



**CORAL REEF COMMONS  
HABITAT CONSERVATION PLAN**

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### LIST OF DEFINED TERMS

Below is a list of acronyms and defined terms that are used in this HCP.

**Applicant** – collective name for the applicants, Ram Coral Reef and UM

**BMP** – Best Management Practices

**BSHB** – Bartram’s scrub-hairstreak butterfly

**Community** – residential and commercial development in CRC Property

**Conservation Program** – mitigation plan for the On-site Conservation Areas and Off-site  
Mitigation Area, as described in Sections 6.0 & 7.0 and Appendices J and J1

**CRC** – Coral Reef Commons, the name of the development project

**CRC Burn Plan** – burn plan for the CRC Property, Appendix J

**CRC Property** – 137.90-acre property located near S.W. 152<sup>nd</sup> Street and S.W.124<sup>th</sup> Ave.

**Development Areas** – 86.49 acres where the CRC Community will be located

**ESA** – Endangered Species Act

### List of Defined Terms (Continued)

**FBB** – Florida bonneted bat

**FBC** – Florida Bat Conservancy

**FLEPPC** – Florida Exotic Pest Plant Council

**FWC** – Florida Fish and Wildlife Conservation Commission

**HCP** – Habitat Conservation Plan

**HCP Plan Area** – all areas within the boundary of the CRC Property and the Off-site Mitigation Area (188.86 acres)

**ITA** – Incidental Take Authorized, describes the species in Table 1-1 for which incidental take authorization is requested

**ITP** – Incidental Take Permit

**MDC** – Miami-Dade County

**Mitigation Areas** – On-site Conservation Areas and Off-site Mitigation Area (106.25 acres)

**MTB** – Miami tiger beetle

**Off-site Mitigation Area** – 50.96-acre mitigation area in the UM Richmond Campus

**Off-site Mitigation Area Mitigation Plan** – mitigation plan for the Off-site Mitigation Area, as described in Section 7.0, Appendices J1 and O

**Off-site Mitigation Area Burn Plan** – burn plan for Off-site Mitigation Area (Appendix J1)

**On-site Conservation Areas** – the On-site Preserves and Stepping Stones (55.29 acres)

**On-site Preserves** – 51.41-acre preserve area on the CRC Property

**On-site Preserves Mitigation Plan** – mitigation plan for the On-site Conservation Areas, as described in Sections 6.0, 7.0, and Appendices J and M

**Project** - all areas within the boundary of the CRC Property and the Off-site Mitigation Area (188.86 acres)

**Proposed Action** – development of a proposed environmentally conscious, mixed-use development on the CRC Property and mitigation activities in On-site Conservation Areas and Off-site Mitigation Area

**Ram Coral Reef**- collective name for owners and applicants, Coral Reef Retail LLC, Coral Reef Resi Ph I LLC, and Ramdev LLC

**Richmond Area** – approximately 4-square mile area, roughly bound by S.W. 152<sup>nd</sup> Street to S.W. 184<sup>th</sup> Street, and S.W. 117<sup>th</sup> Avenue to S.W. 137<sup>th</sup> Avenue in which the CRC Property and Off-site Mitigation Area are located

**Southern Corridor** – 2.16-acre portion of On-site Preserves located along southern boundary of CRC Property connecting East Preserve and West Preserve

**Stepping Stones** -3.88 acres of planted areas located in the Development Areas

**UM Richmond Campus** – property owned by UM within the Richmond Area, in which the Off-site Mitigation Area is located

**University of Miami (UM)** – owner and applicant

**USFWS** – United States Fish and Wildlife Service

## 1.0 INTRODUCTION AND BACKGROUND

The Coral Reef Commons Habitat Conservation Plan (HCP) is being developed as part of an application for an Incidental Take Permit (ITP) from the U.S. Fish and Wildlife Service (USFWS) pursuant to section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973, as amended. The duration requested is for thirty (30) years from the date of issuance. As detailed in the document, this HCP includes avoidance, minimization, and compensatory mitigation measures for compliance with the regulatory requirements of section 10(a)(2) of the ESA. The Applicant for this HCP includes Coral Reef Retail LLC, Coral Reef Resi Ph I LLC, and Ramdev LLC (collectively referred to as “Ram Coral Reef”) and University of Miami (UM). Ram Coral Reef and UM are collectively referred to as Applicant. The Applicant’s consultant was formerly Johnson Engineering, Inc. (“JEI”) and is now Church Environmental, LLC.

### 1.1 Overview of the Project

The Coral Reef Commons (CRC) Project includes 137.90 acres of a proposed environmentally conscious mixed-use development (CRC Property), including 55.29 acres of on-site mitigation on the CRC Property (the “On-site Conservation Areas”), as well as 50.96 acres of off-site mitigation (the “Off-site Mitigation Area”), for a total of 106.25 acres of mitigation.

The On-site Conservation Areas consist of the On-site Preserves (51.41 acres) and the Stepping Stones (3.88 acres) identified in chart below for a total of 55.29 acres. The Off-site Mitigation Area, owned by UM and referred to as the “UM Richmond Campus”, is located less than ½ mile to the southeast of the CRC Property and is 50.96 acres. Altogether, the 137.90-acre CRC Property and 50.96-acre Off-site Mitigation Area are referred to as the Project, totaling 188.86 acres (**Figure 1-1**). The Mitigation Areas for the Project total 106.25 acres. The HCP for the Project includes the following:

**Table 1-0. Description of Project**

<i>Description of the Project</i>	<i>Acreage</i>
<b>Total Project Area</b>	<b>188.86</b>
<b>CRC Property (total)</b>	<b>137.90</b>
<b>Off-site Mitigation Area – UM Richmond Campus</b>	<b>50.96</b>
<b>On-site Conservation Areas – On-site Preserves (51.41 acres) and Stepping Stones (3.88 acres)</b>	<b>55.29</b>
West Preserve	23.92
East Preserve	21.61
Southern Corridor	2.16
Rockland Hammock	3.72
Stepping Stones (On-site Mitigation within the Development Areas)	3.88

<i>Description of the Project</i>	<i>Acreage</i>
<b>Development Areas (less Stepping Stones)</b>	<b>82.61</b>
Total Development Areas	86.49
<b>Mitigation Areas for Project (On-site Preserves, Stepping Stones and Off-site Total)</b>	<b>106.25</b>

Within the CRC Property, the Project includes development of 86.49 acres (the “Development Areas”). Included in the footprint of the Development Areas are 3.88 acres of pine rockland planting areas referred to as “Stepping Stones”. The Project will place the 51.41 acres of on-site preserves (the On-site Preserves) under a conservation encumbrance. The On-site Preserves include four areas that may be referenced throughout this HCP: the West Preserve, the East Preserve, the Southern Corridor, and the Rockland Hammock. Collectively, the On-site Preserves and the Stepping Stones are referred to as the “On-site Conservation Areas.” The 137.90-acre CRC Property and 50.96 acres of Off-site Mitigation Area on the UM Richmond Campus are referred to as the Project. A detailed description of the measures to minimize and mitigate Project impacts are contained in the Conservation Program, in Sections 6.0 and 7.0 of this HCP (the “Conservation Program”). Section 6.0 contains the minimization measures for the On-site Preserves and Section 7.0 contains the Mitigation Plan. Minimization measures for the Off-site Mitigation Area are in the Off-site Mitigation Area Burn Plan in **Appendix J1**.

Portions of the Project consist of habitat classified as pine rocklands, which have become degraded overtime as a result of lack of management. Pine rocklands are found only in southern Florida within Miami-Dade, Monroe and Collier counties, the Bahamas, and Cuba (USFWS 1999). Approximately 24,800 acres of pine rockland habitat remain within Florida (USFWS 1999; FNAI 2010). In Miami-Dade County (MDC), an estimated 22,790 acres of pine rocklands occur from North Miami Beach south and west to the Everglades National Preserve (ENP), which constitutes the largest tract of pine rocklands (approximately 87% [19,840 acres] of the MDC pine rocklands) (USFWS 1999). The remaining 2,950 acres of pine rockland, outside of ENP and within MDC, occur within urbanized areas and are predominantly owned by state, federal and local agencies. The vast majority of urbanized pine rockland habitats in MDC are protected (USFWS 1999). Approximately 680 acres of MDC pine rocklands are privately owned. Development within privately owned pine rocklands is regulated and partially restricted through MDC ordinances and conservation agreements with property owners (Green et al. 2008; USFWS 1999).

The Project is in the northern portion of an area known as the Richmond Pine Rockland tract (the “Richmond Area”). The entire Richmond Area encompasses approximately 4 square miles and is roughly bound by S.W. 152nd Street to S.W. 184th Street, and S.W. 117th Avenue to S.W. 137th Avenue (DERM 1994). This 4-square mile area contains approximately 883.1 acres of pine rockland habitat, of which 578.4 acres are owned by MDC, 157.6 acres are owned by the federal government, 67.1 acres are owned by UM (UM Richmond Campus), and 79.9 acres are within the CRC Property.

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As a result of concerns expressed by the USFWS in a July 2014 letter (**Appendix A**), the Applicant has agreed to develop an HCP and secure an ITP, which will cover both construction and activities for the Mitigation Areas.<sup>1</sup>

The Conservation Program included in this HCP (**Sections 6.0 and 7.0**) will result in a net conservation gain in the functional value and quality of habitat for the Covered Species (**Tables 1-1 and 1-2**), as explained further in **Section 5.0**. Consistent with the USFWS Mitigation Policy (DOI 2016c) published November 21, 2016, and the Endangered Species Act Compensatory Mitigation Policy (DOI 2016d) published December 27, 2016, the Conservation Program is designed to fully offset impacts, provide a net benefit and net conservation gain to habitat supporting listed and unlisted species, increase the carrying capacity and population expansion for the Covered Species, enhance habitat connectivity and allow for land management.

The Conservation Program also includes 50.96 acres of Off-site Mitigation Area. As demonstrated by the functional assessment (see **Section 5.0**), the Conservation Program for the On-site Preserves offsets potential incidental take impacts. The Off-site Mitigation Area provides additional substantial conservation benefits to the Covered Species by protecting and enhancing additional pine rockland habitat, including sandy patches known to be used by the Miami tiger beetle. The UM Richmond Campus is the only other privately-owned parcel in the Richmond Area. The protections provided in the enhanced mitigation plan for the 50.96-acre Off-site Mitigation Area, therefore, adds to the overall, value and benefit to Covered Species in the Richmond Area and a net conservation gain.

The Off-site Mitigation Area Mitigation Plan includes the following: the Applicant will record a deed restriction on the 50.96-acre Off-site Mitigation Area. Currently, the UM Richmond Campus has a deed restriction which is limited to the listing of the deltoid spurge and allows the owner to vacate the restriction. The revised encumbrance will allow for further protections, broadening the deed restriction. The Applicant will also enhance the pine rockland habitat with a management plan that provides increased value to the Covered Species. The Off-site UM Richmond Campus Mitigation Plan is addressed in **Section 7.0** of the HCP, and in **Appendix J1**.

***1.1.1 HCP Plan Area – Includes CRC Property and Off-site Mitigation Area***

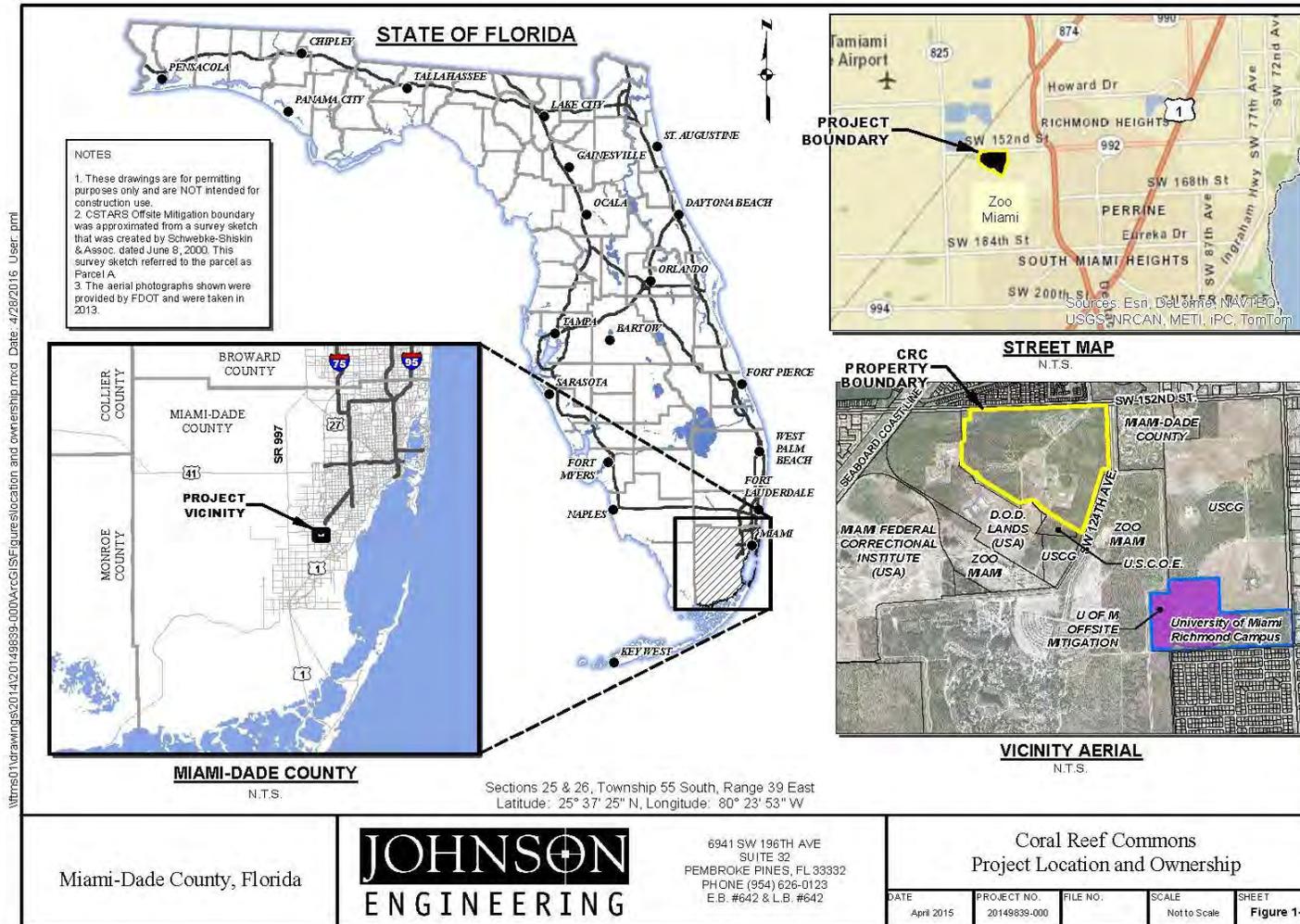
The HCP Plan Area is defined as the exact boundaries within which the project may result in incidental take. (USFWS 1996). For the Project, the HCP Plan Area boundary is defined as the CRC Property boundary and the Off-site Mitigation Area (**Figure 1-1 and Table 1-0 - on Page 1**). The HCP Plan Area is 188.86 acres and is equivalent to the Project. The CRC Property encompasses 137.9 acres and is located in Sections 25 and 26, Township 55, Range 39, in unincorporated MDC. The CRC Property is bounded by SW 152<sup>nd</sup> Street and residential units immediately to the north, SW 124<sup>th</sup> Avenue and Zoo Miami to the east, and U.S. Department of Defense (DOD) lands to the south and west. The Off-site Mitigation Area is located within Section 25, Township 55, Range 39, in unincorporated MDC and is 50.96 acres. The Off-site Mitigation Area is bounded by residential development to the south, Zoo Miami to the west and southwest, and U.S. Coast Guard property to the north. The Mitigation Areas are depicted in Figure 1-A.

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<sup>1</sup> This HCP is without prejudice to the Applicant's position that the proposed development would not result in a take of listed species, nor would it adversely impact listed species. The applicant has voluntarily agreed to submit to the ITP process and prepare an HCP solely in response to USFWS' assertion that there is the possibility of a take.

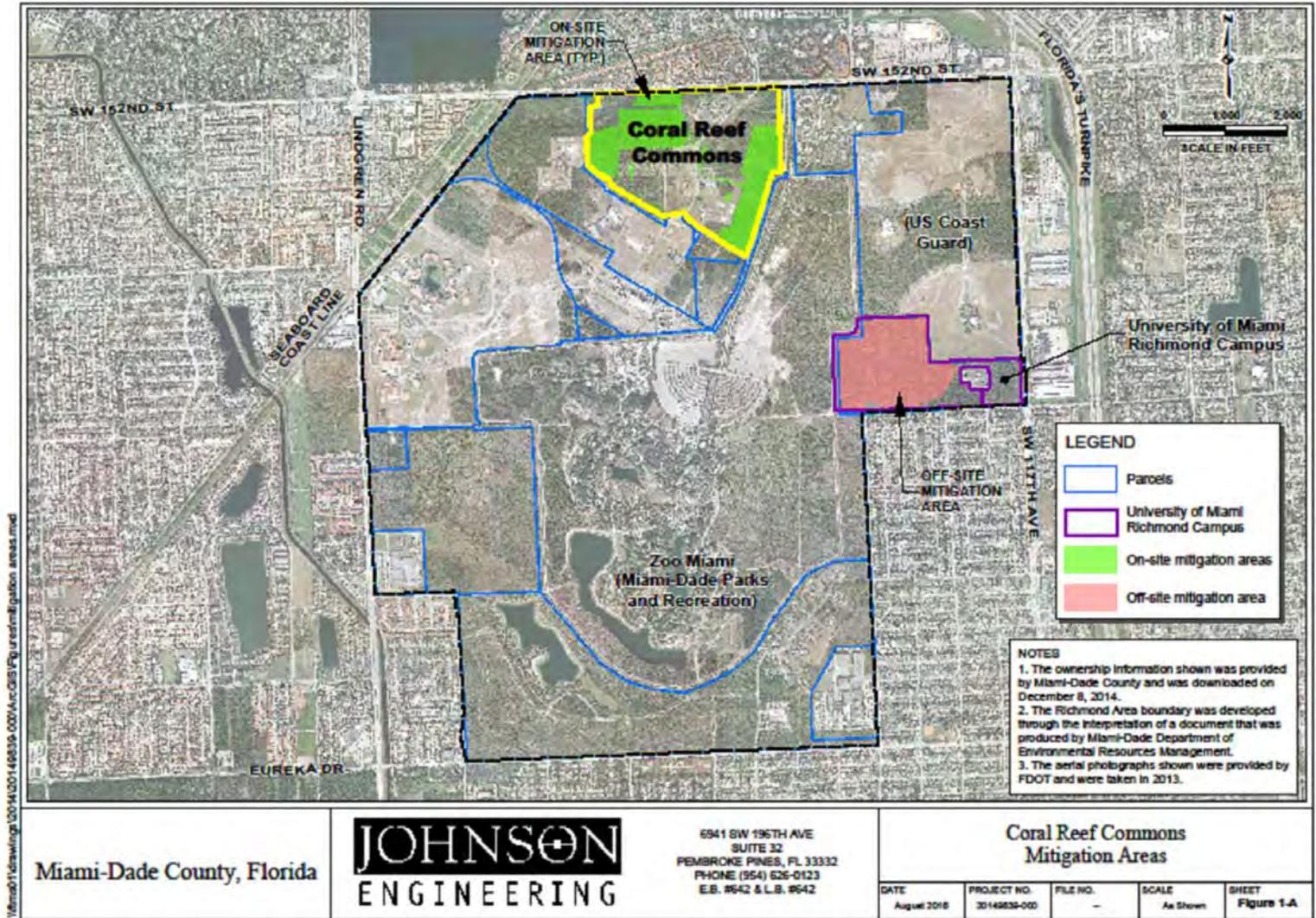
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Figure 1-1. CRC Property and Off-site Mitigation Area Location Map (The Project)



v:\trns01\drawings\2014\20149839-000\ArcGIS\figures\location and ownership.mxd Date: 4/29/2016 User: pmf

Figure 1-A. CRC Mitigation Areas



### ***1.1.2 Organization of the HCP***

This section summarizes the organization of the HCP to assist in understanding how the HCP demonstrates compliance with ITP issuance criteria.

Section 1.0 provides an overview of the Project describing the Project purpose, the acreage of the On-Site Conservation Areas and Off-site Mitigation Area, the ownership of the Project lands, the Covered Species, the CRC Property history and permitting history. The Covered Species include species for which incidental take authorization was assessed and species subject to the “No Surprises” Policy. The Covered Species are summarized in **Tables 1-1** and **1-2**.

Section 2.0 describes the environmental settings of the Project, including the geographical setting, the soils, and the land use and vegetative community category descriptions.

Section 3.0 describes the species that may occur in the HCP Plan Area and summarizes the survey methodologies for the surveys conducted on the Project and a description and site-specific information on each species covered in the HCP. Section 4.0 is the alternatives analysis, which includes the steps taken in considering alternatives and the six alternatives considered, including a “No Action” alternative. Section 5.0 contains the description of the On-site habitat functional assessment and the summary of the functional assessment results for the On-site Preserves and Development Areas. The full functional assessment results are contained in Appendix G.

Sections 6.0 and 7.0 together make up the Project’s Conservation Program. Section 6.0 describes the biological goals and objectives of the HCP and the minimization measures to minimize any potential for take of the Covered Species. Appendices that are relevant to the minimization measures include Appendix E, which contains a summary of the on-site plant removal activities, Appendix E1, which contains the educational materials, Appendix H, which contains the eastern indigo snake standard protection measures, and Appendix H1, which contains the template stormwater pollution prevention plan for construction activities. Section 7.0 describes the on-site and off-site mitigation plan, monitoring and reporting plan. Appendices relevant to the Conservation Program’s mitigation include Appendix J, which is the on-site CRC Fire Reintroduction and Prescribed Burn Plan (“CRC Burn Plan”); Appendix J1, which is the Off-site Mitigation Area Mitigation Plan, including the burn plan and financial assurance information; Appendix K, which includes a recent report on the management of the UM Richmond Campus; Appendix N, which includes the draft conservation encumbrance proposed for the On-site Preserves; and Appendix O, which contains the existing deed restriction for the UM Richmond Campus which is proposed to be modified consistent with Section 7.0.

Section 8.0 describes the potential effects of the Proposed Action, including beneficial and adverse effects, and cumulative effects, as well as an estimate of potential take and a description of the impact of potential take on the applicable Covered Species. Section 9.0 includes a discussion of critical habitat and plants for the benefit of the USFWS’s internal Section 7 consultation. Section 10.0 describes the Applicant’s proposal for HCP administration, data management and permit compliance. Section 11.0 discusses the cost estimates for the Conservation Program, the funding assurances for the Conservation Program (Appendix L), long term operational assurances and the description of the conservation encumbrance for the On-site Preserves and Off-site Mitigation Area. Appendix M includes draft documents for the proposed long term operational entity. Section 12.0 describes the adaptive management strategy, changed

and unforeseen circumstances, and the “No Surprises” policy. Section 13.0 contains the list of references cited in the HCP.

### 1.1.3 Permit Duration for Project

The Applicant requests an ITP duration of thirty (30) years for the Project. Following the 30-year permit duration, permit extensions in 25-year increments may be evaluated and granted by the USFWS in order to ensure habitat management activities remain in compliance with permit conditions.

### 1.1.4 Species Covered

Eight wildlife species are analyzed in this HCP for potential effects of the action. These species are listed in **Table 1-1**, and include five federally-listed species, one candidate species, and two state threatened species. Of the eight species listed in **Table 1-1**, only the Bartram’s scrub-hairstreak butterfly (BSHB) has been documented on the CRC Property.

