on the following page (**Plan Character Areas**), these features include nearby developments, land ownership patterns, and key organizations and institutions operating nearby.

PLANTING AND STEWARDSHIP

Planting and stewardship are two important components of shoreline enhancement. Planting plants that are native to the local environment in strategic locations can help preserve the dunes, mitigate (or lessen) the impacts of climate change and storms, and create a healthier shoreline habitat for people and all other living things. Through stewardship, members of the community can be involved in maintaining these plants, monitoring the shoreline for environmental changes and animal/plant activity, and in related work such as raising public awareness about the importance of the dunes.

The majority of the plan area presents opportunities for planting in the short-term, along with community stewardship. In the next phase of this project, the project team will create and implement a detailed **planting pla**n or *design* in order to bring a healthy mix of native plants to the area, and remove **invasive species** that are there today.

Other parts of the plan area may represent opportunities only for stewardship in the short-term, though there may be opportunities for planting in the future. In many cases, this is due to land ownership and access (for example, the land may be planted and managed already). In other cases, it is due to environmental conditions that make planting difficult or impossible.

The map on page 81, **Planting and Stewardship Opportunities**, shows areas that we have identified as high-priority for planting and stewardship.

Pictured: Participants in a beach clean-up organized by RISE (2021).

PLAN CHARACTER AREAS

Area 3

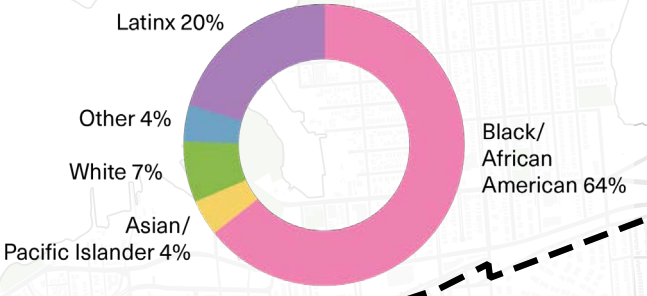
Arverne

Key Institutions

- Rockaway Initiative for Sustainability and Equity
- Arverne Church of God

60%
Residential

13%
Open Space



Area 4

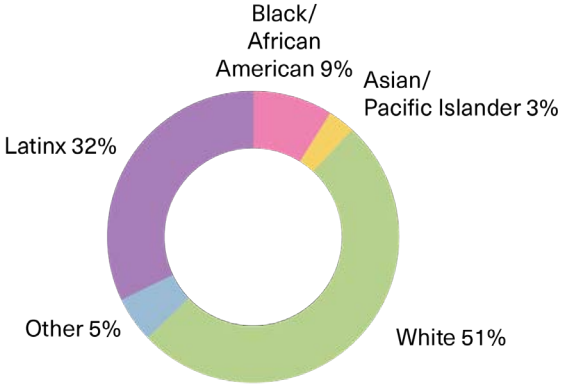
Rockaway Beach / Seaside

Key Institutions

- Rockaway Beach Civic Association
- Rustwoods
- The Black Surfing Association of Rockaway
- Hammels Community Center (NYCHA)
- Seaside Neighborhood Senior Center

76%
Residential

7%
Open Space



Area 1

Far Rockaway

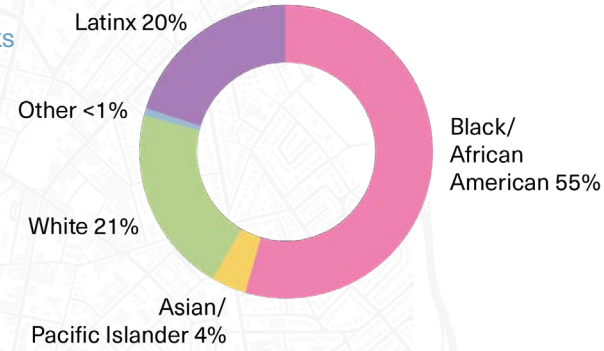
Key Institutions

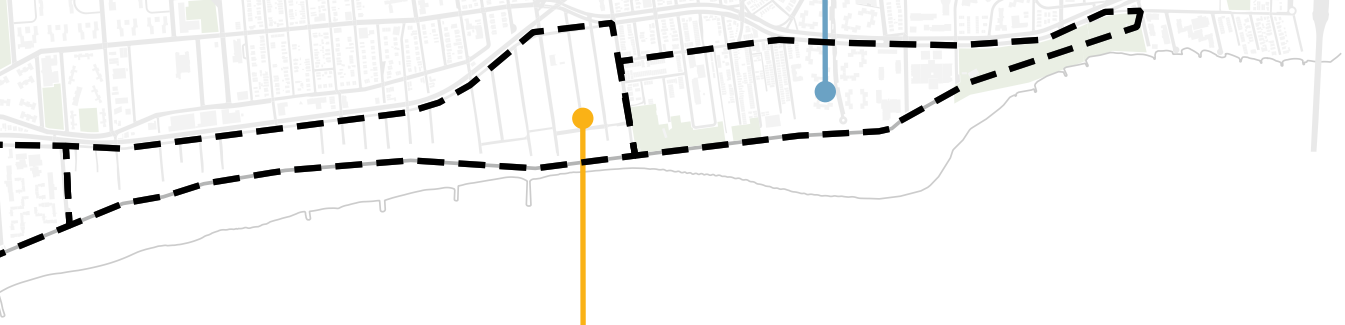
- Rockaway Development & Revitalization Corporation
- Beachside Bungalow Preservation Association
- Jewish Association Serving the Aging
- Community Center of the Rockaway Peninsula

86%
of area owned by Parks Department

49%
Residential

32%
Open Space





Area 2

Arverne East Development Area

Key Institutions

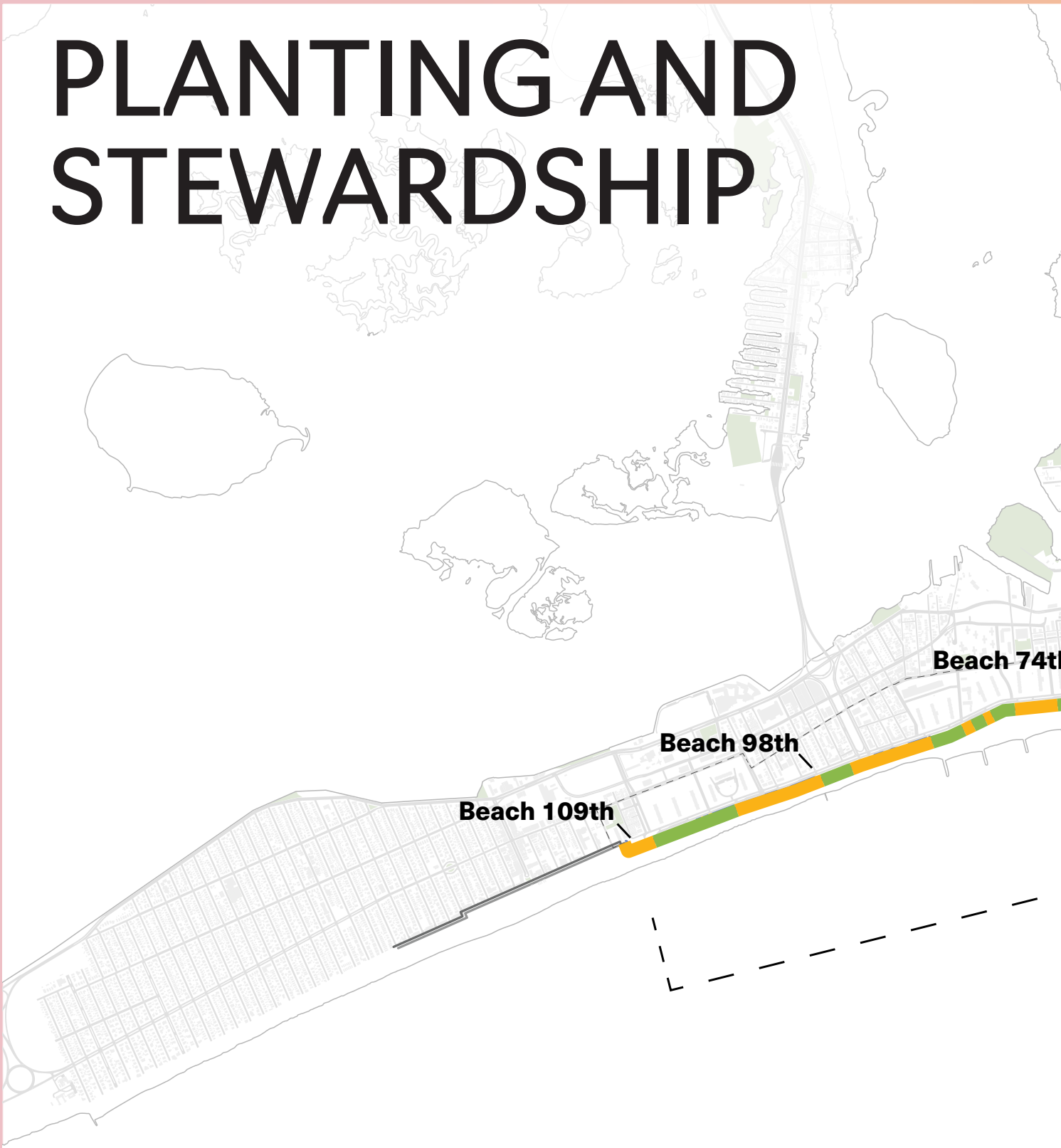
- Far Rockaway Cultural Performance Arts
- Ready Rockaway

50%
Vacant

48%
Open Space

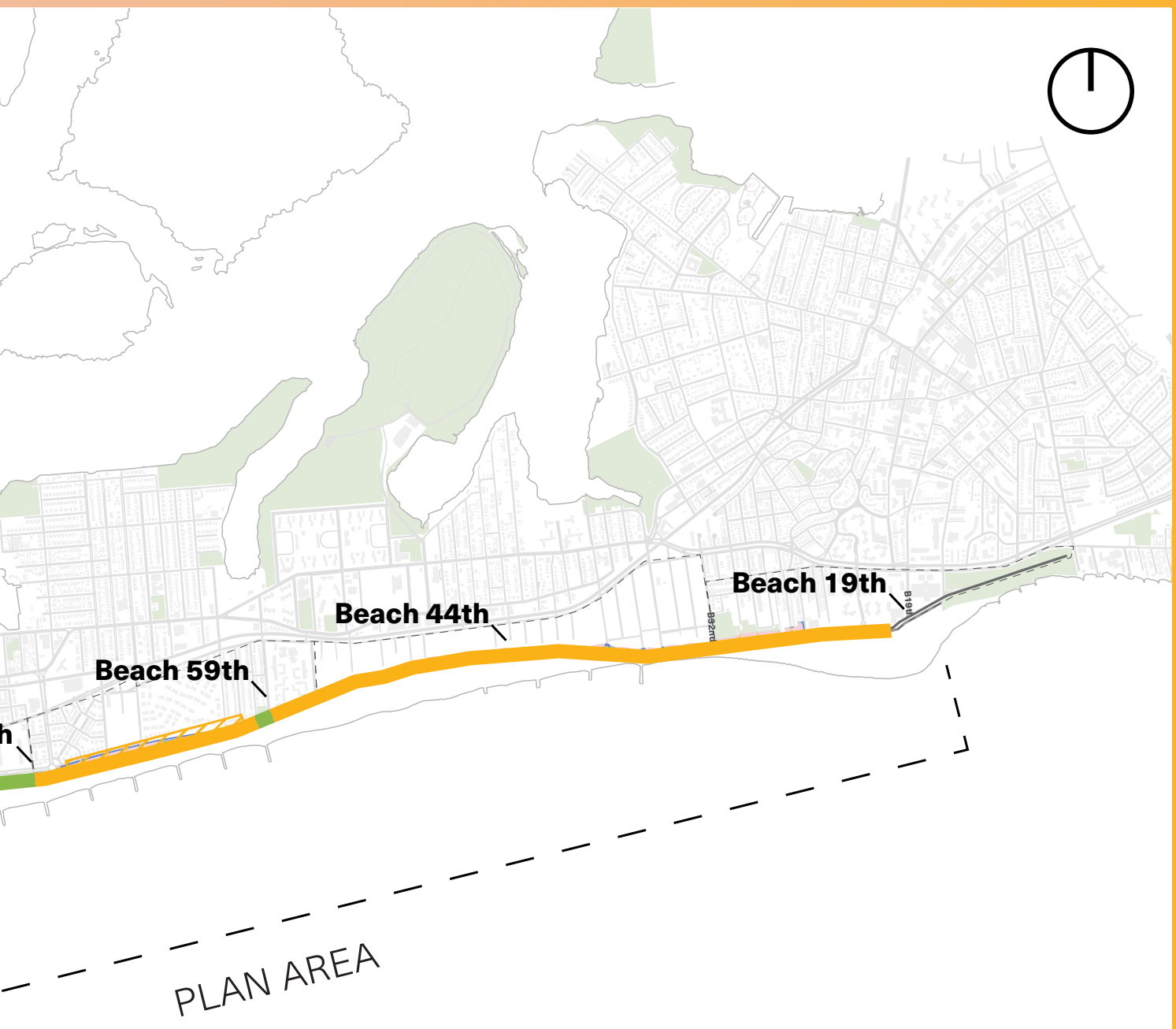
98%
of area owned by HPD

PLANTING AND STEWARDSHIP



Priority areas (planting and stewardship)

Additional interventions


Beach 19th
Beach 44th
Beach 59th
PLAN AREA

PILOT PROJECTS

Through engagement with local organizations and community groups, city agencies, land-owners, and a diverse cross-section of Rockaway community members, we identified a set of key community priorities:

- Increase youth employment opportunities (including training programs, environmental stewardship, leadership opportunities, and internships)
- Improve local food systems (including through community farming, local food production, and community gardens)
- Increase opportunities for economic development and entrepreneurship, especially for people of color
- Make the shoreline more resilient to sea level rise and storms (i.e. dunes, plantings that prevent erosion, clean-ups and beautification, etc.)
- Educate the public about local ecology (including through signage and educational materials and community stewardship programs)

Each of these priorities responds to current challenges in Greater Rockaway. Together, these priorities guided our development of four pilot projects, which were created and refined through an **iterative process** with stakeholders and community members.

With these priorities in mind, the pilot projects represent a framework of four interconnected objectives: youth employment, green economy, community stewardship, and education and awareness. Each project emphasizes one of these objectives in particular, while also addressing other secondary objectives.

What is Iterative Community Engagement?

In **iterative community engagement**, participants offer ideas and feedback, the project team responds to this input, and then seeks additional input and feedback to build upon the ideas further. This process--and the engagement process in general-- is described in detail in the **Community Engagement** section of this report, starting on page 47.

Together, the pilot projects offer a comprehensive approach to addressing the projects “three E’s” - equity, environment, and economy in Greater Rockaway. The projects draw upon the plan area’s assets -- including key sites and environmental features, local partnership opportunities, and the strong legacy of local volunteerism and organizing that has fueled community stewardship in the Rockaways for generations. They are designed to be able to be implemented in the immediate future by RISE and their partners, and supported and maintained in the medium and long-term through the coordinated efforts of the many stakeholders and residents who collaboratively shaped this plan.

Green Economy

Youth Employment

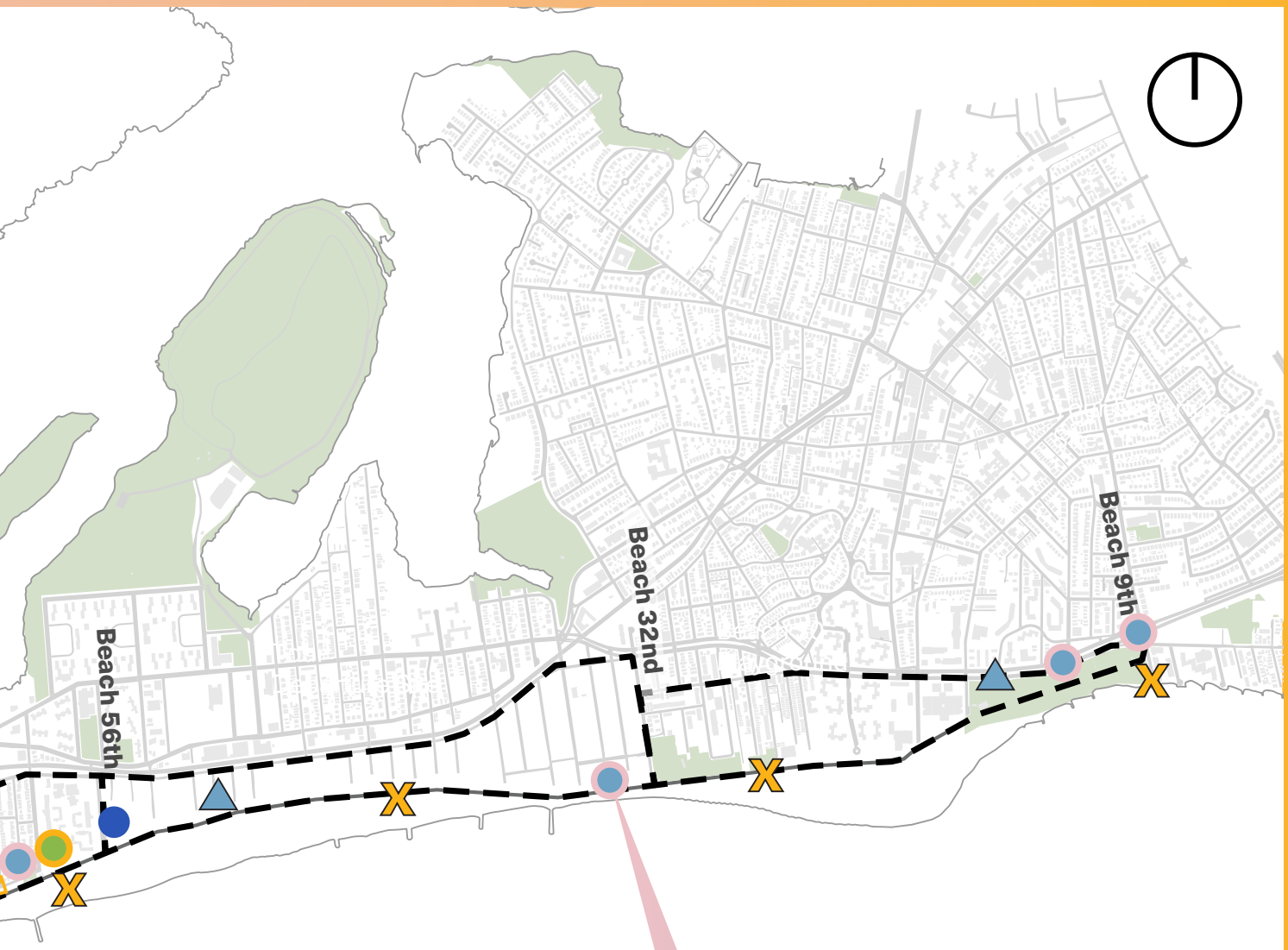
Education & Awareness

Environmental Stewardship

PILOT PROJECT OPPORTUNITY SITES

- Youth Employment
- Community Stewardship
- SURF Cam Opportunity
- Pilot Maintenance Agreement with NYC, Beach 61-70
- Other Stewardship Opportunity
- Tour Departure Site
- Education and Awareness
- Green Economy

Note: Some project recommendations fall slightly outside of the plan area. These areas have been identified as potential sites for stewardship and other activities rather than planting in the short term.



Greater Rockaway Field Station

Strong & Green Plant Nursery

Strong and Green Nursery

Project Overview

A native plant nursery located in the Arverne East Nature Preserve. The nursery will grow native plants and train youth and community members for jobs in horticulture and farming. The nursery would establish a sustainable operation by growing plants that can support shoreline stewardship and reduce the Rockaway Peninsula's carbon footprint.

Working in partnership with **horticulture** programs at academic institutions including CUNY/SUNY, a horticulture/farming curriculum would be developed to teach seed propagation, and horticulture of native coastal shrubs and plants. Youth, low income, and **Black, Indigenous, and People of Color (BIPOC)** residents would be employed through a paid horticulture internship program to maintain operations of the nursery.

Plants produced at the Strong and Green Nursery would be distributed to residents of Greater Rockaway. In the long-term there is the potential to host plant sales at the nursery and to provide educational programs for the public on native plants and ocean-friendly gardens.

CASE STUDY: **LOWLANDS NURSERY, GOWANUS CANAL CONSERVANCY**

The Gowanus Canal Conservancy advocates and cares for ecologically sustainable parks and public spaces in the Gowanus lowlands while empowering a community of stewards. The conservancy features the Lowlands Nursery, which grows native and urban-adapted plants and sells plants and soil to individuals, civic institutions, and landscape designers. They also distribute free compost. The nursery is supported by community volunteers and is open to the public.

Image Source: Gowanus Canal Conservancy

Rockaway Eco-Advocates

Project Overview

An “Adopt-a-Dune” project model led by a network of local civic, businesses, schools and youth-led organizations to consistently monitor and maintain the entire “Greater Rockaway” plan area.

Network partners will “adopt” a designated project area of the “Greater Rockaway” plan to consistently steward, monitor, plant and maintain. Partners will select a project area “team” they want to be involved in, where they will work together and coordinate a schedule of organized events to consistently care for designated team area.

RISE will secure a licensing agreement with NYC Dept of Parks & Recreation to lead the project and will establish a training guide and stewardship tool kit. RISE will also lead a series of training workshops for all the groups to meet one another, collaborate and ensure there is consistency along the entire stretch of the plan sites. RISE will facilitate virtual “how to” demonstrations available to the general public to promote the program and distribute maintenance supplies on an as needed basis to support each group’s effort.

A limited number of paid adult and volunteer positions will be available to lead each team. All youth will be paid for participation through the RISE Shore Corps Program or a not for profit partner (RDRC, Catholic Charities, Queens Defenders, or others). This program will spearhead more independently run stewardship efforts under the umbrella of “Rockaway Eco Advocates” and build on collaboration with local civic partners, businesses, residents and NPO’s. It will also support local employment and civic engagement opportunities, as well as develop more education and awareness of shoreline conservation.

CASE STUDY:
GREEN CITY FORCE

Green City Force is a program based in NYC that engages young adults from frontline communities (those most impacted by climate change and environmental harm) as the essential force for creating more sustainable and resilient cities. The program provides training to youth ages 18-24 from low income housing communities, equipping them with the skills they need to thrive in green jobs. The program provides a network of support to help youth find jobs after their time in the corps. The Green City Force focuses on projects to promote sustainability and resilience in NYCHA communities, including urban farms, farm stands, compost collection, and cool roofs.

Image Source: Green City Force

Here's Rockaway

Project Overview

A docent program that employs and trains youth and local residents (especially low-income and BIPOC residents) as tour guides to inform the public of the historical, cultural and natural resources of the Rockaway Peninsula.

Walking, biking and foraging tours will be hosted at multiple points along the"Greater Rockaway" plan area. The project will also create opportunities for self-guided tours through informational signage and digital messaging to educate residents and visitors. Using the Audubon Pop-Up and the NYC Botanic Garden Explainers Programs as precedents, the signage and tours will incorporate interactive elements including a virtual map, and digital resources for participants to explore more of the shoreline on their own. RISE will collaborate with local artists in the development of educational signage.

The program aims to provide youth and local residents with opportunities to earn money while learning more about the historical and environmental significance of the Rockaway Peninsula.

CASE STUDY:
NEW YORK BOTANICAL GARDEN EXPLAINERS

Volunteer docent internship program at the New York Botanical Garden (NYBG) that provides training for high-school aged students interested in plants, gardening, landscape design, and museum education. Docents receive training in botany, horticulture, landscape design, the history of NYBG, communication, and docent practices, and receive service hours for their work. Select paid positions are available for more experienced youth docents.

Image Source: New York Botanical Garden

The Rockaway Field Station

Project overview

A multi-use center devoted to Rockaway history and ecology education. In addition to spreading knowledge about Rockaway's history and environment, the program will train the next Generation of NYCs environmental professionals through paid internships.

The Rockaway Field Station will serve as a multi-purpose center for learning, volunteering, and exchange for residents, visitors, and students and professionals working in environmental science and stewardship.

The Field Station will be home to an educational program that helps to train local youth and connect them to paid internships. The curriculum will focus on Rockaway history, ecology and communities, and will adopt a social and environmental justice lens. By centering the history of Indigenous/Native American culture, the training for future environmental professionals will reflect the values of indigenous land management traditions and help students develop a critical understanding of how urban planning, transportation systems, local ecology and systemic racism are linked. Aging residents and local elders will play an important role in shaping the curriculum. Low-income and BIPOC youth will be prioritized in applications for paid internships and jobs.

The plan recommends that this center be housed in the new multi-use facility planned for construction in the Arverne East Nature Preserve. The Field Station can serve as a hub for public educational programming and community stewardship, serving as a gathering point and equipment storage for ecological monitoring and other field work taking place on the shoreline.

CASE STUDY: **CUNY NATURAL AREA CONSERVANCY**

This program seeks to train the next generation of environmental scientists, and to encourage New Yorkers to engage with the outdoors. Bringing together CUNY student interns with scientists and other experts, the program trains college students through paid internships in plant identification, field ecology, data management, and ecological surveying methods. Offering fall, spring, and summer semester internships, this program covers 20,000 acres of forests and wetlands in NYC to promote healthy forests, coastal resilience, and climate change mitigation.