**Table 1-1. CRC HCP Covered Species Assessed for Incidental Take Authorization (ITA Species).**

Common Name	Scientific Name	Status	Group	Documented on the CRC Property <sup>2</sup>
Bartram’s scrub-hairstreak butterfly	<i>Strymon acis bartrami</i>	FE	Insect	Yes
Florida bonneted bat	<i>Eumops floridanus</i>	FE	Mammal	No
Eastern indigo snake	<i>Drymarchon corais couperi</i>	FT	Reptile	No
Rim rock crowned snake	<i>Tantilla oolitica</i>	ST	Reptile	No
Gopher tortoise	<i>Gopherus polyphemus</i>	ST, FC	Reptile	No
Florida leafwing butterfly	<i>Anaea troglodyta floridalis</i>	FE	Insect	No
Miami tiger beetle	<i>Cicindelidia floridana</i>	FE	Insect	No
White-crowned pigeon	<i>Patagioenas leucocephala</i>	ST	Bird	No

FE - Federally endangered

FT - Federally threatened

FC - Federal candidate

ST - State threatened

The Applicant also will provide conservation measures for fourteen plant species listed in **Table 1-2**. The plants listed in **Table 1-2** either occur or could potentially occur within the CRC Property following restoration activities. Based on USFWS direction, incidental take authorization is not required for plants in **Table 1-2**. The conservation measures for the plants are intended to demonstrate that the plant species are “adequately covered” and have a net

<sup>2</sup> Only Bartram’s scrub-hairstreak butterfly has been documented on the CRC Property, as described in Section 3.0 of the HCP. Additional information regarding the surveys conducted and whether a species is assumed present for the analysis of the effects in this HCP are provided in Sections 3.0 and 8.0.

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conservation benefit in this HCP. As such, the plant species are considered “Covered Species” for the purposes of application of the “No Surprises” policy. The “No Surprises” regulations provide the permittee assurances that, assuming the HCP is being properly implemented, the USFWS will not require additional measures or funding beyond what was agreed to in the HCP without the permittee’s consent. The changed and unforeseen circumstances relevant to the “No Surprises” policy are addressed in **Section 12.0**.

**Table 1-2. CRC HCP Plant Species for which Conservation Benefit Is Provided (Plant Species Subject to the “No Surprises” Policy).**

Common Name	Scientific Name	Status	Group	Documented on the CRC Property <sup>3</sup>
Tiny polygala	<i>Polygala smallii</i>	FE	Plant	Yes
Deltoid spurge	<i>Chamaesyce deltoidea</i>	FE	Plant	Yes
Crenulate lead-plant	<i>Amorpha crenulata</i>	FE	Plant	No
Florida brickell bush	<i>Brickelia mosieri</i>	FE	Plant	No
Garber’s spurge	<i>Chamaesyce garberi</i>	FT	Plant	No
Small’s milkpea	<i>Galactia smallii</i>	FE	Plant	No
Sand flax	<i>Linum arenicola</i>	FE	Plant	No
Carter’s small-flowered flax	<i>Linum carteri var. carteri</i>	FE	Plant	No
Blodgett’s silver bush	<i>Argythamnia blodgettii</i>	FT	Plant	No
Florida prairie clover	<i>Dalea carthagenensis var. floridana</i>	FE	Plant	No
Florida pineland crabgrass	<i>Digitaria pauciflora</i>	FT	Plant	No
Everglades bully	<i>Sideroxylon reclinatum ssp. austrofloridense</i>	FT	Plant	No
Florida bristle fern	<i>Trichomanes punctatum ssp. floridanum</i>	FE	Plant	No
Clamshell orchid	<i>Encyclia cochleata var. triandra</i>	SE	Plant	No

FE - Federally endangered

FT - Federally threatened

SE - State endangered

<sup>3</sup> Only deltoid spurge and tiny polygala has been documented on the CRC Property, as described in Section 3.0 of the HCP.

### ***1.1.5 Project Purpose***

The Project purpose is to construct an environmentally conscious, economically viable, mixed-use development consisting of residential and commercial components. The Project includes a commercial anchor store, smaller commercial stores and “garden-style” apartments together capable of sustaining on-site shopping, recreation, and employment; enabling restoration and protection of 51.41 acres on-site and 50.96 acres off-site. Development activities include construction and long-term operation of residential units, retail/commercial uses, a school, and infrastructure improvements, including improvements to the existing main spine road, within approximately 86.49 acres of the CRC Property. Knowing that MDC requires certain infrastructure and traffic improvements to be funded by the development, the CRC Property was purchased with the intention of developing an economically sustainable community with a level of residential units and commercial development that is able to sustain commitments to infrastructure improvements on and off-site. The Development requires an anchor retailer with visibility from SW 152<sup>nd</sup> Street to serve this region of MDC and to ensure the mixed-use development plan is viable. Without the combination of commercial and residential components of the Project, it would not be possible to fund the improvements to the spine road, off-site roadway and traffic improvements, other associated infrastructure, or the Conservation Program.

The majority of the Development Areas, 53.62 acres of the 86.49 acres (~62%), will consist of the redevelopment of previously developed areas and disturbed uplands, which are not pine rocklands.<sup>4</sup> Habitat impacts were evaluated and quantified based on a functional assessment, which was applied to all land uses (not just pine rocklands). Of the 33 acres of pine rocklands within the Development Areas, approximately 11 acres were not previously classified as pine rocklands by prior mapping; however, they were conservatively mapped as pine rocklands for this HCP. Based on the habitat functional assessment, approximately two-thirds of the pine rocklands within the Development Areas have a low functional value.

The Project will result in the preservation of 51.41 acres of On-site Preserves, and will allow for funds to be allocated for the management of these lands in perpetuity. In addition, 3.88 acres in the Development Areas are proposed as Stepping Stones, consisting of native pine rockland plantings which will be incorporated throughout the landscaping plan. This equates to over 4% of the Development Areas being maintained as native pine rockland planted areas. The Stepping Stones were strategically placed based on USFWS guidance to enhance connectivity between the Preserves and provide an additional measure of minimizing impacts. In addition to the On-site Preserves and Stepping Stones, the Project also includes 50.96 acres of Off-site Mitigation Area.

### ***1.1.6 CRC Property History***

The CRC Property has a long history of clearing and development, dating back to the early 1940’s, when it was home to the second largest Naval Air Base (Richmond Naval Air Base) in the world (AHC 2015). Based on the 1938 historic aerial photo, prior to the 1940’s, the CRC Property was wooded land and remained largely undeveloped; however, by 1943, large portions of the CRC Property had been cleared and 11 structures associated with the Richmond Naval Air Base had been erected. These structures included barracks, officer’s quarters, a brig, support buildings, a medical dispensary, and associated access roads. After a hurricane in 1945, the Navy began deactivation of the station (AHC 2015).

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<sup>4</sup> These disturbed uplands are not pine rocklands as described in the Land Use descriptions in Section 2.3.2.

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In 1946, UM began operating a new South Campus within a 139-acre parcel of the former Naval Air Base. From 1948 to 2012, the South Campus was used for research and storage.

Most of the previous naval station facilities remained on-site and a large area (approx. 28 acres) near the center of the CRC Property had been scraped (**Figure 1-2**).

Based on the 1978 aerial photo, it appears that six naval buildings had been demolished and four new buildings had been constructed, the previously scraped area remained cleared of wooded vegetation, and approximately 32 additional acres had been cleared of wooded vegetation (**Figure 1-3**).

In 1985, seven of the previously erected structures remained on-site and the UM Genetics Research Compound had begun to be constructed. Large concrete slabs were apparent in the southeast corner (**Figure 1-4**).

By 1991, the majority of the CRC Property was cleared of pines, additional primate cages had been constructed near the center of the property, an additional structure had also been constructed east of the new cages, and construction of the UM Research Compound had been completed (**Figure 1-5**). The human impact on the CRC Property is evident over the last 70 or more years.

**Figure 1-2. 1968 Historic Aerial of CRC Property**



**Figure 1-3. 1978 Historic Aerial of CRC Property**

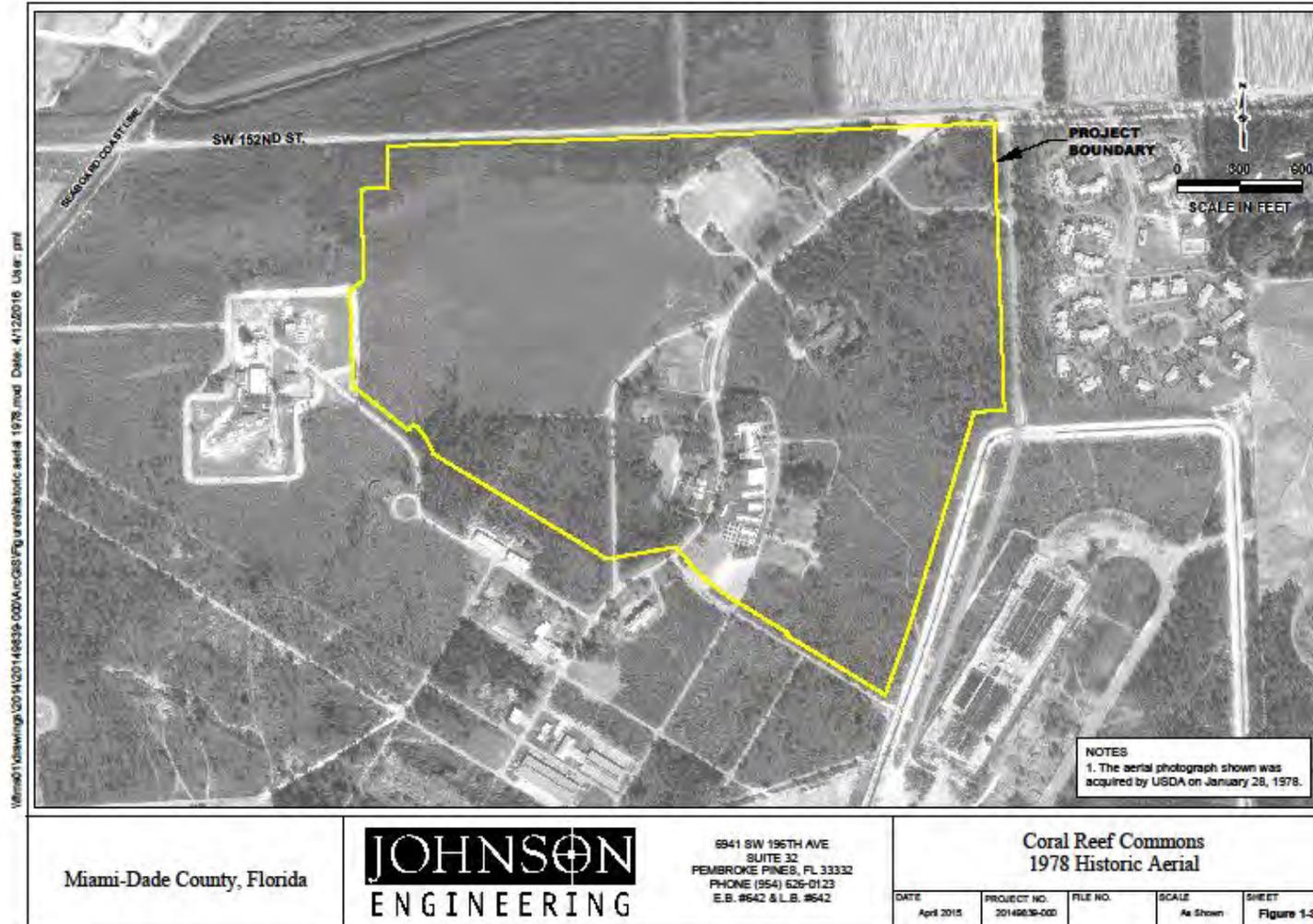
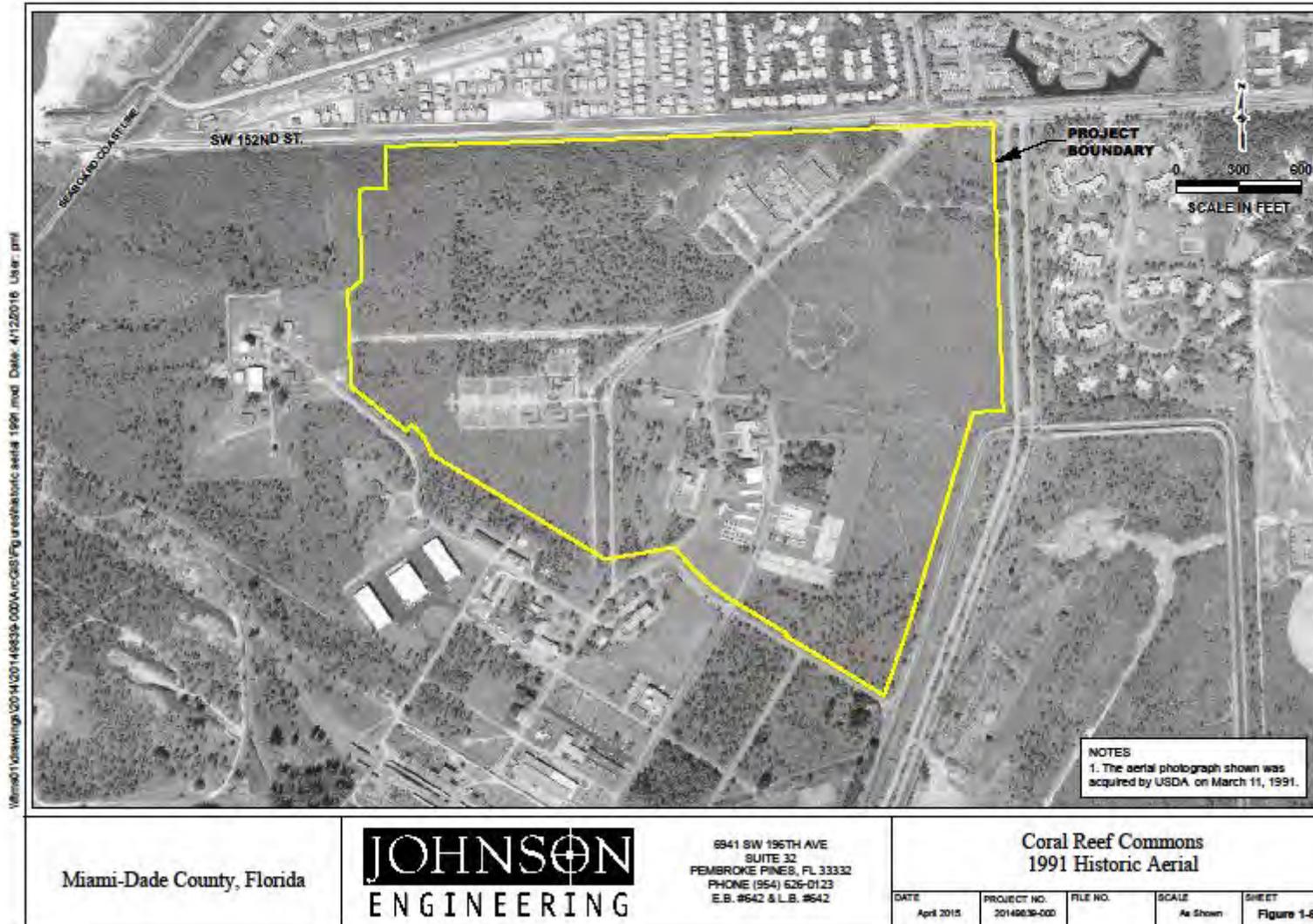


Figure 1-4. 1985 Historic Aerial of CRC Property



Figure 1-5. 1991 Historic Aerial of CRC Property



### ***1.1.7 CRC Property Permitting History***

Below is a general overview of the due diligence, zoning, and local permitting that has occurred to date for the CRC Property.

Ram Coral Reef entered into an agreement with UM in August of 2011 to purchase the 137-acre CRC Property, previously known as the University of Miami South Campus. It was offered and sold to Ram Coral Reef as a single project with the development areas designed around the existing spine road and the proposed preserve areas. On October 3, 2012, MDC amended its Comprehensive Development Master Plan to approve the CRC project after five public hearings during the course of almost one year. MDC approved the CRC Property rezoning application on September 17, 2013 after an additional three public hearings. In addition to advertisements published in The Miami Herald, personal notice was sent to 1,625 neighbors living within a half mile of the CRC Property. No public comments were received. (**Appendix A**).

MDC had designated a total of 49.44 acres as pine rockland Natural Forest Communities (NFCs) under the MDC Code § 24-5. NFCs are upland plant communities that are protected under MDC Code. MDC issued NFC Permit No. NFC2012-012 (the “NFC Permit”) in exchange for the land use approvals (**Appendix B**). The NFC Permit requires the preservation of approximately 39.64 acres of NFC Pine Rockland habitat and 3.72 acres of NFC Hardwood Hammock habitat (the “NFC Preserves”) and details the management and monitoring required for the preserves. The NFC Preserves are to be protected through a restrictive covenant. The NFC Permit authorizes site clearing for the development areas (including 3.2 acres of NFC impact), in exchange for the preserving the NFC Preserves (totaling 43.36 acres).

Under the terms of the NFC Permit, three entities entered into Confidentiality and Access Agreements and were allowed on-site in late June and early July of 2014 to harvest vulnerable plant species prior to clearing activities (**Appendix C**).

On the finality of the local governmental approvals, leases were entered into with several national retailers and construction documents were created, which included residential and commercial units. MDC has been actively reviewing site development applications since 2014. By July 7, 2014, a loan had been closed with Wells Fargo to acquire and construct the first phase of the CRC project. This loan was combined with significant equity from Ram Coral Reef, to provide complete funding of the first phase of the development.

On July 15, 2014, the USFWS sent a letter to Ram Coral Reef expressing concerns regarding the possible presence of listed wildlife species including the endangered Florida bonneted bat (FBB), and then proposed endangered species Florida leafwing butterfly and BSHB (**Appendix A**). The USFWS also identified and expressed concern regarding the possible presence of listed plant species including the endangered deltoid spurge and tiny polygala, and then-proposed endangered species Florida brickell-bush and Carter’s small-flowered flax. The possible presence of the Miami tiger beetle (*Cicindela scabrosa* Cartwright [synonyms = *C. scabrosa* var. *floridana*; *C. abdominalis* var. *floridana*; *Cicindelidia floridana*]) was also referenced in the July 15, 2014 Letter. Based on the most recent taxonomic designation for the Miami tiger beetle, the USFWS accepts *Cicindelidia (Cicindela) floridana* for the Miami tiger beetle. After the July 15, 2014 Letter, in September of 2014, the proposed endangered butterflies were listed as endangered. The July 15, 2014 Letter requested that Ram Coral Reef conduct wildlife surveys and coordinate survey methodologies with the USFWS.

In October of 2014, Ram Coral Reef provided a Technical Submittal report to USFWS, which included avoidance measures to prevent potential impacts to listed species as a result of the development, as well as the results of pineland croton surveys and FBB surveys, and a preliminary burn plan.

Ram Coral Reef has since submitted the first draft HCP in May 2015. Ram Coral Reef also prepared and submitted a draft Environmental Assessment (EA) in September 2015. In May of 2016, after coordinating and receiving comments on all aspects of the HCP from USFWS, Ram Coral Reef submitted a revised draft HCP addressing USFWS technical comments.

## **1.2 Regulatory Framework**

### *National Environmental Policy Act (NEPA)*

NEPA requires an analysis of impacts to listed species by considering the impacts of the Federal Action on the human environment. The USFWS will conduct an appropriate environmental analysis, in accordance with NEPA, prior to finalizing a permit decision.

In accordance with section 10(a)(2)(A), this HCP assesses: (1) the impact of potential incidental take to the listed species in **Table 1-1**; (2) to the maximum extent practicable, the steps the Applicant will take to monitor, minimize, and mitigate such impacts, the funding that will be available to implement such steps, and the procedures to be used to deal with unforeseen circumstances and adequately cover the species in **Tables 1-1** and **1-2**; and (3) what alternative actions to such taking the applicant considered and the reasons why such alternatives are not proposed to be utilized.

### *Federally listed species*

Summaries of the date and status of federal listing are provided as applicable in the species-specific summaries below. Federally listed faunal species addressed in this HCP include: the FBB, the BSHB, the Florida leafwing butterfly, the eastern indigo snake, and the Miami tiger beetle. The FBB was federally listed as an endangered species in 2013 (DOI 2013), the BSHB and Florida leafwing butterfly were listed as endangered species in 2014 (DOI 2014a), and the Miami tiger beetle was listed as an endangered species in 2016 (DOI 2016b). While not required, this HCP also requests incidental take authorization for the state listed rim rock crowned snake and the gopher tortoise, a federal candidate species. The purpose in adding these additional species is to ensure that the Applicant will remain in compliance with the ESA should these species be listed in the future.

The “No Surprises” Policy is incorporated into this HCP to provide coverage for the Covered Species in **Table 1-1** and **Table 1-2**. This HCP covers multiple species, both listed and unlisted, and seeks incidental take authorization for the ITA Species listed in **Table 1-1**.

Critical habitat is addressed in this HCP to assist USFWS in its internal section 7 consultation. Critical habitat has been designated for two of the federally listed faunal species and two federally listed plant species analyzed in this HCP: the BSHB, Florida leafwing butterfly, Florida brickell bush and Carter’s small-flowered flax. No other critical habitat has been proposed or designated for the remaining species analyzed by this HCP.

State and Local Regulatory Mechanisms

FWC listed the FBB, BSHB, Miami tiger beetle and the Florida leafwing butterfly as Federally-designated endangered species. Three state-listed species, the rim rock crowned snake, gopher tortoise (FC) and white-crowned pigeon, are covered by this HCP and subsequent ITP.

At the local level, the MDC Code of Ordinances (MDC Code) protects pine rockland habitat through its NFC regulatory program (MDC Code §24-5). Designation of a NFC requires a minimum community score of 60 points on the “EEL Tax Covenant Program and Natural Forest Community (NFC) Quantitative Evaluation Form” (Resolution No. R-1028-12) (MDC 2012b). NFC maps designating covered forested communities that meet the minimum scoring are approved as NFCs by the Board of County Commissioners, pursuant to Resolution No. R-1764-84. These maps may be revised from time to time by resolution in order to reflect current conditions and to ensure that, at a minimum, the canopy and understory of the designated NFC are dominated by native plant species (MDC Code §24-5. Definitions). Protection due to an NFC designation is therefore not ensured because over time, degradation of a site can lead to the loss of NFC status, if the site no longer meets the minimum quantitative threshold standard for inclusion on the revised NFC maps (MDC Code §24-5. Definitions, ¶ 2). Under the MDC Code, percent allowable development limits have been placed on NFCs. MDC requires a NFC permit for activity that results in the removal or damage to any vegetation in a designated NFC, including impacts to any tree, shrub, or groundcover plant. These permits are required to ensure that impacts to the NFCs are minimized and that remaining NFC areas are preserved and managed. NFCs do not receive protection in perpetuity in absence of a valid development permit with an associated covenant, but instead are protected in exchange for zoning and development approvals, as is the case here.

**1.3 HCP Purpose and Need**

The CRC Property contains pine rockland habitat. The CRC Property is located within the USFWS Consultation Area and a Focal Area for the FBB. Acoustic surveys recorded the FBB flying over the CRC Property, but documented very limited foraging within the airspace over the CRC Property. Portions of the CRC Property also include USFWS designated critical habitat for the Florida leafwing butterfly, BSHB, Carter’s small-flowered flax and Florida brickell-bush. Additionally, the Conservation Program may result in the future recruitment of other ITA Species listed in **Table 1-1** not currently documented on the CRC Property, for which the Applicant is requesting incidental take authorization.

The USFWS has indicated an ITP application would be appropriate to assess the proposed activities related to development and restoration of pine rockland habitat within the CRC Property and the Off-site Mitigation Area. A HCP is a required component of the application for an ITP. The Applicant’s objectives in developing this HCP are to allow development and restoration activities consistent with current zoning restrictions, while to the maximum extent practicable, minimizing and mitigating potential impacts and take of listed species that are incidental to the otherwise lawful activities. This HCP provides the funding and implementation obligations necessary to ensure that the goals and commitments of the HCP are met.

Following is a summary of the purpose of the CRC HCP:

- Assess potential effects to the species for which permit coverage is requested;

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- Provide the steps that will be taken to minimize and mitigate such effects, to the extent practicable;
- Provide the funding mechanism for mitigation measures;
- Provide restoration success criteria for on-site mitigation;
- Provide alternatives and evaluate their feasibility;
- Ensure compliance with the ESA through obtaining an ITP for the development and Conservation Program;
- Establish conservation measures to be implemented within the Project.

### ***1.3.1 Goals of HCP***

The goal of this HCP is to provide the Applicant with incidental take permit and provide long term conservation measures to the species covered in this HCP. The HCP will allow for the Project to meet the project purpose (described in **Section 1.1.4**), while also restoring and preserving habitat. The HCP describes conservation measures for Covered Species through the Conservation Program (**Sections 6.0 and 7.0**). It demonstrates that the potential effects of the Project have been evaluated and the Applicant will, to maximum extent practicable, minimize and mitigate for impacts. This HCP provides a comprehensive plan for implementing the Development Areas and Conservation Program, including the minimization and mitigation measures, funding mechanisms, success criteria, monitoring, reporting, and assurances for meeting the identified mitigation commitments.

### ***1.3.2 Benefits of HCP***

This HCP will result in implementation of the Conservation Program, which includes the mitigation plan for restoration, long-term management and protection of the On-site Conservation Areas, and the Off-site Mitigation Area. The Conservation Program is expected to result in a net conservation gain for the Covered Species. The On-site Preserves total 51.41 acres and include approximately 47.45 acres of the pine rocklands and an additional 3.96 acres of associated habitat (3.72 acres of Rockland Hammock and 0.24 acres of other land uses). To enhance connectivity between the East Preserve and West Preserve, the Applicant will establish the Southern Corridor (2.16 acres – part of the On-site Preserves) and the Stepping Stones (3.88 acres of plantings that are part of the Development Areas). Collectively, the On-site Preserves and Stepping Stones (the “On-site Conservation Areas”) will provide for the natural recruitment of adjacent plant and wildlife populations. The Applicant is also proposing bat boxes to create potential roosting habitat and encourage utilization of the On-site Preserves by the FBB. Outreach and educational activities identified in the Conservation Program will assist in building community and public awareness of pine rocklands and their associated species. The Conservation Program also includes enhancement through prescribed burning in the Off-site Mitigation Area (50.96 acres), which is also a benefit of the HCP, because it provides additional enhancement to pine rockland habitat in the Richmond Area.

## **1.4 Coordination and Consultation**

Upon notification of potential listed species issues on the proposed CRC Project, Ram Coral Reef has taken various opportunities to conduct public outreach, meet with agencies and concerned citizens in the community, and to address comments on the proposed development. The summary below outlines the coordination and consultation history including coordination

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prior to the July 15, 2014 letter, all of which provided comments that have been considered in preparation of this HCP.

*1.4.1 Regulatory Agencies*

USFWS

Ram Coral Reef has coordinated closely with USFWS on species of concern, listed species survey methodologies, methodologies to evaluate the effects of the action, mitigation alternatives, and project alternatives. On July 22, 2014, Ram Coral Reef met with USFWS in Vero Beach. On August 7, 2014, Ram Coral Reef met with the USFWS at the Kimley Horn office in Miami. On August 18, 2014, Ram Coral Reef met with USFWS in Vero Beach. On September 2, 2014, Ram Coral Reef met with USFWS on the CRC Property. On October 15, 2014 Ram Coral Reef met with USFWS in Vero Beach to discuss the project and the previously submitted "Coral Reef Commons Initial Prescribed Burn Plan". The purpose of the CRC burn plan was to implement the burn plan for On-site Preserves. Ram Coral Reef met with USFWS on November 6, and 24, 2014, in Vero Beach. On December 18, 2014, Ram Coral Reef met again with USFWS and FWC in Vero Beach.

On January 12, 2015, Ram Coral Reef's environmental consultant, JEI (Sarah Webber) spoke with Nancy Finley of the USFWS and manager of the National Key Deer Refuge. They discussed the prescribed burning the Refuge does, site preparation including firebreaks, and public outreach. The Applicant and USFWS have had ongoing coordination in the development of the HCP since submittal in May of 2015.

Florida Fish and Wildlife Conservation Commission

Ram Coral Reef has coordinated with FWC throughout the HCP process.

Florida Forest Service (FFS)/ Florida Department of Agriculture and Consumer Services (FDACS)

Ram Coral Reef coordinated early on in the development process with the FFS to get input regarding prescribed burning within the preserves. On September 11, 2014, Ram Coral Reef representatives met with the FFS in consultation on prescribed burning in the preserve areas. On September 18, 2014, Ram Coral Reef and JEI held a telephone conference with the FFS to discuss prescribed burning coordination. On September 22, 2014, a meeting was held on the CRC site with Ram Coral Reef and Gary Lewis (FFS) to review existing on-site conditions. On January 28, 2015 Ram Coral Reef representatives and JEI met with Gary Lewis to discuss the proposed burn plan and logistics of reintroducing fire to the site. On January 14, 2014, Ram Coral Reef again met with Gary Lewis. On October 12, 2016 and in January 2017, Ram Coral Reef met with Terrance Gadson (FFS) on the CRC Property to discuss prescribed burning coordination. On July 5, 2017, FFS sent a letter regarding the CRC Project, which is attached in Appendix A.

Miami-Dade County

Ram Coral Reef has coordinated with MDC throughout the development review process and received the County's NFC permit (NFC2012-012) on July 23, 2013 (Appendix B). By memo dated October 17, 2013, MDC memorialized its findings on Ram Coral Reef's zoning application. MDC approved the development through the zoning resolution, which remains valid today, as confirmed by letter dated July 17, 2017 (see Appendix A). A summary of the public

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hearings held relating to the CRC Project is included in Appendix A. On February 10, 2014 and May 1, 2014, Ram Coral Reef met with the County Building Department to discuss permitting comments. Ram Coral Reef met with Tim Joyner and Luis Moreno of the MDC Department of Environmental Resources Management (DERM) on several occasions during the clearing of invasive vegetation in the rockland hammock between February and June of 2014, and on May 28, 2014 to review the proposed preserve staking on the CRC property. A follow up meeting was held on the CRC site on June 11, 2014 with Tim Joyner (DERM) and Newton Cromer of the Department of Defense (DOD) to review a fence proposal from DOD. On July 28, 2014, Ram Coral Reef and an engineer from Kimley Horn met with a representative of DERM to discuss the NFC permit. DERM representatives also participated in the site visit conducted with USFWS on September 2, 2014.

On August 15, 2014, Ram Coral Reef met with MDC Commissioner Dennis Moss to discuss the CRC project. Ram Coral Reef held additional meetings with members of the Miami-Dade leadership and staff. Ram Coral Reef held two separate meetings, on September 2, 2014 and November 18, 2014, with the Deputy Mayor of Miami, Jack Osterholt, and his staff for the purposes of update on the project status and coordination.

On October 7, 2014, Ram Coral Reef met with MDC DERM staff, Joe Maguire, to discuss conducting prescribed burning on the project site. Another meeting was held with DERM staff on October 14, 2014. On October 28, 2014, Ram Coral Reef met with the Miami-Dade Water and Sewer Department to discuss approvals. On December 23, 2014, Peter Cummings met with Asst. County Attorney Abbie Schwaderer-Raurell, DERM Director Lee Hefty, and Lourdes Gomez of the MDC Mayor's office to provide an update on the status of the HCP document and to discuss the potential for Ram Coral Reef to assist with the maintenance of some of the County's preserves. On February 27, 2015, Ram Coral Reef and JEI met with MDC officials to discuss the Project.

Ram Coral Reef representatives Peter Cummings and Hugo Pacanins met with various members of the MDC Mayor's staff and with MDC Mayor Carlos Gimenez on March 20, 2015 for the purpose of completing the documentation of a Tolling Agreement with MDC. Under the terms of this agreement, MDC will continue to process the infrastructure permits, building permits and site plan approvals submitted by Ram Coral Reef and the various tenants with whom leases have been signed while the HCP application is under review by USFWS. See Appendix A.

On July 19, 2013, MDC Department of Regulatory and Economic Resources (DRER) Natural Resources Division issued Ram Coral Reef a modification to the conceptual surface water management general permit (Permit No. 13-05390-P) for CRC. A modification authorizing construction of the master infrastructure for CRC was issued on December 10, 2013. On May 7, 2014, DRER issued a modification of the conceptual permit for the west basins, and on June 11, 2014, DRER issued a modification of the conceptual permit for Tract 1, Phase 1.

MDC issued the following NFC Permits relating to the UM Richmond Campus: NFC2001-552, NFC2004-2016, NFC2006-034, and NFC 2014-005.

The Applicant continues its coordination with MDC, including application for a new NFC permit to address the work contemplated in this HCP.

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South Florida Water Management District

A water use permit (Permit No. 13-05615-W) for landscape irrigation was issued to Coral Reef Retail LLC on August 7, 2014.

Elected Officials

On August 15, 2014, Peter Cummings met with Commissioner Moss at his district office to discuss the project.

On September 12, 2014, Ram Coral Reef met with Florida State Senator Anitere Flores. On September 23, 2014, Ram Coral Reef held a meeting with U.S. Congressman Joe Garcia.

On September 24, 2014, Peter Cummings met with U.S. Congressman Patrick Murphy to brief him on the project. Subsequent telephone discussions regarding project status occurred 12/23/2014 and 3/26/2015.

On March 20, 2015, Peter Cummings met with Mayor Gimenez in Miami to discuss the project.

Utilities

On January 22, 2014, Ram Coral Reef met with Florida City Gas to discuss infrastructure design and abandonment of existing gas lines. On February 6, 2014 Ram Coral Reef met with Comcast to discuss infrastructure design.

On February 20, 2014, April 14, 2014 and May 23, 2014, Ram Coral Reef met with AT&T to discuss infrastructure design. On January 15, 2014, April 15 & 30, 2014, and May 9, 2014, Ram Coral Reef met with Florida Power and Light (FPL) to discuss infrastructure design.

State Historic Preservation Office – Florida Department of State Division of Historical Resources

On November 6, 2015, the Applicant’s consultant, Archaeological and Historical Conservancy, Inc. (“AHC”) submitted two technical reports to the State Historic Preservation Office (“SHPO”). On December 9, 2015, SHPO provided its opinion that resources DA14321, 8DA14322, and 8DA14396 are ineligible for the National Register of Historic Places (“NRHP”). SHPO stated it had insufficient information to assess the eligibility of site 8DA14320, but concluded there would be no adverse effect on resources eligible for or listed on the NRHP if the site is protected from project activities. Site 8DA14320 is located in the rockland hammock area of the On-site Preserves and will be protected from project activities.

**1.4.2 Interested Stakeholders**

Fairchild Tropical Botanic Gardens (FTBG)

Ram Coral Reef coordinated early on in the process with stakeholder groups to conduct on-site plant removals prior to development of the CRC Property. Prior to receiving the July 15, 2014 USFWS letter, in July 2014, a “plant rescue” was held on the CRC Property in accordance with the MDC NFC permit, which was conducted by Zoo Miami, FTBG, and the Institute for Regional Conservation (IRC).

On September 10, 2014, Ram Coral Reef met with Jennifer Possley of FTBG to tour the facility and view their greenhouses and nurseries with respect to pineland croton and listed plants. Ram Coral Reef met with staff for the FTBG on October 31, 2014 to discuss FTBG’s input on the On-site Preserves.

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On January 26, 2015, Peter Cummings, Jim Sopher, and Church Roberts, consultant from JEI and subconsultant, Steve Woodmansee met with Bruce Greer, FTBG Board Chair and Joyce Maschinski, who manages the Connect-To-Protect program to discuss the potential to collaborate on the Conservation Program.

Zoo Miami

On July 17, 2014, Ram Coral Reef and its environmental consultant from RS Environmental met with Frank Ridgley of Zoo Miami on the CRC site to discuss pine rockland habitat and the Florida bonneted bat. On September 11, 2014, Ram Coral Reef met with the Director of Zoo Miami, Eric Johnson, and Frank Ridgley of Zoo Miami.

Institute for Regional Conservation (IRC)

On July 18, 2014, Ram Coral Reef met with a representative of the IRC on the CRC Property to discuss pine rockland habitat.

Sierra Club

On August 11, 2014, Ram Coral Reef attended a Sierra Club meeting, where the Project was an agenda item.

South Florida Wildlands Association

On September 23 and 26, 2014, Ram Coral Reef held meeting with Matthew Schwartz of the South Florida Wildlands Association to seek his input on the project. Peter Cummings held a further meeting with Matt Schwartz on November 11, 2014 to discuss the project and has had numerous communications since that time regarding the status of the HCP.

The Nature Conservancy

On January 22, 2015, Ram Coral Reef held a telephone conference with Richard Hilsenbeck of The Nature Conservancy to discuss potential acquisition of the property by The Nature Conservancy. Upon learning the zoning and land use were in place, leases were signed, and construction permits were under review, Mr. Hilsenbeck stated the CRC Property did not appear to be an appropriate candidate for acquisition. On November 30, 2016, Ram Coral Reef met with The Nature Conservancy to provide a briefing on the latest draft HCP.

Tropical Audubon Society

On September 11, 2014, at the meeting of the Kendall Federation of Homeowners, Peter Cummings met and discussed with Laura Reynolds of Tropical Audubon the potential for a follow-up meeting. Ram Coral Reef has reached out to Tropical Audubon Society to continue communications.

Department of Defense

On August 27, 2014, Ram Coral Reef met with representatives of DOD, which owns property adjacent to CRC Property.

Municipalities and Homeowner's Associations

On September 4, 2014, Ram Coral Reef attended the MDC League of Cities meeting.

On September 11, 2014, Ram Coral Reef attended the Kendall Federation Homeowners Association meeting at the request of its chairman, Michael Rosenberg, for the purpose of

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presenting the CRC project. After the presentation, representatives of Ram Coral Reef spoke with Matt Schwartz of South Florida Wildlands, Sandy Koi (University of Florida Entomology student), Laura Reynolds of Tropical Audubon and Frank Ridgely of Zoo Miami, who all made their own presentations at the meeting. On September 11, 2014, Ram Coral Reef attended a presentation to the Kendall Federation of Homeowner's Associations. Ram Coral Reef also made a subsequent presentation to the Board of the Kendall Federation of Homeowner's Associations on September 18, 2014 for the benefit of some who missed the September 11 meeting. Ram Coral Reef held additional meetings with the President of the Kendall Federation of Homeowner's Associations, Michael Rosenberg, on September 9, 2014 and October 3, 2014 and has since had numerous phone calls with him.

On February 2, 2015, Ram Coral Reef sent an email update on the status of the CRC project to the Kendall Federation of Homeowner's Associations/Michael Rosenberg, and on the same day, Ram Coral Reef received an email response with suggestions regarding the on-site Development and Preserve planning.

***1.4.3 Other Outreach***

***Media***

On September 24, 2014, Ram Coral Reef met with the Miami Herald Editorial Board. In January 2015, Ram Coral Reef was interviewed by Jessica Meszaro of WLRN in Miami, followed by a site visit for the interviewer. On February 3, 2015, Ram Coral Reef and its environmental consultant, JEI, conducted an on-site interview with Spanish language television news on the CRC Project.

## **2.0 ENVIRONMENTAL SETTINGS OF PROJECT**

### **2.1 Geographical Setting**

In MDC, pine rocklands occur in association with the Miami Rock Ridge, a Pleistocene deposit of oolitic limestone (Myers and Ewel 1990; Green et al. 2008). The limestone that forms this ridge serves as a substrate for pine rocklands (USFWS 1999).

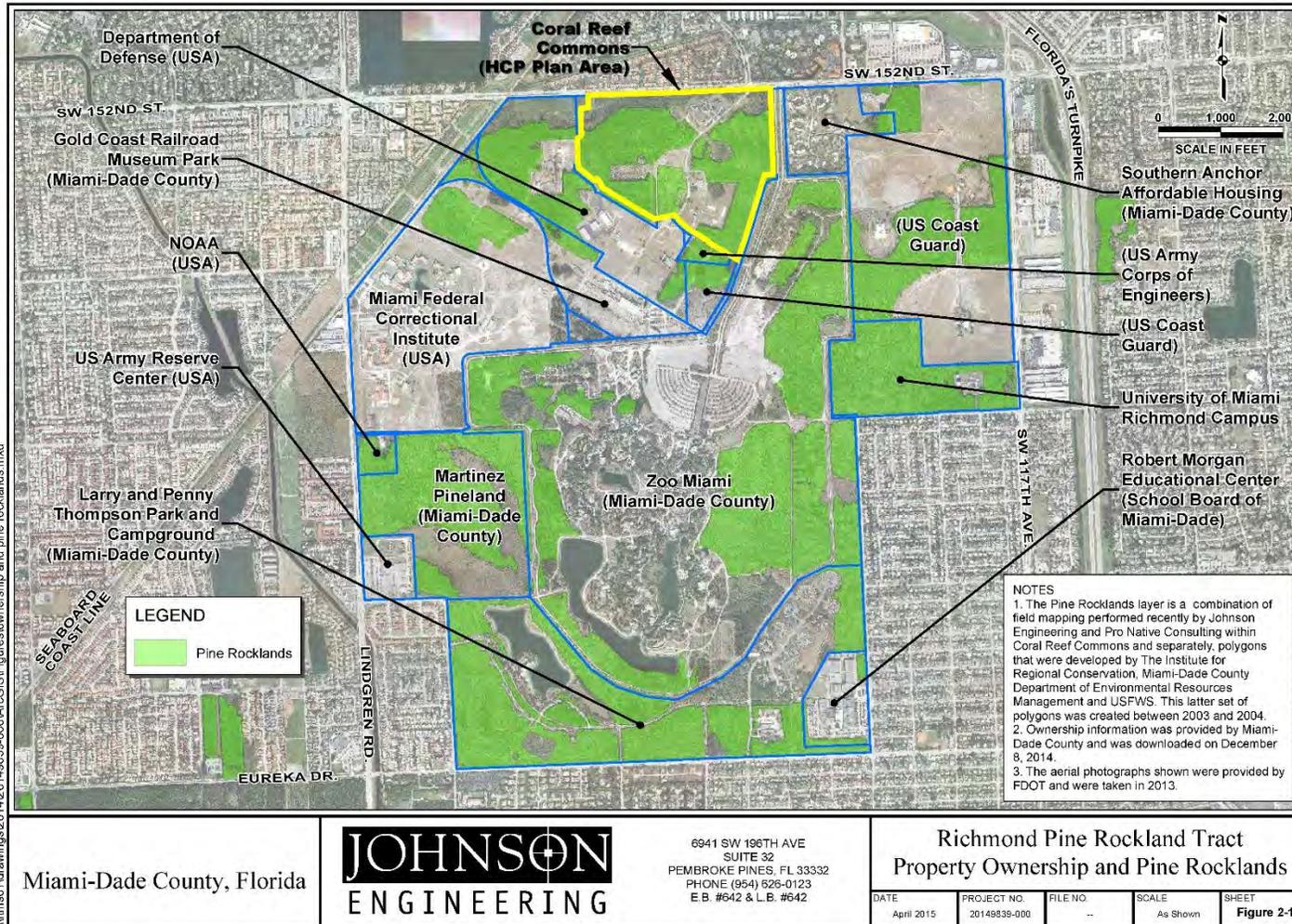
The Project is centrally located on the Miami Rock Ridge within the Richmond Area. The Richmond Area represents the second largest contiguous tract of pine rocklands (883 acres) in MDC, behind the ENP (19,840 acres). It encompasses approximately 4 square miles and is roughly bound by S.W. 152nd Street to S.W. 184th Street, and S.W. 117th Avenue to S.W. 137th Avenue (DERM 1994). This 4-square mile area contains approximately 883 acres of pine rockland habitat, including 578 acres owned by MDC, 158 acres owned by the federal government, 67 acres owned by UM (which includes the Off-site Mitigation), and 80 acres on the CRC Property (**Figure 2-1**).

### **2.2 Soils – CRC Property**

Based on the National Cooperative Soil Survey, soils within the CRC Property consist of Opalocka Rock Outcrop Complex and Urban Land soils (USDA 1990). The USDA soil mapping for Dade County was conducted in 1986 and is meant to be a general soil guide; soil characteristics within a site may vary widely from the USDA mapping, as great differences in soil properties can occur within short distances (USDA 1990). Based on on-site surveys, representative soils within the CRC Property also include remnants of Biscayne marl, drained soil series from an area that was historically a transverse glade. Opalocka Rock Outcrop Complex is classified as well drained soil series, with quartz sand overlaying exposed oolitic limestone (USDA 1990). The sand deposits are a defining characteristic of this soil series, and tend to be thicker in the northern extent of their range but become thinner with less coverage in the Richmond Area (Maguire 1995; URS 2007).

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Figure 2-1. Richmond Area Ownership and Pine Rocklands



### 2.3 Land Use/Vegetative Community Categories for the CRC Property

Land uses within the CRC Property have been historically mapped several times, starting in the 1990s. In 1993, DERM, IRC, and USFWS conducted a joint mapping of pine rocklands within Miami-Dade County. Mapping for all the land uses within the CRC Property, including pine rockland habitat delineations, was conducted on November 5, 2003 and February 18, 2004 by IRC (PAMI 2004). The most recent land use mapping update was conducted by Ram Coral Reef, through its consultants, Pro Native Consulting and JEI, in 2014 and 2015. The 2015 land use map is a generalized land use map with modified pine rockland descriptions based on DERM (1994) vegetation classifications for pine rocklands and associated habitats (**Figure 2-2**).