Image Source: Natural Areas Conservancy

Project Recommendations

	Rockaway Eco-Advocates	Strong and Green Nursery
Key Objectives	Community stewardship; Green economy	Green economy; youth employment
Site Opportunities	Indoor meeting space at RISE Arverne East Field Station (planned) Foredune areas north of the Boardwalk (Beach 17th St.- Beach 109th St.)	Nursery located in the Arverne East Nature Preserve Development
Leadership / organizers	RISE, NYC Parks	RISE, HPD, L&M Development Partners
Potential Partners	Local non-profits including: RDRC (Summer Youth Employment Program), SRIJB (shoreline monitoring framework), Catholic Charities, Child Center of NY, Surfrider Foundation, Queens Defenders, FRANC	Rockaway Youth Task Force, Local schools, Dred Surfer, NYC Parks, Belle Harbor Garden, Jamaica Bay Eco-Watchers, Sheltering Arms, NYCHA, The Child Center of NY, St. John's Residence for Boys, Campaign Against Hunger, Catholic Charities
Potential Sponsors	NFWF, NYC Parks, YMCA, Caraca Arepas, Dred Surfer, Skudin Surf, Locals Surf, NY Surf School, private developers: L&M Development Partners, Goldfarb Properties, Arverne By the Sea	Private developers: L&M Development Partners, Goldfarb Properties
Participants / key beneficiaries	Students and un- and under-employed residents recruited through local NPO's, and Schools including: RISE, New Visions, Child Center of NY, Ocean Bay CDC, Queens Defenders, and Sheltering Arms	Local residents and youth

Here's Rockaway	The Rockaway Field Station
Education and awareness; youth employment	Youth employment; education and awareness
Youth education centers at RISE, Arverne Preserve, and Beach 30, 59, 74-90th Street playgrounds. Tours departing from Beach 16th and Beach 51st Streets.	Arverne East Field Station (planned)
RISE	RISE, NYC Summer Youth Employment Program (SYEP)
Rockaway Artists Alliance, FRANC	St. John's Residence for Boys, Pratt Institute
Queens Museum, Queens Historical Society, SYEP, City Council Discretionary Funding	NFWF; Private developers: L&M Development Partners, Goldfarb Properties
Students and low income residents	Low-income and/or BIPOC youth; unemployed Rockaway residents

Project Objectives Matrix

The matrix below presents a set of core project objectives, organized around the four overarching objectives: youth employment, community stewardship, green economy, and education and awareness. These core objectives include the key priorities identified by community members during engagement, as well as priorities identified by interviewees, As the pilot projects and other related efforts evolve, these objectives, too, will evolve in response to continued engagement of partner organizations, key stakeholders, and the broader Rockaway community.

This table can be used as a starting point for evaluating project progress and outcomes, and revisiting project goals over time.

YOUTH EMPLOYMENT

	Rockaway Eco-Advocates
Increase opportunities for youth employment, particularly for low-income and BIPOC youth	
Raise awareness among local youth about careers in environmental sciences and stewardship	
Provide hands-on training and skills-building to equip local youth for green jobs	
Build relationships between key agencies, employers, and educational institutions and local youth	

Strong and Green Nursery	Here's Rockaway	The Rockaway Field Station

GREEN ECONOMY

	Rockaway Eco-Advocates
Increase residents' access to sustainable, locally grown plants and food	
Equip residents (particularly low-income and BIPOC) with the training needed to pursue green jobs and/or launch their own green economy enterprises	
Increase participation among residents in sustainable practices, such as recycling, composting, farming, and gardening	
Support and partner with existing and new local businesses, particularly those owned by people of color and women	
Encourage and strengthen a circular economy in Rockaway	
Increase opportunities for eco-tourism in Rockaway	
Connect Rockaway community with city-wide climate change efforts	

Strong and Green Nursery	Here's Rockaway	The Rockaway Fleld Station

COMMUNITY STEWARDSHIP

	Rockaway Eco-Advocates
Mobilize local organizations and civic associations to become involved in coordinated community stewardship efforts	
Increase the number of volunteers who regularly participate in community stewardship activities	
Empower property owners to leverage their land for stewardship through native plantings, ocean-safe gardens, and more.	
Beautify the shoreline for all to enjoy through clean-ups and plantings	
Involve local schools and community/civic groups in shoreline monitoring efforts	

Strong and Green Nursery	Here's Rockaway	The Rockaway Field Station

EDUCATION AND AWARENESS

	Rockaway Eco-Advocates
Build awareness among residents and visitors about the importance of the dunes for a sustainable and resilience shoreline	
Decrease damage to the dune ecosystem by decreasing foot traffic and other disturbance of the dunes, including through signage and tours that promote awareness of sensitive habitats/ plants	
Build awareness among residents and visitors about the communities and histories of Rockaway, including the role of Native American communities	
Build local understanding of environmental and racial justice, and their importance in the peninsula's past and future	
Use social media to increase awareness of dune habitats, especially by/for young people	

Strong and Green Nursery	Here's Rockaway	The Rockaway Stewardship Center

OTHER OBJECTIVES

	Rockaway Eco-Advocates
Build an understanding of the beach as the "people's beach;" connect diverse residents to the water who otherwise have fewer opportunities or more barriers (i.e. Far Rockaway residents)	
Address the "east-west divide" to bring residents together across the peninsula	
Increase collaboration across sectors to address jurisdictional challenges (i.e. land ownership and maintenance)	

Strong and Green Nursery	Here's Rockaway	The Rockaway Field Station

A Roadmap for Youth-Driven Community Stewardship

This plan grows out of a particular place (Greater Rockaway), and the unique people and organizations that make up that place. However, the approach to youth-driven community stewardship proposed here can be applied in other places, through collaboration with the people and organizations that make up those places. Below is a roadmap for youth-driven community stewardship that can be applied where you live or work.

There is no one-size-fits-all approach to community stewardship! We encourage the reader to add steps, change the order, or otherwise tailor this guide to fit the distinct needs of your team and community.

1 Form a Youth Stewardship team

You may work with an existing organization that engages youth, such as RISE's Shore Corps team. Find educators and experts familiar with your local ecology to provide training and help the youth stewardship team build necessary skills and knowledge. Learn from the youth on your team what matters to them and what their hopes are for this effort. You may even create a manifesto together, as our team did (see page 11 of this report).

2 Engage local agencies and land-owners

Research who the important agencies, governing bodies, and land owners are in the area you hope to do stewardship with, and build relationships with them. Have conversations with them to better understand what is permitted on their land, and who you will have to work with closely to create a stewardship plan. In this project, we formed a steering committee to engage these partners long-term.

3 Gather community input

Find opportunities to get to know residents in your community and learn what it is they care about. What are their priorities with regard to environmental stewardship? What kinds of projects do they want to see happen? Gather this input through interviews, public meetings, focus groups, a survey, or tabling in public spaces or events. Make sure to hear from a diverse range of voices (including diversity in age, race and ethnicity, language, ability, and income).

4 Draft a stewardship plan

Use input from the Youth Stewardship Team, local agencies and land-owners, and members of your community to draft a stewardship plan. This plan should outline what you hope to do, who you hope to involve, and what you will need to make it happen. Look at the Stewardship Training Materials in this report for more on the necessary steps for restoring and preserving your local habitat. Make sure to get feedback on this plan from key agencies and land-owners, youth stewardship team members, and others who you want to work with to enact the plan.

5 Create a stewardship agreement(s)

Once you have determined where you want to work and what kinds of stewardship activities you hope to do there, speak with the agencies and land-owners who own, manage, or oversee that land. Work with them to create a written agreement that outlines what you are allowed to do on this land, who you have to coordinate with, and what kind of support or involvement the agency or land-owner will have along the way.

6 Seek funding for your plan

Now that you have a plan, and partners on board who want to make it happen, determine what amount of funding you need, and seek this funding. This can come in the form of grants, corporate sponsorships, donations/campaigns, or a combination of all three.

7 Train youth and community stewards

Recruit stewards to take part in a training program to learn the fundamentals and skills or community stewardship. The youth in your youth stewardship team may play a leadership role in this, or may participate and learn alongside other residents. Consider compensating stewards for their time if your budget allows through stipends, or provide in-kind thanks in the form of child care or food.

8 Implement your plan!

With all the pieces in place, and the human-power to make the plan happen, it's time to dive in. Work closely with your project partners, and involve experts as you need them (for example, an environmental engineer to assess your site and recommend a planting plan).

Set up a system to continually recruit and train community stewards, and to keep a strong team of youth stewards at the center of the effort. Make sure your plan includes milestones for evaluating your progress and impact, and making changes as needed in response to a changing environment and changing needs and priorities in your community.

Stewardship Training Materials

Coastal Resilience: A Crash Course

The big idea: Flexible, adaptive designs have frequently replaced fixed structures as the preferred approach to coastal resilience. Because the climate is in a state of change, natural areas and infrastructure must be designed to change and adapt to new conditions. This approach is called **adaptive design** and it is the cornerstone of coastal resilience.

Flexible, **adaptive designs** use fixed structures that are frequently replaced as the preferred approach to coastal resilience. Naturally formed shorelines provide high levels of protection from storms and erosion; but as conditions change, these protections diminish, and inland areas experience greater vulnerability to wave energy and flooding. Adaptive designs anticipate climate change and other impacts and allow the physical form of the coastline to adjust in response to stressors, lessening future risks and resource loss. Resilient projects are also connective (allowing for the movement of humans and animals), multi-functional, and respond to the social and biological diversity of places. In this way, these projects provide a range of benefits to ecosystems and people. To plan community stewardship in a coastal area like Rockaway, it is important to understand the impacts of climate change, and the role of stewardship in **mitigating** its impacts.

HOW DOES CLIMATE CHANGE IMPACT COASTAL AREAS?

Storm Surge

According to the New York City Panel on Climate Change (NPCC) 2015 Report, sea level is projected to rise as much as 75 inches in New York City by the end of the century. Forecasters also predict an increase in the frequency of extreme storm events, particularly hurricanes for the North American Atlantic coastline. Hurricane-force winds drive local sea levels much higher than normal, an effect known as storm surge, which puts coastal areas such as the Rockaways at an increased risk of flooding and erosion when coupled with the rise in average sea levels and increased runoff from upland areas.

Flooding

During storms, hurricanes, and other severe weather events, all areas where water meets land are affected. Depending on the severity, measurable amounts of marsh, dune/beach and meadow are lost during extreme weather events. Buildings, parking lots, and other impervious surfaces worsen the problem as they have no ability to absorb excess

flooding. This puts stress on natural or semi-natural lands close by, which leads to erosion both in the short- and long-term.

CLIMATE MITIGATION APPROACHES

There are three very general responses to changing sea and flood levels. **Holding the line** is a strategy to use direct protections that keep high waters at bay. Coastal cities throughout the world are considering use of barrier protections like seawalls. These are ineffective when flood waters or storm surge rise above the walls causing protected areas to become fully inundated. Barriers can also prevent stormwater runoff from reaching open water, creating a "bathtub effect." **Managed retreat** is a strategy that moves structures and people to higher ground, and creates or relocates natural shoreline habitats that help to limit flooding. **Accommodation** requires a design approach to buildings and utilities that accepts higher flood levels without damage to structures. Lower elevations become accessible again once floods recede.

Have you observed or heard about any impacts of climate change in your community?

Which mitigation approach(es) do you think would work best where you live (holding the line, managed retreat, or accommodation) and why?

Dunes: Rockaways' Best Resource for Coastal Resilience

The big idea: Dunes are key to protecting the Rockaways from coastal storms and beach erosion. Although dunes are highly adaptable to changes in their environment, urban influence, such as building of roads or pollution, disturbs the adaptability of these ecosystems, increasing the effects of erosion and sea level rise. Dune systems are formed by a mix of wind, sand, and vegetation, and they have four sections: lower beach, high beach, primary dunes, and--when space allows--secondary dunes.

Coastal sand dunes are natural barriers separating inland areas from the destructive forces of wind and waves. They are a critical defense against coastal storms and beach erosion. Dunes absorb the impact of storm surges and high energy waves, preventing or delaying flooding of inland areas and limiting damage to buildings and other structures. The role of plants along dunes is to limit the movement of sand by wind or waves and to help support the many life forms that make beaches lively and dynamic habitats. The Rockaways and Jamaica Bay provide a unique and valuable habitat which attracts a robust diversity of migratory wildlife. These coastal systems are ever dynamic and responsive to currents and waves and are influenced by changes caused when humans develop areas nearby. As conditions change, plant and animal communities adjust, migrating to where the water depth, wave energy, sand quality, and other forces accommodate the specific needs of their

species. Our urban influence, however, often disturbs and sometimes prevents the healthy adaptation of ecosystems, increasing the effects of erosion and sea level rise. As recent climatic events like Hurricane Sandy have demonstrated, the Rockaways are no longer as protected from storms as they once were.

COMPONENTS OF COASTAL DUNE SYSTEMS[1]

Coastal dune systems are naturally formed through a dynamic interaction between wind, sand, and vegetation (or, plants). Dune system components consist of lower beach, high beach/embryonic dune, primary dune, and secondary dunes:

- ***Lower beach*** is the sandy **intertidal zone** (between high and low tides) where there is no persistent vegetation and sand is always moving in response to wind and waves. Debris, both natural and unnatural, are deposited at the high side of the lower beach, and a line of debris forms at high tide.

Lower Beach

- ***High beach*** **and** ***embryonic dunes*** start above high tide and support sparse vegetation. Storm surges and wind deposit sand in these areas, but erosion is more limited. Dune grass, sea rockets, and other plants create protective mats that buffer wind energy. Over time, embryonic dunes form as sand accumulates in these areas.

High beach/Embryonic Dunes

- ***Primary Dunes*** have steep slopes and rise on the landward side of the high beach (away from the ocean). These dunes form and change through cycles of erosion and **deposition** (the depositing of sand, rocks, and sediment). Sand grains are generally smaller here than on the lower beach, creating more ideal conditions for dune grass to grow. As more fresh sand is deposited, more dune grass grows, which promotes the growth of the dune. The steep slope facing the sea buffers the wind and creates conditions that encourage more varied plant species on the gentler slope facing away from the sea.

Primary Dunes

1 To address climate vulnerability, projects planned by the U.S. Army Corps of Engineers (USACE) will stabilize the Rockaways shoreline by constructing artificial dunes as a physical barrier to flooding and planting native dune grasses. To learn more about USACE's efforts, please see Existing Conditions, on page 28, or Appendix B. USACE Dune Enhancement Project, on page 160.

- When space allows, ***secondary dunes*** form on the landward side of primary dunes. Those closer to the front of the dune will have similar vegetation to the primary dunes. However, the beach grass tends to be much less dense and healthy in secondary dunes than on primary dunes, providing the opportunity for greater plant diversity. Seaside goldenrod is common in this habitat, as are sand spurge and sometimes sea rocket. Elevation is varied in these zones and is the main factor influencing species survival.

Secondary Dunes

Introduction to Natural Area Preservation and Restoration

The big idea: In restoration ecology, **functions** refer to the physical processes and **values** of ecosystems. Assessing the functions and values of the habitats where we work helps ensure the project is successful. Functions refer to what the ecosystem does to sustain itself, its organisms, and human communities. Assessing an ecosystem's functions will help us identify how we can best support it. Values, on the other hand, means what it sounds like: for people who are impacted by the project because they live close-by, visit that area, or own some of the land, what outcomes do we want to prioritize? Example priorities include building an ecosystem that is most likely to ensure the success of large numbers of species, support a target species or group, or be the most sustainable based on project costs and maintenance requirements.

Function and values can be applied to either **habitat preservation** or **habitat restoration** projects. Habitat preservation focuses on maintaining existing functions in the habitat rather than improving them. Habitat restoration occurs when the habitat is already degraded, and focuses on maximizing functions and values. Because Rockaway is an urban habitat that has been damaged through human activity over time, stewardship here will focus on **habitat restoration.**

FUNCTIONS & VALUES

Restoration ecologists often talk about ecosystems in terms of their ***functions*** and ***values***. Functions refer to the physical processes that contribute to the nourishment, health, and stability of ecosystems and the organisms that make up those ecosystems, as well as the environmental processes that provide benefits to humans. When assessing ecosystems and tracking the advancement of habitat restoration work, ecologists regularly return to a site to perform **monitoring** and quantify key functions such as the following parameters:

- *Biomass* - The quantity of living material within a given area, measured by weight. Biodiversity - The variety of biological or genetic material found within a given

area, sometimes referred to as **species richness**.
- *Climate Resilience* - The ability of an ecosystem to adapt to climate stressors such as extreme events or gradual changes in water levels or temperature.
- *Carbon Sequestration* - Closely connected with biomass, this refers to the stockpiling of atmospheric carbon (CO2) within biological tissue (organic carbon).
- *Recreation and Education* - Most restoration projects are driven in part by an interest in providing recreational services and educational opportunities that promote good environmental stewardship.

It is important to note that this is only a short list of many ecosystem functions: ecosystems are highly complex and integrated systems, where each species is codependent on the life cycles of all other species and on the physical conditions present at the site.

Values in restoration projects are the priorities or preferences of stakeholders as they relate to the services that restored ecosystems can provide. In planning restoration work, designers and decision-makers should work with local communities to determine which habitat functions align most closely with public priorities. These conversations also include discussion of valued resources or services not provided by the proposed ecosystem but that might be diminished or excluded to make way for habitat expansion. Often there are conflicting goals that must be resolved between stakeholders with informed input from experienced experts, in order to best satisfy the greatest number of public priorities.

Restoration ecologists also have values for restoration projects that have to do with assuring success in meeting the project goals. These values include:

- *High-Functioning Ecosystems* - The success of large numbers or dense populations of common native species typical of the region is generally easier to achieve than the promotion of plants or wildlife species that are rare or endangered.
- *Pragmatic Interventions* - Planners consider the likelihood that their interventions will achieve long-term ecosystem success, while also considering project costs and maintenance requirements. Plant species are selected based on vulnerability to pests and competition from invasive exotic species, as well as the effort expected to remove plant communities currently occupying the site.
- *Target Species*- Ecologists and the public often agree over the interest in supporting charismatic or favored animal and plant species that are rare to the region or listed as species of concern. As these species are low in numbers, successfully attracting them to the site can be difficult. Instead, restoration ecologists will typically identify target guilds, or groups of species that seek out the same habitats and resources as the target species, but in greater numbers.

HABITAT PRESERVATION

Preservation strategies are used in well-functioning habitat zones that support rare species or a diversity of common native species. These strategies focus on maintaining existing functions in the habitat as opposed to improving or changing them. Ecologists will identify potential stressors that might degrade the site and recommend protections against human disturbances that could upset local conditions. In comparison with habitat restoration practices, preservation is typically less costly and has a greater probability of success, since the habitat is already functioning well.

HABITAT RESTORATION

Restoration becomes necessary when habitats are already degraded and are in need of improvements. The contemporary view is to base restoration goals more on maximizing habitat functions and values rather than the traditional emphasis on recreating "pristine" ecological conditions seen before the habitat was disturbed. While restoration plans introduce native plant species only, some non-native species or other compromised local conditions may remain on site if they are thought to perform functions and do not pose a risk of expanding into new areas.

Restoration activities are more involved and demand a higher cost than preservation. To manage invasive plant species, field biologists visit and evaluate the site and mark **invasive plants** for removal. Removals are performed mechanically or, in some situations, with carefully and professionally applied herbicides. Native plants are protected from the disturbance, and cleared areas are prepared for new planting.

When preparing a **plant palette**, the restoration ecologist evaluates soil, light, and moisture conditions and selects native plant species suited to the site. Ecologists also look to improve regional habitat connectivity by looking to nearby reference sites. In the case of the Rockaways, these reference sites are in and around Jamaica Bay and to the east where shorelines have been less disturbed.

To introduce the new plant palette, seeds are sometimes used, but most plants are installed as **plugs** that were raised in a (preferably nearby) **nursery**. Plugs are more likely to sprout than seeds. This helps assure that newly planted areas can quickly establish as intended, out-competing any weed species that may have seeds present in the soil or which are blown over from elsewhere. Some of the more persistent weeds can very effectively reproduce by their **rhizomes**, or root structures, which can remain in the soil even after careful removal. In some more involved situations, the restoration ecologist recommends changes to the existing or **in situ** soils such as excavation and removal of contaminated or unsuitable material, addition of new soils with specific parameters, or in situ soil amendments such as pine mulch to promote the growth of desirable plant communities. None of these methods are foolproof, and they all come at a cost.

The first two growing seasons after construction are considered the ***establishment period*** when new plants are growing their root systems and adjusting to local conditions. An adaptive management plan prescribes ongoing monitoring activities and methods to track the progress of new plantings until they are well established. If progress is limited, remedies are introduced to improve growing conditions or to adapt the planting plan. It is during these first two years that the maintenance team must be most diligent. Once the restored ecosystems are established, the risk of plant loss or invasion from non-native species decreases, but is not eliminated.

Given the high level of disturbance in urban areas like the Rockaways, it is not feasible to restore habitats to pre-development conditions. Restoration ecologists instead focus on maximizing habitat functions and values, and meeting restoration goals before aggressive, non-native species can take hold.

Ten Tenets of Urban Habitat Restoration

The following text outlines the key steps which ecologists use to plan a successful habitat restoration within highly urban environments like the Rockaways. A more detailed, step-by-step guide for habitat restoration can be found in the Natural Areas Restoration Guide on page 117.

TEN TENETS OF URBAN HABITAT RESTORATION

1. **Community stewardship:** Involvement of the community is necessary for long-term success of any project while also creating the opportunity for education on restoration and habitat creation.
2. **Target selection:** Carefully select a realistic target ecosystem appropriate to the site (i.e. complementing nearby and regional ecosystems, similar disturbances).
3. **Soil selection:** Select the appropriate soil to accommodate native species (e.g. low-nutrient, slightly acidic soil to favor the establishment of native plant species and limit invasive species).
4. **Hydrologic understanding:** Assess local hydrology to limit potential sedimentation or erosion. Select plant species that tolerate the site's hydrologic conditions.
5. **Light conditions:** Analyze both existing and future light conditions to ensure planting will be successful in their proposed locations.w
6. **Native, diverse, local plant selection:** Select native plant species based on survivability and project specific goals (i.e. biodiversity, dune stabilization).
7. **Construction practices and timing:** Proper construction techniques are necessary to limit disturbances and allow for successful establishment of plantings.
8. **Succession as a tool:** Use **ecosystem succession** as both a design tool and a cost saving measure by designing a plan that allows for **the** change of plant species composition over time.
9. **Adaptive management and maintenance:** Employ adaptable maintenance strategies to support establishment and guide the trajectory of the ecosystem, while considering possible adaptations to the management approach in response to unanticipated events.
10. **Protection from predators:** To protect the ecosystem from common predators, strategies include constructing waterfowl barriers, planting densely to ensure full coverage, replacing species which become targets of predators, and sometimes trapping predators.

Rockaways residents participate in a beach clean-up in June, 2021

A Guide to Natural Areas Restoration

The big idea: The first step towards a restoration project is determining the feasibility, or possibility, of a specific location being a restoration site. Consider three questions: What are the conditions of the site? What kind of strategies will we need to use to get to our desired physical and environmental outcomes? And, what changes would it require? After selecting and assessing your site, the steps include plant selection, creating a planting plan, and lastly constructing and implementing the plan.

Conduct feasibility study → **Make a plan to remove invasive species** → **Select plants and make a planting plan** → **Construct and implement your plan**

1 Feasibility Study

The feasibility of any habitat restoration involves determining the physical and environmental conditions present at the site, evaluating modifications that can be implemented at reasonable cost, and configuring the site for maximum productivity and longevity with minimal maintenance needs.

- *Conditions*: The foundation for successful ecosystem restorations is rooted in understanding soil, hydrology, water quality, and sunlight. These four building blocks determine the species most adapted to survive and the type and diversity of habitat that can be created at the site with minimal intrusion and acceptable cost.
- *Strategy:* Ecosystem creation is equal parts designing for desired vegetation and designing against weed species. This means that restoration planning should not focus on creating soil and water conditions that optimize native plant growth, but rather conditions to provide a competitive advantage for native species to dominate over the aggressive weeds found in urban locations. Such conditions may include low nutrient, low pH soils and hydrologic controls that prevent sudden flooding.
- *Modifications:* The designer has leeway to alter some of the site's conditions by re-grading, excavating, and importing soils, and diverting or detaining water. Restoration ecologists select a diversity of appropriate native plants adapted to local conditions, provide protection from predators, and specify maintenance protocols to assure healthy growth.

The Planting and Stewardship Opportunities Map on page 78 highlights which parts of the plan area are high priority for planting and stewardship in the short-term. Areas labeled "Other Interventions" will require feasibility assessments regarding restoration or maintenance needs before planting can take place.

SOIL ASSESSMENT

The Rockaways plan area lies north of the boardwalk and behind the primary dunes which are being restored and enhanced by the Army Corps of Engineers (USACE). Many parcels within the plan area were formerly developed and are now in varying states of disturbance. Soil texture, compaction, contamination, and elevation are the primary parameters for assessment to determine the plantings best suited to areas within the secondary dunes. Restoration designers will perform a visual inspection of soils on site and evaluate by hand for the proper texture. Field instruments can rapidly measure pH and nutrient levels, and when necessary, teams can collect additional samples for a full laboratory analysis of the soil's chemical properties, pH, and nutrients. If **in situ** soils are unacceptable for use, designers will determine the volume of fill required for construction and assess volume availability of viable sources nearby. Soil conditions and elevation will be the main drivers for plant selection. The design plans will specify areas for weeding and preservation, locations where imported soil or changes to soil are recommended, and planting plans with species lists and plant spacing requirements.