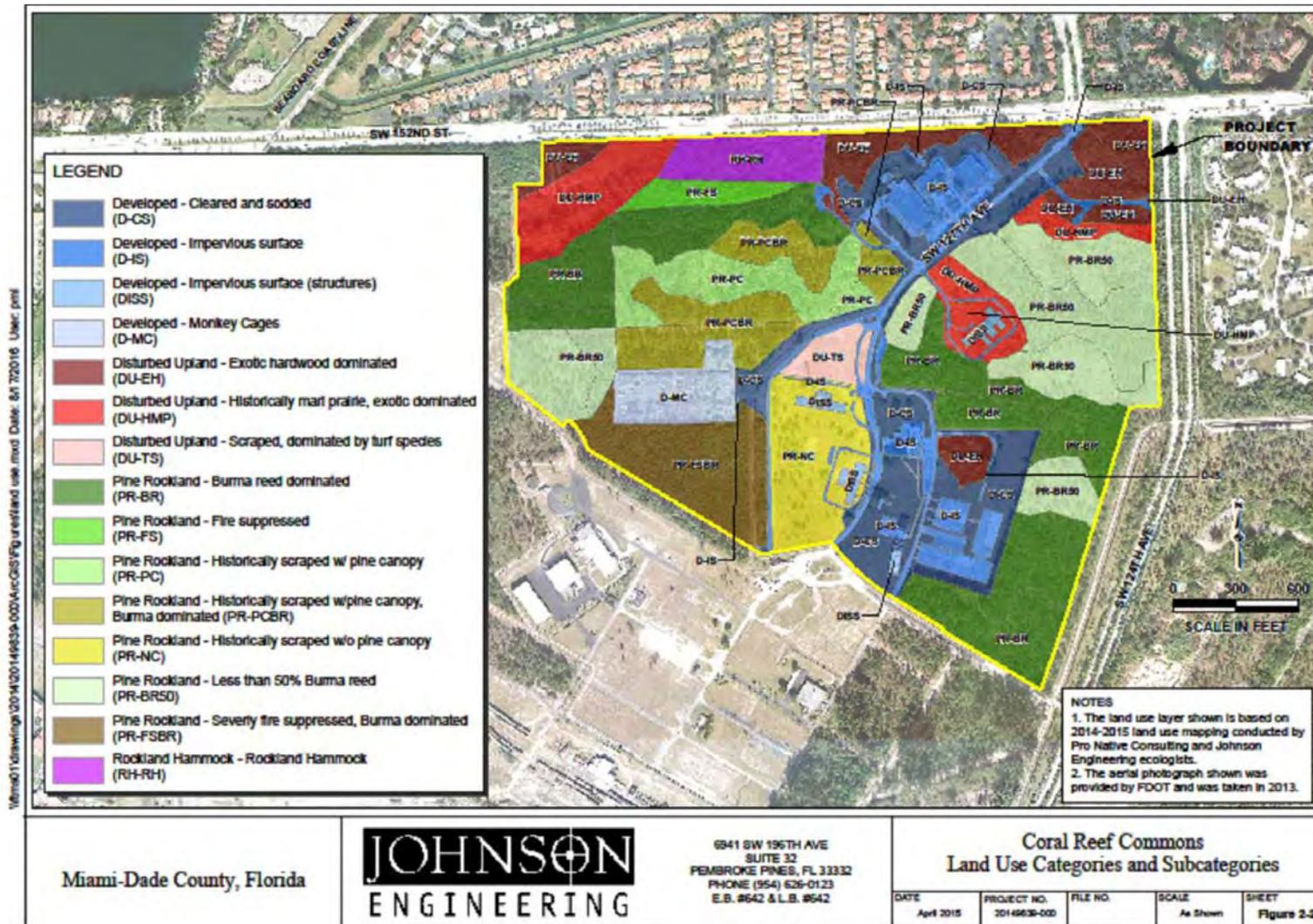
Under conditions of fire suppression, hardwoods will invade pine rocklands, eventually shading the pine rockland understory species. For this reason, pine rocklands are described as a “fire subclimax” community, which means a community in an ecological succession held stable by fire. (USFWS 1999). Several of the land uses within the CRC Property are in various stages of succession to a “climax” hardwood forest community due to lack of fire, resulting in hardwood encroachment and invasive infestations. Fire suppression of fire subclimax communities, such as pine rocklands, will ultimately result in a succession of the habitat to native or non-native broadleaf forests with only relict pines remaining from the pine rocklands (Robertson 1953; Snyder et al. 1990; Wade et al. 1980). The succession of pine rockland not only involves a change in the vegetative structure, it also negatively influences the abiotic and microbial factors of the habitat (Berendse 1998; De Deyn et al. 2003; Jia et al. 2005). Hardwoods will effectively create a humid microclimate as the canopy is closed. This humid microclimate results in a thick organic layer being formed, altering the soils, nutrients, and microbes (Read and Lawrence 2003; Safford 1919; Vitousek and Reiners 1975). Succession also results in herbaceous vegetation no longer being able to grow, instead being replaced by fire-resistant vegetation, further feeding the cycle of fire suppression (Snyder et al. 1990; Whitney et al. 2004; Wade et al. 1980). Once a pine rockland habitat has undergone these changes, it no longer exhibits pine rockland characteristics. It has then effectively transitioned to an alternative stable state of hardwood forest (native or non-native) (Robertson 1953; Snyder et al. 1990; Wade et al. 1980. Possley et al. 2014). At this point, restoration to a pineland by reintroducing fire is impractical and may, in fact, be impossible (Possley et al. 2014).

This transitional concept, existing habitat conditions, disturbance history, soils, and vegetative structure and composition were all used to determine the appropriate categories and subcategories of land uses. This transitional concept and other characteristics in determining land uses did not result in reducing the areas on the CRC Property described as pine rocklands. To the contrary, the use of the above characteristics resulted in an increase in total acres classified as pine rocklands on the CRC Property.

An inventory of plant species documented within each land use category, excluding the Developed category (defined below), can be found in **Appendix B** of the Coral Reef Commons Rare Plant and Floristic Inventory and Assessment report (Woodmansee 2014) (**Appendix D**). Land uses within the CRC Property generally fell into four (4) different categories, with each category then further defined by subcategories. The four categories are: Developed Lands, Disturbed Uplands, Pine Rockland, and Rockland Hammock. **Figure 2-2** and **Table 2-1** depict the current land uses within the CRC Property. Descriptions of species observations are limited to those observed by JEI or its sub-consultant, Pro Native Consulting, unless otherwise indicated.



Figure 2-2. CRC Property Existing Land Use – Four Categories



### **2.3.1 *Developed Lands Category***

Developed Lands included areas that have had ground disturbance activities related prior to development, resulting in changed soils, such that these lands are classified as Urban Land-Use/Threats Association. This category totals 33.3 acres and includes several sub-categories discussed below. Subcategories of the Developed Land category include, impervious surfaces and structures, cleared and sodded lands, and monkey cages.

#### **2.3.1.1 *Impervious Surface and Structures – Developed Lands***

Impervious surfaces include areas that have existing buildings, concrete pads, concrete sidewalks, and asphalt roads, which total 11.7 acres. This sub-category also includes structures that have partially or entirely remaining foundations. A total of 5.75 acres of structures were initially digitized based on aerials. Field surveys were conducted to verify if the digitized structures had remaining foundations. The majority of structures digitized from aerials no longer exist on-site, with the exception of 1.06 acres that had identifiable foundations remaining. This 1.06 acres was added to the 11.7 acres of existing buildings and other various impervious surfaces for a total of 12.76 acres of impervious surfaces.

#### **2.3.1.2 *Cleared and Sodded – Developed Lands***

This subcategory occurs in proximity to buildings and roads. It consists of areas that have been cleared of native vegetation, scraped to the limestone, and filled and sodded with non-native soils and grasses. Some ruderal plant species have regrown along areas that are no longer mowed; however, with the exception of a few individual perimeter occurrences, plants indicative of pine rocklands no longer occur within these areas likely due to the introduced soils associated with the planted ornamental lawn grasses such as St. Augustine grass (*Stenotaphrum secundatum*). This land use totals 16.53 acres within the CRC Property.

#### **2.3.1.3 *Monkey Cages - Developed Lands***

Structures from the UM biomedical research facility, which historically housed the monkeys used in the polio and cancer research, remain on the CRC Property. This 4-acre area was previously cleared, scraped to the limestone, and sodded. Concrete foundations were built under the perimeter of all chainlink cages. Both the concrete and chainlink structures remain intact. Vegetation within this area consists of invasive species and ornamental lawn grasses, with the exception of some scattered native ruderal plant species within the footprint and a few common pine rockland plant species along the extreme perimeter.

### **2.3.2 *Disturbed Upland Category***

The Disturbed Upland category includes areas that are severely degraded. These areas have all had disturbances that have altered the soils, are dominated by non-native plant species, and exhibit only remnant characteristics of the historical habitat. These areas have completed the transition from historical habitat classifications and are no longer pine rockland. The Disturbed Upland areas totaled 20.91 acres and included the subcategories described below: exotic hardwood dominated, historically marl prairie-exotic dominated, and scraped dominated by turf species.

### **2.3.2.1 Exotic Hardwood Dominated – Disturbed Upland**

The exotic hardwood dominated habitat is found predominantly along the northern boundary of the property, with the exception of one patch of exotic hardwoods east of the two-story research facility. Exotic hardwood habitats totaled 10.1 acres and contained over 90% exotic-invasive species that have formed dense canopies. Representative species include leadtree (*Leucaena leucocephala*), Australian pine (*Casuarina equisetifolia*), earleaf acacia (*Acacia auriculiformis*), Australian umbrellatree (*Schefflera actinophylla*), Brazilian pepper (*Schinus terebinthifolius*), and shoebutton ardisia (*Ardisa elliptica*). The understory was also predominantly exotic-invasive species and included Burma reed and shrub verbena (*Lantana camara*).

This subcategory of Disturbed Upland has been altered by exotic hardwood and herbaceous species to such a degree that characteristics of historical habitats are not identifiable. These areas have minimal to no functional value for wildlife and other pine rockland species. The biotic and abiotic characteristics of this habitat have been altered to where this habitat has lost the ability to carry fire. Second only to the Developed Land category, this subcategory had the lowest potential for the possibility of restoration.

### **2.3.2.2 Historically Marl Prairie, Exotic Dominated – Disturbed Upland**

This subcategory of Disturbed Upland habitat is the result of historical drainage that occurred in conjunction with the early development of Miami. The Miami Rock Ridge was historically interlaced with transverse drainages where ancient tidal waters eroded portions of the oolite shoal. These areas were underlaid by marls soils and contained graminoid wetland vegetation creating what is known as a marl prairie. Two major transverse glades were located within the Richmond Area, portions of which are still partially visible today (DERM 1994).

The CRC Property contains a band of this remnant marl prairie along the northwest portion of the site as well as two areas in the central and northeast portion of the property, totaling 9.05 acres. Some of the marl soils remain, and some plants typical of this community still occur such as muhlygrass (*Muhlenbergia capillaris*) and sawgrass (*Cladium jamaicense*). However, due to the artificial lowering of the water table and other hydrologic alterations, this habitat is now dominated by upland species. A large majority of this area has become dominated by invasive plant species including Burma reed, shoebutton ardisia, and Brazilian pepper. The latter two areas were previously described as transitional areas into historic pine rocklands (Woodmansee 2014). Historically, these areas were likely a transitional area from marl prairie to pine rockland, based on remnant occurrences of marl soils and proximity to existing pine rocklands. These areas are no longer representative of either of their historical habitats. The hydrologic alterations of the site and surrounding area, combined with the degree of invasive infestation and hardwood encroachment, has resulted in these areas being included under the Disturbed Upland category. In order to better delineate land uses on a finer scale, the transitional boundary was delineated and the southern portion of this land use was re-categorized as pine rockland, Burma reed dominated (Polygon ID 94).

### **2.3.2.3 Scraped, Dominated by Turf Species – Disturbed Upland**

This Disturbed Upland subcategory includes 1.76 acres within the center of the CRC Property. This area was historically pine rockland that was scraped down to the limestone and subsequently recolonized by turf species. While this subcategory contains some of the same

characteristics of the Cleared and Sodded subcategory it has not been altered to the point where it exhibits no characteristics of its historic habitat. This area contains native soils, albeit the substrate showed significant evidence of modification from scraping. While non-native turf species were the dominant vegetation documented in this area, some scattered occurrences of common pine rockland plants were observed primarily along the perimeter (Personal communication Steve Woodmansee, 1/28/2015). No listed plant species were documented in this area.

### ***2.3.3 Pine Rockland Category***

The 2014/2015-land use mapping and habitat delineations were performed on a conservative approach than that required by MDC's definition of Natural Forest Community for pine rocklands. Based on the MDC Code (§24-5) only 49.44 acres within the CRC Property were designated as pine rockland NFC. Determination of habitat type for the 2014/2015 mapping was based on predominant characteristics of an area. An area was not eliminated from the pine rockland classification (as occurs in NFC Quantitative Evaluations), provided it exhibited characteristics indicative of pine rockland habitat.

Based on these recent habitat delineations, approximately 79.97 acres were classified as pine rockland habitat. This was an increase from the previous 66.4 acres, classified as pine rocklands during the 2003/2004 survey conducted by IRC, and an increase from the 49.44 acres classified by MDC. The reclassification of the additional acreage was the result of the inclusion of a scraped area without pine canopy (Polygon ID 70), the reclassification of an area previously described as disturbed upland, historically marl prairie/pine rockland (Polygon ID 78), and the addition of a pocket of pine rockland that was identified within the disturbed upland – historically marl prairie/pine rockland area (Polygon ID 77). The first and second areas continue to exhibit some characteristics of a pine rockland, making it appropriate to classify it under the Pine Rockland category than the Disturbed Upland category. The third area was identified due to the increased level of details considered when classifying an area as pine rockland. It should be noted that while this second area (Polygon ID 77) did exhibit characteristics indicative of a pine rockland habitat (e.g., herbaceous species, canopy), this area had soils that were altered from previous activities, down to a depth of 6 feet and were no longer indicative of pine rockland habitat or oolitic substrate.

Fire suppression was evident in all 79.97 acres of the CRC Property's pine rocklands. The lack of fire, combined with the lack of invasive control, has resulted in the considerable degradation of 30.83 acres of the pine rocklands on-site and moderate degradation of 45.58 acres, with only 3.52 acres of pine rocklands on site receiving a functional value greater than 0.8. All pine rocklands on-site require mechanical or chemical treatment to address the overgrown vegetative structure and/or invasive plant infestations, in addition to prescribed burning. Approximately 74% (58.82 acres) require significant levels of management, including intensive hardwood removal and invasive treatment, to address historical lack of management and to allow the reintroduction of fire. Unfortunately, some of the pine rocklands have fallen into such poor condition, that restoration of these areas may not be feasible (Woodmansee 2014; Possley et al. 2014).

The Pine Rockland category includes seven subcategories. The subcategories were determined by level of Burma reed infestation, percent canopy cover, fire history, and substrate modifications.

### **2.3.3.1 *Less Than 50% Burma Reed – Pine Rockland***

Areas of pine rockland that had less than 50% cover of Burma reed were not considered dominated by this invasive plant. This is a slight modification from DERM (1994) recommendation, which considered areas with over 30% Burma reed to be classified as “pine rockland with *Neyraudia*”. The areas classified as pine rocklands with less than 50% Burma reed coverage were considered the CRC Property’s highest quality pine rocklands, although even these pine rocklands still exhibit varying levels of fire suppression and lack of management. A total of 21.81 acres (27%) of the pine rocklands on the CRC Property fell into this category. Approximately 70% of this subcategory will be restored and preserved. The subcategory had less than 30% pine cover, with one area having less than 5% canopy. With the exception of one small population of deltoid spurge, all documented occurrences of the federally listed deltoid spurge and tiny polygala occurred exclusively within the On-site Preserves.

### **2.3.3.2 *Burma Reed Dominated – Over 50% Coverage – Pine Rockland***

Pine rocklands were considered dominated by Burma reed if they contained over 50% coverage of the invasive plant. A total of 25.97 acres of pine rocklands fell into this category. This category accounted for canopy cover of pines, which ranged from 50-75% cover. These areas were also characterized by a subcanopy that was overgrown, exceeding 6 feet in many areas. Much of this subcategory also exhibited high levels of organic debris, exceeding 7 cm and 10 cm in many areas. Due to the extent of degradation, these areas were largely devoid of pine rockland plant diversity with the exception of a small population of deltoid spurge that occurred along the edge of a firebreak. The subcategory scored less than 0.54 out of 1 for functionality, with over half of the subcategory scoring well into the low quality range. Restoration of these areas will require effort; however, these areas can be restored following mechanical and chemical treatments and fire reintroduction.

### **2.3.3.3 *Historically Scraped with Pine Canopy – Pine Rockland***

Based on available aerial imagery, a large portion of the CRC Property was cleared and scraped to the limestone sometime prior to 1968. This included the removal of all pine trees and subcanopy. Regrowth of the pine canopy has occurred; however, the limestone was altered and retains evidence of previous scraping activities. Despite previous ground disturbance activities, this subcategory exhibits characteristics of a functioning pine rockland. Canopy cover was relatively open ranging from 25-50% cover, with Burma reed cover less than 50%. No federally listed plant species were documented within this area; although plants representative of pine rocklands were documented, including pineland croton (*Croton linearis*). Approximately 6.23 acres are included in this subcategory.

### **2.3.3.4 *Historically Scraped with Pine Canopy, Burma Reed Dominated – Pine Rockland***

This subcategory occurs in proximity to the previous subcategory and was also scraped prior to 1968. This subcategory is differentiated from the previous subcategory as a result of the extent of Burma reed coverage, which exceeds 50%. It is therefore included as a Burma reed dominated subcategory. A total of 9.05 acres are classified under this subcategory. The canopy cover is denser in some areas than the previous subcategory, exceeding 50% and in some areas reaching 75% cover. This subcategory does not contain the plant diversity of the previous subcategory.

Pineland croton occurrences are found primarily along the edges of these areas, in the transitional edges with the previous subcategory.

#### **2.3.3.5 *Historically Scraped without Pine Canopy- Pine Rockland***

This land use encompasses 6.9 acres and occurs south of the subcategory “Scraped, dominated by turf species” described in **Section 2.3.2.3**. Unlike the previously described category, this area is not dominated by turf species. The limestone substrate within this area has experienced substrate modification from several historical scrapings. The area was partially scraped and several buildings were erected within this area prior to 1968. The foundations of some of these buildings and associated sidewalks remain present. The area appears to have been entirely scraped sometime between 1978 and 1985, and then again between 1991 and 1998. This area remains open without a mature pine canopy, although some pine regeneration was observed. Although this area was not originally classified as a pine rockland in the 2003/2004 land use delineation or the 2014 Woodmansee report, following a review of site characteristics this area was reclassified as a subcategory of pine rocklands. Primary reasons for the reclassification was the presence of pine rockland plant species and the absence of non-native soils. This area contains scattered dense patches of Burma reed, but the aerial coverage of Burma reed does not exceed 50%.

#### **2.3.3.6 *Fire Suppressed – Pine Rockland***

This subcategory of pine rockland habitat has a dense pine canopy due to fire suppression, but is not dominated by Burma reed. The area classified as Fire Suppressed occurs just south of the Rockland Hammock and encompasses 1.9 acres. The eastern portion of this area has a pine canopy with approximately 60% cover and gets progressively denser further west ranging up to 75%. The subcanopy also exhibits evidence of fire suppression and exceeds 6 feet throughout much of the area, with moderate densities of cabbage palm (*Sabal palmetto*), saw palmetto (*Serenoa repens*), and Brazilian pepper. Dense patches of Burma reed were documented within this area, however, aerial coverage ranged between 30-49%. No federally listed plants were documented, with one isolated occurrence of pineland croton documented within a small opening of vegetation.

#### **2.3.3.7 *Severely Fire Suppressed, Dominated by Burma Reed – Pine Rockland***

This subcategory of pine rockland encompasses 8.11 acres and is the most severely degraded pine rockland habitat, due to the extent of hardwood encroachment and invasive infestation. Canopy cover and Burma reed coverage both exceeded 75%. The canopy included relict slash pine with no evidence of pine regeneration. The canopy also included mature earleaf acacia and Australian pine. Additionally, the subcanopy exceeded 6 feet and included significant amounts of invasive hardwoods such as Brazilian pepper. Based on historic aerials, pine harvesting occurred several times prior to 1991, with complete removal of the pine canopy sometime between 1985 and 1991. Historic aerials indicate that no hardwood removal occurred after 1991. Site conditions indicate this area has not experienced fire in several decades or a beneficial disturbance in over 25 years. While this area has not completed the transition to a hardwood hammock, it exhibits several characteristics that indicate it is in the later stages of transitioning from a pyrogenic community, including a build-up of organic materials contributing to changes in the soil composition and moisture levels, absence of pine regeneration, presence of invasive

hardwood species in the canopy stratum, excessive overgrowth of subcanopy, and extremely limited occurrence of pyrogenic fine fuel grass species. The limited occurrences of pineland croton documented in the area occurred strictly around the perimeter and on the edges of firebreaks.

#### **2.3.4 Rockland Hammock Category**

Rockland hammocks are often considered to be the advanced successional stage of pine rockland that occurs in the absence of fire (FNAI 2010). The CRC Property has approximately 3.72 acres classified as rockland hammock. Although, approximately 3.72 acres of habitat within CRC Property has been classified as rockland hammock, Woodmansee (2014) states that this habitat is not considered a true rockland hammock. Historically, this area was not pine rockland and therefore would not be considered a true rockland hammock, as it did not transition from a pine rockland. Relict vegetative species indicate this area may have been a more open habitat. Additionally, much of the oolitic limestone has been carved by water, which indicates evidence of historic hydrologic flow no longer present. Species in this area include giant leatherfern (*Acrostichum danaeifolium*), cocoplum (*Chrysobalanus icaco*), swamp bay (*Persea palustris*), and long strapfern (*Campyloneurum phyllitidis*). It is dominated by hardwood species such as live oak (*Quercus virginiana*), strangler fig (*Ficus aurea*), gumbo limbo (*Bursera simaruba*), and poisonwood (*Metopium toxiferum*). Prior to receipt of the July 15<sup>th</sup> letter from USFWS, Ram Coral Reef had begun restoration activities within this area, in good faith and anticipation of the development that was permitted by MDC's issuance of the NFC Permit. This included extensive hand removal of invasive species that dominated this area, including Brazilian pepper, white leadtree, and shoebutton ardisia.

### 3.0 SPECIES THAT MAY OCCUR IN HCP PLAN AREA

This section includes survey methodologies, general biology of species potentially occurring within the CRC Property, and survey results.

#### 3.1 Survey Methodologies for CRC Property

JEI's and its subconsultant's species survey methodologies for the surveys for the CRC Property are discussed below. The results from the surveys are included in **Section 3.2**. A summary of the field survey dates can be found in **Table 3-1**.

**Table 3-1. Dates, Times, and Weather Conditions for CRC Property Listed Species Surveys**

Date	Time	Weather
September 2, 2014	1000 - 1400	Mostly cloudy, Winds 10-15 mph, 85-90°F
September 3, 2014	0900 - 1700	Light rain to mostly cloudy, Winds 5-15 mph, 85-90°F
September 8, 2014	0900 - 1700	Mostly cloudy, Winds 5-10 mph, 85-90°F
September 12, 2014	1000 - 1400	Mostly cloudy, Winds 5-10 mph, 75-85°F
September 17, 2014	1000 - 1500	Mostly cloudy, Winds 5-10 mph, 85-90°F
September 22, 2014	1000 - 1500	Mostly cloudy, Winds 5-10 mph, 85-90°F
September 24, 2014	1000 - 1600	Mostly cloudy, Winds 5-10 mph, 80-85°F
September 26, 2014	0800 - 1600	Mostly cloudy, Winds 5-10 mph, 80-85°F
September 27, 2014	0800 - 1600	Mostly cloudy, Winds 5-15 mph, 80-85°F
September 28, 2014	1000 - 1400	Mostly cloudy, Winds 5-10 mph, 85-90°F
October 3, 2014	1000 - 1300	Mostly cloudy, Winds 0-5 mph, 85-90°F
October 6, 2014	0900 - 1600	Mostly cloudy, Winds 10-15 mph, 80-85°F
October 7, 2014	0900 - 1500	Mostly cloudy, Winds 5-10 mph, 80-85°F
October 10, 2014	1000 - 1400	Mostly cloudy, Winds 10-15 mph, 80-85°F
November 4, 2014	1000 - 1400	Mostly cloudy, Winds 10-20 mph, 75-80°F
January 23, 2015	0900 - 1500	Mostly cloudy, Winds 10-15 mph, 75-80°F

#### 3.1.1 General Protected Species Survey Methodology

Protected species surveys consisted of species-specific surveys and general species surveys. The general species surveys were conducted at the CRC Property in conjunction with other surveying efforts and included qualitatively recording observed flora and fauna. In addition to field surveys, a literature review was conducted to develop a comprehensive list of animal and plant species, which may potentially occur within the CRC Property. The literature review included an IRC database search of species documented within adjacent areas, a biodiversity matrix query

of FNAI database, the USFWS IPAC system, FWC's action plans for listed species, and pulling pine rockland associated species from the FWC list of "Florida's Species of Greatest Conservation Need" (FWC 2012). **Tables 1-1 and 1-2** list all the species identified through the literature review.

### **3.1.2 BSHB Survey Methodology**

To assess the habitat potential for the BSHB, the USFWS requested surveys for pineland croton be conducted in accordance with the methodology outlined in the "Survey and Mapping of the Distribution of Pineland Croton (*Croton linearis*) in Pine Rocklands in Miami-Dade County" conducted by Fairchild Tropical Botanic Garden in 2013 (Maschinski et al 2013). JEI ecologists conducted surveys in accordance with the recommended methodology. Pineland croton locations were recorded using ESRI's GPS mapping software. When a pineland croton was located, a 5 meter radius was surveyed to assess for the presence of other individual croton plants. Thus each GPS point typically represents a cluster of plants within a 5 meter radial area. However, some isolated croton occurrences represented a single plant, which was typically occurring in a small canopy opening or on the edge of densely forested areas. Surveys were conducted on September 12, 22, 24, and 26, 2014 and October 3, 6, and 7 of 2014.