HYDROLOGY AND WATER QUALITY ASSESSMENT

Designers will look at low points in the project area where water pools, and areas adjacent to roadways or other impervious surfaces that might receive runoff. Road runoff commonly carries oils, metals, and nutrients, and may be detrimental to plant growth. **Green Stormwater Infrastructure (GSI)** practices help filter these pollutants and any additional sources of poor water quality for mitigation. Generally, lower-lying areas are wetter and support different plants than dryer zones. These will include the bottom of slopes and any depressions within the existing landscape. Standing water will be examined for soil conditions and proximity to groundwater. Community members trained to perform maintenance work can learn to recognize the different weed species expected at both wet and dry soil areas.

LIGHT NEEDS ASSESSMENT

Light exposure and shading have a direct influence on plant success. The plant palette will reflect this and will also anticipate the way the habitat may continue to change over time. Where new trees are planted, for example, ground-level or **understory plants** should be shade tolerant, even before the new tree is able to cast a shadow.

GREEN STORMWATER INFRASTRUCTURE

Green Stormwater Infrastructure (GSI) is a set of practices for managing runoff within the landscape using engineered systems that imitate natural processes. Conventional stormwater management directs runoff toward sewers and hard structures that send rainwater to treatment plants or points of discharge in natural waters. These practices either require large energy inputs for treatment or cause harmful water quality issues.

There are widespread opportunities in the Rockaways for implementing localized GSI practices adjacent to roadways or other hard surfaces. Urban runoff, however, carries contaminants that can cause harm to groundwater if not properly managed, which is why we enlist the support of plants to help filter contaminants and absorb nutrients prior to infiltration.

GSI planning starts by identifying large runoff sources from paved areas that can be easily diverted toward the project area for management in the landscape. Practices

GREEN STORMWATER INFRASTRUCTURE

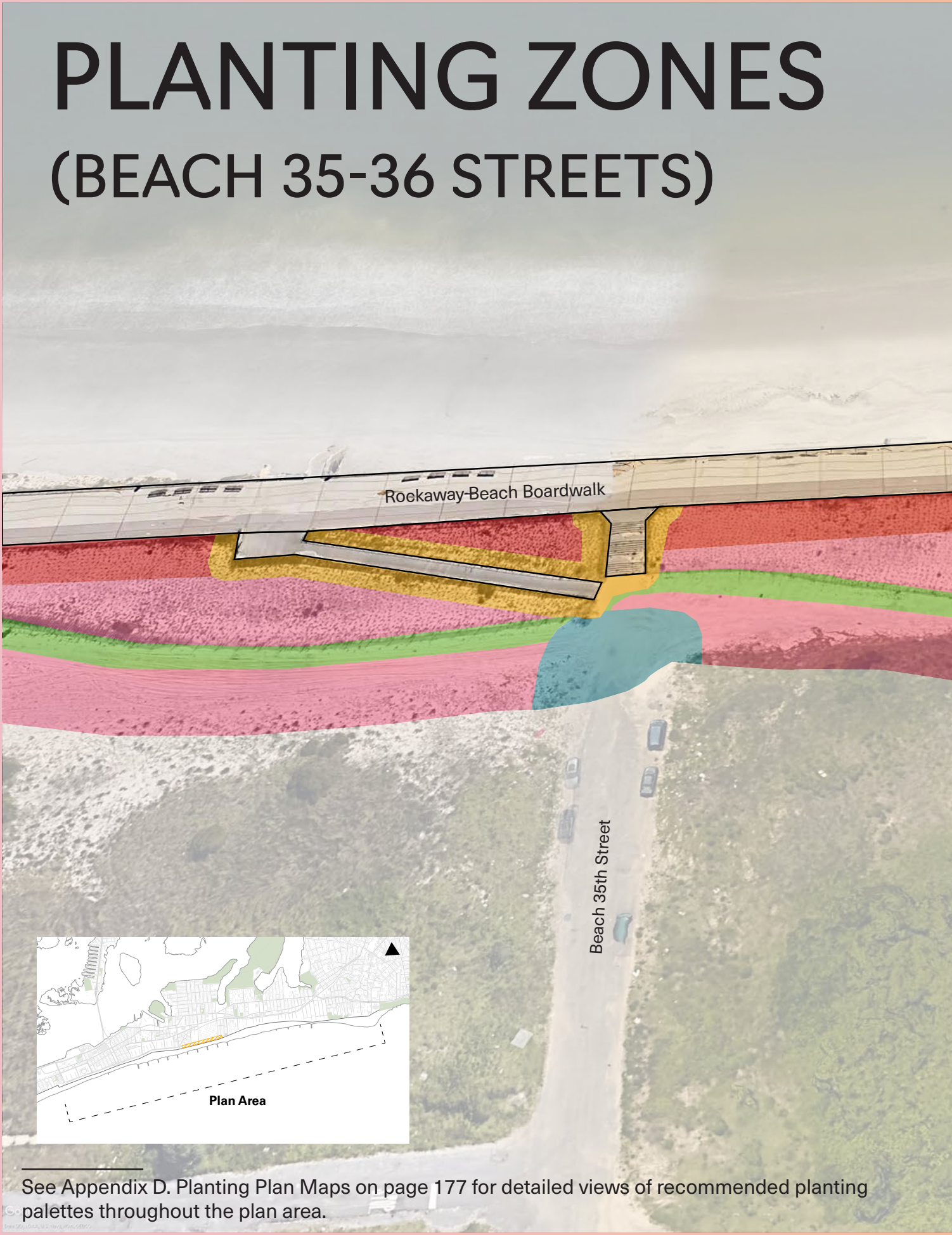
(contd.) will include linear swales and planted depressions adjacent to defined discharge points, and will involve the use of forebay structures or other practices for trapping debris and managing sediment. These tiny wetland zones will support a plant palette that enhances local ecosystems services by attracting birds and insects that might otherwise have no reason to visit the site. GSI can also be planted to screen the beach and natural areas from traffic and development and can help to delineate areas of public access from protected zones.
The RISE project team will develop plans to incorporate green systems in the design, and will include an introduction to GSI maintenance practices when training community stewards.

2
Invasive Species Removal Plan

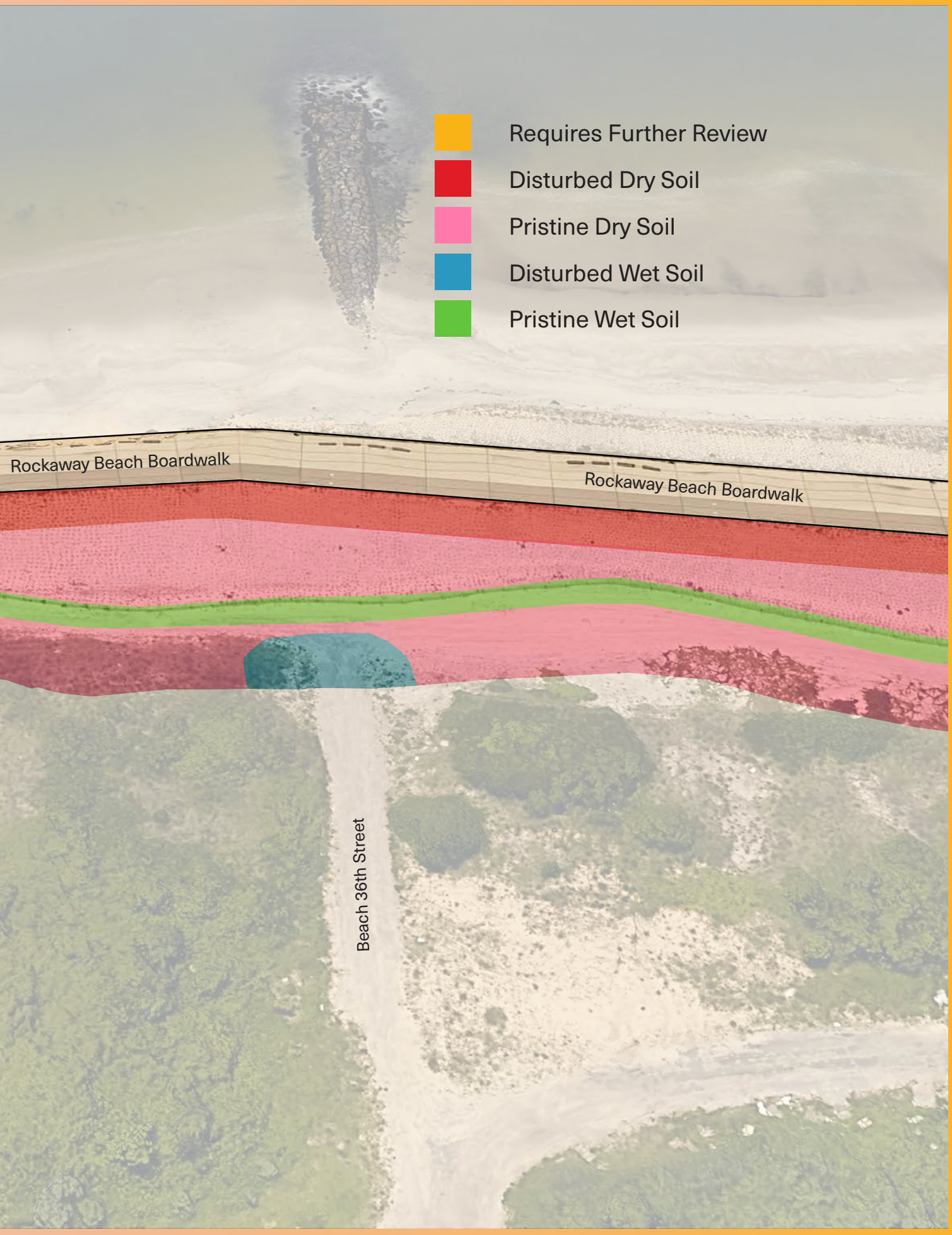
Invasive plant species are quick to colonize where native ecosystems have been disturbed by development activities. Non-native plants provide limited functions in support of native ecosystems, and invasive varieties can form dense monocultures where native plant communities are not fully established. Throughout the northeast, marginal wetland areas have become dominated by the non-native common reed (Phragmites australis). Compaction of upland soils and the presence of fill will give a competitive advantage to invasive plants like mugwort, Japanese knotweed, and ragweed, as well as **woody perennials** such as autumn olive, Russian olive, and tree of heaven. Successfully reclaiming disturbed areas from established communities of non-native weeds can be a heavy-handed process requiring soil excavation and replacement or repeated use of herbicides. At some locations where the disturbance is minor, restoration ecologists will provide an advantage to native plant communities by changing the hydrologic regime or reducing nutrient-rich runoff, importing low-nutrient, low pH soils favorable to native species, or planting trees to shade out invasive reeds over the long-term.

The restoration plan for the Rockaways will specify the species for removal and will identify areas where invasive species can be mechanically removed by trained volunteers. This will require hands-on training to distinguish the desirable species from the weeds, and techniques for removal that include the root zones and rhizomes. Initial species removal efforts are far more labor-intensive than subsequent maintenance years. Where extensive removals are required, the restoration designers may recommend outside contractors or a licensed herbicide applicator to initially prepare the landscape. For at least two years after planting, regular volunteer maintenance will be required to keep weeds to a minimum while native plants become better established.

PLANTING ZONES
(BEACH 35-36 STREETS)



See Appendix D. Planting Plan Maps on page 177 for detailed views of recommended planting palettes throughout the plan area.


Requires Further Review
Disturbed Dry Soil
Pristine Dry Soil
Disturbed Wet Soil
Pristine Wet Soil
Rockaway Beach Boardwalk
Rockaway Beach Boardwalk
Beach 36th Street

PLANTING ZONES
(BEACH WAY-BEACH 67 STREET)

See Appendix D. Planting Plan Maps on page 177 for detailed views of recommended planting palettes throughout the plan area.


Requires Further Review
Disturbed Dry Soil
Pristine Dry Soil
Disturbed Wet Soil
Pristine Wet Soil
ardwalk
Rockaway Beach Boardwalk
Beach Front Road
Beach 67th Street

3
Plant Selection and Planting Plan

The dominant habitat type in the northeast United States in sandy shoreline zones is known as coastal scrub-shrub. Scrub-shrub ecosystems are dominated by woody vegetation less than 20 feet tall along with herbaceous species, and develop along estuaries and coastal dunes where conditions require hardiness and adaptability, as well as wind, drought, and salt tolerance. When restoring dunes in the Rockaways, appropriate scrub-shrub varieties should be planted that provide foraging and nesting grounds for coastal and migrating birds and also stabilize and sustain the sandy soils. By selecting plant communities consistent with native growth and nearby reference sites, we can promote a degree of connectivity with adjacent habitats and Jamaica Bay. These dune and coastal scrub-shrub habitats support neotropical migratory songbirds, raptors, as well as a range of butterflies, damselflies, and dragonflies.

APPROACH TO SPECIES SELECTION

To develop shrub-shrub ecosystems in Rockaway, Army Corps contractors will plant foredunes with dune grass and beach grasses to establish stability at the most vulnerable locations. These early colonizing species possess extensive root networks and survive on unstable soils with low nutrient levels and little to no fresh water. The RISE project team will design the planting of secondary dunes and areas north of the boardwalk with a range of coastal scrub and herbaceous plants that have a degree of salt tolerance. The tables below list native species suited to dry or wet conditions, and those best adapted to survival in disturbed areas. The planting plans will lean heavily toward use of native plugs and pots from nearby plant nurseries. Community volunteers will be guided during installation, and the restoration designer will prepare a maintenance schedule for each planted area that will include irrigation, weeding, soil replacement if roots become exposed and plant removal of dead or diseased plants.

All plant palettes being recommended for the Rockaway planting zones consist of species that make up coastal scrub-shrub communities. Within the site, however, the plant palette should be altered slightly based on hydrologic regime and soil characteristics. There are four general typologies in the site areas which call for different plant mixes: ***disturbed wet, disturbed dry, pristine wet***, and ***pristine dry***. The following gives definitions for each of the typologies and recommended plant mixes. For all areas where shading occurs, species requiring full sun should be removed in favor of shade-tolerant species from the same typology. It should be noted that no shaded areas have been identified within the plan area.

WHAT IS THE WETLAND INDICATOR STATUS?

Each plant species in the planting palette is identified with a wetland indicator status. This refers to the kinds of conditions where the plant is most likely to grow. The categories include:

1. Obligate (OBL) – Almost always grows in water, rarely in uplands.
2. Facultative Wetland (FACW) – Usually grows in water but occasionally found in uplands.
3. Facultative (FAC) – Commonly grows in water or in uplands.
4. Facultative Upland (FACU) – Occasionally grows in water, but usually grows in uplands.
5. Upland (UPL) – Rarely grows in water, almost always grows in uplands.

These plant lists are not comprehensive, but are good references for the more commonly planted native species at coastal restorations in the Northeast.

ZONE 1: DISTURBED WET

The disturbed wet typology tends to be found in areas within 25 feet of existing roads where runoff from the impervious surfaces creates wetter soil conditions. Facultative (FAC) species to upland (UPL) species of herbaceous grasses and woody shrubs should be selected for planting, with facultative species being located closer to the roadbeds and within swales or other low-lying areas. Hardier species should also be favored due to the disturbed soil environment in this typology.

Blue Mistflower

HERBACEOUS			
Mix %	**Species**	**Common Name**	**Wetland Indicator Status**
15%	*Andropogon gerardii*	Big Bluestem	FACU
15%	*Echinacea purpurea*	Purple Coneflower	UPL
10%	*Eupatorium coelestinum*	Blue Mistflower	FAC
10%	*Eupatrium purpureum*	Spotted Joe-Pye	FAC
10%	*Euthamia graminifolia*	Flat-top Goldenrod	FAC
5%	*Hudsonia tomentosa*	False Beach Heather	n/a
25%	*Panicum virgatum*	Switchgrass	FAC
10%	*Sorghastrum nutans*	Indian Grass	FACU
SHRUBS			
Mix %	**Species**	**Common Name**	**Wetland Indicator Status**
40%	*Amelanchier canadensis*	Serviceberry	FAC
40%	*Myrica pensylvanica*	Bayberry	FAC
20%	*Rosa carolina*	Pasture Rose	FACU

ZONE 2: DISTURBED DRY

The disturbed dry typologies are found in upland areas within 25 feet of former roads where cracking in the roadbeds creates more well-drained soil conditions than adjacent to active road beds. Upland to facultative upland (FACU) species of herbaceous and woody plants should be selected for this typology. Hardier species should also be favored due to the disturbed soil environment in this typology.

Beach Plumb

HERBACEOUS			
Mix %	**Species**	**Common Name**	**Wetland Indicator Status**
30%	*Andropogon gerardii*	Big Bluestem	FACU
20%	*Echinacea purpurea*	Purple Coneflower	UPL
15%	*Hudsonia tomentosa*	False Beach Heather	n/a
15%	*Schizachyrium scoparium*	Little Bluestem	FACU
20%	*Sorghastrum nutans*	Indian Grass	FACU
SHRUBS			
	Species	**Common Name**	**Wetland Indicator Status**
15%	*Ilex opaca*	American Holly	FACU
20%	*Prunus maritima*	Beach Plumb	UPL
25%	*Rhus aromatica*	Fragrant Sumac	UPL
30%	*Rhus copallinum*	Winged Sumac	UPL
10%	*Rosa carolina*	Pasture Rose	FACU

ZONE 3: PRISTINE WET

The pristine wet typology is found in low-lying areas at the bottom of the slope of dunes and the boardwalk and in other low-lying areas more than 25 feet from existing or former roads. Plant species with less tolerance to stress can be more readily planted here due to the limited levels of disturbance in these areas. Facultative species to upland herbaceous and woody species can be selected for these areas.

Blue Mistflower

HERBACEOUS			
Mix %	**Species**	**Common Name**	**Wetland Indicator**
15%	*Andropogon gerardii*	Big Bluestem	FACU
5%	*Echinacea purpurea*	Purple Coneflower	UPL
10%	*Eupatorium coelestinum*	Blue Mistflower	FAC
10%	*Eupatrium purpureum*	Spotted Joe-Pye	FAC
10%	*Euthamia graminifolia*	Flat-top Goldenrod	FAC
10%	*Hudsonia tomentosa*	False Beach Heather	n/a
10%	*Panicum virgatum*	Switchgrass	FAC
10%	*Schizachyrium littorale*	Shore Little Bluestem	FAC
5%	*Solidago sempervirens*	Seaside goldenrod	FACW
15%	*Sorghastrum nutans*	Indian Grass	FACU
SHRUBS			
	Species	**Common Name**	**Wetland Indicator**
20%	*Amelanchier canadensis*	Serviceberry	FAC
20%	*Aronia melanocarpa*	Black Chokeberry	FAC
50%	*Myrica pensylvanica*	Bayberry	FAC
10%	*Rosa carolina*	Pasture Rose	FACU
30%	*Rhus copallinum*	Winged Sumac	UPL
10%	*Rosa carolina*	Pasture Rose	FACU

ZONE 4: PRISTINE DRY

The pristine dry typology is found in upland areas with well drained soils 25 feet or greater in distance from roads or heavy foot traffic. Plant species with less tolerance to stress can be more readily planted here due to limited levels of disturbance (both past and present). A wide breadth of facultative upland species to upland herbaceous and woody species can be selected for these areas.

American Searocket

HERBACEOUS			
Mix %	**Species**	**Common Name**	**Wetland Indicator Status**
15%	*Andropogon gerardii*	Big Bluestem	FACU
10%	*Cakile edentula*	American Searocket	FACU
10%	*Carex silicea*	Beach Sedge	n/a
20%	*Echinacea purpurea*	Purple Coneflower	UPL
5%	*Hudsonia tomentosa*	False Beach Heather	n/a
10%	*Lathyrus japonicus*	Beach Pea	FACU
20%	*Schizachyrium*	Little Bluestem	FACU
10%	*Sorghastrum nutans*	Indian Grass	FACU
SHRUBS			
	Species	**Common Name**	**Wetland Indicator Status**
20%	*Ilex opaca*	American Holly	FACU
15%	*Prunus maritima*	Beach Plum	UPL
15%	*Rubus allegheniensis*	Common Blackberry	UPL
10%	*Rhus aromatica*	Fragrant Sumac	UPL
20%	*Rhus copallinum*	Winged Sumac	UPL
10%	*Rhus glabra*	Smooth Sumac	UPL
10%	*Rosa carolina*	Pasture Rose	FACU

4
Construction & Implementation

The restoration plan spells out all actions to be taken at the project site, including earth moving, additions of new sand or soil, plant removals and protections for desirable native plants. The plan also shows locations for new plantings and seeding, additions of fertilizer or soil amendments, and construction of pathways or boardwalks to manage how visitors utilize the area. In Rockaway, work requiring heavy machinery will be performed by contractors, but weeding and planting efforts can be done with trained volunteers. While USACE will oversee construction and planting of the primary dunes, the RISE project team is responsible for the secondary dunes to the north.

WHEN SHOULD WE PLANT?

Planting is best done early in the growing season, i.e., early to mid-spring, going as late as June 1 depending on conditions. Some restoration ecologists allow planting in late October or November just prior to dormancy, but success rates are generally lower, and some failed plants will need to be replanted in the spring. Seeding is also best done in early spring.

HOW CAN WE MAINTAIN PLANTINGS IN THE SHORT-TERM?

New plantings are most vulnerable to failure during the first growing season, and weed flush is most likely before new plants become established and can out-compete invasive species. RISE volunteers and community stewards will be trained in weed removal which will be initially required with some frequency and diligence. The first year after planting is the most crucial for ensuring successful outcomes. Stewardship volunteers will identify weeds, learn to inspect the depth of roots for removal, all while taking precautions not to trample native plants in the process. Some attention to irrigation is required until new plants have sufficient root maturity, especially during July and August when temperatures are highest and precipitation is lower.

What role can you imagine yourself playing in a habitat restoration project in your community?

Which steps of the process are most interesting to you?

Shore Corps planting plan recommendations, from a workshop in May, 2021

Shore Corps students on a site tour with ecologist Mike Feller in May 2021

A Guide to Long-Term Natural Area Management

The big idea: managing a restoration project in the long-term requires protocols to ensure the hard work in the first years of the project is sustained for the long haul. Engaged community members can support this work through monitoring and adaptive management practices, like weeding and debris clean up.

Many restoration projects are executed by construction teams from start to finish, working for two to five years after planting to perform regular maintenance and assure the site establishes fully as designed. In areas with active and engaged communities, volunteers are recruited and trained to help steward the site, establishing a personal stake in the project's success.

While long-term management involves significantly less effort than during the first years of establishment, maintenance protocols remain necessary if the project area is to sustain the plant communities and an attractive appearance. As volunteers continue to learn about secondary dune ecosystems, the restoration ecologist will introduce monitoring practices and an introduction to stewardship of natural areas.

Rockaway residents participate in a beach clean-up with RISE in July 2021

MONITORING

Visual inspections are useful but tracking year-to-year progress requires informed documentation and plant surveys performed at the same time each growing season in order to identify changes in species composition and increased encroachment of invasive exotic species. Record-keeping will focus on the progress of coastal scrub-shrub plantings and spread of grasses to full ground cover. In Rockaway, the project team will work with volunteers and provide protocols for photographic documents, estimates of species percent cover, tracking the growth of **woody perennials**, and flagging areas where individual species are dying back or stunted. Records should track maintenance activities including plant replacement and any major disturbances witnessed after storm events. If chronic problems emerge, the restoration ecologist will prepare a field-testing protocol to assess issues with salt intrusion, nutrient imbalance or soil deposition that may be interfering with the growth trajectory. Volunteers may also wish to record wildlife sightings, and citizen scientists can be trained to analyze organic material and organisms in the soil to track the recovery of the ecosystem and local diversity.

ADAPTIVE MANAGEMENT

As discussed, **adaptive management** implies a flexible and informed approach to site maintenance, where maintenance personnel (RISE volunteers/community stewards) continually assess the site and react in accordance with what is observed during monitoring. In the short term, more frequent and intensive maintenance strategies are employed to ensure the establishment of the plantings (approximately

two years after planting). On the other hand, long-term maintenance strategies are meant to guide **ecosystem succession**. Ongoing maintenance tasks include replacing plant species which are not thriving or being targeted by pests with native species that are proving to thrive at the site, removing weeds, and ensuring runoff is not causing erosion or plant loss. Responding to encroachment of pests or invasive plant species is of highest priority. Delays in correcting these issues can put large areas at risk and increase maintenance costs considerably.

Weeding

Competition in nature is inevitable, and where native plant communities have been disturbed, invasive plants will seize any opportunity to establish themselves and quickly reproduce. An abundance of non-native species have arrived from other regions, transported in cargo ships or imported by horticulturalists. Some of these species have become **naturalized** to the region, meaning they are so prevalent that they can no longer be considered invasive or alien. Others continue to spread unimpeded by natural pests, giving them an advantage over native species. Weed removal may be the single most important maintenance activity in support of native ecosystems, especially during the first five years or so after restoration work is complete. Removals are generally performed mechanically (by hand - so wear gloves!) with the goal of removing the entire root along with the stem and leaves. Chemical treatments may be used as well, but only by personnel trained in herbicide application at natural areas.

Debris Cleanup

Debris from many sources collects in planted areas and should be removed regularly. Wind blows lighter materials which get caught up in plants; runoff will convey floatables and smaller objects toward areas of stormwater management; wave energy can deposit large objects washed in by storms and visitors can be irresponsible with their trash. Debris-ridden locations imply a devalued landscape, invite further littering, and work against community pride. However, most debris does not have an impact on habitat function and value. Therefore, we need to ensure that by removing debris we do not compromise habitat zones and that plant health is not sacrificed. Volunteers will need to be trained not to step on plants and how to plan clean-ups on a rotating basis so that plants have time to recover before the next clean up.