### **3.1.3 FBB Survey Methodology**

Florida bonneted bat surveys were conducted by JEI ecologists with George and Cyndi Marks of the Florida Bat Conservancy (FBC) providing technical support and assistance in reviewing and confirming species identification and call types. The FBC has provided expert assistance in the review and confirmation of bat call recordings, including the identification of species, and where possible the types of calls recorded. JEI ecologist, David W. Ceilley was appointed to the FWC FBB Working Group at the recommendation of Cyndi Marks of the FBC. The FBB Working Group was formed to address the conservation needs of this species across its range. Members include the FWC, USFWS, National Park Service, Zoo Miami, FBC, and several other private and public entities. Members of this working group are involved in conservation activities such as acoustical surveys, bat house monitoring, species education and outreach activities, as well as ongoing research projects (FWC 2013a).

An initial consultation meeting between Ram Coral Reef, JEI ecologists, and staff from USFWS Vero Beach office was held in Miami on August 7, 2014. One of the objectives of the meeting was to discuss survey methodologies for the FBB. It was pointed out by the USFWS staff that Frank Ridgley, DVM of Zoo Miami had been conducting acoustic surveys as part of a research project throughout the Richmond Area using a Wildlife Acoustics, SM2 ultrasonic recorder and had detected FBB calls at locations immediately to the east of the CRC Property. This research project was funded by the USFWS and a final report was being prepared at the time. Based on acoustic surveys conducted by MDC staff within adjacent lands, the USFWS requested surveys to determine if FBBs are roosting within the CRC Property.

JEI ecologists suggested conducting acoustic surveys at equally spaced locations across the parcel to determine if FBBs are using the site before conducting a visual roost survey. The USFWS agreed to follow up with the site selection for FBB acoustic surveys by setting up a WebEx teleconference, which was later scheduled for August 18, 2014. Prior to the August 18 teleconference, JEI sent a map of the CRC Property with four acoustic monitoring locations proposed to determine if FBBs are using the CRC Property. The USFWS responded with a map

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with a total of 24 monitoring locations equally spaced across the forested portions of the property at distances of 400 ft. from each other (**Figure 3-1**). This intensive acoustic monitoring program proposal was designed to systematically survey the entire property for the purpose of identifying a roost and/or area that had acoustic activity, which would warrant additional follow-up and investigations to identify a roost. The acoustic monitoring was also supplemented by visual inspection of abandoned buildings and structures to determine whether roosts were present in those structures.

Per USFWS recommendation, the acoustic surveys were based on the methods developed by the USFWS for the endangered Indiana bat (*Myotis sodalis*) and “Additional Guidance on Acoustic Surveys for Florida Bonneted Bat for Coral Reef Commons” dated August 18, 2014. The 2014 guidance states microphones should be placed at a height of 5 meters (16.4 ft) in forest canopy openings, near open water or vegetated wetlands, wooded fence lines adjacent to large openings, road and/stream corridors and forest edges. This microphone placement guidance was followed with the exception of the open water areas, streams or vegetated wetlands due to absence of these features within the CRC Property. The 2014 guidance further stated that microphones should be spaced a minimum of 200 meters (656 ft.) apart, which was subsequently modified by USFWS indicating closer placement (400-450 ft.) was desirable to search for roosts.

FBB detection involves the use an ultrasonic recorder that allows documentation of the call frequency of bat utilizing an area. Call frequencies are unique for bat species and can also indicate types of activities (e.g. search, clutter, commute, and emergence). The bottom call frequency range of the FBB is unique to this species and lies between 10-17 kilohertz (kHz). This unique frequency range is a valuable aid in identifying the presence of FBBs. However, since FBBs are considered to be rare even within their focal areas (Marks and Marks 2008), it is necessary to sample for several nights at appropriate locations to determine presence of FBB roost.

The CRC Property surveys for the FBB utilized full spectrum SM3BAT™ (Wildlife Acoustics; www.wildlifeacoustics.com) bat detectors, which were deployed using a U1 ultrasonic microphone with 10 meter section of cable, mounted on a 5-meter long section of metal conduit attached to a tree. The microphone was elevated vertically above the shrub zone and facing open areas to maximize likelihood of recording ultrasonic bat calls. The SM3BAT program utilized for this acoustic survey would record in WAV format with no compression. The gain was set to auto with frequency range was 8 kHz to 100 kHz, DMIN= 001.0, DMAX 500.0, Trigger level = Auto, trigger windows: TRGWIN = 3.0 sec. and TRGMAX = 16.0 sec. based on recommendations of George Marks.

JEI deployed two SM3BAT recorders on August 20, 2014 near the center of the parcel at locations near stations 13 and 14 in the 24 station grid suggested by USFWS (**Figure 3-1**). An additional site situated between stations 7 and 8 (station 7.5) was added by JEI ecologists to fill a gap in the grid suggested by USFWS. Passive sampling was programmed to record daily from before sunset to just after sunrise, more specifically from 19:30 hours through the night till 07:30 hours the following day. Surveys were expanded by purchasing an additional three SM3BAT recorders so that from August 29 on at least four recorders were active and recording from 19:30 hours through the night till 07:30 hour in the morning.

On September 2, 2014, JEI and Ram Coral Reef met with USFWS on the site along with Cyndi and George Marks to review and approve the field conditions and placement of recorders and

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microphones at stations 13A, 15, 16, and 17. Brian Scofield with USFWS commented that the microphone placement should be on tripods out in the open or attached to chain-link fences. However, JEI ecologist, David W. Ceilley mentioned that there are several considerations for recorder and microphone placement and that the potential for vandalism or theft required locking them to trees and camouflaging them. The FBC both concurred that the microphone placement was fine for detecting FBB calls, and USFWS agreed with this determination. The site visit was followed by a brief presentation of the preliminary results from sites 13 and 14 including some FBB search and clutter calls recorded from site 14. Mr. Scofield's comments about microphone placement were taken into consideration for future placement of microphones and at several sites the perimeter fence was used to attach microphones and recorders. FBB call surveys continued through the remainder of September 2014 until a total of 26 sites were surveyed. At each station, the SM3BAT recorders were deployed for a minimum of four (4) consecutive nights for 12 hours each. More than half of the stations were surveyed for five (5) nights to ensure adequate sampling effort.

WAV file data were recorded on 32 GB SD memory cards, downloaded to a computer and converted to Zero Crossing (ZC) format using Kaleidoscope™ 2.1.7 software provided by Wildlife Acoustics. Using the ZC file format, the data were manually reviewed using Analoop software (Anabat™Systems). The program settings resulted in recordings of 0.1 to 16 seconds in length and several thousands of recordings were manually reviewed for detection and subsequent identification of bat species recorded. Noise filters in the Kaleidoscope program can and will erroneously capture FBB calls and so those folders were also reviewed for FBB. Selected individual FBB calls identified in ZC graphical displays or various lengths and types were copied as MS Word documents and delivered to FBC for positive identification of FBB and type of calls. Identification of FBB and other bat species was confirmed by Cyndi and George Marks of the FBC. A summary table was then created to list the number of total calls recorded, total number of FBB calls, the percent FBB, type of calls, earliest evening detection and latest morning detection for each station.

Figure 3-1. FBB Passive Acoustic Monitoring Stations within the CRC Property



### **3.1.4 Plant Inventory Methodology**

Plant surveys on the CRC Property were conducted by botanists Steve Woodmansee and Craig van der Heiden with ProNative Consulting (Miami, FL). The complete report “Coral Reef Commons Rare Plant and Floristic Inventory and Assessment” with associated appendices is attached as **Appendix D**.

A historical data search for floristic data was performed prior to field surveys. This search consisted of contacting staff with FTBG to obtain data on plants outlined in Appendix A of the “Coral Reef Commons Rare Plant and Floristic Inventory and Assessment” (**Appendix D**). FTBG also provided shapefiles from plant surveys conducted by Miami Dade Department of Environmental Resource Management (DERM). This data contained the historic locations of two federally endangered plant species: tiny polygala and the deltoid spurge. In addition, FTBG provided maps of locations where they had previously harvested tiny polygala within non-NFCs, as well as track logs of surveyed areas. FNAI was also contacted but possessed no further site specific data. A plant list and herbarium species record data from Bradley et al. (2000) and Gann et al. (2002), respectively was reviewed.

Recommended guidelines for conducting a botanical inventory were provided by the USFWS in an email sent on August 20, 2014 (**Appendix A**). These methods were followed during the surveys, which were conducted on September 26-27, 2014, and October 10, 2014. Additional field surveys were conducted by Woodmansee on September 28, 2014 and November 4, 2014. Historical data were uploaded onto a submeter GPS device, which was utilized during field surveys. All surveys were conducted on foot in all parcels of the CRC Property.

## **3.2 ITA Species (Table 1-1) Biology and Site-Specific Information**

### **3.2.1 Bartram’s Scrub-hairstreak Butterfly (BSHB)**

#### Biological Information

The BSHB was listed as endangered under the ESA by the USFWS on September 11, 2014 (DOI 2014a). The BSHB is found in southern Florida and is a small butterfly approximately 25 mm (1 inch) in length with a forewing length of 10.0 to 12.5 mm (0.4 to 0.5 in) (Opler and Krizek 1984; Minno and Emmel 1993). Salvato (1999) identified three major factors contributing to the population decline of BSHB; (1) loss of pineland habitat; (2) mismanagement of existing habitat resulting in decreased host density, and (3) use of chemical pesticides meant to control mosquitoes but with collateral effects on non-target arthropod species. The final rule published in the Federal Register also includes poaching, disease and predation, small population size and restricted range as threats. Future threats included loss of genetic diversity and climate change (DOI 2014a).

Estimates for population both localized and regional vary widely and there is not yet a standardized or reliable approach for estimating population density of BSHB. However, it has been documented that BSHB’s occurrence is dependent on the occurrence of its host plant, pineland croton (Worth et al. 1996; DOI 2014a). The BSHB will lay its eggs singly on the flowering racemes of pineland croton (Worth et al. 1996; Salvato and Hennessy 2004). USFWS’s final rule identified pine rockland and associated rockland hammocks and hydric pine flatwoods (specifically those containing pineland croton) as habitats for the butterfly (DOI 2014a). Pineland croton is typically restricted from areas where pinelands have grown very thick, and tends to grow most densely on pineland edges and in previously cleared or open areas

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(e.g. access roads, areas damaged by hurricanes or fires) (Schwarz et al. 1996). Adult BSHBs prefer open pine areas, at the edges and opening of associated rockland hammocks and hydric pine flatwoods (DOI 2014a), and will form localized colonies near dense patches of pineland croton (Schwarz et al 1996). The BSHB is capable of dispersing throughout the landscape as far as three miles from habitat patches (DOI 2014a); however, when found within their habitat, they are rarely documented more than 5 meters (16.4 ft) from their host plant (Schwartz 1987; Worth et al 1996; Salvato 2003). Despite its rapid flight, the BSHB is easily observed by an experienced observer if present at any density as it alights often, and the brilliance of its grey underside marked with bold, white postdiscal lines beneath both wings provides an instant flash of color against the foliage of its host plant (Smith et al. 1994; Salvato 1999).

The BSHB is currently known to occur on Big Pine Key in the lower Florida Keys (Monroe County), Long Pine Key within ENP, Navy Wells Pineland Preserve and various parcels of the Richmond Area. It is extirpated from the majority of its historic range in southern Florida. Extant populations are threatened by habitat loss, inconsistent fire management of pine rockland habitat, small population size, poaching, and pesticide applications (USFWS 2013).

It is crucial that the butterfly's host plant, pineland croton, experiences periodic fires, as they stimulate re-sprouting allowing for the persistence of the plant (DOI 2014a). Given the BSHB's close association with pineland croton, partial and systematic prescribed burns should be implemented alternately within occupied habitat. This allows for unburned refugia to remain on-site, allowing for adjacent populations to migrate in and recolonize burned areas. Studies within the MDC pine rocklands (both within and adjacent to the Everglades) indicate that pineland croton will return to the burned areas within one to three months post-burn. Based on the size of the burn and amount of refugia provided, the BSHB may begin to use the new growth for oviposition within eight months post burn (Salvato and Salvato 2010; DOI 2014a). Studies on BSHB response to burns suggest lag time is required between hostplant resurgence and compatibility with resurgence. Therefore, alternating prescribed burns in adjacent areas with the appropriate intervals between burns based on croton recovery, allows for recolonization of an area prior to burning adjacent habitat. The use of small-scale burns and/or mechanical clearing maintains the vegetative structure required by the BSHB (DOI 2014a). BSHBs have been documented in every month (Salvato and Hennessey 2004). Therefore, it does not appear that seasonal timing of burns would have a direct effect on the BSHB.

A total of 11,539 acres of critical habitat for the BSHB has been designated by USFWS (DOI 2014b). Designation of critical habitat is based on identifying areas within a species historic range, which provide physical or biological features (PBFs) necessary for the conservation of the species. PBFs are determined by species but, in general, are considered to be 1) space for individual and population growth and for normal behavior; 2) food, water, air, light, minerals, or other nutritional or physiological requirements; 3) cover or shelter; 4) sites for breeding or reproduction; and 5) habitats that are protected from disturbance or are representative of historical, geographical, and ecological distributions. The USFWS determined the following species-specific parameters for the BSHB PBFs: 1) pine rockland habitats and associated rockland hammock and hydric pine flatwoods that are at least 18 acres in size and no more than 3 miles apart; 2) pine rockland habitats and associated rockland hammock and hydric pine flatwoods (specifically those that contain pineland croton and other herbaceous plants typical of those communities that fulfill larval and dietary requirements; 3) absence of pesticides in the pine rockland habitats and associated rockland hammock and hydric pine flatwoods, or

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pesticides in low enough quantities that they are not detrimental to the butterfly; 4) pine rockland habitats and associated rockland hammock and hydric pine flatwoods (specifically those that contain vegetation typical of those plant communities that fulfill the larval development and adult reproductive requirements); 5) disturbance regimes natural or prescribed to mimic natural disturbances, such as fire and storms.

Delineating areas that meet a species PBFs is determined by assessing specific elements of a species' PBFs, also known as Primary Constituent Elements (PCEs), which provide for a species' life-history processes that are essential to the conservation of the species.

The USFWS identified the PCEs for the BSHB to be as follows:

1. Areas of pine rockland habitats and associated rockland hammock<sup>5</sup>;
  - a. pine rockland habitat contains:
    - i. open canopy, semi-open subcanopy, and understory;
    - ii. substrate of oolitic limestone rock;
    - iii. a plant community of predominately native vegetation;
  - b. rockland hammock habitat that contain:
    - i. Canopy gaps and edges with an open to semi-open canopy, subcanopy and understory;
    - ii. Substrate with a thin layer of highly organic soil over limestone;
    - iii. A plant community of predominantly native vegetation;
2. Competitive nonnative plant species in quantities low enough to have minimal effect on survival of BSHB;
3. Presence of pineland croton in sufficient abundance to support BSHB life history; A dynamic natural disturbance regime or one that artificially duplicated natural ecological processes;
4. Pine rockland habitats and associated rockland hammock and hydric pine flatwoods that allow for connectivity and are sufficient in size to sustain viable BSHB population;
5. Pine rockland habitats and associated rockland hammock and hydric pine flatwoods with low pesticides levels.

Site-Specific Information

The CRC Property falls within the Richmond Pine Rockland critical habitat unit (Unit BSHB4), which encompasses 1,082 acres of the total 11,539 acres designated as BSHB critical habitat (DOI 2014b). The CRC Property contains 90.2 acres of BSHB critical habitat (**Figure 3-2**). Portions of the area designated as critical habitat within the CRC Property do not meet any of the PBFs or PCEs identified by USFWS, such as exotic dominated hardwood habitats with inappropriate substrate.

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<sup>5</sup> Hydric pine criteria omitted due to absence of habitat within the CRC Property.

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During the field surveys by JEI, the BSHB was observed a total of three times in two different locations within the CRC Property. The first location was in the western portion of the CRC Property within the area described as pine rockland with less than 50% Burma reed, where a BSHB was observed by JEI ecologists on September 8 and 22, 2014. The second location was in the southern central portion of the site, west of an abandoned DOD security booth, observed by JEI ecologists on October 6<sup>th</sup>, 2014, within the land use described as pine rockland – scraped without pine canopy. **Figure 3-2** depicts the documented observations of BSHB by JEI.

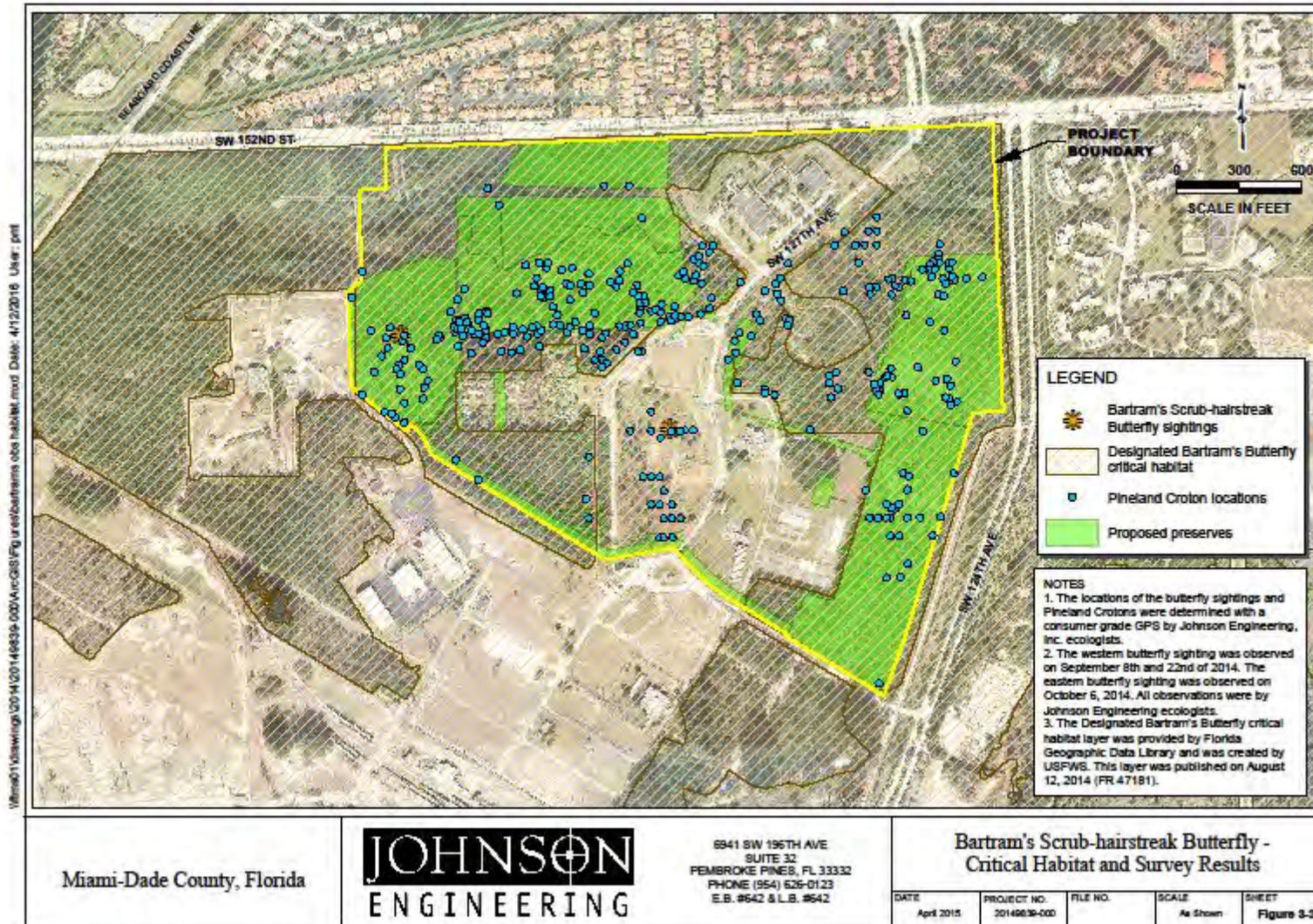
Pineland croton surveys documented a total of 322 pineland croton locations within the CRC Property. Of these, the majority of the locations (189) were in the On-site Preserves (**Figure 3-2**). Canopy cover and invasive plant cover appeared to be the primary factors limiting the presence and density of pineland croton. Croton was primarily restricted to open canopy habitat in pine rockland that contained less than 50% invasive plants (primarily Burma reed). Pine rocklands with less than 50% Burma reed contained the largest number of occurrences with 117 observations (36%), followed by pine rockland – historically scraped with pine canopy (75 occurrences, 23%), and pine rockland – historically scraped with pine canopy, dominated by Burma reed (50 occurrences, 16%). Pineland croton occurrence within the CRC Property appears to be largely influenced by canopy cover; 46% (147 occurrences) occurred within areas that had 0-24% canopy cover, 39% (125 occurrences) were documented in 25-49% canopy cover. Pineland croton occurrences drastically dropped when canopy cover exceeded 50%, with only 32 occurrences (10%) in areas with 50-74% cover and 18 occurrences (6%) in areas that had a canopy exceeding 75% cover.

Likewise, occurrence of pineland croton on the CRC Property was also negatively associated with Burma reed infestation, two-thirds (>66%) of the croton appeared in areas with less than 50% infestation. Once infestations exceeded 50%, the Burma reed appears to act as a canopy to the pineland croton and limits the plants' ability to colonize an area. Occurrences of pineland croton within areas that had greater than 50% canopy or Burma reed cover were almost entirely the result of proximity to the edge of the habitat or within small openings in the canopy. Pineland croton frequently occurred within areas that were artificially disturbed areas such as unpaved trails which provided open substrate and canopy for colonization. (Schwarz et al. 1996). Many of these occurrences accounted for the croton records in areas with greater than 50% canopy and Burma reed cover. Factoring in this skewing of data, the results provide further evidence canopy and invasive cover are primary factors influencing croton occurrence.

Approximately 60% of the pineland croton documented on the CRC Property occurred within the On-site Preserves. Management of the On-site Preserves results in an increase and expansion of pineland croton within the On-site Preserves, increasing carrying capacity for BSHB.

Designated critical habitat for the BSHB includes the Off-site Mitigation Area; however, its occurrence in the Off-site Mitigation Area is unknown.

Figure 3-2. BSHB Critical Habitat and Pineland Croton Survey Results for the CRC Property



### 3.2.2 *Florida Bonneted Bat (FBB)*

#### Biological Information

On November 2, 2013, the USFWS listed the FBB as endangered under the ESA (DOI 2013). The FBB was previously known as the Florida mastiff bat, Wagner's mastiff bat, and mastiff bat (*Eumops glaucinus floridanus*). Recent genetic research confirmed that *E. floridanus* is a distinct species (McDonough 2008). The FBB is non-migratory and the largest bat in Florida measuring 5.1 to 5.6 inches in length (NatureServe 2009; Timm and Genoways 2004). It is distinguished from the Brazilian free-tailed bat (*Tadarida brasiliensis*) by its larger size and the ears being joined at the midline of the head. (NatureServe 2009). The FBB's fur is short and bi-colored with a white lower portion of its hair shaft (Timm and Genoways 2004). Fur color is highly variable (Timm and Genoways 2004), typically ranging from black to brown to brownish-gray to cinnamon (NatureServe 2009).

The long-term habitat requirements of the FBB are poorly understood (Robson 1989; Marks and Marks 2008). Documented foraging areas for FBBs are diverse and include fields, ball parks, golf courses, lakes, canals, streams, and wetlands (Marks and Marks 2008). Perennially flooded wetlands and waterbodies are known to be used as foraging areas during dry seasons and droughts (Marks and Marks 2008). FBBs rely on speed and agility to catch insects (Simmons et al. 1979). An analysis of fecal samples indicates that moths (Lepidoptera), caddisflies (Tricoptera), beetles (Coleoptera), true bugs (Hemiptera), flies (Diptera), and spiders (Arachnida) appear to be important prey items (C. Marks pers. comm.). The FBB uses echolocation to detect prey 10 to 15 feet away (Belwood 1992). Foraging flights can last six hours (NatureServe 2009) and may occur at distances of several miles from established roosts. The FBB produces loud calls easily recognizable by humans as they fly (Belwood 1992). Free-tailed (Molossid) bats are known to be high fliers when foraging and acoustic surveys for bonneted bats should take this into consideration when positioning microphones for recording.