Conclusion

This introduction is not meant as a complete guide to habitat restoration practices, rather the intent has been to provide background into the motivations and goals behind it and to impress upon community stakeholders the importance of their involvement in the planning and maintenance of restored natural systems. By working in tandem with restoration ecologists, construction firms and community groups, stakeholders can have a dramatic influence over the long-term success of these projects, while also enjoying a host of social benefits, including stewardship skills, species identification, community integrity, and personal satisfaction. The RISE project team recognizes the need to train and engage residents in the value of their coastal infrastructure and the processes that protect low-lying areas from storm surge and sea level rise. No intervention can reduce flood risk to zero, but an engaged community and diligent site maintenance can go a long way toward mitigating a community's exposure to coastal flooding while also providing a host of additional amenities that benefit both city residents and wildlife.

What are your hopes for the shoreline (or for habitats in your community) 10 years from now? 50 years from now? 100 years from now?

What do you think can be done today to make sure these hopes become reality?

Stewardship Training Guide Glossary

Adaptive design
Designs that use fixed structures that are frequently replaced to promote coastal resilience. Adaptive designs anticipate climate change and other impacts and allow the physical form of the coastline to adjust in response to stressors, in order to lessen future risks and resource losses.

Artificial dunes
Constructed dune-like structures composed of a hardened core meant to stabilize the structure and act as a protective barrier. While these structures appear similar to a dune, they lack the dynamic nature of natural dunes.

Beach nourishment
The practice of adding sand or sediment to beaches to combat erosion and increase beach width.

BIPOC
An acronym that stands for Black, Indigenous, and People of Color. This term helps to directly name those groups that have been subjected to the greatest harm historically in the U.S. and beyond as a result of white supremacy, colonization, and related processes of violence, discrimination, and exclusion. From the BIPOC Project: "We use the term BIPOC to highlight the unique relationship to whiteness that Indigenous and Black (African Americans) people have, which shapes the experiences of and relationship to white supremacy for all people of color within a U.S. context." The words used to talk about race are constantly evolving. This is one term widely used today that helps us describe the groups of people who have been harmed and excluded in past planning processes in Rockaway and elsewhere, and who should be prioritized to ensure that this plan helps to shape a more equitable Rockaway (one of the three E's!).

Coastal Scrub-shrub
A shrubland community consisting of woody vegetation (typically less than 20 feet tall) that occurs on dry seaside uplands that are exposed to onshore winds and salt spray. See images for reference.

Ecosystem
An interconnected biological community of organisms (e.g. plants and animals) and the physical environment in which they live.

Ecosystem succession
The change of plant species composition over time. Ecosystems are dynamic and constantly changing, succession refers to the shift in species over an extended period of time.

Feasibility
The possibility of something being accomplished. Specifically, the possibility of accomplishing a successful habitat restoration at a specific location – dependent on factors such as soil, water, and light regimes.

Green stormwater infrastructure (GSI)
Structures (i.e. rain gardens, tree pits, bioswales) that capture stormwater runoff in order to limit the amount of runoff that enters the storm sewers. GSI holds stormwater and slowly releases it back into the ground or into the storm sewer, while also naturally removing some pollutants.

Habitat Restoration
To recreate, initiate, or accelerate the recovery of a disturbed habitat with the goal of maximizing ecosystem functions and values.

Habitat Preservation
To protect a habitat from deterioration and encroachment (from either development, invasive species, predation, etc.).

Horticulture
The practice of cultivating and managing plants and gardens

Intertidal Zone
The area where the ocean meets the land between low and high tides.

In situ soils
The existing soils in a particular location.

Invasive species
An organism (in this case, a plant) that causes harm in an environment where it is not native. An example of this would be a weed spreading in a habitat and causing damage to native plants and the species who depend on them.

Mitigation
Practices that work to limit the impacts of climate change and related challenges (such as extreme storms).

Monitoring
The practice of observing and keeping track of environmental conditions and changes. In community stewardship, monitoring is a key role for community members to play, and can include monitoring wildlife behavior, tides and flood levels, plant life, and more.

Nursery
A place where plants are planted and grown. A nursery may sell or give plants to a variety of different users: businesses, landscape designers and engineers, or the general public, for example.

Planting plan
An important part of a habitat restoration project, which guides the project team and community about which plants to plant, and where to plant them. A strong planting plan will help improve a damaged habitat, and will include guidance on how to maintain and protect plants over time.

Restoration ecologist
A scientist who studies and/or practices the restoration (or renewal and repair) of ecosystems and habitats that have been damaged by human activities. In community stewardship, restoration ecologists play an important role in helping communities understand the best strategies to use to restore the local environment.

Rhizomes
Root-like stems that are below the surface of the soil that produce a root system underground and are capable of sending up shoots above the surface.

Plant Palette
A selection of plant species suitable for planting within designated areas or conditions. Plant palettes often identify herbaceous, shrub, and tree species which are compatible with one another.

Sediment
Solid material that is moved by means of wind or water to a new location. Sediment can consist of rocks, minerals, and organic matter.

Storm surge
An abnormal rise in seawater level during a storm caused primarily by winds pushing water onshore.

Upland
Typically dry land that lies above wetlands.

Understory plants
A plant that is small enough and tolerant enough to shade to thrive under the canopies of taller trees

Wetland
Low-lying land that is saturated with water (i.e. marshes, swamps).

Wetland Indicator Status
Denotes the probability of individual plant species to occur in wetland conditions. See list below:

- Obligate (OBL) – Almost always grows in water, rarely in uplands.
- Facultative Wetland (FACW) – Usually grows in water but occasionally found in uplands.
- Facultative (FAC) – Commonly grows in water or in uplands.
- Facultative Upland (FACU) – Occasionally grows in water, but usually occurs in uplands.
- Upland (UPL) – Rarely grows in water, almost always occurs in uplands.

Woody perennials
Plants with stems that do not die back into the ground each year, but instead grow throughout the seasons. This includes trees and vines.

Pictured: Participants in a beach clean-up organized by RISE (2019).

3

IMPLEMENTATION PLAN

Introduction

So far, this report has offered context about the Greater Rockaway plan area, provided recommendations for Community and Shoreline Enhancement, and presented a guide for how to approach this work in Greater Rockaway (and beyond). This final section focuses on the how: how will this plan be carried out, by whom, and what should be considered as we plan?

WHO IS THIS SECTION FOR?

This section can be used as a planning tool for organizations that will be involved in carrying out this plan. This includes RISE, and agencies identified as partners in this process, such as the NYC Parks Department. This section can be used by groups and individuals in Greater Rockaway who are interested in participating or supporting the effort in some way, to see what opportunities may exist in the immediate, short, medium, and long term. This section can also be used by potential funders or sponsors who wish to support this plan and want a better sense of what the needs will be.

Finally, this section can be used by those who live outside of the Rockaways, but wish to create a plan for community stewardship and/or environmental restoration in their own communities. This plan, and the projects within it, can be adapted to fit the unique needs of your community.

HOW DO I USE IT?

First, learn about the big picture vision for implementation by looking at the Implementation at a Glance Table on page 141. Then, explore the implementation plan for each pilot project and for overall site development on the following pages, including considerations like personnel, site and space needs, and key partners.

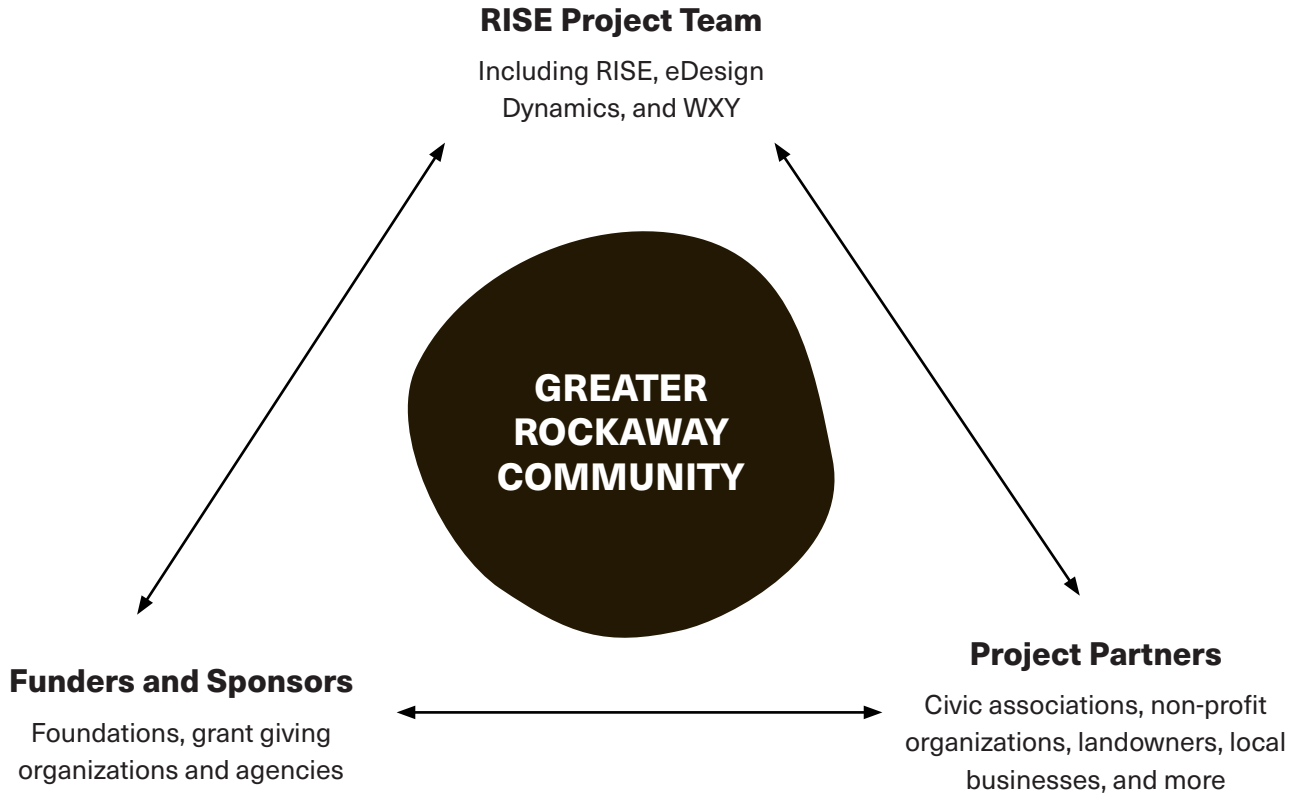
Finally, explore the Detailed Implementation Table on page 147. This table outlines in more detail the key steps that are recommended for each project, and for ongoing site and plan development.

If you live or work in Greater Rockaway, this section may clarify which projects or aspects of this plan's development are the best for you or your organization to plug into. If you don't live or work in Greater Rockaway, this section may offer some guidance or inspiration as to how you can implement a community stewardship and shoreline enhancement or environmental restoration plan in your own community.

A TEAM EFFORT

In order for this plan to be a success, it is important that there is strong collaboration between the Project Team, the Project Partners, and current and future Project Funders and Sponsors. Just as ecosystems thrive when diverse groups of organisms work together, community stewardship and shoreline enhancement projects thrive when diverse groups of people work together.

- **Project Team**: RISE will continue to lead the project team to implement this plan, and will work closely with eDesign Dynamics and WXY architecture + design.
- **Project Partners:** this includes key agencies like NYC Parks, HPD, and USACE. The project team will coordinate closely with these agencies as key stakeholders who maintain, work on, and manage land on the shoreline. Other project partners include the civic associations and non-profit organizations who will work closely with the project team to engage community members, take the lead on some community stewardship projects (including "Adopt-a-Dune"), and otherwise plug in to this effort.
- **Funders and Sponsors:** current and future project funders can use this part of the report to gain an understanding of the kinds of support and resources this plan will need moving forward.
- **The Greater Rockaway Community:** a broad range of Rockaway residents helped create the vision for this plan. And it will be critical that they continue to play a central role in bringing it to life.



IMPLEMENTATION AT A GLANCE				
	Immediate (<1 year)	**Short-term** (1-3 years)	**Medium-term** (3-5 years)	**Long-term** (5+ years)
Strong and Green Nursery	Establish location and site design for nursery and design training program.	Build out the training program and recruit participants.	Sustain training program; raise and distribute native plants.	Establish outdoor market to sell native plants to homeowners and the general public and pilot related educational programming.
Rockaway Eco-Advocates	Establish a pilot maintenance agreement with NYC Parks and develop a monitoring framework.	Develop & recruit for stewardship training model and adopt-a-dune-program.	Implement framework and maintain program sites.	Establish long-term maintenance/ licensing agreements with NYC Parks, City Agencies and private landowners.
Here's Rockaway	Develop site map and docent training model.	Create signage, train docents, and launch tours.	Monitor impact of tours and signage.	Sustain program, update signage, and connect programming to Rockaway Field Station.
Rockaway Field Station	Launch pilot training hub at RISE, in partnership with Shore Corps.	Establish & activate physical site in Arverne Nature Preserve.	Continue programming each academic year; coordinate with Here's Rockaway, Eco-Advocates, and local stewardship and monitoring activity.	Partner with agencies and university partners to create job readiness and training opportunities for interns.
Plan and Site Development	Secure funding, conduct additional engagement, and develop final design.	Implement final design and establish maintenance plan. Secure permits and approvals.	Ongoing stewardship, monitoring, and maintenance of the plan area.	Evaluate impact and continue monitoring and maintenance in coordination with the Rockaway Eco-Advocates Program.

Strong and Green Nursery

IMPLEMENTATION OVERVIEW

In the immediate term, RISE will recruit and coordinate potential partners and sponsors (see list below) and work with them to gain the support and funding necessary to get the project off the ground. RISE and the partner team will determine a site for the nursery--ideally within the Arverne Nature Preserve--, and design a horticulture training program.

With a partner team and nursery site in place, the team will design and implement the nursery. Meanwhile, the team will begin to recruit for the first set of participants in the horticultural training program, with a focus on Rockaway youth (particularly low-income and BIPOC). These paid participants will plant native plants in the nursery while learning about native plants , horticulture, and ecology.

Once Strong and Green has established a plant market and strong networks for distribution, project partners can consider additional programming to engage the public around the nursery. This may include horticultural education events, planting and plant use workshops, the development of a discovery garden to engage children, or other ideas generated by residents and nursery volunteers and staff. Further funding and personnel may be needed to expand the programming.

WHO?

- **Lead:** RISE
- **Potential Partners:** Rockaway Youth Task Force, Local schools, Dred Surfer, NYC Parks, Belle Harbor Garden Club, Jamaica Bay Eco-Watchers, Sheltering Arms, NYCHA, The Child Center of NY, St. John's Residence for Boys, Campaign Against Hunger, Catholic Charities, Jamaica Bay-Rockaway Parks Conservancy
- **Key Participants:** Local residents and youth (especially low income and/or BIPOC)

COSTS & REQUIREMENTS

- *Financial costs:* initial costs of designing and implementing the nursery; ongoing costs of seeds, planting, nursery staff, and supplies
- *Personnel*
  - *Paid:* RISE and partner organization staff needed to coordinate and lead project; paid educators and horticulture experts to lead the training program; paid program participants to participate in training and nursery planting and maintenance
  - *Unpaid:* Resident volunteers to support the maintenance of the nursery
- *Space / site needs:* Plot suitable for growing native plants, ideally in the Arverne East Preserve (between .25-2.5 acres in size); If space allows, storage needs could be accommodated at Rockaway Field Station, or in a small facility on the nursery plot.

KEY IMPACTS: HOW DO WE MEASURE SUCCESS?

Some key indicators to measure the impact of this project include:

- Variety and amount of native plants grown, per season
- Number of local residents engaged as volunteers and paid staff at the nursery (volunteer positions created; paid positions created)
- Amount of native plants and seeds distributed and to whom
- Number of community members engaged in programming at the nursery (events, workshops, distribution)
- Number of community members engaged as nursery volunteers
- Number of paid positions created (paid interns and staff; paid horticultural educators)
- Qualitative feedback on amount learned or educational value of programming and volunteer/internship experiences

Rockaway Eco-Advocates

IMPLEMENTATION OVERVIEW

In the immediate term, RISE will continue coordinating with NYC Parks to establish a pilot maintenance agreement on Parks-owned land in the plan area between Beach 61-70 Streets. During this time, RISE will develop a monitoring framework, drawing from the SRIJB monitoring framework. RISE will work with Shore Corps youth to establish this framework and participate as stewards in the pilot maintenance area.

Throughout implementation, the project team will coordinate closely with the site development and design being led by the RISE Project Team, and draw upon the expertise of e-Design Dynamics (the engineering lead) to develop planting, maintenance, and monitoring protocol.

Next, RISE will establish partnerships with organizations interested in "adopting a dune." Using a toolkit and set of protocols developed by the RISE team, these partners will maintain program sites and coordinate stewardship activities with community members at those sites. Participating organizations will participate in workshops, trainings, and events hosted by RISE, and will also enter into Memorandums of Understanding (MOU's) between rise and the adopting organizations.

In the medium and long term, RISE and adopting organizations will maintain additional stewardship sites along the plan area, prioritizing the leadership of youth and BIPOC residents, and will establish further maintenance agreements with NYC Parks, city agencies, and private landowners who own or manage adopted stewardship sites.

WHO?

- **Lead:** RISE, NYC Parks
- **Potential Partners:** NYSDEC, RDRC (Summer Youth Employment Program), SRIJB (shoreline monitoring framework), Catholic Charities, Child Center of NY, Surfrider Foundation, Queens Defenders, FRANC, Jamaica Bay Rockaway Parks Conservancy
- **Potential Sponsors:** NYC Parks, YMCA, Caracas Arepa Bar, Dred Surfer, Skudin Surf, Locals Surf, NY Surf School, private developers: L&M Development Partners, Goldfarb Properties, Arverne By the Sea
- **Key Participants:** Students and unemployed residents recruited through local organizations including: RISE, New Visions Charter School, Child Center of NY, Ocean Bay CDC, Queens Defenders, and Sheltering Arms

COSTS & REQUIREMENTS

- *Financial costs:* Plants and seeds; maintenance supplies (i.e. bags, gloves, trowels, hoses, hydrant wrench, buckets); development of training/toolkit materials and costs associated with workshops and trainings (staffing, materials, food, etc.)
- *Personnel*
  - *Paid:* Limited number of paid staff positions to lead each adopt-a-dune team; Shore Corps youth paid through RISE program
  - *Unpaid:* Volunteer stewards coordinated by RISE and adopting organizations
- *Space / site needs:* Use of Rockaway Field Station, RISE Center, and/or adopting organization spaces for meetings, workshops, and supply storage; stewardship activities to take place on foredunes throughout the plan area

KEY IMPACTS: HOW DO WE MEASURE SUCCESS?

Some key indicators to measure the impact of this project include:

- Number of volunteers and paid participants engaged
- Number of sustained "adopt-a-dune" partnerships created
- Ecological/habitat goals achieved (i.e. plant diversity, improvements to erosion, wildlife observations)*
- Impacts and benefits reported by adopting organizations, according to distinct goals set

by these organizations (i.e. educational impacts of participants, increase in membership or residents served, social and emotional impacts for participants, funding/grants awarded, and other benefits observed for organizations and the residents they serve)

**Specific ecological goals to be set though Plan and Site Development Process, and incorporated into the monitoring framework.*

Here's Rockaway

IMPLEMENTATION OVERVIEW

In the immediate term, RISE will coordinate with interested partners to develop a map of significant sites using recommendations from local residents, including consultation with local historians and partners like the Queens Historical Society and Queens Museum. Meanwhile, RISE will develop a model to train docents and begin recruiting interested docents. After initial recruitment, the project team should begin to develop an online portal that can be used to recruit and manage a database of docents, and potentially to host registration for tour participants.

Once the training model is in place, RISE will collaborate with paid local artists (potentially through Rockaway Artists Alliance) to design and install educational signage along the tour route, using input from engagement participants gathered in the making of this plan. Within three years, RISE should be prepared to begin conducting tours for the public, having trained a first generation of paid docents. Over the subsequent 2-3 years, the RISE team will monitor the impacts of tours and signage on public awareness, while expanding the reach of the tours to reach new audiences (such as visitors and tourists). In the longer term, the Rockaway Field Station can serve as a partner and/or host site for this program.

WHO?

- **Lead:** RISE
- **Potential Partners:** Rockaway Artists Alliance, FRANC
- **Potential Sponsors:** Queens Museum, Queens Historical Society, SYEP, local City Council Members
- **Key Participants:** Students; BIPOC and low income residents

COSTS & REQUIREMENTS

- *Financial costs:* Signage design and development; training materials ; development of online registration systems for docents / tour participants
- *Personnel*
  - *Paid:* Paid artists/designers to design signage; paid tour docents; RISE and other partner organization staff leading docent trainings
- *Space / site needs:* Meeting space for docent trainings (at RISE Center and/or Rockaway Field Station); permissions and locations for signage throughout plan area.

KEY IMPACTS: HOW DO WE MEASURE SUCCESS?

Some key indicators to measure the impact of this project include:

- Number of paid docent positions created
- Number of paid opportunities created for local artists
- Impact of signage and tours on public awareness about dunes and other aspects of Greater Rockaway community (measured through surveys)
- Improvements to public behavior (i.e. observed rate of climbing or stepping on dunes, polluting, etc.)
- Number of participants who take tours (and participant zip code)
- Increased spending at local businesses due to tours

Rockaway Field Station

IMPLEMENTATION OVERVIEW

In the immediate term, before there is a physical site for the Rockaway Field station, RISE can use the RISE Center to launch a pilot training hub, in partnership with the Shore Corps. This training hub can be used to develop the ecology education and training curriculum to be housed at the Field Station.

In the short-term, RISE will work with relevant partners (i.e. L&M Partners) to develop a physical space (ideally in the Arverne East Nature Preserve), with facilities and amenities needed to house an education and training program, and related uses such as stewardship supply storage. Simultaneously, RISE will establish a partnership with Department of Youth and Community Development (DYCD) to determine a model for employing youth to participate in year- or semester-long training and learning programs at the Field Station. RISE will also establish a partnership with a university or other educational institution to serve as a key partner for supporting curriculum design and instruction for participating youth.

Once established in the Field Station, the RISE team and partners will recruit young people to participate in the educational and training program, and begin offering the program every academic year in coordination with SYEP and a university partner. In the longer term, the RISE team will begin coordinating with partner agencies and organizations to establish opportunities for internship and job placement for students graduating from the Field Station program. RISE will also coordinate with the Here's Rockaway docent program as one such paid opportunity for graduating youth.

Also in the long term, RISE will engage organizations leading local stewardship efforts to assess other potential needs and uses for the field station, including equipment storage, meeting space, and training/events space.

WHO?

- **Lead:** RISE, NYC Summer Youth Employment Program (SYEP)
- **Potential Partners:** L&M Partners, St. John's Residence for Boys, Pratt Institute, USACE
- **Key Participants:** Low-income and/or BIPOC youth; Rockaway residents; Community stewardship volunteers and coordinators working in Rockaway

COSTS & REQUIREMENTS

- *Financial costs:* any costs associated with constructing/equipping the Field Station facility incurred by RISE; training materials
- *Personnel*
  - *Paid:* Youth participants (paid through SYEP); RISE staff coordinating/leading program; paid educators/trainers
  - *Unpaid:* Volunteer educators, trainers, or guest speakers
- *Space / site needs:* Training and learning hub, ideally housed at the new facility in the Arverne East Nature Preserve

KEY IMPACTS: HOW DO WE MEASURE SUCCESS?

Some key indicators to measure the impact of this project include:

- Number of paid youth participants engaged
- Number of youth placed in paid internships or jobs through/after participation in the program
- Number of community members engaged in programming at the Field Station
- Qualitative feedback on amount learned or educational value of programming
- Reported value added of the Field Station to community stewardship projects taking place in Rockaway

Plan and Site Development

IMPLEMENTATION OVERVIEW

In addition to the four pilot projects outlined in this report, the RISE Project Team will also undertake plan and site development to further refine this Community and Shoreline Enhancement Plan and conduct in-depth assessment, design development, and baseline monitoring to enhance the plan area and ready it for ongoing stewardship activity.

In the immediate term, the RISE Project Team will conduct further engagement with the steering committee and Rockaway residents, conduct site assessments to determine design feasibility, and develop a conceptual design for restoration in the plan area. Additionally, the team will design a monitoring framework for the plan area and conduct baseline monitoring. Monitoring efforts will be coordinated with program development for the Rockaway Eco-Advocates Project, which will facilitate ongoing monitoring and stewardship in the plan area.

In the short and medium term, the RISE Project Team will develop a final design for plantings, GSI, and signage/wayfinding in the plan area. The team will also continue to coordinate with NYC Parks, HPD, and other land-owners along the plan area to secure maintenance agreements. The team will also develop a detailed cost estimation for implementing the final design. In alignment with the Rockaway Eco-Advocates project, the pilot maintenance agreement with NYC Parks at Beach 60-71 Streets will serve as a site, too, to pilot the final design, monitoring framework, and maintenance agreement, to be scaled up to include sites throughout the plan area.

In the medium term, RISE will lead the build out of the final design primarily with community member installers and stewards. The Project Team will coordinate efforts that cannot be achieved by community members, such as soil importation and grading, and identify vendors/suppliers to perform these tasks.

WHO?

- **Lead:** RISE, e-Design Dynamics (engineering and design), WXY architecture + design (engagement)
- **Potential Partners:** NYC Parks, USACE, L&M Development Partners, HPD, NYSDEC, NYC DYCD, property owners in the plan area
- **Key Participants:** Rockaway residents, participants and partners in Rockaway Eco-Advocates Project

COSTS & REQUIREMENTS

- *Financial costs:* any supplies and services needed for design build out
- *Personnel*
  - *Paid:* Project Team staff and educators; any vendors or suppliers needed for design build out
  - *Unpaid:* n/a
- *Space / site needs:* all of plan area to be considered for design sites; exact sites to be determined during site assessment and selection.

KEY IMPACTS: HOW DO WE MEASURE SUCCESS?

Some key indicators to measure the impact of this project include:

- Miles of beach stewarded and plants planted
- Percentage increase in the quantity of planted dune scrub/shrub forest habitat to sustain ecosystem and connectivity over plan area
- Increase in quantity of climate-resilient plants in the plan area
- Number of volunteers engaged in installation, build-out, monitoring, and stewardship activities
- Improvements to habitat resilience and plant biodiversity in the plan area
- Improvements to wildlife diversity or habitat use (i.e. presence of target species, including regionally rare species)
- Hazard mitigation & structural integrity (i.e. condition of the site over time; performance of the site during storm or flood events)

DETAILED IMPLEMENTATION TABLE				
Action	**Timeframe**	**Lead**	**Where**	**Cost**
Strong and Green Nursery				
Determine location for native plant nursery and create space and design parameters	Immediate	RISE, L&M Development Partners	Arverne East Preserve	$$
Establish key contacts/partnerships for program development (i.e. NYC Parks, Botanical Gardens)	Immediate	RISE	--	$
Develop horticultural training program	Immediate	RISE	RISE Center	$
Recruit trainers for training program (emphasize Rockaway residents)	Immediate	RISE	--	$$
Develop nursery site (i.e. clearing, construction of any needed facilities)	Short	RISE, L&M Development Partners	Arverne East Preserve	$$$
Work with horticulturists to determine planting plan and palette	Short	RISE, NYC Parks, NYC Botanic Garden	--	$$
Recruit participants for training program	Short	RISE	RISE Center	$
Launch training program	Short	RISE	RISE Center/ Nursery Site	$$
Plant and maintain Strong and Green Nursery	Short-Medium	RISE	Nursery Site	$$
Distribute plants to Rockaways residents (pick-ups, markets, etc.)	Medium	RISE	Nursery Site	$$
Establish plant market at nursery site	Long	RISE	Nursery Site	$$
Develop public educational programming to host at nursery (i.e. workshops, classes, tours)	Long	RISE	Nursery Site	$$
Maintain and evaluate the horticultural training program	Long	RISE	Nursery Site	$$
Consider expanding nursery to include educational elements (children's discovery garden, Indigenous People's garden)	Long	RISE	Nursery Site	$$$

Rockaway Eco-Advocates				
Create maintenance agreement with NYC Parks for pilot site at Beach 61-70.	Immediate	RISE, NYC Parks	Beach 61-70	$
Develop monitoring framework, drawing upon SRIJB Framework as a model	Immediate	RISE		$
Launch pilot stewardship program; apply monitoring framework	Immediate	RISE, NYC Parks	Beach 61-70	$$
Establish targeted sites for Adopt-a-Dune program	Short	RISE	--	$
Develop training materials/toolkit for adopting organizations	Short	RISE	--	$$
Recruit civic associations, non-profits, schools, and others to serve as adopting organizations	Short	RISE	--	$
Create MOU's between RISE and adopting organizations	Medium	RISE	--	$
Maintain adopt-a-dune sites, using established framework	Medium	RISE, Adopting Organizations	--	$$
Establish long-term maintenance/licensing agreements with NYC Parks, City Agencies and private landowners.	Long	RISE, NYC Parks, NYSDEC	--	$
Coordinate with Strong and Green Nursery to source native plants	Long	RISE	--	$
Coordinate with Rockaway Field Station for program equipment storage and meeting space.	Long	RISE	Strong and Green Nursery	$
Expand into additional sites (i.e. Arverne East)	Long	RISE		$$
Here's Rockaway				
Establish partnership with Rockaways history partners, such as Queens Museum, Queens Historical Society	Immediate	RISE		$
Develop map of significant sites	Immediate	RISE		$$

Gather feedback on map from civic associations, local businesses, and residents	Immediate	RISE		$
Recruit local artists/partner with artist groups or coalitions to develop approach to sign design	Immediate	RISE, Rockaway Artist Coalition		$$
Design training program and tour script for docents	Short	RISE	RISE Center	$$
Develop and install educational signage in partnership with local artists	Short	RISE, Rockaway Artist Coalition	Throughout plan area	$$
Develop digital volunteer portal to recruit and manage docents	Short	RISE		$$
Develop social media strategy for outreach and monitoring tour impact	Short	RISE		$
Publicize and launch tours (weekends and select weekdays)	Short	RISE		$$
Monitor impact of tours and signage on public awareness and behavior	Medium	RISE		$$
Maintain docent roster/recruit new docents	Medium	RISE		$
Update tours and signage periodically	Long	RISE		$$
Expand tour audiences, including recruiting daytrippers/tourists and others outside of Rockaways	Long	RISE		$
Rockaway Field Station				
Design field station curriculum	Immediate	RISE	RISE Center	$
Launch pilot training hub at RISE Center, in partnership with Shore Corps	Immediate	RISE	RISE Center	$$
Establish partnership with SYEP/align with Summer Youth Employment Program to create plan for compensating youth	Immediate	RISE, DYCD	RISE Center	$

Recruit youth (prioritize BIPOC and low-income residents) to participate in training program	Immediate	RISE	RISE Center	$
Plan space for the program within the facility planned for development in Arverne East Nature Preserve, in coordination with L&M Development Partners and any other key partners needed for site development	Short	RISE, L&M Development Partners	Arverne East Nature Preserve	$$$
Recruit experts from agencies, universities, and nonprofits to collaborate on training; explore long-term partnership with a university	Short	RISE		$
Continue programming every academic year	Medium	RISE	Rockaway Field Station	$$
Work with partner agencies and university partners to create job/internship placement opportunities for interns/trainees	Long	RISE, USACE, NYCDCP	Rockaway Field Station	$
Coordinate with Rockaway Eco-Advocates and other stewardship efforts to make Rockaway Field Station a resource for stewards (supply storage, meeting space, etc.)	Long	RISE	Rockaway Field Station	$
Host job fairs and other events to increase opportunities for trainees and other Rockaways residents to seek green jobs and internships	Long	RISE	Rockaway Field Station	$$
Incorporate community monitoring elements at the Field Station (i.e. whale cam, surf cam, migratory bird or horseshoe crab monitoring)	Long	RISE	Rockaway Field Station	$$
Plan and Site Development				
Conduct additional engagement, including reconvening the Steering Committee and property owners)	Immediate	RISE, WXY	Throughout Greater Rockaway	$
Create Stewardship Agreements and Maintenance Agreements with NYC Parks and other partners	Immediate	RISE, NYC Parks		$
Conduct detailed site assessment (desktop and in field)	Immediate	eDesign Dynamics	Plan Area	$$
Develop final design for shoreline enhancement (planting plan, palette, green infrastructure).	Immediate	eDesign Dynamics		$$$
Conduct baseline monitoring	Short	eDesign Dynamics	Plan Area	$$

Complete wayfinding plan and install signage (in coordination with Here's Rockaway project)	Short	RISE, eDesign Dynamics	Plan Area	$$
Secure approvals and permitting	Short	RISE		$
Update Stewardship plan and framework	Short	RISE		$$
Develop cost estimates and budget for implementation; secure further funding as needed	Short	RISE, eDesign Dynamics		$
Build out the final design primarily with community member installers and stewards	Medium	RISE, eDesign Dynamics	Plan Area	$$$
Maintain and monitor plantings throughout plan area, in coordination with the Rockaway Eco-Advocates Program	Medium	RISE	Plan Area	$$
Evaluate impact and continue monitoring and maintenance in coordination with the Rockaway Eco-Advocates Program.	Long	RISE	Plan Area	$$

Conclusion and Next Steps

RISE is committed to putting the Greater Rockaway Community & Shoreline Enhancement Plan into action and has begun implementing community design ideas that came out of the process. Below are a few of the projects and initiatives already underway:

From RISE:

- Developing a native plant nursery
- Management of a new Nature Preserve / Center in partnership with L&M Development Partners
- Exploring maintenance agreement with NYC Parks for a pilot site
- Continue engaging Shore Corps youth interns and develop a workforce training model
- Holding youth led tours of local historical and cultural sites

In June 2021, RISE applied for the next phase of funding from the National Fish & Wildlife Foundation's National Coastal Resilience Fund to support aspects of the implementation of the dune enhancement including final design, baseline monitoring, and approvals/permitting. The steering committee developed under the current phase will continue to inform the project development. Additionally in the next phase, the project team will continue to engage the community to inform the conceptual plan and preferred alternative, schematic design, and design of stewardship and a 10-ten year monitoring framework. RISE will continue to work with eDesign Dynamics as the environmental engineer lead and WXY as the community engagement lead.

Participants at a RISE community stewardship event (2019).

Participants at a RISE community stewardship event (2019).

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APPENDIX

Contents

APPENDIX A. GAP ANALYSIS MATRIX

GAP ANALYSIS MATRIX

DOCUMENT TITLE	CB14 Community Health Profile	DOT Access to Opportunity	Greater Rockaway Vision Plan Brochure	Greater Rockaway Vision Plan Rise 2010	Hester Street Rockaway Community Planning + Envisioning	HPD Resilient Edgemere Progress Report 2020	HPD Resilient Edgemere Report 2017	Living Shoreline Techniques 2017	NYC Biodiversity Assessment Handbook 2013	NYC Planning Coastal Climate Resilience 2013	Ne ds
PUBLICATION DATE	2018	2019	2010	2010	Dec. 2014	2020	2017	2017	2013	2013	
AUTHOR	NYC DOHMH	NYC DOT/Arup/Stump Hausman /	Jonathan Rose Companies	RWA/ Trust for Public Land	Hester Street	NYC HPD	3x3 Design	NYS DEC	Erik Kiviat; Elizabeth A. Johnson	NYC DEP	
COMMISSIONED BY	NYC DOHMH	NYC DOT / FHA	Waterfront Alliance (RWA/RISE) + members (planning commiittee), public	0 members (planning commmittee)	Asian Americans for Equality, Local Initiatives SUpport Local community, Implementation partners	0 stakeholders, implementation partners	NYC HPD members (planning committee)	0	American Museum of Natural History	(funded by HUD) members (planning committee),	
INTENDED AUDIENCE	Unclear (maybe-policymakers, community board, practitioners)	Community Board, Stakeholders						State ageny	Unclear		
CONTEXT											
Existing Conditions & Background											
Social & Demographic Context	●		●	●	●	●	●				
Public Health Context	●			●	●	●	●	●			
Economic Conditions*	●	●	●	●	●	●	●				
Regulatory Context								●	●		
Environmental Conditions	●	●	●		●	●	●	●		●	
Coastal Dune Habitat Identification*	–	–	–	–	–	–	–	–	●	–	
Participatory Processes (Tiered)											
TIER 1: Education Campaign			●	●						●	
TIER 2: Community Input	●	●	●	●		●				●	
TIER 3: Community stewardship											
YOUTH Empowerment											
RECOMMENDATIONS											
Economic Empowerment											
Local Ownership / Concessions/Local Business						●	●	●			
Workforce Development											
Entrepreneurship											
Equity (Housing, Race, Health & Access)											
Access to public space	●	●	●	●	●	●	●				
Mobility & Connectivity											
Housing Access & Affordability	●		●			●					
Health Equity	–	–	–	–	–	–	–	–	–	–	
Environmental Justice	–	–	–	–	–	–	–	–	–	–	
Racial Equity & Inclusion	–	–	–	–	–	–	–	–	–	–	
East & West Side Alignment	–	–	–	–	–	–	–	–	–	–	
Environmental Resilience & Public Space Quality											
Ecosystem Preservation & Design		●	●		●	●		●			
Green Stormwater Infrastructure		●		●	●	●	●	●		●	
Storm Surge Protection / Coastal Resilience		●			●	●	●	●		●	
Public recreation			●						●		
Waterfront Identity	–	–	●	–	–	–	–	–	–	–	

The matrix below is a representation of the 24 past plans that have been conducted during the 2000's in the Rockaways. Our conclusions are drawn from the key planning and engagement gaps that we believe can be fulfilled by the Greater Rockaway Community and Shoreline Enhancement Plan process.

NYC Planning Resilient eighborhoo Rockaway Park & Beach	NYC Planning Zoning Coastal Flood Resiliency 2019	NYCS Risk Landscape Chapter 4.2 Coastal Erosion	Post Hurricane Sandy Health Needs	RISE Food Retail Study 2016	Rise Mental Health Resource Guide 2016	Rise Neighborhood Arts and Cultural Inventory 2019	Rockaway EAST NY RCR 2014	Rockaway West NYRCR Plan	RPA Road to Equitable Adaptation 2019	USACE North Atlantic Coast Comprehensive Study	Vision 2020: NYC COmprehensive Waterfront Plan Chapter 3 Goal 5	Waterfront Alliance Waterfront Edge Design Guidelines
2017	2019	0	2014	2016	2016	2019	2014	2014	2019	2015	2011	2018
0	NYC DCP	0	Doctors of the World USA / Columbia SIPA	RISE	Rise/FRANC/Take Care Rockaway	0	HRA/Parsons Brinkerhoff/BBB A + P/ Hammes	0	RPA / Make the Road NY	0	NYC DCP	0
0	0	0	0	RISE	0	0	Communicty Reconstruction Program	0	0	0	0	0
partners, community members	Public use, practitioners, business owners	Unclear	members, stakeholders for future	State Agency: NYC DOHMH	Community members specifically	community members, non profits	members (planning committee)	members (planning committee)	Unclear	Coastal communities, stakeholders, state	Unclear	Professionals, communities, landowners
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APPENDIX B. USACE DUNE ENHANCEMENT PROJECT

THE USACE DUNE ENHANCEMENT PLAN

USACE Dune Enhancement Plan Overview

Ihicab ipsapedis non repelluptati core dolupta At the outset of this process, the project team thoroughly reviewed the USACE Environmental Impact Study and coordinated with USACE to understand the impacts of this work on the Greater Rockaway Community and Shoreline Enhancement Plan. To read the complete USACE EIS, please visit: https://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/East-Rockaway-Inlet-to-Rockaway-inlet/.

The study area addressed within the EIS encompasses the Rockaways and Jamaica Bay. The Atlantic Shorefront Component is part of the USACE's efforts in the area and poses many impacts to the Greater Rockaway Project footprint. The project area for the Atlantic Shorefront Component is contextualized within NYC in the gray call-out box in the upper left corner of "Atlantic Shorefront Component of USACE Recommended Plan" on the following page, from the USACE EIS, which illustrates their project area and proposal for oceanfront enhancement.

The Atlantic Shorefront Component of the Recommended Plan includes the following features:

A composite seawall with elevation of +17 feet NAVD88 extending approximately 35,000 linear feet immediately south of the boardwalk from Beach 20th Street to Beach 149th Street;

A dune with elevation of +18 feet NAVD88 and minimum berm width of 60 feet immediately south of the composite seawall resulting in a total beach fill quantity of 1,596,000 cubic yards (cy);

- Extension of 5 existing groins; and
- Construction of 13 new groins.
- Reinforced Dune - Composite Seawall

The composite seawall is proposed for Rockaway Beach from Beach 149th Street up to Beach 20th Street. It extends approximately 35,000 linear feet immediately south of the boardwalk. The seawall consists of an impermeable core (i.e. sheet pile wall with concrete cap) and rubble mound structure on the seaward side of the wall. The seawall is covered with sand and only the top of the seawall and concrete cap are exposed on the land side of the dune at elevation +17 feet NAVD88.

Beach Restoration

Beach restoration within the Atlantic Shorefront Component stretches from Beach 19th Street to Beach 169th Street. A design profile is proposed that includes a dune with a 25-foot wide crest at elevation +18 ft NAVD88 and a back slope of 1V:3H and a front slope of 1V:5H. The design includes a berm of variable width (minimum 60 ft) at an elevation of +8 ft NAVD88. The width of the design berm is controlled by the alignment of the baseline. The baseline is aligned with the natural shoreline and the distance from the baseline to the design shoreline is always 243 feet. The dune lies parallel to and immediately south of the seawall, and, as a result, the distance between the toe of the dune and

the seaward crest of the berm varies . The extent of beach fill and renourishment varies by location and proximity of the natural shoreline. The total beach fill quantity is 1,596,000 cy for the initial placement (including tolerance, overfill, and advanced nourishment with a 4-year renourishment cycle of 1,111,000 cy).

Groins

The Recommended Plan includes the construction of new groins and the extension of existing ones. Existing groins are to be extended from Beach 43rd Street to Beach 49th Street and from Beach 37th Street to Beach 40th Street, and one new groin is planned at Beach 34th Street. From Beach 92nd Street to Beach 108th Street, seven new groins are to be constructed, and between Beach 110th and Beach 121st Streets, five new groins are to be constructed.

Impacts of the USACE Dune Enhancement Plan

Existing Dunes

The USACE EIS describes impacts to the existing dune habitat. It is anticipated that all of the existing beach habitats, consisting of open, sparsely vegetated areas, in the USACE project area would be impacted by the following recommendations: sand fence and beachgrass planting; berm, dune, and seawall construction; and groin construction. The EIS explains that sand fences and beachgrass planting are expected to promote the southern expansion of the dune at the expense of berm habitat and may effect dune topography and encourage the formation of steep, uniform dunes. In terms of habitat modification, the seawall does not replicate a natural dune and will not migrate or permit the formation of microhabitats such as dune blowouts or depressions. The construction of the proposed seawall will result in the permanent loss of approximately 4.2 acres of dune habitat.

Loss of habitat may also occur due to the proposed tapered groins through erosional processes. The USACE EIS explains that sand accumulation on one side of the groins may offset potential decreases in habitat area, but this is uncertain.

Wildlife

As described in the USFWS Biological Opinion, Attachment D2c of the USACE EIS, the USACE project is not likely to jeopardize the continued existence of the threatened or endangered species discussed because there are no Critical Habitat designations within the project boundary. Seawall and berm construction are likely to adversely affect a portion of the roughly 3.5 acres of interdunal sandy habitat near Beach 19th Street. This area is used for foraging and sheltering for shorebird species such as the piping plover and red knot. The USACE indicated it would attempt to minimize this loss as much as possible and restore any of the lost habitat; restoration plans have not yet been developed.

Construction activities are very disruptive to beach environments and the habitats that support various wildlife. The use of heavy machinery and equipment (e.g., dredge pipes, trucks, and bulldozers) may adversely affect animal species, causing disturbances and posing significant disruption to normal activities such as breeding, feeding, and sheltering. Construction activities, while most likely limited to non-lethal impacts, could force birds to expend valuable energy reserves to seek available habitat elsewhere, delay feeding, impact breeding behaviors, or interfere with sheltering activities.

The USFWS predicts the proposed project will result in habitat loss and modification of piping plover and seabeach amaranth habitats within the concentration areas, and red knot habitats through construction of seawall, berm, groins, walkovers, and road access points. Habitat loss and modification may contribute to the following conditions: loss of nesting habitat area, sloped shoreline conditions, reduced or degraded foraging and resting areas, and plant competition, ultimately resulting in injury or death to piping plovers and injury to red knots.

Construction throughout the duration of the project may negatively effect access to foraging habitats and the prey available to piping plovers for up to two years following initial construction and for each renourishment. This will make competition more likely between different or among the same species in the area, resulting in high mortality of young

piping plovers, decreased productivity, and possibly the abandonment of nesting areas.

It is likely the proposed project would create habitat for, and affect the movements and influence the search behaviors of predators of the piping plover and red knot. Recreation may exacerbate predator activities and may lead to increased predator populations in the action area. Beach construction, along with the installation of sand fences, planting of vegetation, and a hardened dune system may contribute to a uniform beach system, impacting species' ability to evade detection as opposed to within a natural beach system. Furthermore, constructed and stabilized dunes provide a less suitable habitat for seabeach amaranth; this allows for succession to a densely vegetated perennial community, in which habitats are ill-suited for seabeach amaranth.

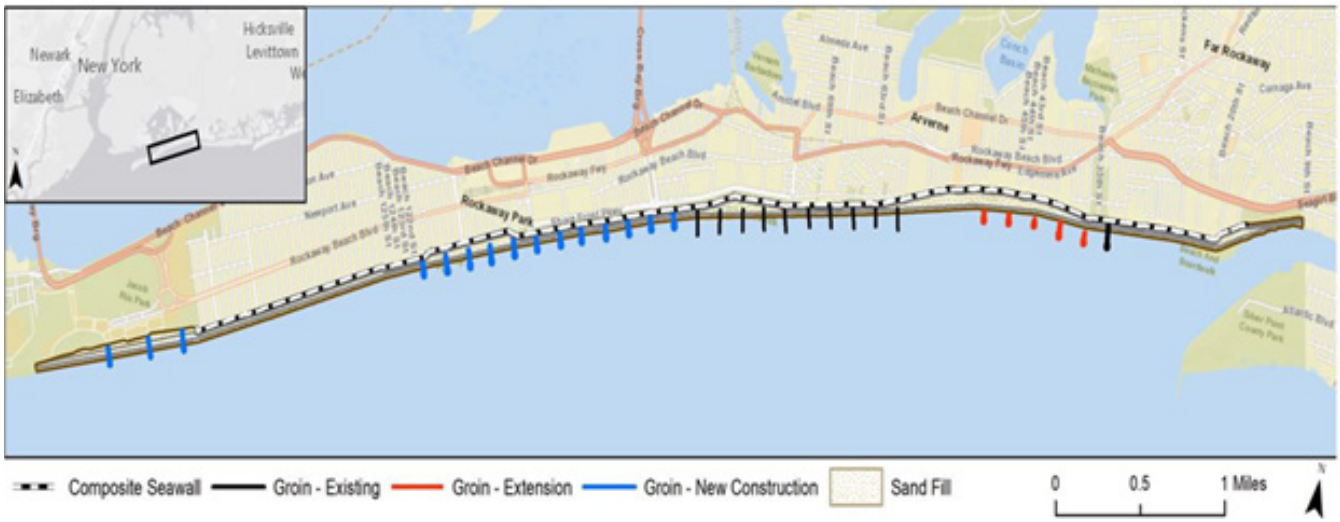
Green Stormwater Infrastructure Opportunities

The USACE project includes a composite seawall for Rockaway Beach from Beach 20th Street to Beach 149th Street; its alignment is parallel to and immediately south of the existing boardwalk's alignment. Any surface or groundwater drainage that presently flows from north of the boardwalk to the south may be impeded by the new seawall. As coastal cities are planning in preparation of sea level rise, they must engage in a delicate balance to protect shorelines from storm surges without contributing to a bathtub-like effect that would hinder runoff from reaching coastal waters.