The FBB has been documented at more than 17 locations in Charlotte, Collier, Lee, Miami-Dade, Monroe, Okeechobee, and Polk Counties (Marks and Marks 2012; DOI 2013). Limited information is available regarding roost preferences of FBB, they have been documented in pine trees and man-made structures (Marks and Marks 2008). Longleaf pines (*Pinus palustris*), slash pine, royal palms (*Roystonea regia*), as well as numerous man-made structures, are believed to provide suitable roosting habitat (Belwood 1981; Belwood 1992; Marks and Marks 2008; USFWS 2016c). Roosts have also been documented in Spanish-style tile roofs (Belwood 1992), in attics, rock or brick chimneys, and fireplaces (NatureServe 2009), and in bat houses (Marks and Marks 2008). Currently, only four natural FBB roosts have been documented. They occur on Avon Park Air Force Range, Big Cypress National Preserve, and Florida Panther National Wildlife Refuge. In addition, a FBB roost was recently discovered in a dead royal palm snag in Fakahatchee Strand State Preserve Park using telemetry from a tagged bat from the Florida Panther National Wildlife Refuge. This may be the largest roost ever discovered, with 80 bats observed emerging after dusk (Personal communication Dennis Giardina, 4/29/2016).

The breeding season occurs in June through September (Marks and Marks 2008). However, the limited data available suggests the FBB may be polyestrous, with a second breeding in January or February (Timm and Genoways 2004). Early in the maternity season, females give birth to young and forage frequently to support their young (Marks and Marks 2008). Later in the season, the young and females forage together until the young are capable of foraging and

surviving on their own (Marks and Marks 2008). The typical litter size is one (NatureServe 2009). Natural predation records are limited to one death due to an owl (Marks and Marks 2008).

### Site-Specific Information

Acoustic surveys recorded the FBB flying over the CRC Property, but only documented limited foraging within the airspace over the CRC Property. The results of the FBB surveys are discussed below. All raw data from the surveys was provided to USFWS in October 2014.

*Passive Acoustic Surveys* - A total of 22,384 bat calls were recorded and reviewed for species identification. Based on the acoustic surveys from 25 separate locations, six bat species were identified, including the FBB. Calls of other bat species identified in order of relative abundance were the Brazilian free-tailed bat, northern yellow bat (*Lasiurus intermedius*), the evening bat (*Nycticeius humeralis*), the tricolored bat (*Perimyotis subflavus*), and it appears that the big brown bat, *Eptesicus fuscus* was also present but calls were indistinct and overlapping in frequency with *Lasiurus*. An equipment or programming malfunction at the very first station (13) resulted in the site being resurveyed and labeled as station 13A. The FBB was detected at all 25 recording stations (**Figure 3-1**) but it was not common at any location and comprised an average of 1.49% of all calls or call sequences<sup>6</sup> recorded, or 334 of the 22,384 total calls (**Table 3-2**). Of the total number of FBB calls, the vast majority were attributed to search, clutter, or commute calls. FBB foraging calls were only documented at four (4) stations and were extremely rare. No roost chatter or emergence calls were recorded at any of the stations.

The percentage of FBB calls to total number of calls by station ranged from a high of 6.79% at station 6 to a low of 0.19% at station 24. However, only 221 calls were recorded at station 6 and the higher percentage of FBB could be an artifact of our ability to detect their louder calls above other bat species. At the same time, 3,226 total calls were detected at station 24 and only six (6) were FBB. This may be a reflection of other bat species habitat preference for habitat near the historic marl prairie south of 152<sup>nd</sup> Street.

To assess roosting locations, Ridgley *et al.* 2014 considered an early emergence call to be within 30 minutes of sunset and within one hour of sunrise. Five individual calls were recorded at the CRC Property within the sunset emergence time period and no calls were recorded during the sunrise emergence time period. Due to the limited number of emergence calls and each emergence call recorded at a different station, FBB roosting on the CRC Property is not likely and potential roost sites are likely located offsite. Additionally, given the saturated acoustic coverage of the surveys, late emergence of an on-site roost would have likely documented roost chatter signatures. No roost chatter was documented for any species in any of the 22,384 call sequences that were recorded, thus supporting a conclusion that the probability of the CRC Property supporting a natural roost is low.

During the survey period all documented FBB calls were infrequent. Following is a summary of the earliest documented FBB calls that occurred after sunset. On September 1, 2014, the sunset was at 19:40 hours and sunrise was at 07:01 hours (Sunrise Sunset Miami 2014). By the end of September, the sunset was at 19:09 and sunrise was at 07:13. The earliest FBB calls in the evening were recorded at station #23 at 20:10 on September 16th, which was 46 minutes after

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<sup>6</sup> Any call sequences were defined as “calls,” as sequences are attributed to a single bat, last only a few seconds and are connected continuous chirps. (Verified by Cyndi and George Marks)

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sunset (19:24). The earliest FBB call at station #10 was at 20:18 on September 11<sup>th</sup>, which was 49 minutes after sunset (19:29), and at station #7 at 20:24, station #2 at 20:26, and station #18 at 20:30.

The latest morning FBB calls were recorded at station #22 (06:25) station #10 (06:25), and station #23 (06:22) (over 35 minutes before sunrise) with all other calls recorded at 06:00 or earlier in the morning. Given the earliest evening calls were more than 45 minutes after sunset at stations closest to the property boundary (#23, #18 and #10) and latest morning calls were more than 35 minutes before sunrise also at boundary stations (#23, #22, and 10), would indicate that the FBB is commuting over the CRC Property from the developments to the north and the west. This is further supported by recordings that occurred at adjacent stations a few seconds apart, which provided directional indications for the FBB flight path, such as documented FBB calls at exterior stations and subsequent calls documented a few seconds later at the adjacent interior station. The likelihood of off-site roosting was supported by the FBC (Letters from Cynthia Marks to JEI, 9/5/2014 and 10/8/2014) (Appendix A).

The highest number of FBB calls (32 calls) were recorded at station #1 adjacent to the Zoo and DOD entrance roads. FBB calls were also relatively abundant at stations #11 (25 calls), #18 (25 calls), #9 (21 calls), and #19 (19 calls). Based on the total number of calls recorded that were solely attributed to FBB, it appears that the NFC outer edges are open areas for FBB movement and call detection. Stations #11, and #19 are in proposed preserve pine rocklands, also designated as NFCs, which represent the less degraded, open pine rocklands on the CRC Property. Station #9 was along the ecotone between open disturbed lands where the monkey cages remain and a severely fire suppressed, densely forested pine rockland is found. The more open pine rockland preserve areas and open developed areas adjacent to densely forested area create areas that can act to direct or funnel the FBB flight paths. However, given the very limited number of FBB calls that were attributed to foraging it would appear FBBs are opportunistically foraging as they commute over the site to forage in the open areas of Zoo Miami, rather than preferentially foraging within the CRC Property. This determination or assessment is further supported by survey findings in the adjacent Zoo Miami (Ridgley et al. 2014). This study documented that FBBs had a noticeable preference for foraging over Zoo Miami's largest lake and parking lot, over the smaller lakes or field areas (Ridgley et al. 2014). These areas had dimensions of 3,000 ft by 670 ft at widest location to 150-260 ft at narrow point (lake) and 2,000 ft by 2,500 ft (parking lot). Ridgley et al. (2014) concluded that FBBs prefer large unobstructed and unlit areas with lengths greater than 1,500 ft and a minimum width of at least 125-150 ft for foraging. No area within the CRC Property meets this criteria.

The conclusion that the FBB was opportunistically foraging as it commuted over the CRC Property to forage in more open areas and over nearby lakes was also supported by the FBC (Letters from Cynthia Marks to JEI, 9/5/2014 and 10/8/2014 [**Appendix A**]).

*Active Roost Surveys of Existing Structures* - Active roost surveys were conducted on the CRC Property on September 2 and 3, 2014 by the FBC and JEI ecologists. These surveys included the interior and exterior of all abandoned buildings, the chimney site pending demolition, pines adjacent to open areas, and rock cavities within the Rockland Hammock area. Active surveys included visual inspections of the building interior and exterior, use of handheld bat detectors (Echo Meter Touch™ and AnaBat SD2™), and visual observations on the exterior of the buildings for one hour after sunset. No roosting or other bat activity of any species was detected

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and the FBC recommended demolition as soon as possible (Letter from Cynthia Marks to JEI, 10/8/2014). On September 17<sup>th</sup> 2014, an email from USFWS (Shawn Christopherson) stated “*The Service believes that impacts to the FBB are unlikely to occur as a result of the demolition work and therefore we do not object to the demolition of the abandoned buildings (three large buildings just south of SW 152<sup>nd</sup> and west of 127<sup>th</sup> Avenue, the lift station shack east of 127<sup>th</sup> and the guard shack and building along 127<sup>th</sup> Ave) and the chimney.*” (USFWS 2014d).

Roost surveys of rock outcroppings and pines along the perimeter of open areas during surveys also did not document any evidence of roosting activity. The dense pine and vegetation growth, combined with previous history of pine clearing has resulted in undesirable (young, dense, even-aged stands) roosting conditions for the FBB, which prefers open habitats and would require mature cavity trees (Letters from Cynthia Marks to JEI, 9/5/2014 and 10/8/2014; Letter from USFWS to JEI, 12/5/2014 [**Appendix A**]).

The Off-site Mitigation Area, it is also located within the USFWS Consultation Area and a Focal Area for the FBB. Its occurrence on the Off-site Mitigation Area is unknown.

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**Table 3-2. FBB Summary of Survey Results for the CRC Property**

Site ID	Nights #	FBB Calls	Total Calls	% FBB	Search/Clutter	Commute	Feeding	Roost Chatter	Earliest	Latest
1	5	32	2,155	1.48%	1	1	0	0	20:35	4:16
2	5	9	473	1.90%	1	0	0	0	20:26	1:40
3	5	3	373	0.80%	1	0	0	0	1:04	2:39
4	5	6	750	0.80%	1	1	0	0	22:16	3:08
5	5	16	805	1.99%	1	0	1	0	21:00	5:45
6	4	15	221	6.79%	1	0	0	0	20:42	2:40
7	4	8	407	1.97%	1	1	0	0	20:24	5:13
7.5	5	10	798	1.25%	1	0	0	0	20:43	4:25
8	5	16	1,025	1.56%	1	1	0	0	22:15	4:11
9	5	21	812	2.59%	1	0	1	0	22:35	4:12
10	5	7	1,025	0.68%	1	1	0	0	20:18	6:25
11	5	25	1,016	2.46%	1	1	1	0	20:43	5:49
12	4	16	354	4.52%	1	1	0	0	20:44	4:26
13A	5	4	478	0.84%	1	1	0	0	20:35	3:33
14	4	14	469	2.99%	1	1	0	0	22:53	6:06
15	5	17	418	4.07%	1	1	0	0	21:12	6:00
16	5	18	452	3.98%	1	1	0	0	21:04	6:00
17	5	3	705	0.43%	1	1	0	0	21:38	2:52
18	5	25	1,082	2.31%	1	1	0	0	20:30	4:58
19	5	19	1,048	1.81%	1	1	1	0	20:43	4:57
20	4	11	603	1.82%	1	1	0	0	20:50	4:27
21	4	17	1,166	1.46%	1	1	0	0	21:14	5:12
22	4	4	1,301	0.31%	1	1	0	0	4:58	6:25
23	4	12	1,222	0.98%	1	1	0	0	20:10	6:22
24	4	6	3,226	0.19%	1	1	0	0	22:23	4:16
<b>Total</b>		<b>334</b>	<b>22,384</b>	<b>1.49%</b>	<b>25</b>	<b>19</b>	<b>4</b>	<b>0</b>		

1 = recorded

0 = not recorded

### 3.2.3 *Eastern Indigo Snake*

#### Biological Information

The eastern indigo snake (*Drymarchon corais couperi*) was listed as threatened under the ESA on January 31, 1978 (DOI 1978), due to population declines caused by habitat loss, vehicular traffic, over-collecting for the domestic and international pet trade, and mortality caused by rattlesnake collectors who gas gopher tortoise burrows to collect snakes. Georgia and Florida currently support the remaining endemic populations of the eastern indigo snake (Lawler 1977).

The eastern indigo snake is the largest non-venomous snake in North America, obtaining lengths of up to 8.5 ft (2.6 m) (Moler 1992). It obtained its name from its color, which is uniformly lustrous-black except for a red or cream-color on the chin, throat, and sometimes the cheeks. The USFWS has not designated critical habitat for this species.

Eastern indigo snakes need a mosaic of habitats to complete their annual life cycle. In Florida, home ranges for females and males range from 5 to 371 ac and 4 to 805 ac, respectively. Its home range may cover several habitat types, including pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, edges of freshwater marshes, agricultural fields, coastal dunes, human-altered habitats, and agricultural lands (such as citrus) (USFWS 1999). In Georgia and northern Florida, the eastern indigo snake is more commonly associated with sheltering in gopher tortoise burrows, hollowed root channels and logs, or the burrows of rodents, armadillos, or land crabs (Lawler 1977; Moler 1985; Layne and Steiner 1996). They are not as closely associated with occupying gopher tortoise burrows in south Florida due to the warmer climate and are found in tropical hardwood hammocks, pine rocklands, freshwater marshes, abandoned agricultural land, coastal prairie, mangrove swamps, and human-altered habitats (Steiner et al. 1983; USFWS 1999). In south-central Florida, limited information on the reproductive cycle suggests that eastern indigo snake breeding extends from June to January, egg laying occurs from April to July (4-12 eggs), and hatching occurs from mid-summer to early fall (Layne and Steiner 1996). Eastern indigo snakes are active during the day and spend a great deal of time foraging and searching for mates. The eastern indigo snake is a generalized predator and will eat any vertebrate small enough to be overpowered; swallowing their prey alive (Keegan 1944; Babis 1949; Kochman 1978; Steiner et al. 1983).

To protect and manage this species for recovery, Breininger et al. (2004) concluded that the greatest eastern indigo snake conservation benefit would be accrued by conserving snake populations in the largest upland systems that connect to other large reserves while keeping edge to area ratios low. Management of these lands should be directed towards maintaining and enhancing the diversity of plant and animal assemblages within these properties. Where these goals are achieved, eastern indigo snakes will directly benefit because of improved habitat conditions. Land managers should be encouraged to utilize fire as a tool to maintain biodiversity in fire-dependent ecosystems.

#### Site-Specific Information

The eastern indigo snake would likely have historically been found in the Richmond Area. The USFWS South Florida Ecological Service Office has not published a species specific survey methodology for the eastern indigo snake; however, other USFWS offices have established methodologies that entail pedestrian survey transects throughout the development footprint. Pedestrian transects were placed at appropriate distances based on site conditions were used in

almost all of the listed species surveys conducted within the CRC Property. Furthermore, ecologists conducting the 2014 and 2015 surveys within the CRC Property included an ecologist that holds a section 10(a)(1)(A) permit under the ESA for this species (Permit # TE 49427A-2). The eastern indigo snake was not observed during any of the surveys conducted within the CRC Property. Eastern indigo snake has not been documented on adjacent properties, including the Off-site Mitigation Area, per available data.

#### **3.2.4 Rim Rock Crowned Snake**

##### Biological Information

The rim rock crowned snake is a non-venomous species that can reach up to 10 inches in length. They are light brown with a dark brown or black head and neck, with a partial light band between the darker head and neck sometimes occurring. Their scales are smooth and belly is pale, with the anal scale divided (FNAI 2001). This species is not federally protected. It is listed as threatened by the state of Florida under Chapter 68A-27, F.A.C. A contributing factor to the decline in population is attributed to habitat fragmentation and threats from invasive species, in particular fire ants (*Solenopsis invicta*) that threaten egg viability (FWC 2013b).

The rim rock crowned snake is endemic to Miami-Dade and Monroe counties. Its preferred habitat is pine rocklands and tropical hardwood hammocks near fresh water although it has been documented within human altered habitats (FWC 2013b; FNAI 2001). It is a fossorial species that most commonly inhabits the shallow soil that overlays the oolitic limestone foundation of pine rocklands and tropical hammocks (FWC 2013b; FWC 2016a). When above ground, rim rock crowned snakes may shelter under rocks, fallen logs and anthropogenic debris (e.g., rotten boards or piles of clothing) (FWC 2016a). Its underground nature can present threats to the species during time of flooding, such as hurricanes and level rise (FWC 2011). There is no comprehensive assessment of population numbers or trends. One population has been reported to exist within the Barnacle Historic State Park, despite only containing 4 acres of hammock (FWC 2011). FWC lists the top three priority actions for this species as 1) acquire, restore, protect and manage as much suitable habitat as possible; 2) continue the removal of non-native species; and 3) research the species' life history (FWC 2013b).

##### Site-Specific Information

The rim rock crowned snake was not documented within the CRC Property and has not been documented on the Off-site Mitigation Area. Literature review indicated this snake was documented in 2009 within the Zoo Miami area (FWC 2011).

#### **3.2.5 Gopher Tortoise**

##### Biological Information

Gopher tortoises (*Gopherus polyphemus*) are a medium sized terrestrial turtle that averages nine to 11 inches. An adult's carapace (upper shell) is generally a brownish tan with a yellow plastron (under shell) and rough brown/dark gray, elephant like, skin. Its flattened, shovel-like forelimbs are used for digging deep burrows (FWC 2015a). Males will have a slightly concave plastron. The young have a brighter yellow carapace with the edges of the scales outlined in a darker brown color. Their skin will also be a yellowish tan and are approximately two inches in length at hatching (FNAI, 2001).

The gopher tortoise is listed as threatened by the state of Florida and is listed as a candidate species for federal protection in Florida. Their primary threat is habitat loss. Other threats include road mortality and illegal human predation. This species occurs throughout Florida (also within portions of Alabama, Louisiana, Mississippi, South Carolina and Georgia) and is typically found in dry upland habitats including sandhills, scrub, xeric oak hammocks, and dry pine flatwoods. Other potential areas include disturbed habitats such as pastures, old fields, and road shoulders (FNAI 2001).

Gopher tortoises dig deep burrows that average 15 feet long and 6.5 feet deep to provide protection from extreme temperatures and predators. These burrows also serve as refuges for 350 to 400 other species which is what designates gopher tortoises as a keystone species. Gopher tortoises feed on a wide variety of vegetation including broadleaf grasses, wiregrass, grass-like asters, legumes, blackberries, and the prickly pear cactus (FWC 2015b).

#### Site-Specific Information

This species was not documented within the CRC Property during any of the surveys. Survey methodologies employed met the FWC gopher tortoise survey guidelines and also included two JEI ecologists who are Authorized Gopher Tortoise Agents. The USFWS has stated this species is present within the Richmond Area (Email Shawn Christopherson, USFWS 1/8/2015) (USFWS 2015c). However, based on documented soil and site conditions within the CRC Property and the Off-site Mitigation Area, it is unlikely this species occurs within the CRC Property due to the lack of suitable burrowing habitat.

### **3.2.6 Florida Leafwing Butterfly**

#### Biological Information

The Florida leafwing butterfly (*Anaea troglodyta floridaalis*) was federally listed as endangered on September 11, 2014 (DOI 2014a) and USFWS designated critical habitat on August 12, 2014 (DOI 2014b). This species is a medium-sized butterfly approximately 2.75 to 3.00 inches in length with a forewing length of 1.3 to 1.5 in (Opler and Krizek 1984; Minno and Emmel 1993). The upper-wing surface color is red to red-brown, the underside is gray to tan, with a tapered outline, cryptically looking like a dead leaf when the butterfly is at rest. The Florida leafwing butterfly exhibits sexual dimorphism, with females being slightly larger and with darker coloring along the wing margins than the males (DOI 2014a).

Adults are rapid, wary fliers. The subspecies is extremely territorial, with both sexes flying out to pursue other butterflies (Baggett 1982; Worth et al. 1996; Salvato and Hennessey 2004). The Florida leafwing butterfly is multivoltine (i.e., produces multiple generations per year), with an entire life cycle of about 60 days (Hennessey and Habeck 1991) and maintains continuous broods throughout the year (Salvato 1999). Females lay eggs singly on both the upper and lower surface of the leaves of its host plant, pineland croton, normally on developing racemes (Baggett 1982; Hennessey and Habeck 1991; Worth et al. 1996; Salvato 1999).

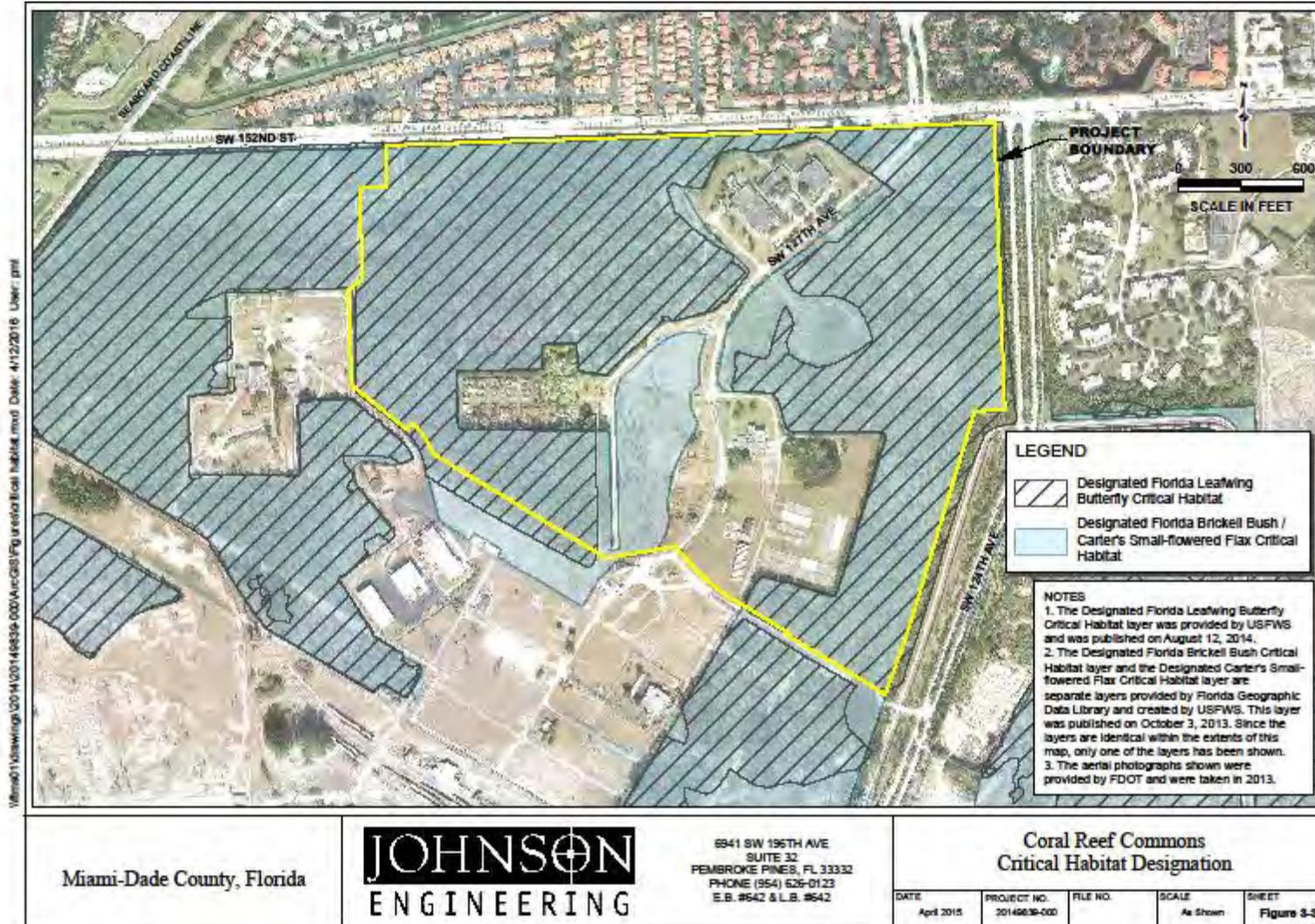
The Florida leafwing butterfly is currently known to occur only within the Long Pine Key within ENP (MDC). Populations of this species within Big Pine Key, in the lower Florida Keys (Monroe County), as well as Navy Wells Pineland Preserve and the Richmond Area in MDC have been extirpated (DOI 2014a). The extant population remaining within the ENP is threatened by inconsistent fire management of pine rockland habitat, small population size, and illegal poaching.

Site-Specific Information

The USFWS final rules for listing this species and designating critical habitat, list the Richmond Area unit as unoccupied by this species and further state that breeding populations have not been documented within this area in over 25 years (DOI 2014a; DOI 2014b). Surveys of the CRC Property supported the information listed in the final rules for the species, and did not document the species within the CRC Property. Currently, the closest extant population occurs in the ENP, over 20 miles southwest of the CRC Property and the Off-site Mitigation Area.

The CRC Property contains 90.2 acres of Florida leafwing butterfly critical habitat, as designated by the USFWS under the ESA (**Figure 3-3**). The CRC Property and Off-site Mitigation Area fall within the Richmond Pine Rockland critical habitat unit (Unit FLB3), which encompasses 888 acres of the total 10,561 acres designated as critical habitat for this species (DOI 2014b). Similarly to the BSHB, while some areas within the CRC Property do meet the criteria for the designated as Florida leafwing butterfly critical habitat, other areas that were designated within the CRC Property do not meet any of the PBFs or PCEs identified by USFWS, such as exotic dominated hardwood habitats with inappropriate substrate.

**Figure 3-3. Designated Critical Habitat for Florida Leafwing Butterfly, Florida Brickell Bush, and Carter’s Small-flowered Flax within the CRC Property**



### 3.2.7 *Miami Tiger Beetle*<sup>7</sup>

#### Biological Information

The Miami tiger beetle was first discovered in 1934 and was considered extinct until it was rediscovered in 2007 in the Richmond Area (Knisley 2013). It was originally described as a variety of tiger beetle, *Cicindela abdominalis floridana*, then later combined into the group *C. scabrosa* by P. Choate (Choate 1984), and noted as a distinct species *Cicindela floridana* in 2011 (Brzoska et al. 2011). On December 11, 2014 an emergency petition to list the Miami tiger beetle under the ESA was submitted to USFWS on behalf of the Center for Biological Diversity (CBD) and other petitioners (CBD 2014), and, on the same day, an emergency petition to list the Miami tiger beetle under Florida law was submitted to FWC on behalf of the same petitioners. USFWS determined emergency listing was not warranted. On December 22, 2015 USFWS published a proposed rule (DOI 2015d) (the “Proposed Rule”) to list the Miami tiger beetle as endangered. On October 5, 2016, USFWS published the final rule (DOI 2016b) (the “Final Rule”) adding Miami tiger beetle to the federal endangered and threatened species list as endangered, and the final rule became effective on November 4, 2016. In June 2017, FWC listed Miami tiger beetle as federally-designated endangered.

The Proposed Rule indicates another population of Miami tiger beetle was located outside the Richmond Area (location undisclosed) and a new location within the Richmond Area was recorded at Larry and Penny Thompson Park.

#### Site-Specific Information

The Miami tiger beetle has been observed on four properties within the Richmond Area (**Figure 3-4**), including the Off-site Mitigation Area, and also at an undisclosed location outside the Richmond Area but has not been documented on the CRC Property. Portions of the CRC Property were surveyed by Dr. Barry Knisley during USFWS funded surveys. Knisley stated that tiger beetles were not documented within the CRC Property during any surveys and his “previous surveys provided a pretty good indication that this site was not suitable habitat” (Email Knisley to USFWS 7/25/2014 [**Appendix A**]; Knisley 2013). Knisley (2013) stated an extensive survey of the area west of the zoo entrance (CRC Property) produced no tiger beetles. This report goes on to say this area seems to have marginal or unsuitable habitat and although there are some smaller and/or connected bare patches, these were probably too limited to support beetles. There was also extensive cane (Burma reed) in much of the area and other parts had considerable rock substrate (Knisley 2013). Survey efforts by Knisley during the period of 2008-2015 were used as the basis for determining presence or absence of Miami tiger beetle for the Proposed Rule. Therefore, the survey efforts and habitat descriptions that Knisley reported

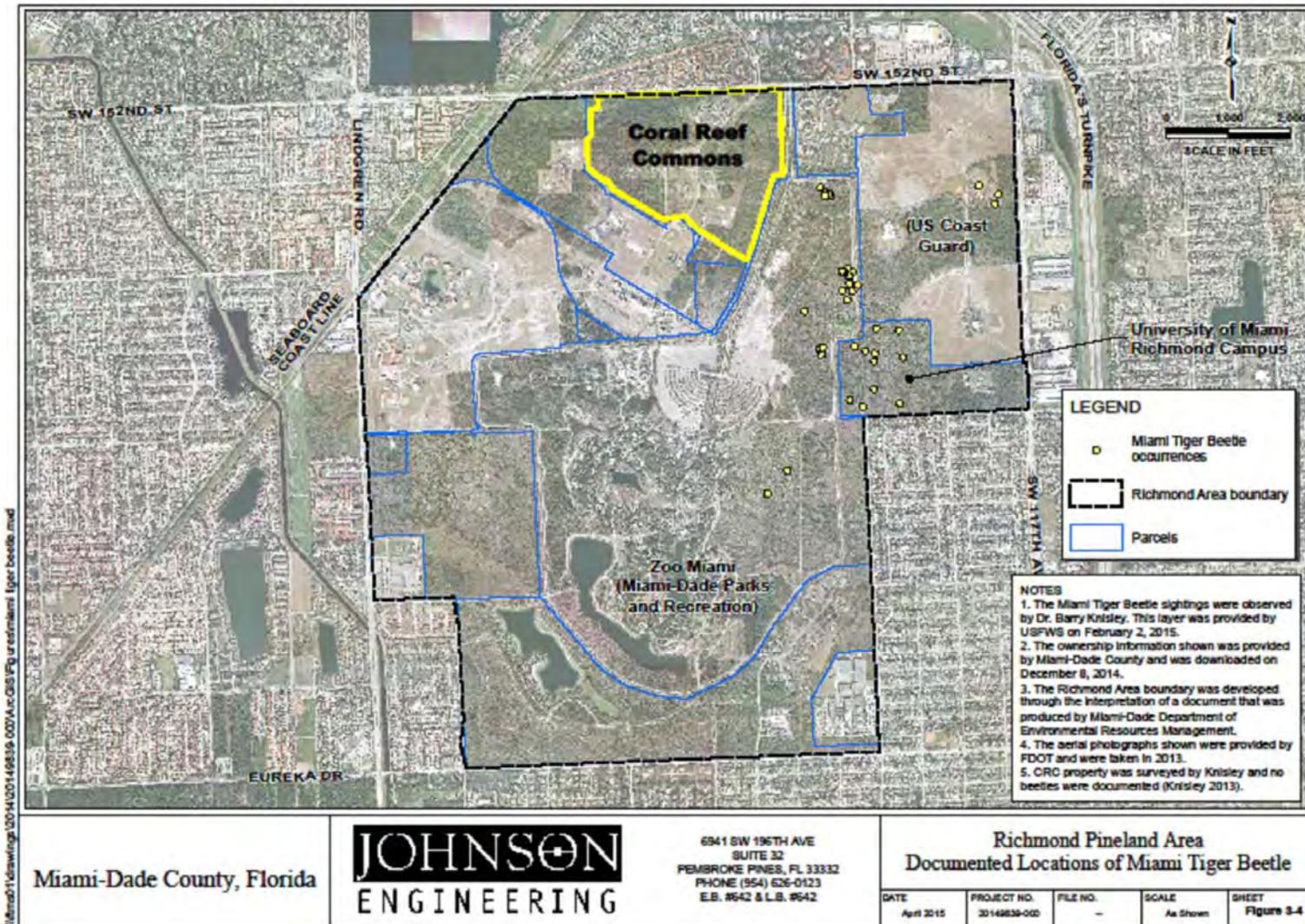
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<sup>7</sup> On January 14, 2015 and February 27, 2015, Ram Coral Reef filed a Technical and Legal Submittal regarding the emergency petition and a supplemental response. On February 22, 2016, Ram Coral Reef filed comments on the proposed rule to list the Miami tiger beetle as endangered and also submitted an index of documents to supplement the rulemaking record. The Applicant seeks incidental take coverage for Miami tiger beetle in this HCP because it has been raised by USFWS in meetings and communications regarding the CRC Property. Ram Coral Reef has submitted formal comments to the USFWS raising concerns regarding the listing of the Miami tiger beetle, including taxonomy concerns. In moving forward with this HCP and including the Miami tiger beetle, Ram Coral Reef retains all rights to contest the potential listing of the Miami tiger beetle. Ram Coral Reef also objects to characterization of the CRC Property as suitable habitat for the Miami tiger beetle. All of our comments were submitted into the administrative record for the Proposed Rule to list the Miami tiger beetle and were added to the HCP record.

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and described herein, are the best available information on Miami tiger beetle for the CRC Property and the Off-site Mitigation Area.

Figure 3-4. Miami Tiger Beetle Occurrences within Richmond Area



\\mmd01\drawings\0014\00148639-002\ArcGIS\Figures\miami tiger beetle.mxd

Miami-Dade County, Florida	<b>JOHNSON</b> ENGINEERING	6941 SW 196TH AVE SUITE 32 PEMBROKE PINES, FL 33332 PHONE: (954) 626-0123 E.B. #642 & L.B. #642	Richmond Pineland Area Documented Locations of Miami Tiger Beetle	
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### 3.2.8 *White-crowned Pigeon*

#### Biological Information

The white-crowned pigeon (*Patagioenas leucocephala*) has a dark gray body with green feather on their back and neck and a white crown that reaches down just below the eye (FWC 2015a). Both the crown and body of females are duller than in males, and juveniles lack the white crown all together (FNAI 2001). This species of pigeon can reach up to 14 inches long with a wingspan of 23 inches (<http://myfwc.com/wildlifehabitats/imperiled/profiles/birds/white-crowned-pigeon/> accessed May 18, 2016).

The white-crowned pigeon is not federally listed but is state designated as threatened. They can be found foraging in low-lying forest habitats with ample fruits trees and nesting on mangrove islands and islets (free from raccoons or other disturbances) (FWC 2015a). Their distribution in Florida is mainly limited to Florida Bay, Biscayne Bay, and the Florida Keys with the exception of a few in Collier and Palm Beach counties (FNAI 2001). The main threat to the white-crowned pigeon is habitat degradation and deforestation, as well as pesticides and other human impacts (FWC 2015a).

The White-Crowned Pigeon Species Conservation Measures and Permitting Guidelines (FWC 2016b) identify breeding habitat as mangrove islands in the Florida Keys and foraging habitats possible in Broward, Collier, Miami-Dade and Monroe Counties. Core foraging areas have not been identified however, patches of tropical hardwood hammock greater than 12 acres in size within the species distribution are considered significant for feeding (FWC 2016b).

#### Site-Specific Information

Surveys included general wildlife surveys, in addition to the rare plant, pineland croton, FBB, and land use mapping surveys. These surveys included early morning surveys and surveys conducted during the wintering months when the pigeon is known to leave its nesting mangrove habitat and move to other habitats. During all surveys, any state or federally listed species that were observed were recorded as part of the on-going wildlife documentation within the site. The white-crowned pigeon was not documented within the CRC Property during any of the site surveys, and it is unlikely to occur at the CRC Property or the Off-site Mitigation Area because neither the CRC Property or the Off-site Mitigation Area contain tropical hardwood hammock areas that are greater than 12 acres in size.

### **3.3 Biology and Site-Specific Information for Plant Species Subject to the No Surprises Policy (Table 1-2)**

#### **3.3.1 *Tiny Polygala***

#### Biological Information

Tiny polygala was federally listed as endangered under the ESA on July 18, 1985 (DOI 1985). Critical habitat has not been designated for this species (USFWS 1999). As its name suggests it is a small, short-lived (180 days) perennial herb, appearing, flowering and then disappearing until the next suitable disturbance (USFWS 2013). This species exhibits natural and dramatic fluctuations in population numbers from season to season, as much as several hundred percent, making it extremely difficult to estimate total population number (USFWS 1999). It typically has 1-4 unbranched stems that are commonly buried in the sand, which gives it a tufted

appearance. It is about 4 inches tall with 0.5 inch wide and 2 inch long succulent leaves. Flowers are small, yellow-green and numerous, crowded at the top (FNAI 2000).

It was once thought to be endemic to Miami-Dade and Broward counties but eleven populations have now been documented as far north as southern St. Lucie County. All populations are found within six miles of the Atlantic Coast and occurs in pyrogenic communities including pine rocklands, open sand pine scrub, slash pine, high pine, and well-drained coastal spoil (USFWS 1999). Tiny polygala requires a relatively open canopy for high levels of light and occurs in sand pockets at least 2 cm. deep. It has not been documented in litter deeper than 2.5 cm, therefore, it requires little to no organic litter accumulation (USFWS 1999). Tiny polygala produces a seed bank that persists within the soil for at least two years, although seeds buried at least 1 cm deep may persist for longer (USFWS 2013).

The fire ecology of tiny polygala is poorly understood, however, it is known that fire is needed to maintain an open well-lit substrate and to reduce organic litter. Population numbers have been documented to increase following other disturbances such as the storm surge associated with Hurricane Andrew. Threats to the recovery of tiny polygala include fire suppression, which will allow organic litter accumulation, hardwood succession, shading, and invasive infestation. In MDC, Burma reed is the greatest threat (USFWS 1999).

#### Site-Specific Information

The tiny polygala occurs in only two areas within the CRC Property (**Figure 3-5**). The largest population was found within the On-site Preserves (specifically, Management Unit 8) and contains 100 plants. Seedlings as well as flowering and fruiting adult plants were observed.

A second smaller population of nine (9) plants was found within pine rocklands that occur within Development Areas. This population was also encountered during a plant relocation that occurred in June 2014 by staff at FTBG, during which time three (3) tiny polygala specimens were removed (**Appendix D**). Seedling, flowering, and fruiting plants were all observed within this smaller population.

Both populations were found within pine rocklands that had been subject to less habitat degradation and had an open canopy with less than 25% Burma reed infestation and limited organic accumulation. As a result of the issuance of the ITP, the largest population of tiny polygala within the CRC Property (estimated at 100 plants) will be preserved. Tiny polygala is known to occur within the Richmond Area, but it is unknown if it occurs in the Off-site Mitigation Area.

### **3.3.2 Deltoid Spurge**

#### Biological Information

Deltoid spurge was federally listed as endangered under the ESA on July 18, 1985 (DOI 1985). Critical habitat has not been designated for this species (USFWS 1999). The deltoid spurge is a prostrate perennial herb that forms small mats over exposed limestone. Leaves are deltoid to ovate in shape, opposite and up to 5mm long.

This plant has similar habitat requirements to tiny polygala, only the deltoid spurge occurs on limestone adjacent to sand pockets. It requires an open shrub canopy and minimal organic litter (FNAI 2000). Unlike tiny polygala, the deltoid spurge occurs only in MDC on Opalocka-Rock Outcrop soils. Determining population trends for this species is not possible due to the lack of

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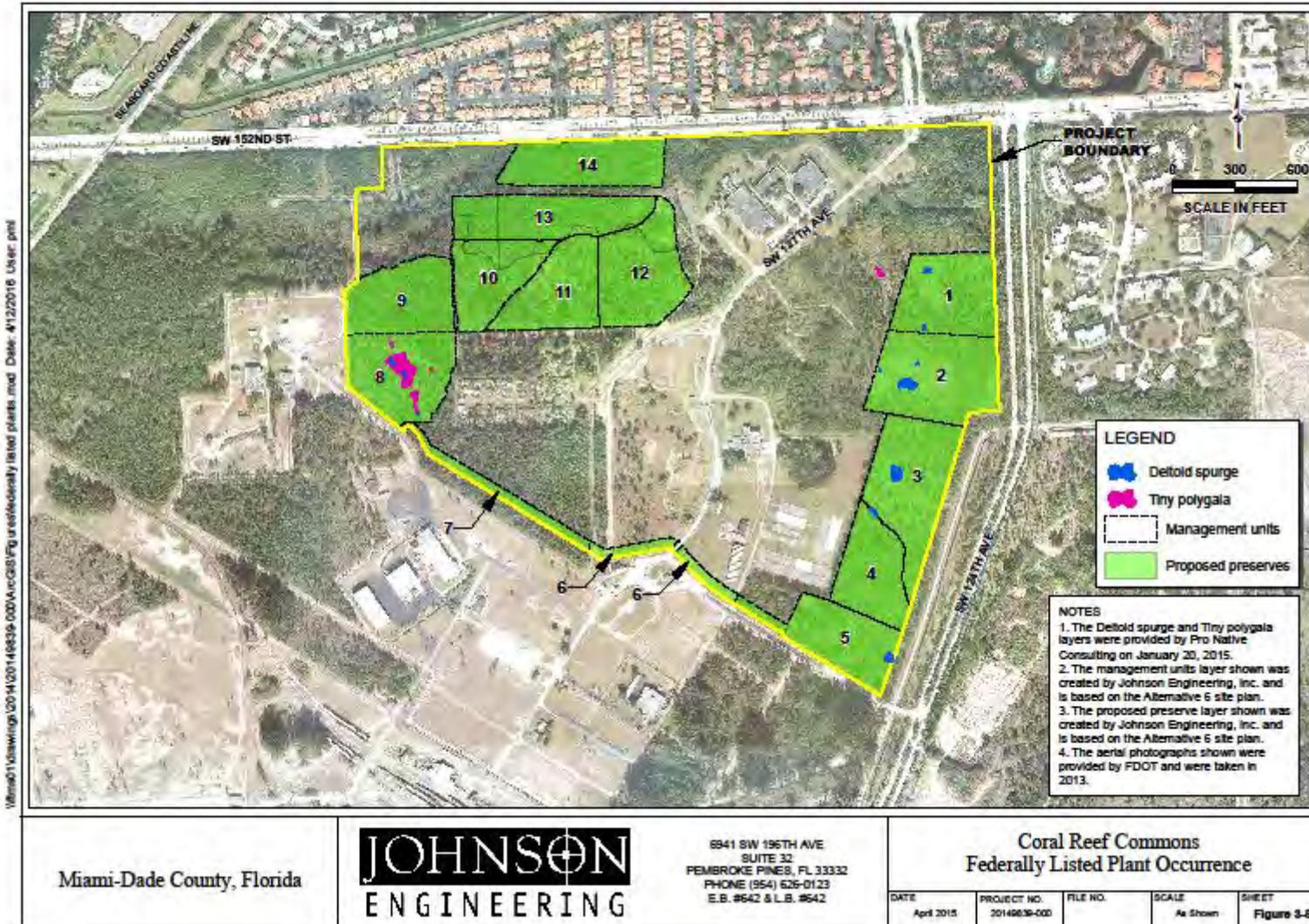
data on the plant's life history and need for additional surveying (USFWS 2013). Currently, this subspecies is known to occur on 14 public lands and an undetermined number of private lands (USFWS 2013).

Fire suppression, invasive infestations, and habitat fragmentation and loss are contributing threats to the recovery of the species. A regular fire regime, typical of pine rocklands (3-7 years) is required to maintain an open shrub canopy and reduce organic litter. Moderate mechanical disturbance that reduces the shrub canopy has also been shown to benefit the species. A comprehensive invasive management strategy is also important to the survival of the species (USFWS 1999).

Site-Specific Information

The deltoid spurge *deltoidea* variety was documented within the CRC Property during the 2014 plant surveys. Eleven areas were identified within the CRC Property that contained deltoid spurge plants (**Figure 3-5**). All of the occurrences of this species were within areas slated for preservation. With the exception of one small population that occurred on the edge of pine rocklands-Burma reed dominated, near a firebreak; all of the deltoid spurge occurrences were within pine rocklands with less than 50% Burma reed. Young plants, fruiting and flowering were observed during the 2014 survey. The existing deed restriction for the Off-site Mitigation Area (**Appendix O**) indicates that deltoid spurge has been observed on the Off-site Mitigation Area.

Figure 3-5. Federally Listed Plant Occurrences within the CRC Property



### **3.3.3 *Crenulate Lead-plant***

#### Biological Information

The crenulate lead-plant (*Amorpha crenulata*) was federally listed as endangered under the ESA on July 18, 1985 (DOI 1985). Critical habitat has not been designated for this species (USFWS 1999). This species is a rhizomatous, perennial, deciduous shrub that grows to 1.5 m in height and is endemic to Miami-Dade County. The branches of the plant are reddish purple and contain 25 to 33 gray and green leaflets. It has a showy white flower that is 5.2mm long and 4.2 mm wide (USFWS 2013).

The crenulate lead-plant occurs in seasonally hydrated soils that are frequently burned such as wet pinelands, transverse glades, and hammock edges. It requires open sun to partial shade. This species has a very limited distribution range that encompasses a 20-mi<sup>2</sup> from Coral Gable to Kendall. The crenulate lead-plant was listed as endangered due to loss of habitat from development. Fire suppression, invasion by exotic plant species, and drainage are also contributing threats for this species (USFWS 2013).

#### Site-Specific Information

The crenulate lead-plant historically had a very limited range, mainly from the Miami River south to possibly SW 168<sup>th</sup> Street. The closest natural population of crenulate lead-plant occurs in Pinecrest, approximately five miles northeast of the CRC Property. This species was not documented during the 2014 Woodmansee rare plant surveys, and Woodmansee concluded it was likely this species has never occurred within the CRC Property (Woodmansee 2014). This species is not expected to occur at the Off-site Mitigation Area. An experimental population of crenulate lead-plant has been introduced nearby within the Richmond Area.

### **3.3.4 *Florida Brickell Bush***

#### Biological Information

The Florida brickell bush (*Brickellia mosieri*) was listed as federally endangered under the ESA on September 4, 2014 (DOI 2014c) (effective October 6, 2014). USFWS has designated critical habitat, which encompasses approximately 2,636 acres in Miami-Dade County (Federal Register 80 FR 49845 49886).

The Florida brickell bush is a perennial herb 1 to 3.5 ft tall that is slender, erect, and branching. Leaves are alternate, narrow, linear, thick, toothed and usually spread downward. The flowers are white and are in loose, open clusters at the end of branches (USFWS 2013).

This species is found only in Miami-Dade pine rocklands that have an open, well-lit subcanopy with exposed limestone and minimal organic material (USFWS 2013). Its current distribution is in central and southern Miami-Dade County from SW 120 Street to Florida City (USFWS 2013). Bradley and Gann (1999) estimate the population between 1,001 and 10,000 plants with a probable number closer to 5,000 to 7,000 plants. USFWS lists the approximate population closer to 1,550 plants based on recent studies (USFWS 2013).

As with virtually all other pine rockland species, the primary threats to this plant are related to fire suppression, exotic infestations, habitat loss and fragmentation (USFWS 2013).

### Site-Specific Information

During the 2014 rare plant surveys this plant was not documented within the property, likely due to habitat degradation from lack of management (Woodmansee 2014). This species has been documented in adjacent pine rocklands within the Richmond Area.

The CRC Property contains approximately 104 acres of designated critical habitat for the Florida brickell bush (**Figure 3-3**). Some portions of the area proposed as critical habitat are exotic dominated hardwoods with completely closed canopies and non-appropriate soils. Designated critical habitat for the Florida brickell bush includes the Off-site Mitigation Area; however, its occurrence on the Off-site Mitigation Area is unknown.