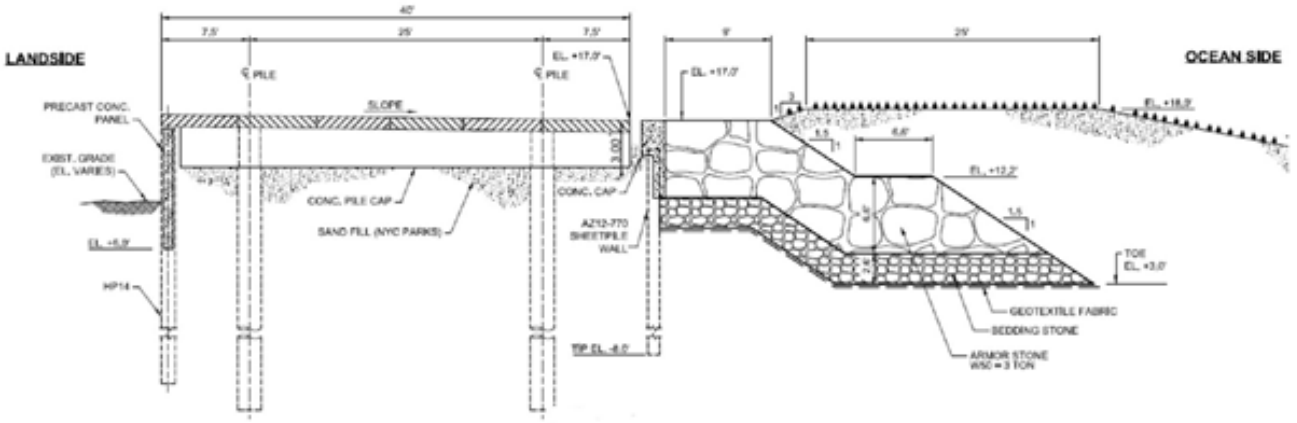
USACE Dune Enhancement and Coastal Protection

The USACE Dune Enhancement project is located within a federally designated flood hazard area and will result in physical changes to the Atlantic shorefront and the Back Bay of Jamaica Bay. As

Atlantic Shorefront Component of USACE Recommended Plan

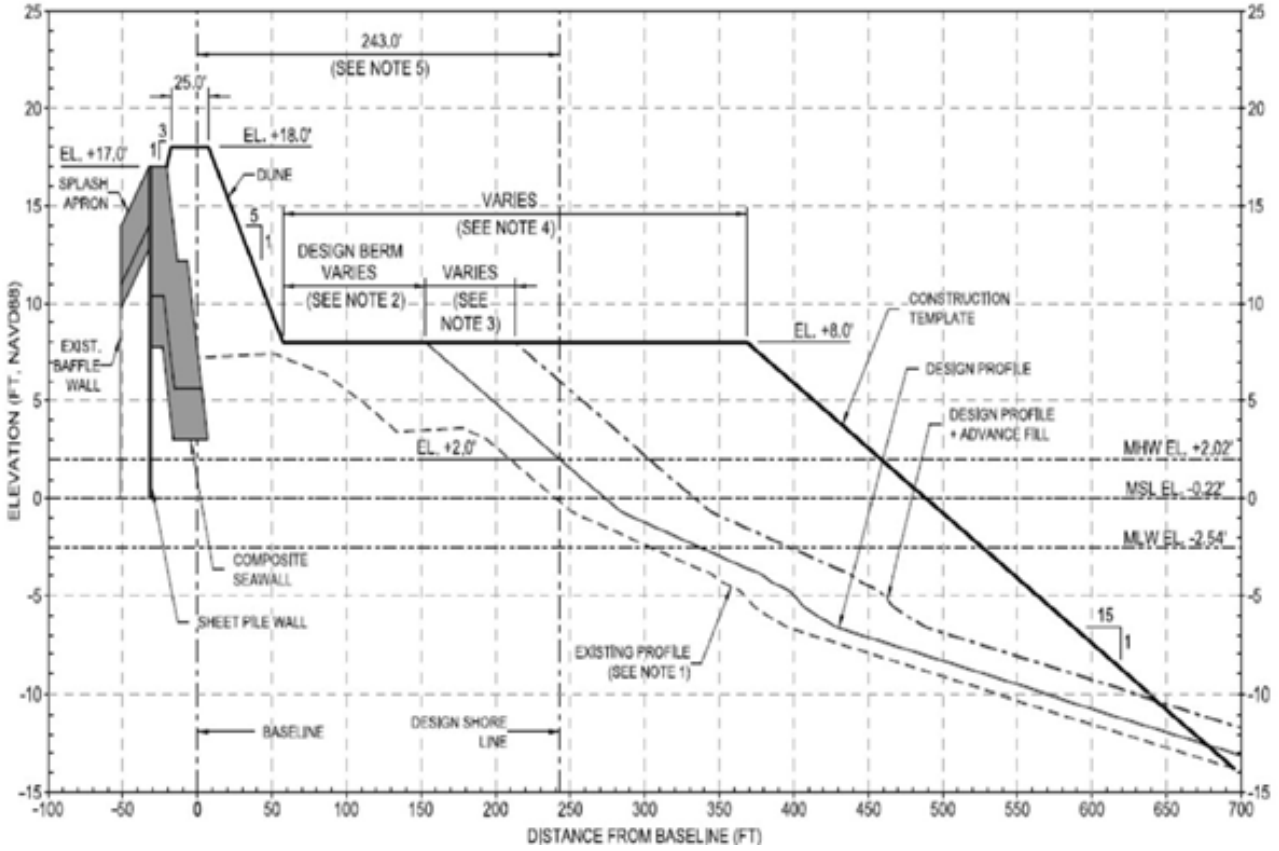


Composite Seawall



the USACE explains in EIS Attachment D5, Coastal Zone Management Program Federal Consistency Determination, the project is designed to protect coastal resources in these areas through a layered approach consisting of seawalls, groins, floodwalls, bulkheads, nature-based non-structural features, and beach renourishment. Sand obtained from the offshore borrow area would be pumped to beach areas to restore their natural protective features. The USACE emphasizes that their project will restore the Rockaways' character as a barrier island and minimize damage to natural resources and property by safeguarding the Peninsula's naturally occurring protective characteristics and associated physical processes. The USACE concludes that its project will minimize damage to property and reduce the risk to human lives caused by erosion and flooding from coastal storms such as Hurricane Sandy.

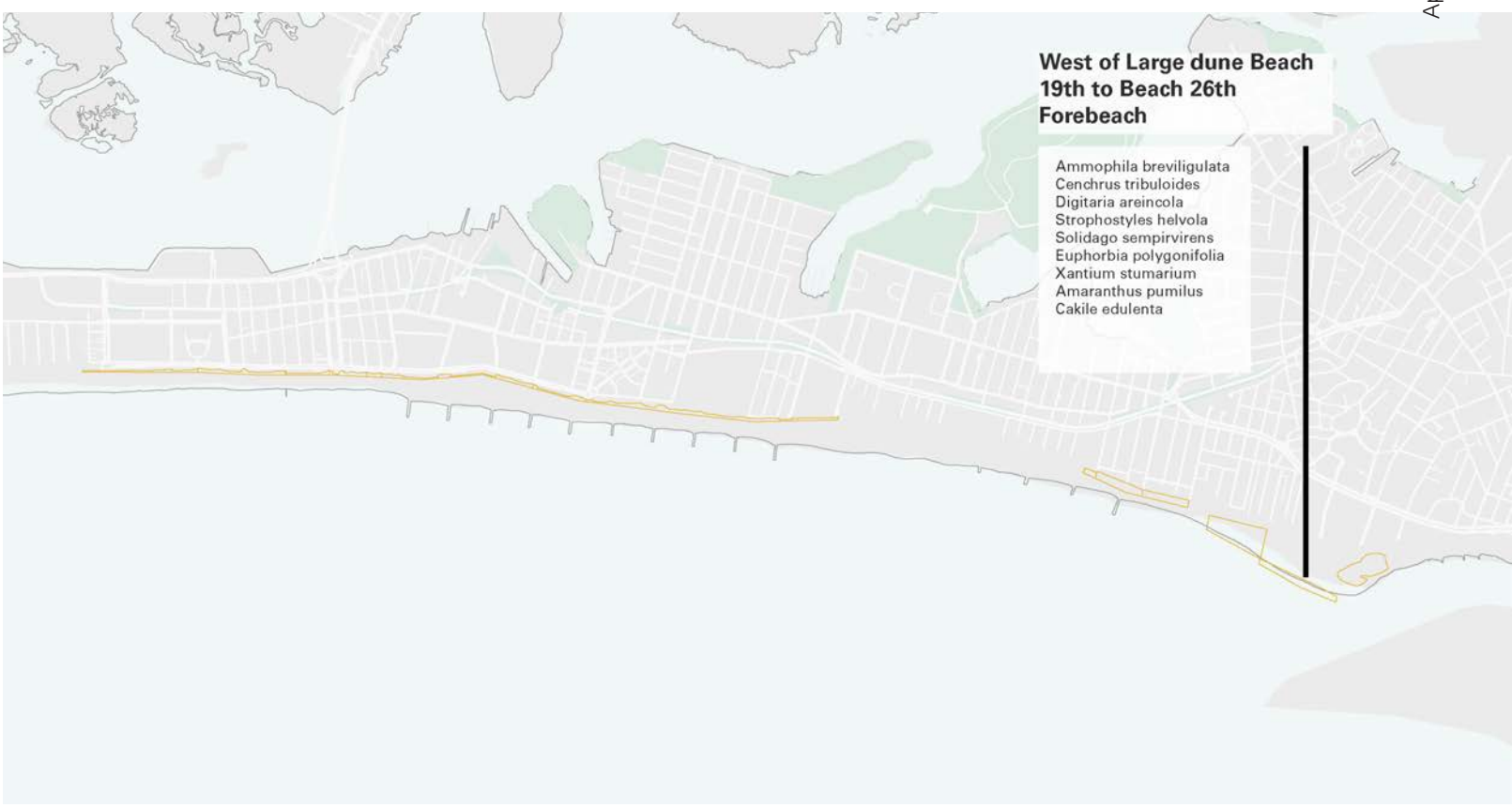
Design Beach Profile



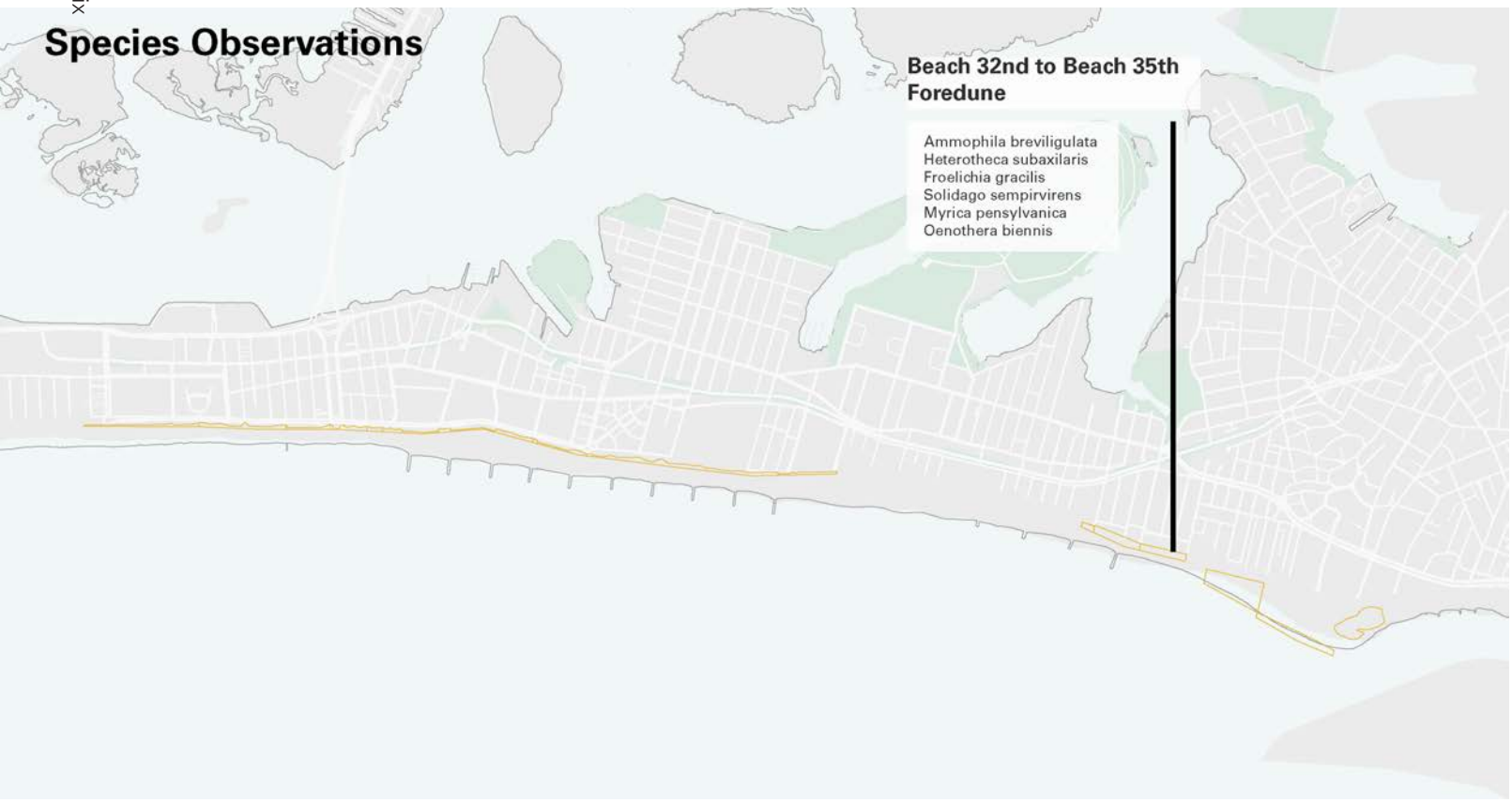
APPENDIX C. PLANT HABITATS

PLANT HABITATS

The following set of maps reviews the existing plant habitats located within the plan area. The titles in bold describe the classification of habitat found by eDesignDynamics: Concessions, Paved, Mostly Paved, Foredune or Dune. The text below summarizes the plant species that were observed on September 21st and 25th, 2020.

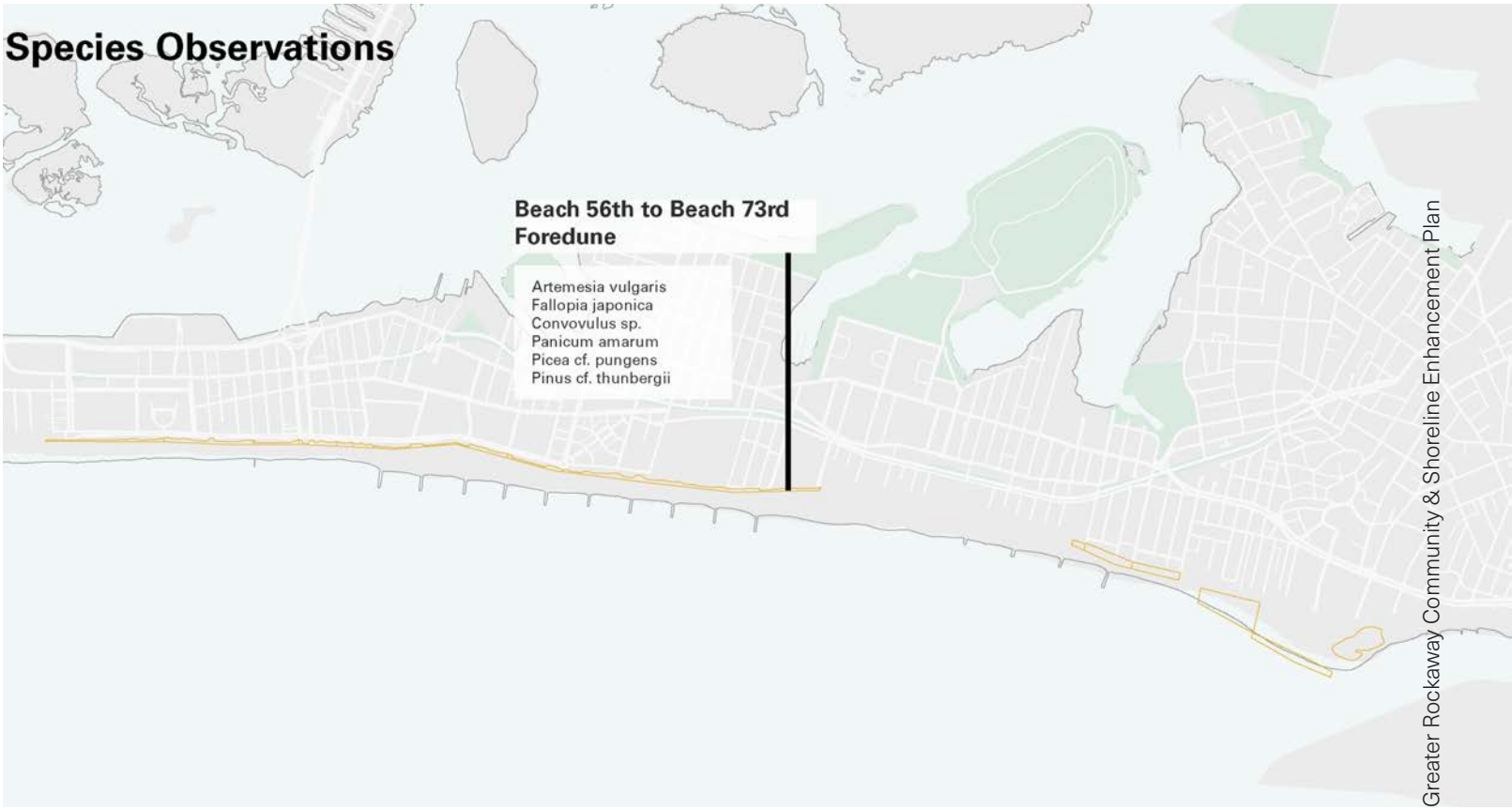

West of Large dune Beach
19th to Beach 26th
Forebeach
Ammophila breviligulata
Cenchrus tribuloides
Digitaria areincola
Strophostyles helvola
Solidago sempirvirens
Euphorbia polygonifolia
Xantium stumarium
Amaranthus pumilus
Cakile edulenta


Beach 26th to Beach 30th
Landward
Bare Beach


Species Observations
Beach 32nd to Beach 35th Foredune
Ammophila breviligulata
Heterotheca subaxilaris
Froelichia gracilis
Solidago sempirvirens
Myrica pensylvanica
Oenothera biennis


Species Observations
Beach 35th to Beach 38th Foredune
Ammophila breviligulata
Solidago sempirvirens
Myrica pensylvanica
Euphorbia polygonifolia


Species Observations
Beach 38th to Beach 39th Foredune
Medicago sativa
Heterotheca subaxilaris
Andropogon virginicum
Schizachyrium scoparium
Diodia terres
Panicum amarum
Anaphalis margaritacea
Rosa cf. carolina
Eragrostis spectabilis
Yucca filamentosa
Fallopia japonica
Lechea asp.
Polygonella articulata


Species Observations
Beach 56th to Beach 73rd Foredune
Artemesia vulgaris
Fallopia japonica
Convovulus sp.
Panicum amarum
Picea cf. pungens
Pinus cf. thunbergii


Beach 73rd to Beach 77th
Paved


Beach 77th to Beach 81st
Foredune
100% Cover


Beach 81st to Beach 88th
Mostly Paved
Some patches of weedy mugwort dune


Beach 89th to Beach 91st
Foredune
Pityopsis falcata
Comptonia peregrina

APPENDIX D. PLANTING PLAN MAPS

PLANTING ZONES

Character Area Boundary

Requires Further Review

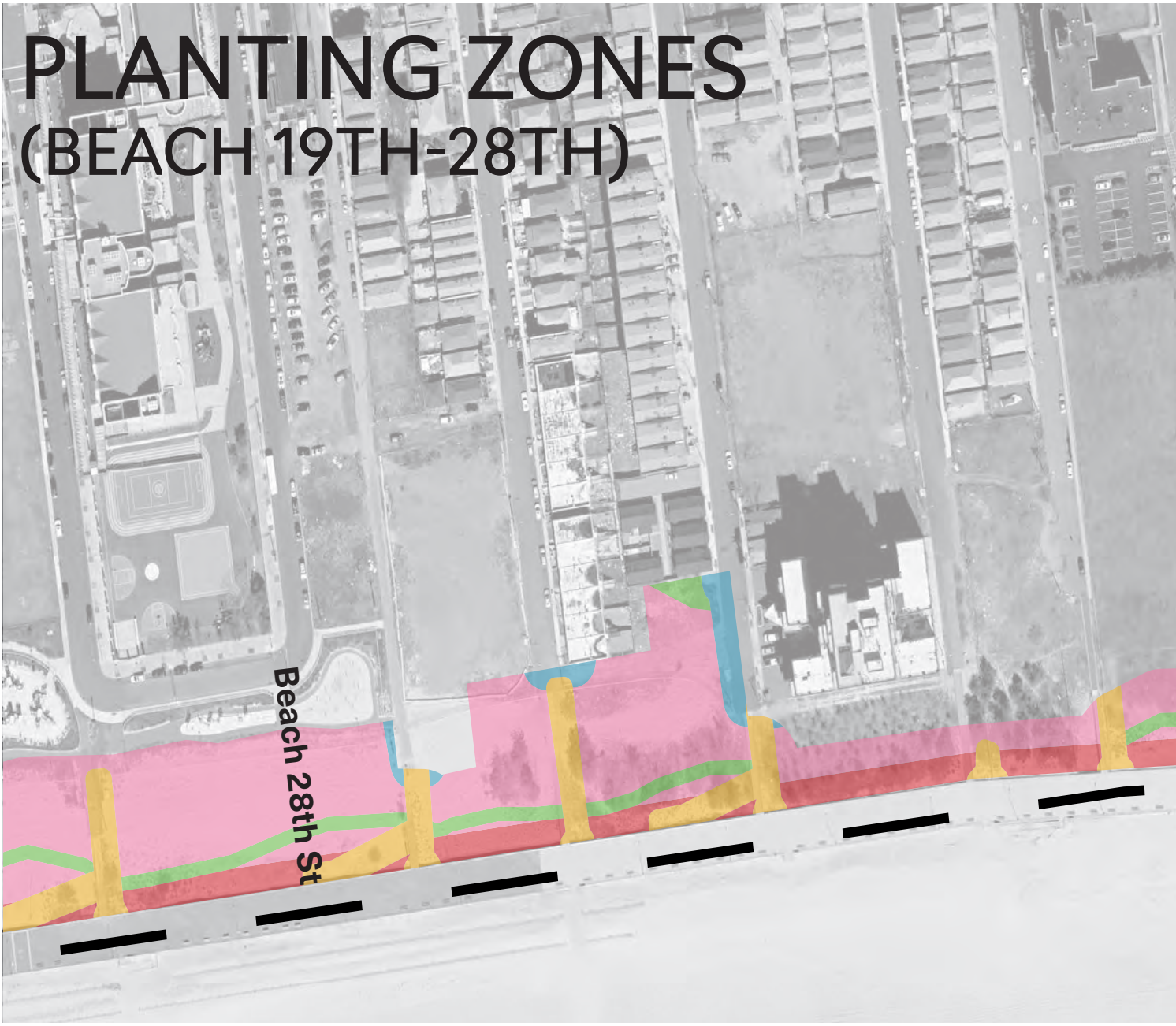
Disturbed Dry Soil

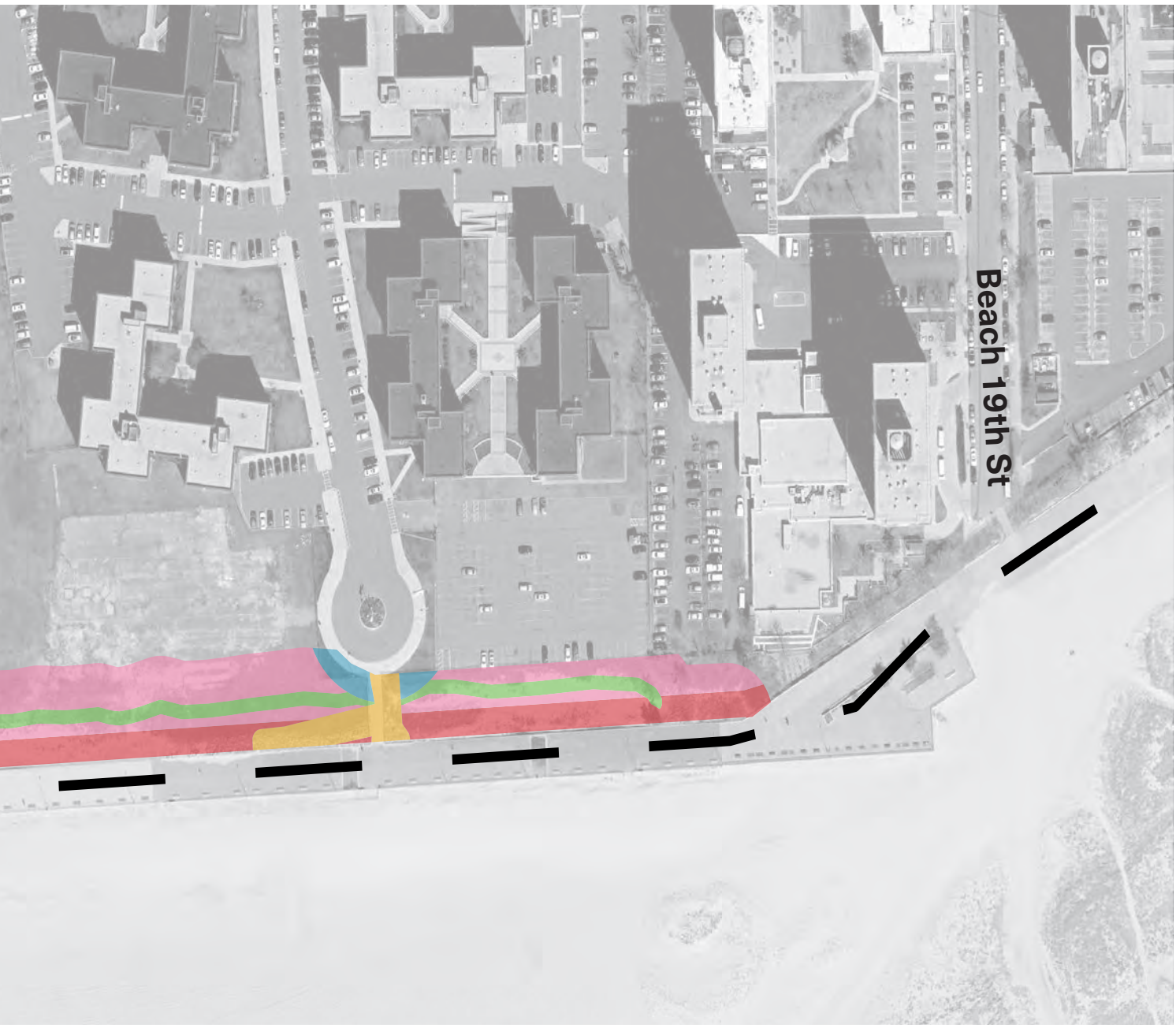
Pristine Dry Soil

Disturbed Wet Soil

Pristine Wet Soil

PLANTING ZONES (BEACH 19TH-28TH)





Character Area Boundary

Requires Further Review

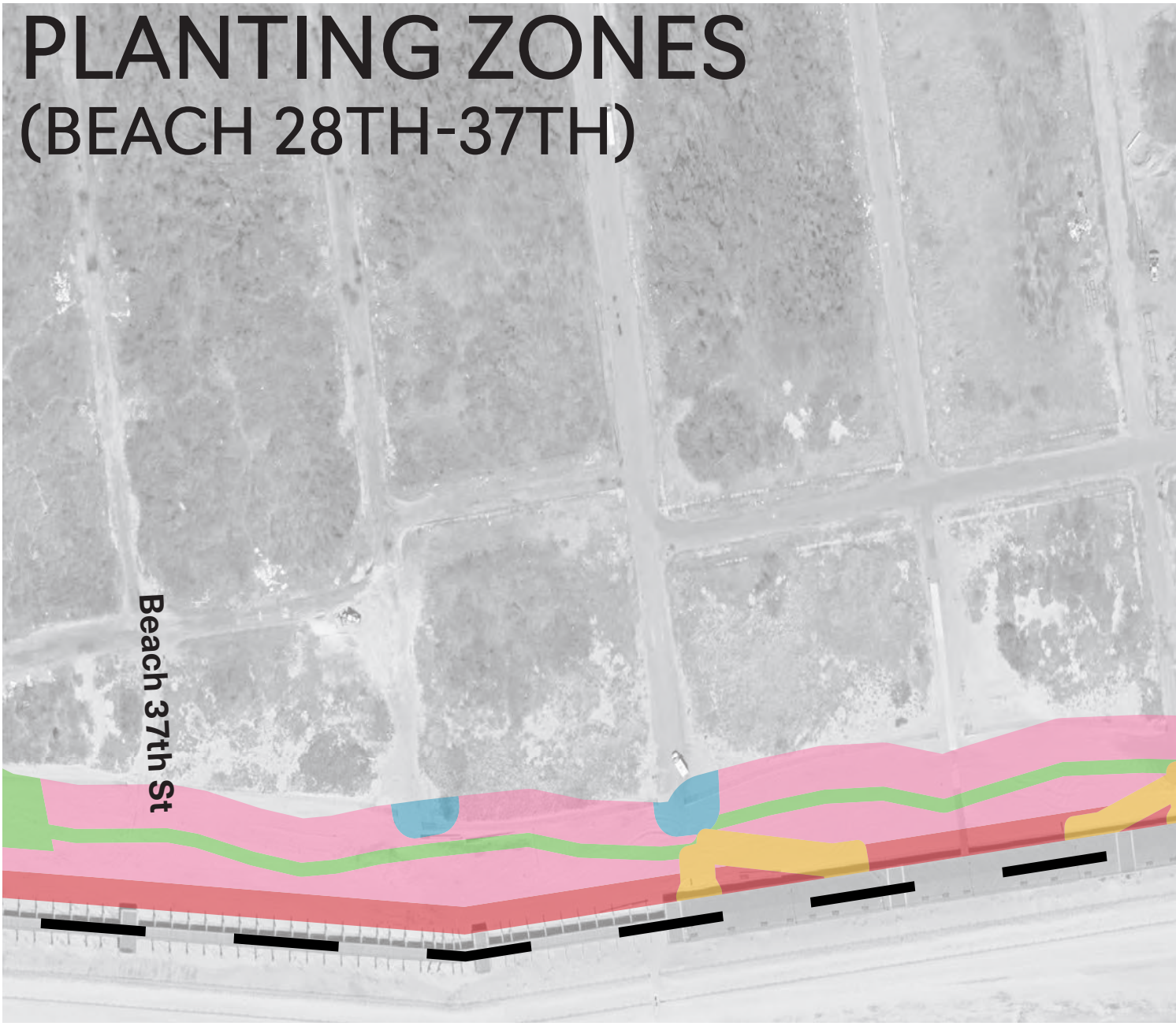
Disturbed Dry Soil

Pristine Dry Soil

Disturbed Wet Soil

Pristine Wet Soil

PLANTING ZONES (BEACH 28TH-37TH)



Character Area Boundary

Requires Further Review

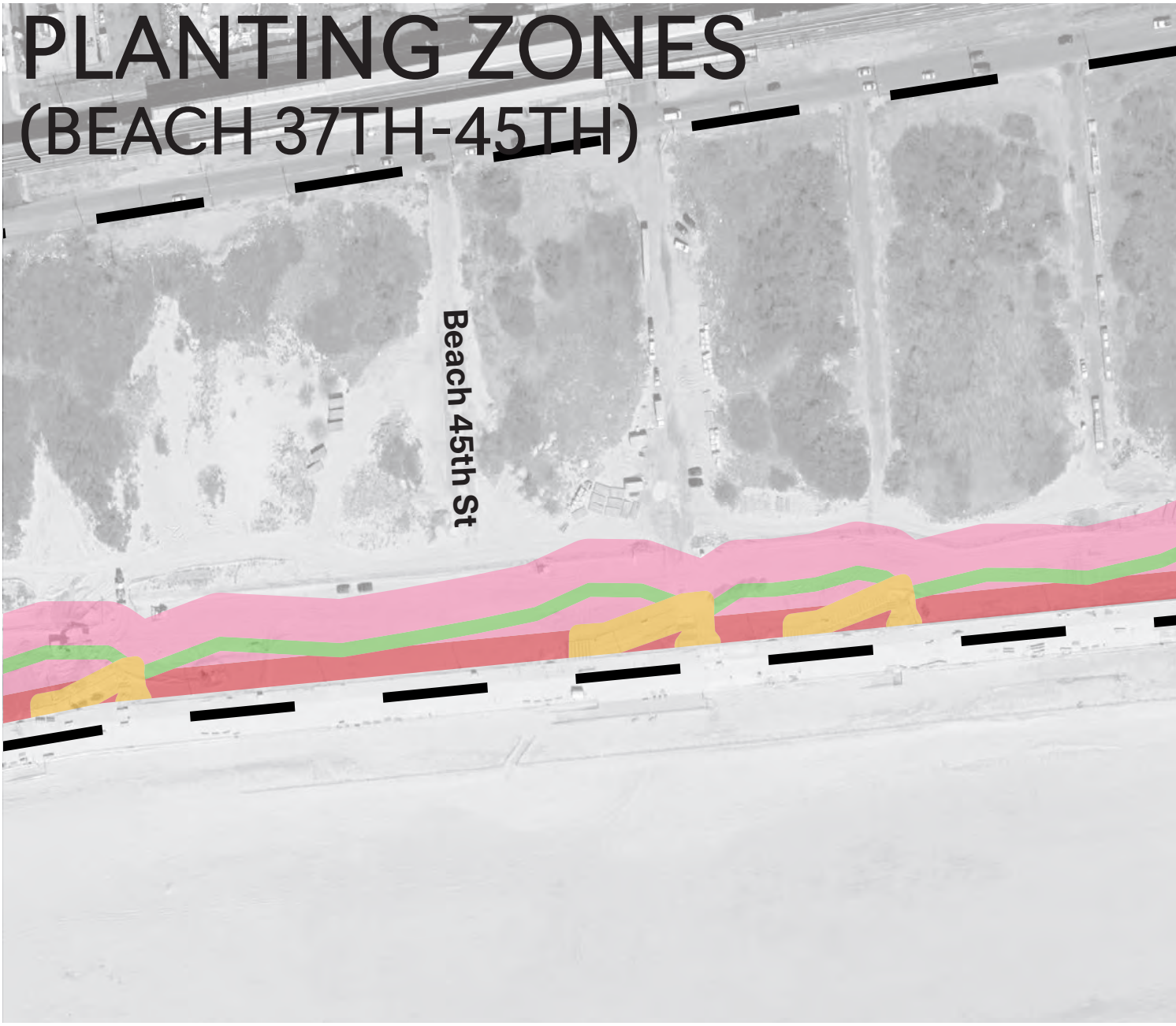
Disturbed Dry Soil

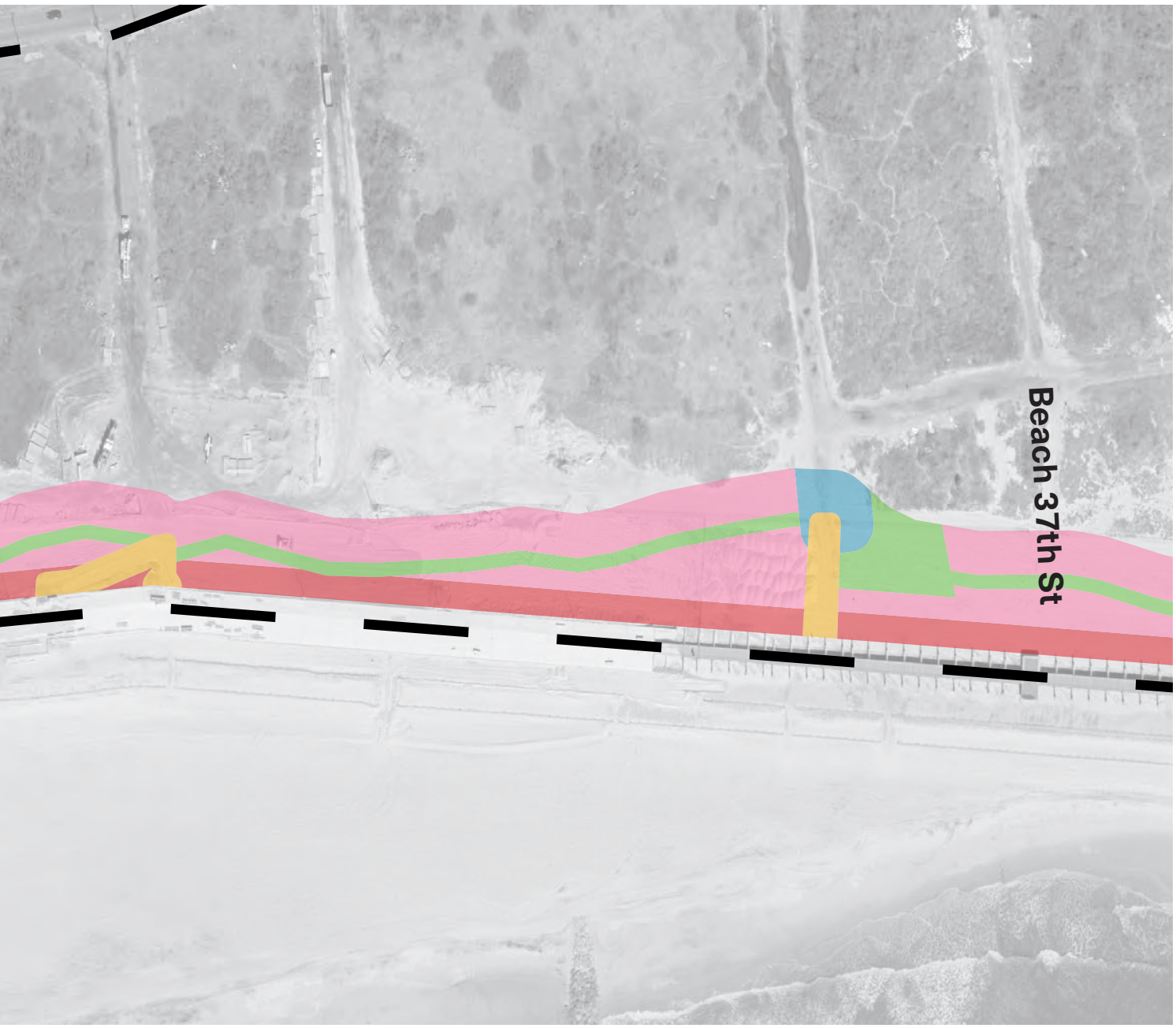
Pristine Dry Soil

Disturbed Wet Soil

Pristine Wet Soil

PLANTING ZONES (BEACH 37TH-45TH)





Character Area Boundary

Requires Further Review

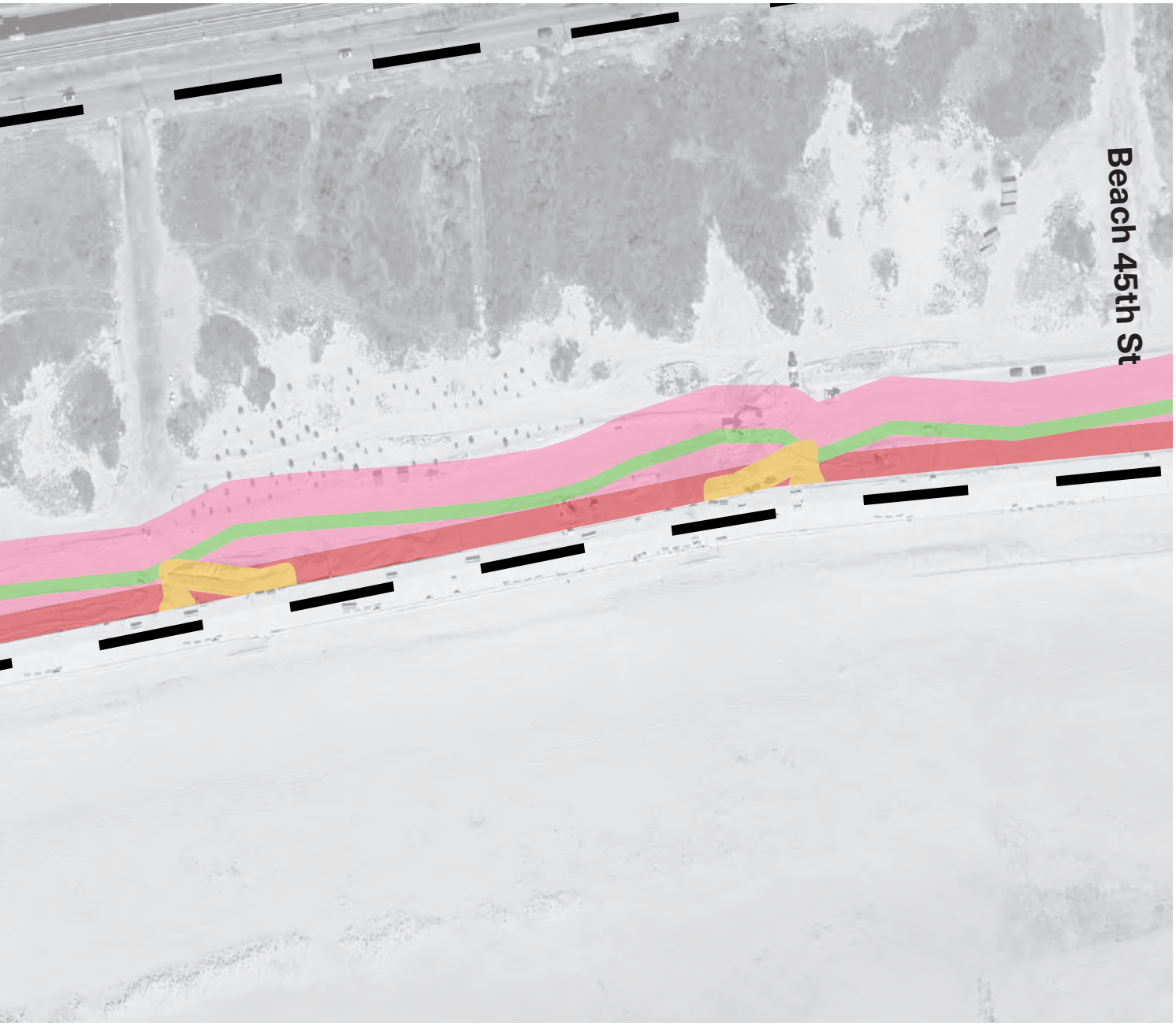
Disturbed Dry Soil

Pristine Dry Soil

Disturbed Wet Soil

Pristine Wet Soil

PLANTING ZONES (BEACH 45TH-55TH)



Character Area Boundary

Requires Further Review

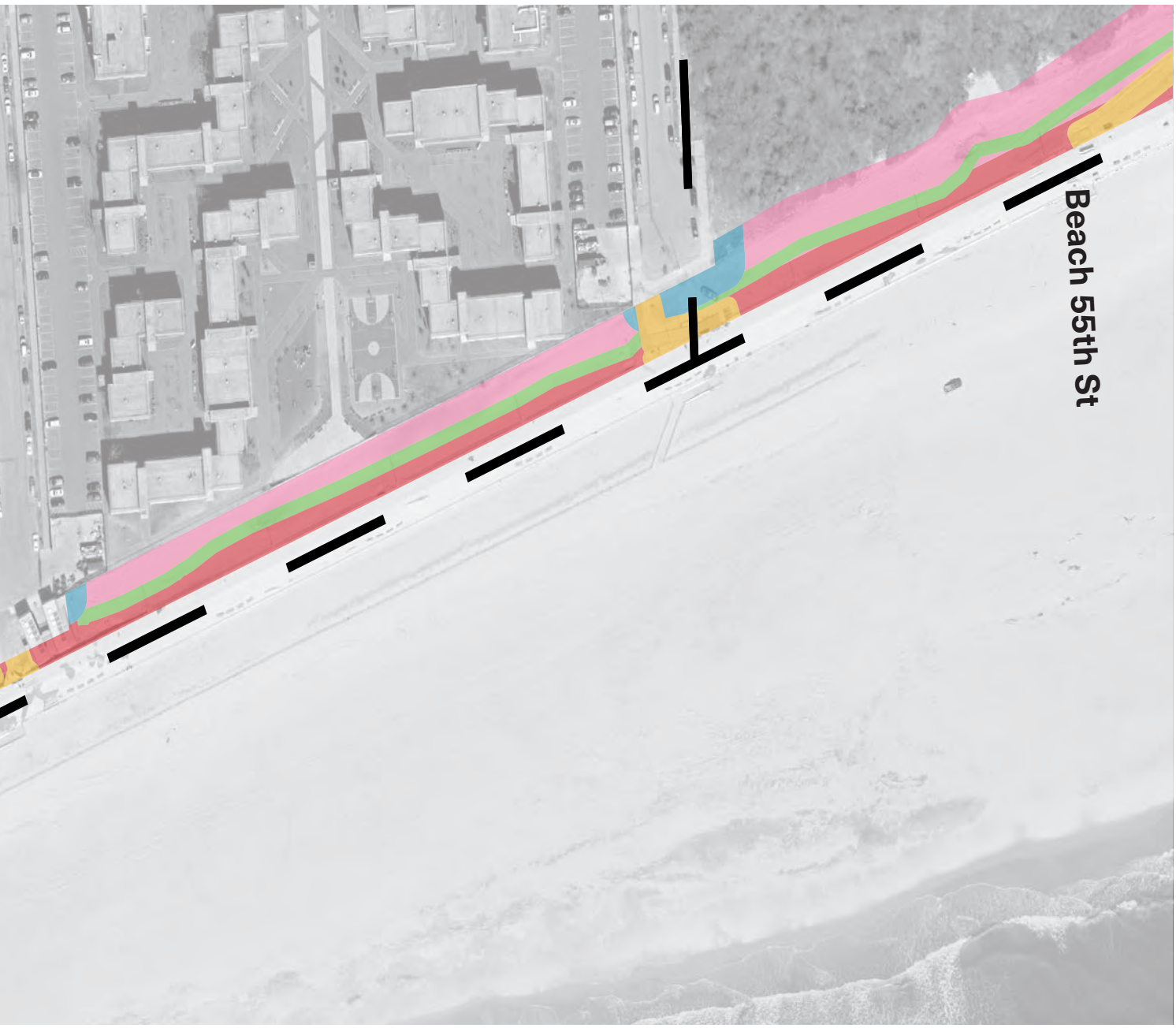
Disturbed Dry Soil

Pristine Dry Soil

Disturbed Wet Soil

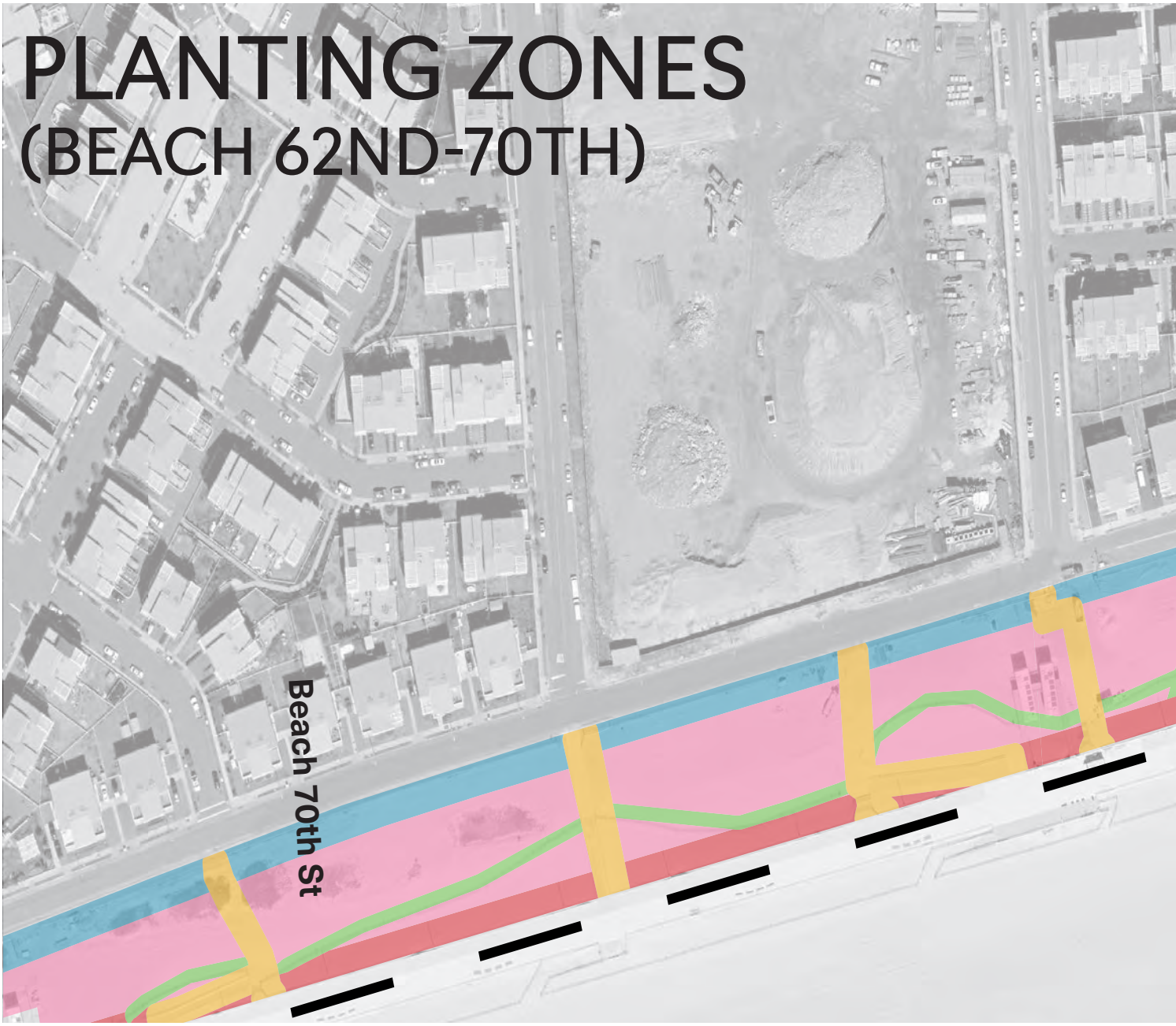
Pristine Wet Soil

PLANTING ZONES (BEACH 55TH-62ND)



- Character Area Boundary
- Requires Further Review
- Disturbed Dry Soil
- Pristine Dry Soil
- Disturbed Wet Soil
- Pristine Wet Soil

PLANTING ZONES (BEACH 62ND-70TH)

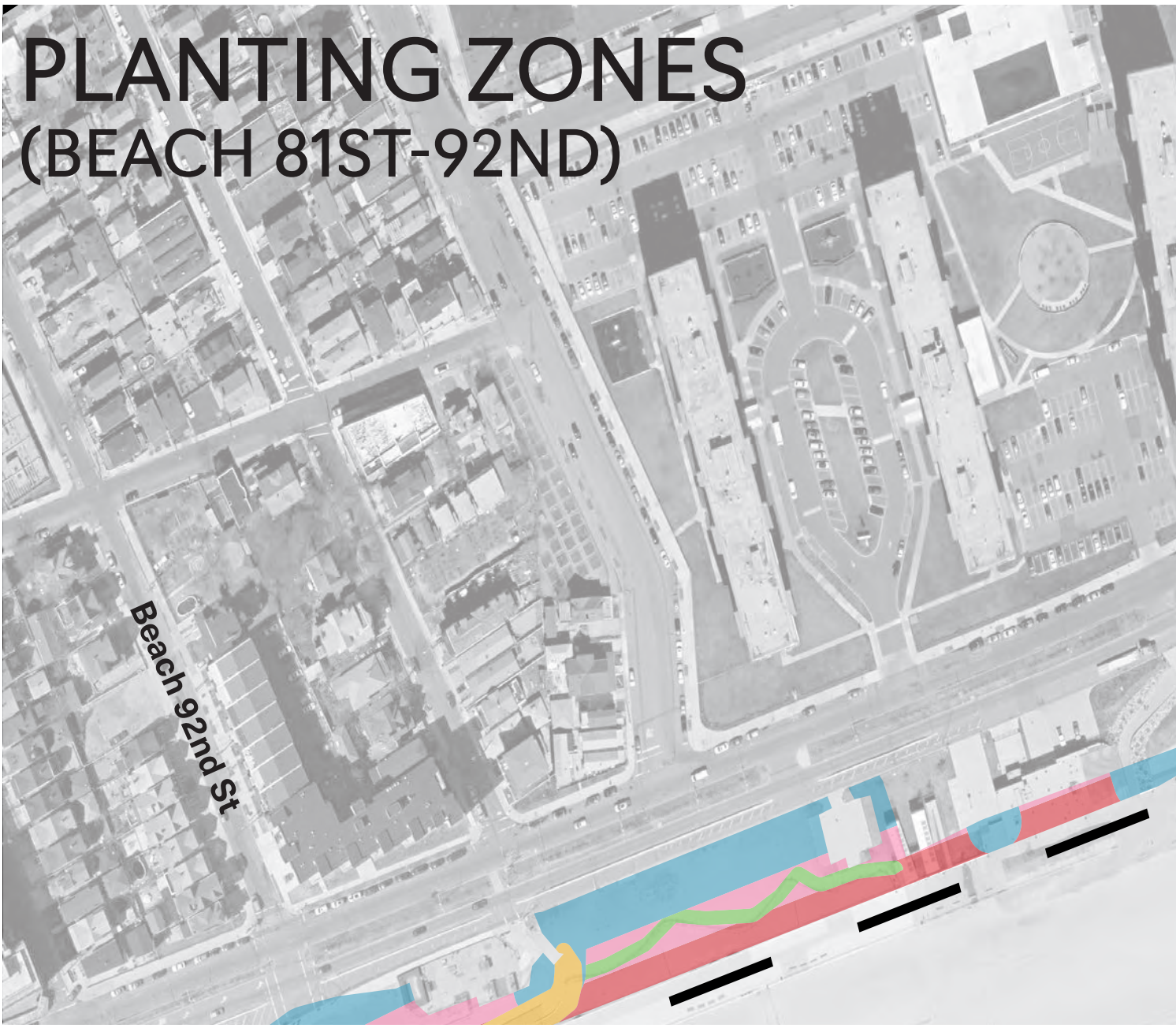


- Character Area Boundary
- Requires Further Review
- Disturbed Dry Soil
- Pristine Dry Soil
- Disturbed Wet Soil
- Pristine Wet Soil

PLANTING ZONES (BEACH 70TH-81ST)

- Character Area Boundary
- Requires Further Review
- Disturbed Dry Soil
- Pristine Dry Soil
- Disturbed Wet Soil
- Pristine Wet Soil

PLANTING ZONES (BEACH 81ST-92ND)



Character Area Boundary

Requires Further Review

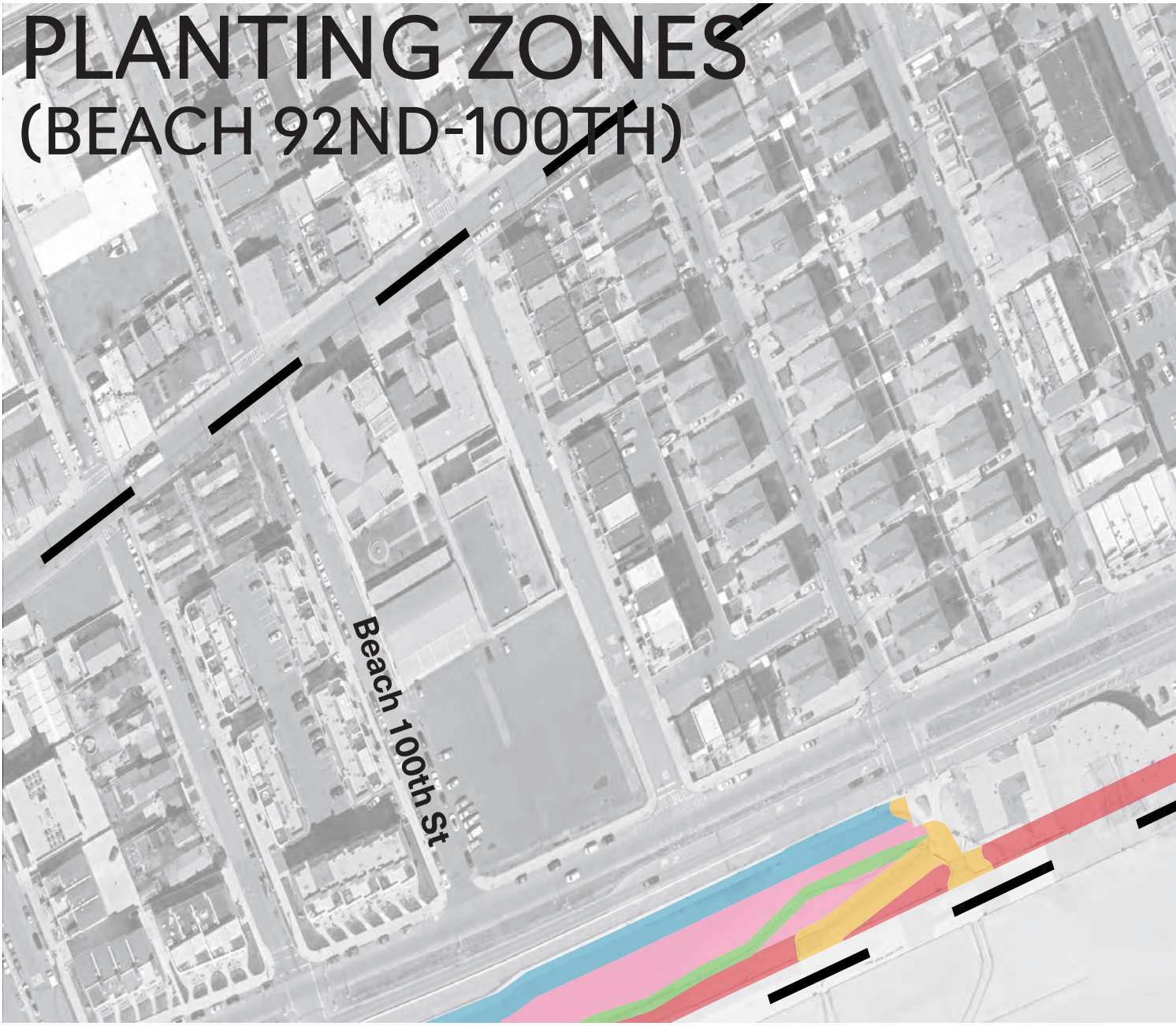
Disturbed Dry Soil

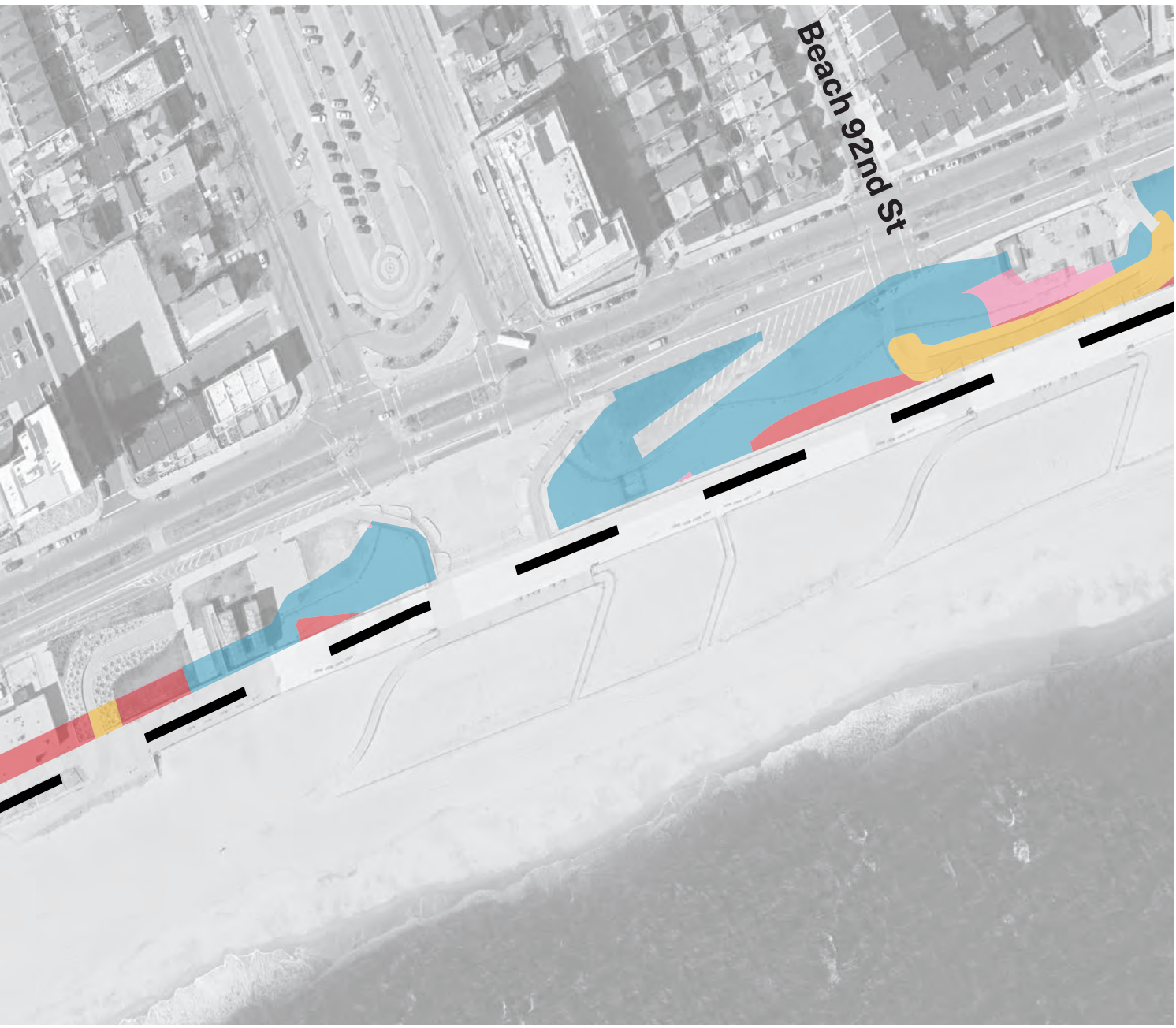
Pristine Dry Soil

Disturbed Wet Soil

Pristine Wet Soil

PLANTING ZONES (BEACH 92ND-100TH)





Character Area Boundary

Requires Further Review

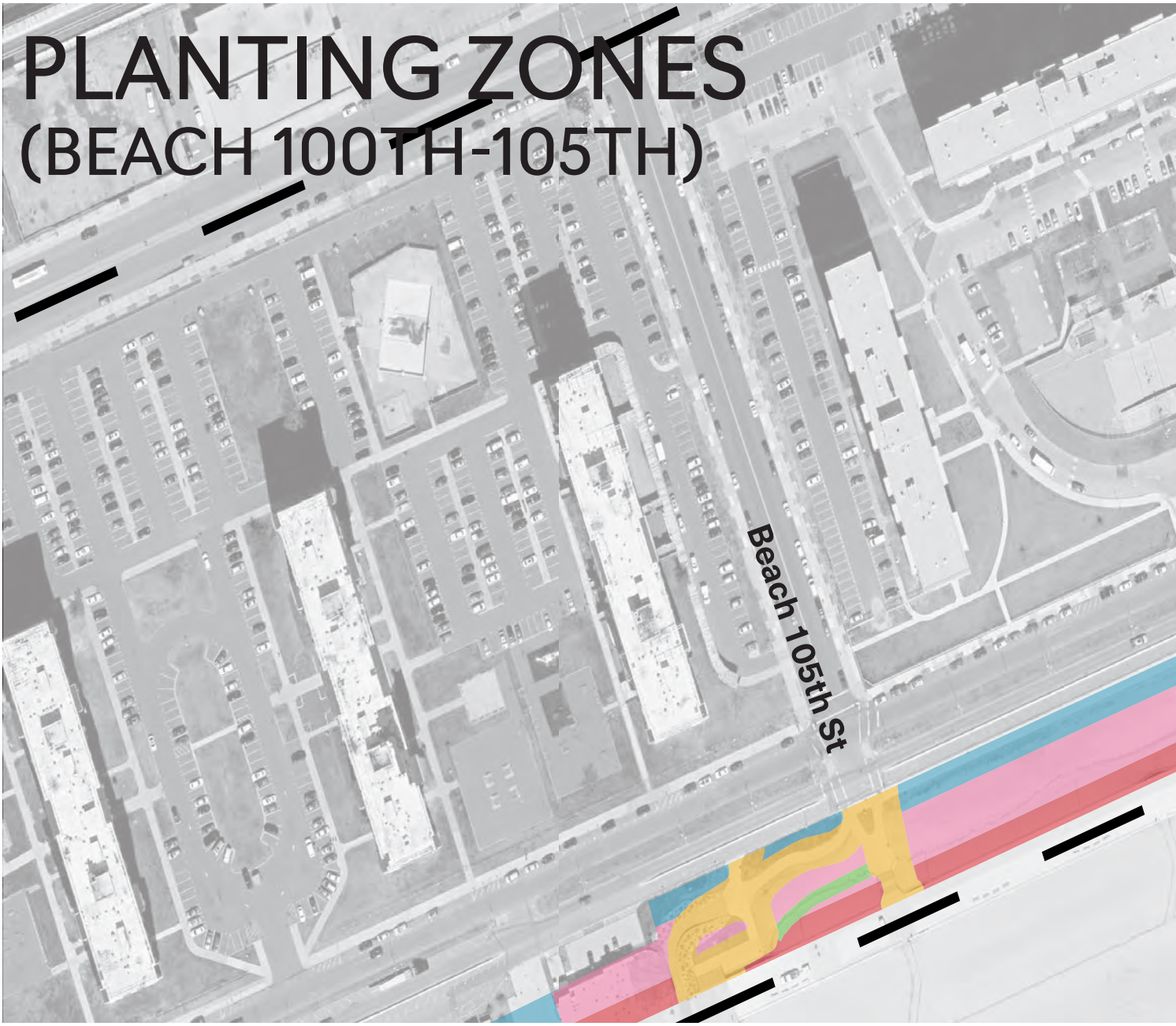
Disturbed Dry Soil

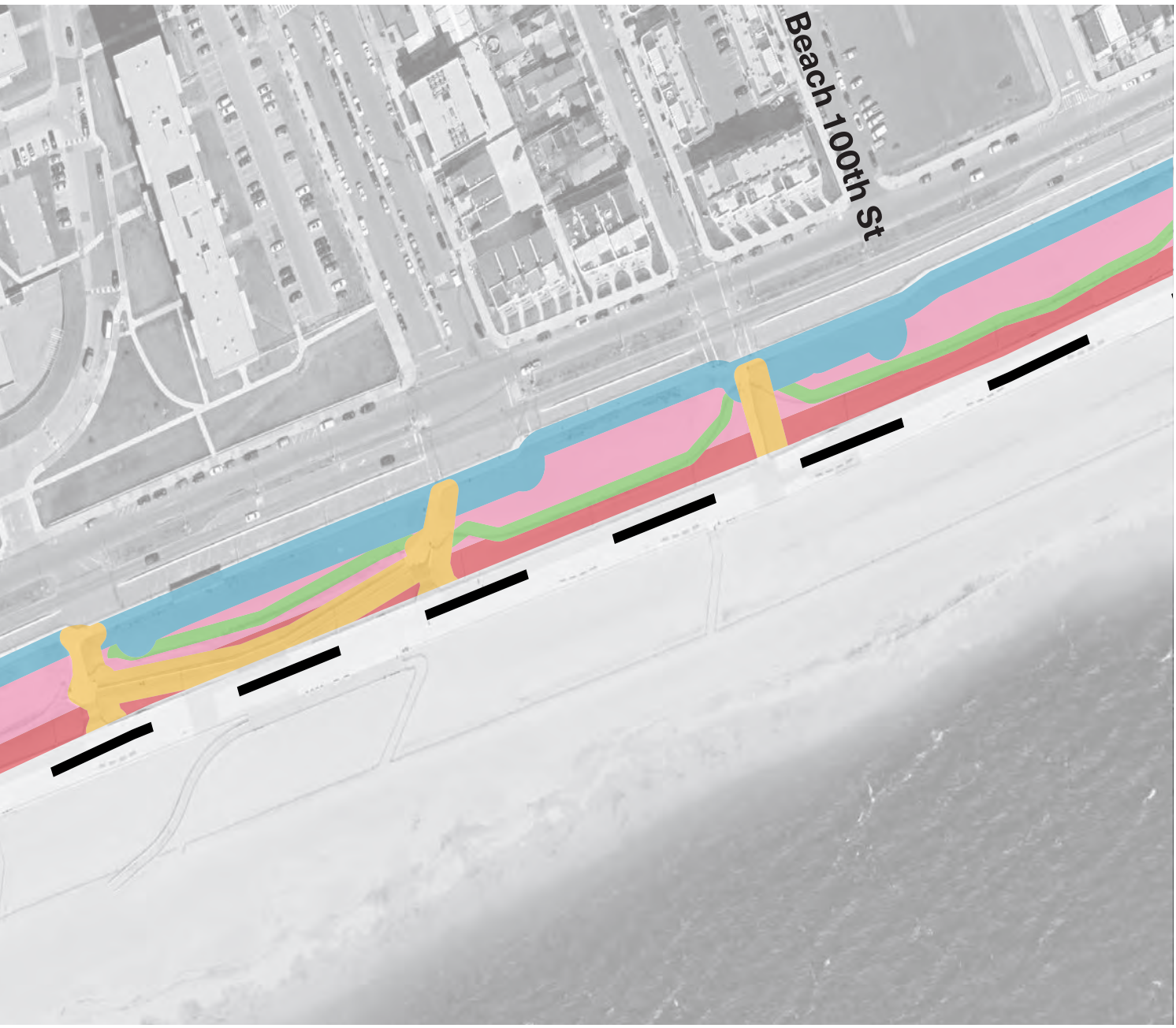
Pristine Dry Soil

Disturbed Wet Soil

Pristine Wet Soil

PLANTING ZONES (BEACH 100TH-105TH)





Character Area Boundary

Requires Further Review

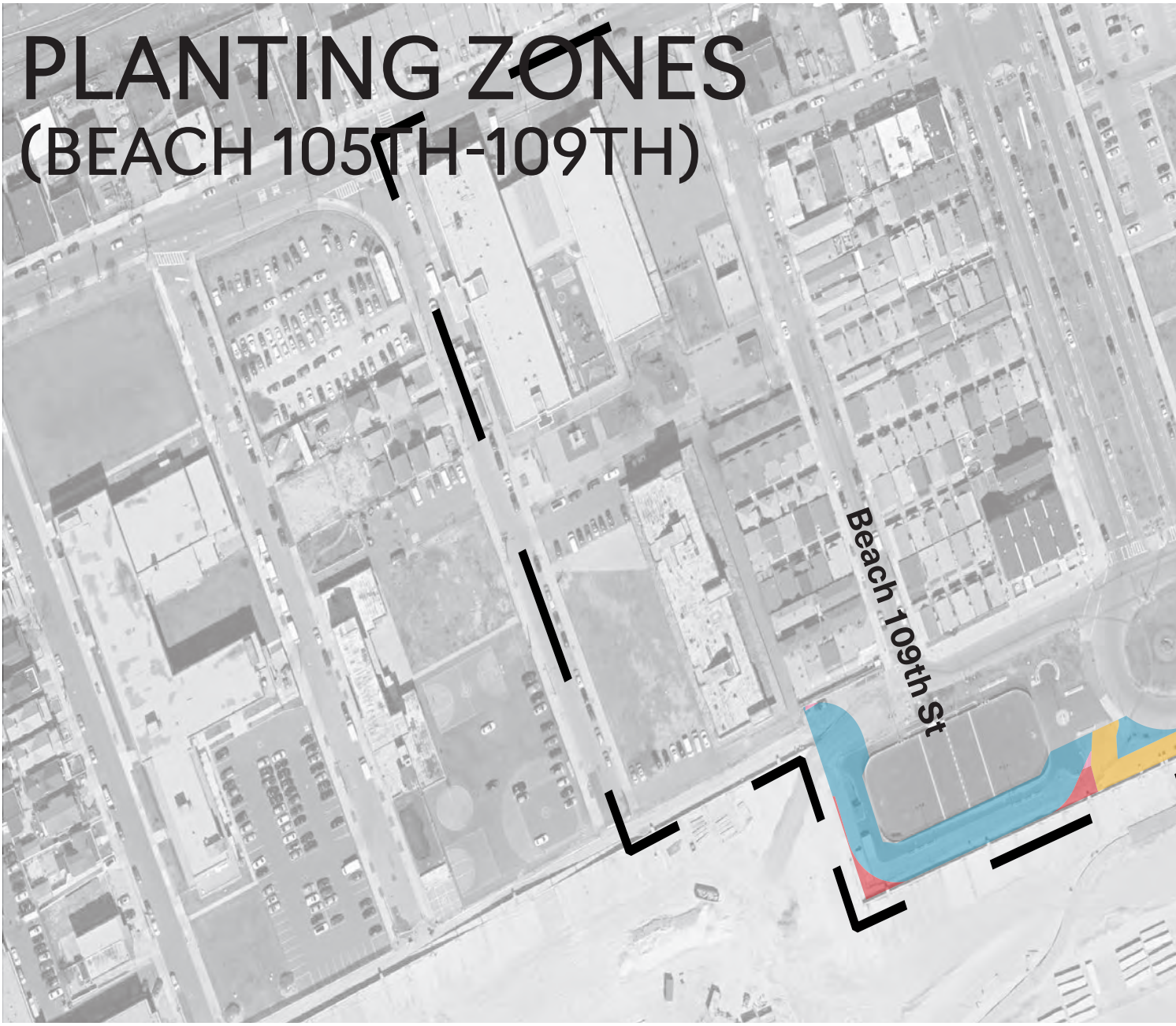
Disturbed Dry Soil

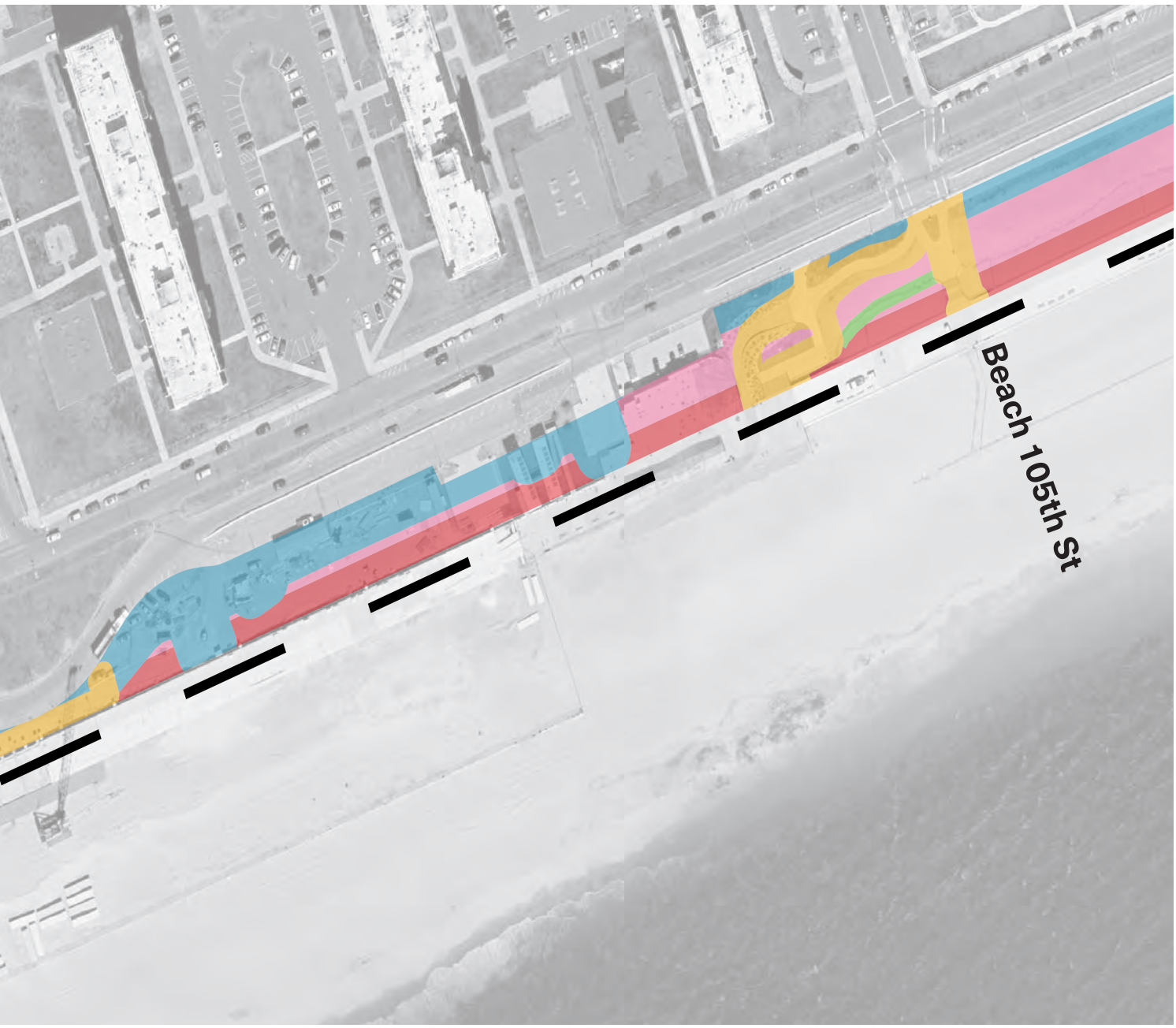
Pristine Dry Soil

Disturbed Wet Soil

Pristine Wet Soil

PLANTING ZONES (BEACH 105TH-109TH)





- Character Area Boundary
- Requires Further Review
- Disturbed Dry Soil
- Pristine Dry Soil
- Disturbed Wet Soil
- Pristine Wet Soil

WXY RISE