#### **3.3.5 Garber's Spurge**

### Biological Information

The Garber's spurge (*Chamaesyce garberi*) was federally listed as threatened under the ESA on July 18, 1985 (DOI 1985). The USFWS has not designated critical habitat for this species (USFWS 1999). This species of spurge is a prostrate to erect herb with pubescent stems. The leaves are ovate in shape and 4 to 9 mm long with entire or obscurely serrate leaf margin (USFWS 2013). The Garber's spurge is endemic to south Florida, where it occurs on sandy soils over limestone in pine rocklands, hammock edges, coastal rock barrens, grass prairies, salt flats, beach ridges and swales (FNAI 2000). Population numbers are well over 1 million plants within a 17 populations; 96% of the total population is protected (USFWS 1999; USFWS 2013). Threats to this species are largely related to fire suppression and lack of habitat management, although sea-level rise may become a significant threat to the coastal populations in the future (USFWS 2013).

### Site-Specific Information

The Garber's spurge was not documented within the CRC Property during the 2014 rare plant surveys (Woodmansee 2014). Additionally, this species does not occur in the adjacent Richmond Area, including the Off-site Mitigation Area.

#### **3.3.6 Small's Milkpea**

### Biological Information

Small's milkpea (*Galactia smallii*) was federally listed as endangered under the ESA on July 18, 1985 (DOI 1985). The USFWS has not designated critical habitat for this species (USFWS 1999). Small's milkpea is a perennial legume with numerous trailing stems radiating from large woody taproots, possessing relatively large flowers (USFWS 2013). The distribution of this species is correlated with soil depth and color in Redland pine rocklands and does not occur in pine rocklands along the limestone rock ridge (USFWS 2010). Small's milkpea prefers open sun and little shade, it is threatened by hardwood encroachment and invasive infestations (USFWS 2013).

### Site-Specific Information

This species was not documented during the 2014 plant surveys or any prior surveys within the CRC Property and Off-site Mitigation Area. It was recorded in error within adjacent portions of the Richmond Area by IRC. FNAI reported an occurrence of this species on August 14, 1991 within the Larry and Penny Thompson Park, which is within the Richmond Area. Specimens

were not photographically documented or collected, therefore it is unknown whether this observation was a misidentification given its similarity in appearance to other species (Personal communication Woodmansee 2/23/2014). Additionally, this species does not appear to have been subsequently documented in this location in the 25 years after the initial reporting. Given the soils within the CRC Property are limestone Opalocka Rock Outcrop Complex, which are not the preferred soil for this species, and lack of verifiable or subsequent documentation for sole reported location within the Richmond Area, it is likely this species does not occur within the CRC Property or the Richmond Area.

### **3.3.7 Sand Flax**

#### Biological Information

Sand flax (*Linum arenicola*) was federally listed as endangered on September 29, 2016 (DOI 2016a) (effective October 31, 2016). Sand flax is a small wiry, yellow-flowered perennial herb that can easily go unnoticed, or be confused with a more common wildflower pitted stripeeed (*Piriqueta caroliniana*) (USFWS 2013; Woodmansee 2014). Sand flax can be found in pine rockland, disturbed pine rockland, marl prairie, roadsides on rocky soil, and disturbed areas. It is known to occur in Miami-Dade and Monroe counties in 12 locations. As with other pine rockland plants, it requires periodic fires to maintain an open well-lit habitat with low levels of organic litter (USFWS 2013).

#### Site-Specific Information

The more common wildflower, pitted stripeeed, is abundant within the CRC Property. Knowing this, determined searches were made for the presence of sand flax, but this species remains undocumented within the CRC Property (Woodmansee 2014). It has been documented within adjacent pine rocklands in the Richmond Area and may occur in the Off-site Mitigation Area.

### **3.3.8 Carter's Small-Flowered Flax**

#### Biological Information

The Carter's small-flowered flax (*Linum carteri* var. *carteri*) was federally listed as endangered under the ESA on October 6, 2014 (DOI 2014c). USFWS has designated critical habitat, which encompasses approximately 2,666 acres in Miami-Dade County (DOI 2015b). It is a short-lived perennial herb that is endemic to Miami-Dade County, where it grows in pine rocklands, and disturbed pine rocklands (USFWS 2013). It is similar in appearance to the more common wildflower, the pitted stripeeed (Woodmansee 2014). Historically it occurred from latitude 25°43.8 to latitude 25°30.4. It is currently found from R. Hardy Matheson Preserve (near Pinecrest) southwest to Naranja/Modello (USFWS 2013). It is threatened by loss of habitat due to development and habitat degradation related to lack of management and fire suppression.

#### Site-Specific Information

Similar to the sand flax, determined searches were made for Carter's small-flowered flax during the 2014 rare plant surveys, carefully looking for differentiations from the abundant pitted stripeeed. Despite these efforts, Carter's small-flowered flax was not documented within the CRC Property during 2014 Woodmansee rare plant surveys. The Carter's small-flowered flax has never been reported within the Richmond Area. The closest natural population occurs approximately 3 miles to the east of the Richmond Area (Woodmansee 2014). The USFWS has

designated approximately 104 acres of critical habitat for this species within the CRC Property (**Figure 3-3**). However, some portions of the area designated as critical habitat contain habitat not suitable for this species, such as exotic dominated hardwoods. The Off-site Mitigation Area is also located within an area designated as critical habitat for the Carter's small-flowered flax.

### **3.3.9 *Blodgett's Silver Bush***

#### *Biological Information*

The Blodgett's silver bush (*Argythamnia blodgettii*) was federally listed as threatened on September 29, 2016 (DOI 2016a) (effective October 31, 2016). It is an erect, short-lived, perennial, evergreen forb that occurs on the edges of rockland hammocks and pine rocklands (Woodmansee 2014; USFWS 2013). It is capable of tolerating some level of human disturbance and can be found in disturbed rocklands or in completely scarified pine rockland (Bradley and Gann 1999). It is found in MDC and Monroe County in the Florida Keys. Lack of habitat management from fire suppression to invasive plants and habitat loss due to development are the primary threats to this species (USFWS 2013).

#### *Site-Specific Information*

Blodgett's silver bush was not documented during the 2014 rare plant surveys and is presumed absent within the CRC Property and Off-site Mitigation Area. Although no "true" hammock occurs within the CRC Property, it may have historically occurred within the site, but lack of habitat management would likely have extirpated any occurrence of the species (Woodmansee 2014).

### **3.3.10 *Florida Prairie Clover***

#### *Biological Information*

The Florida prairie clover (*Dalea carthagenensis* var. *floridana*) was listed as an endangered species by USFWS on October 6, 2017 (DOI 2017) (effective November 6, 2017). It is a 3 to 6 foot shrub with a woody base and red, contorted, velvety, non-woody branches. Its leaflets number 11 to 23 and are oval and gland dotted on the underside. Its flowers are small whitish turning maroon loose heads at the end of hairy, glandular stalks. The loose flowers and hairy stems are differentiating from other *Dalea* spp. (FNAI 2000). This shrub is found in pine rocklands, edges of rockland hammocks, coastal uplands, and marl prairies (USFWS 2013). Nine occurrences of this shrub remain within Collier, Monroe and Miami-Dade Counties, seven of these occurrences are on conservation lands. Fire suppression is described as the biggest threat to this species because the plants cannot tolerate hardwood shading (USFWS 2013).

#### *Site-Specific Information*

Historical and recent plant surveys have never identified this species within the CRC Property. It is unlikely this species has ever occurred within the CRC Property and Off-site Mitigation Area given it has not been recorded anywhere within the Richmond Area and the closest natural population is 4.5 miles to the east southeast (Woodmansee 2014).

### **3.3.11 Florida Pineland Crabgrass**

#### Biological Information

Florida pineland crabgrass (*Digitaria pauciflora*) was listed as a threatened species by USFWS on October 6, 2017 (DOI 2017) (effective November 6, 2017). It is a rhizomatous perennial with long hairy leaf blades that are twisted, spreading 7-18cm. It occurs most commonly along the ecotone between pine rocklands and marl prairies. Historically, it occurred along the central and southern portions of the Miami Rock Ridge but is now confined to ENP and BCNP. In 1995, a single plant was found on marl soils in the Richmond Area and was last observed in 1997 and is considered extirpated from the area due to decreased hydroperiods. The largest threats to this species are drainage, loss of habitat due to agriculture and development, and suppression of fire (USFWS 2014c).

#### Site-Specific Information

This species was not documented within the CRC Property during the 2014 rare plant surveys or any prior surveys within the CRC Property and Off-site Mitigation Area. The last known occurrence within the Richmond Area consisted of a single plant that was last documented in 1997. This species may have historically occurred within the CRC Property but it was likely extirpated from the area several decades ago due to historical hydrologic alterations and fire suppression (Woodmansee 2014).

### **3.3.12 Everglades Bully**

#### Biological Information

The Everglades bully (*Sideroxylon relinatum* var. *austrofloridense*) was listed as a threatened species by the USFWS on October 6, 2017 (DOI 2017) (effective November 6, 2017). This species is not state listed but is listed as “critically imperiled globally” by FNAI. The Everglades bully is a woody shrub 3-6 feet tall. Leaves are thin, obovate or ovate, and evergreen. They are a defining characteristic from the other two subspecies of *S. relinatum* in Florida, which are persistently pubescent on their undersides, rather than smooth or pubescent only along the midvein (USFWS 2013). This species is restricted to pinelands with understory on limestone rock and are found in low elevation pine rocklands at the pineland/marl prairie ecotones that flood each summer (USFWS 2013). Everglades bully is known to occur at 11 sites including the Richmond Area (USFWS 2013). Hydrologic alterations and loss of habitat are likely the greatest threats to this species.

#### Site-Specific Information

The more common subspecies, recline Florida bully (*Sideroxylon reclinatum* ssp. *reclinatum*), was previously reported by Bradley *et al.* (2000) within the CRC Property. This species is similar in appearance to the Everglades bully, therefore, searches were carefully carried out within the CRC Property during the 2014 rare plant surveys. Despite determined searches, neither species was found within the CRC Property (Woodmansee 2014). This species has been documented within the adjacent Larry and Penny Thompson Park. There is no documentation of this species at the Off-site Mitigation Area.

### **3.3.13 Florida Bristle Fern**

#### Biological Information

The Florida bristle fern (*Trichomanes punctatum* ssp. *floridanum*) was listed as endangered under the ESA on October 6, 2015 (DOI 2015c). This species is a very small, mat-forming fern, with brownish black hairlike outgrowth (trichomes) and superficially resembles some liverwort species (USFWS 2013). It is always associated with shaded limestone outcrops and can be found in rockland hammocks and solution holes, which provide higher levels of moisture from the accumulation of organic soils (USFWS 2013). Historically, this species occurred in central and southern Florida. There are now 5-6 current locations known for the Florida bristle fern in Sumter and Miami-Dade counties.

#### Site-Specific Information

This species was not documented within the CRC Property during the 2014 rare plant surveys. This species may not have ever occurred within the CRC Property because there is no historical record of this species occurring within the Richmond Area (Woodmansee 2014). There is no documentation of this species at the Off-site Mitigation Area.

### **3.3.14 Clamshell Orchid**

#### Biological Information

Clamshell orchid (*Encyclia cochleata* var. *triandra*) is listed as endangered by the State under Chapter 5B-40 (FAC 1998, amended). This attractive orchid has a pear-shaped, somewhat flattened stem (pseudobulb) attached to tree trunks and branches by numerous white aerial roots. Its strap-like leaves grow to 12 inches long. Flowering stem reaches to 16 inches long, with up to ten flowers. The flower has drooping, narrow, twisted, yellow-green sepals to 1.4 inches long, two petals similar to sepals, and an erect, purplebrown, shell-like lip marked with yellow (FNAI 2000).

Clamshell orchid grows on trunks and branches of pond apple, cypress, live oak, and buttonwood trees in swamps and hammocks in southern Florida, the West Indies, Central and South America (FNAI 2000).

#### Site-Specific Information

This species was not documented within the CRC Property during 2014 rare plant surveys (Woodmansee 2014). Based on the literature review, it does not appear to occur within the Richmond Area, including the Off-site Mitigation Area.

## **4.0 ALTERNATIVES ANALYSIS**

The Applicant is seeking federal and state authorization for the incidental take of species in **Table 1-1**, the ITA Species, for the Project, per section 10(a)(1)(B) of the ESA. Pursuant to Section 10(a)(2)(A), the HCP presents alternative actions considered and reasons why certain alternatives were not chosen.

Several alternatives have been considered through the evolution of the Project, as the Applicant has modified the Project to, to the maximum extent practicable, minimize and mitigate for impacts. As an initial matter, the CRC Property has previous development, including buildings and an existing spine road through the center of the CRC Property. The Project was designed to expand and improve the existing spine road to avoid unnecessary impacts and save costs. The Development Areas are logically placed adjacent to the spine road with the On-site Preserves located on the east and west sides of the CRC Property. The location of the On-site Preserves allows for connectivity with the adjacent pine rocklands on surrounding properties. Furthermore, under the MDC Code, the On-site Preserves include 93% of the NFCs. The On-site Preserves maximize preservation of the largest contiguous areas of on-site pine rocklands. MDC also required commitments of significant monies amortized over several years for the funding of on-site and off-site infrastructure and traffic improvements. This background information frames the discussion of alternatives and explains why certain impacts were unavoidable. The following are the alternatives that were considered and led to the development of the Preferred Alternative – Alternative 6. Other alternatives were considered and rejected earlier in the process, and therefore, are not brought forward for in-depth consideration.

The following alternatives have been included in the HCP to provide a frame of reference for the evaluation of impacts and to meet the requirements of the ESA and NEPA.

### **4.1 Alternatives**

#### ***4.1.1 Alternative 1 – No Action***

Under the No Action Alternative, no development and no restoration of the CRC Property would occur. In the No Action Alternative, habitat management would not be authorized by an ITP and the site would continue to degrade, with some species likely to experience a decline in population. Under the No Action Alternative, lightning-based fires could potentially occur and have some temporary mitigating beneficial effects by reducing hardwood encroachment. However, this beneficial effect would likely be temporary, and given the extensive presence of invasive plants, burned areas would likely be quickly colonized by invasive plants, which are known to outcompete native plants following disturbance. Under the No Action Alternative, land management activities would not be covered by an ITP and the presence of invasive plant species would continue to expand.

#### **Feasibility**

This alternative was considered infeasible for the following reasons.

- Does not meet the purpose of the project or goals of the HCP;
- Abandoning the project purpose would not realize the investments incurred to date;

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- The existing restrictive covenant, which Applicant provided to MDC in exchange for development rights, for the management and preservation of 39.64 acres of pine rocklands and 3.72 acres of hardwood hammock, Applicant would seek to vacate; and
- The On-site Preserves would continue to degrade with some areas likely losing their NFC designation and existing pine rockland characteristics could be lost or diminished.

Based on the habitat functional assessments detailed in **Section 5** of the HCP, the entire 137.9-acre CRC Property has 40.72 Habitat Value Units (HVU). As referenced above, as a result of lack of management, the CRC Property would continue to degrade and the HVU would decline, resulting in less ecological value to Covered Species. The No Action Alternative does not result in avoidance of impacts to the Covered Species.

**4.1.2 Alternative 2 – Redevelopment Only /No Restoration**

Alternative 2 would redevelop 25.44 acres of previously developed lands, resulting in 250 residential units/apartments on 13 acres and 80,000 square feet of commercial/retail on approximately 10 acres (**Figure 4-1**). Alternative 2 eliminates pine rockland impacts and impacts to MDC-designated NFCs. **Figure 4-1** identifies 25.44 acres of “Existing Development” on which redevelopment in Alternative 2 could occur. An area of existing development that is not included for redevelopment in this alternative is identified as “Previously Removed NFC.” These areas represent the impacts to “Previously Removed NFC Pine Rockland Impact” (see MDC NFC2012-012), and without redevelopment, the Applicant would seek to vacate designation of preserves or restoration activities. The areas identified on **Figure 4-1** do not support residential or commercial development because of their irregular shapes, lack of sufficient acreage to accommodate the necessary commercial development in the necessary configuration, coupled with the distance from SW 152nd Street which is too far to meet visibility requirements for development.

Feasibility

Alternative 2 is not feasible because it does not meet the project purpose, which is to construct an environmentally conscious, economically viable, mixed-use development. The economic viability of the Project is dependent on the ability to develop a large commercial retailer as an anchor store that is visible from SW 152nd Street, along with smaller retail uses and a residential community large enough to sustain the anchor store and related retail entities. An anchor store is typically a larger retail department store whose presence draws customers not only to the anchor store itself, but also to the numerous interior tenants. Alternative 2 would not support an anchor store because it does not allow for the necessary size (approximately 158,000 square feet) and the irregular shape would not allow the necessary configuration. The 80,000 square feet available for commercial and retail uses is insufficient for the large commercial retailer. If no large commercial retailer is accommodated, the project purpose is negated because the smaller commercial/retail tenants would not be attracted to the CRC Property, effectively eliminating the commercial component of the mixed use purpose. The residential development in the southern portion of the CRC Property alone does not meet the project purpose.

Alternative 2 also is not economically feasible. To generate revenue to support the infrastructure improvements, the costs to the limited set of lessees, property owners, and/or tenants would be too high when compared to the local market. This alternative also would result in an investment return that is below the current financial investments in the Project. Finally, the preservation and

restoration of pine rocklands and the rockland hammock would not be required, thus no restoration of the CRC Property would occur and the Previously Removed NFC Pine Rockland Impact would be subject to potential negotiations (MDC NFC2012-012)). Pine rocklands and the rockland hammock would continue to degrade as a result of hardwood encroachment and invasive infestations, similar, if not identical to the No Action Alternative.

#### ***4.1.3 Alternative 3 – Maximum Build-out***

This alternative is driven by the maximum allowable limits of development that would be permitted under MDC Code §24-49.2. This code regulates the development of areas designated as NFCs. MDC has formally designated 49.44 acres as pine rockland NFC and 3.72 acres as rockland hammock NFC based on the quantitative evaluation criteria in **Section 24-5** of the MDC Code. The MDC Code allows for the development of 20% of pine rockland NFCs for sites greater than 5 acres, with an additional 10% allowable development provided the subcanopy and canopy are replaced through site plantings. Additionally, a total of 10% of the rockland hammock is allowed to be developed under the MDC Code.

Under the maximum allowable development of NFCs, only 34.6 acres of pine rocklands would be required for preservation, provided 4.9 acres of plantings to replace understory and canopy loss were included in the landscape plan. Additionally, only 3.3 acres of the rockland hammock area would be required to be preserved. Total NFC required to be preserved on-site based on this alternative would be 37.9 acres.

Alternative 3 has a development footprint of 100.12 acres and includes approximately 370,000 square feet of commercial development and 1,056 residential units (**Figure 4-2**). Total preservation would include 34.6 acres pine rockland, 3.3 acres of rockland hammock and 4.9 acres of landscape plantings, which is required only to replace the canopy and understory and does not need to consist of pine rockland species.

#### ***Feasibility***

This alternative was considered prior to submittal of a NFC permit application to MDC. While this alternative meets the Project Purpose for the Applicant, it was not selected due to its potential increased impacts to Covered Species resulting in less conservation than Alternative 6.

#### ***4.1.4 Alternative 4 – County Approved Zoning in 2013***

Alternative 4 was originally permitted by the NFC Permit on July 8, 2013. The NFC Permit authorized the clearing of 9.8 acres of pine rockland provided 39.64 acres of NFC pine rockland and 3.72 acres of NFC hardwood hammock (rockland hammock) were preserved and managed. The total acreage of permitted NFC clearing included 3.2 acres of pine rockland NFC that would be cleared for the development, as well as 6.6 acres of pine rocklands that was previously cleared by UM for the research facility. Alternative 4 has a development footprint of 94.07 acres, which includes 370,000 square feet of commercial development and 900 residential units. A total of 43.36 acres of mitigation would be preserved under this alternative (**Figure 4-3**).

#### ***Feasibility***

This alternative is feasible and is allowable under MDC Code, but was not chosen due to its potential impacts to Covered Species. Based on the habitat functional assessments detailed in **Section 5.0** of the HCP, Alternative 4 would result in impacts to 16.22 HVU and overall would result in a net deficit of 4.02 HVU. This alternative was not selected due to lesser HVU impacts

and because additional minimization and mitigation measures are proposed in Alternative 5 and Alternative 6.

#### ***4.1.5 Alternative 5 – County Approved Zoning/Stepping Stones and Southern Corridor***

Alternative 5 was developed in response to the USFWS July 15, 2014 letter indicating the potential presence of federally listed species within the CRC Property (**Figure 4-4**). Residential and commercial development parameters (370,000 square feet of commercial and 900 residential units) remain consistent with Alternative 4 and would also be covered by the NFC Permit issued on July 8, 2013. Areas planned for development were eliminated in Alternative 5 to provide for a 2.16-acre corridor of additional preserve along the southern boundary of the property (the “Southern Corridor”), for a total of 45.52 acres of mitigation and a reduced development footprint of 91.8 acres. The Southern Corridor would enhance connectivity for species between the East and West Preserves. The addition of a preserve corridor would also be consistent with several USFWS recovery objectives for pine rocklands including Objective 6, to connect existing pine rocklands by acquiring lands for conservation between them (USFWS 1999). The Southern Corridor is contiguous with a section of undeveloped land located offsite on DOD land. Additionally, Alternative 5 includes 2.86 acres of Stepping Stones, native landscaped areas that would be planted with pine rockland species throughout the development. These native planted areas would meet the USFWS’s pine rockland recovery Objective 5.1 and act as Stepping Stones to enhance connectivity between the On-site Preserves (USFWS 1999).

#### ***Feasibility***

This alternative is feasible and allowable under MDC Code. Alternative 5 would result in impacts to 15.94 HVU and overall would result in a net deficit of 0.64 HVU. This alternative was not selected due to lesser HVU impacts and because additional minimization and mitigation measures are proposed in Alternative 6.

#### ***4.1.6 Alternative 6 – Reduced Commercial/Increased Preserve (Preferred Alternative)***

Alternative 6 (**Figure 4-5**) is the Preferred Alternative because it fulfills the project purpose of creating an economically viable community with residential and commercial development and also minimizes impacts and maximizes the On-site Preserves, provides additional buffers and connectivity, through a Southern Corridor and Stepping Stones. Alternative 6 depicts green spaces that will be available to residents for recreational use to help deter people from using the Preserves and Stepping Stones as a public space. Compared to Alternative 5, Alternative 6 would reduce the development area from 91.8 acres to 86.49 acres, reduce commercial units from 370,000 square feet to 289,000 square feet, reduce impacts to pine rocklands by 5.45 acres, and increase the acreage of Stepping Stones from 2.86 acres to 3.88 acres and On-site Preserves from 45.52 acres to 51.41 acres. Under Alternative 6, the additional 5.45 acres of pine rocklands not impacted would be restored and enhance the connectivity between two other preserve areas to the north and south. This connectivity would create an even larger West Preserve that, when restored, is expected to increase the habitat value for listed species. Overall, the total acres of On-site Conservation Areas (On-site Preserves and Stepping Stones) would be increased from the original 43.36 acres, permitted by MDC, to 55.29 acres. The minimization and mitigation measures in Alternative 6 fully offset the impacts to the listed species habitat. In addition to the

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On-site Conservation Areas, the Applicant proposes in Alternative 6 conservation measures on an additional 50.96 acres of Off-site Mitigation Area to provide additional substantial conservation benefit to the Covered Species, as depicted in **Figure 1-A**.

Feasibility

The existing condition habitat functional value of the CRC Property, the 137.9 acres, is 40.72 HVUs, and Alternative 6 would result in impacts to 14.35 HVUs, which is less HVU impact than Alternatives 4 and 5. Following restoration activities, the HVU for Alternative 6 would be 43.83 units, a net increase of 3.10 HVU. Alternative 6 also maintains the project purpose and creates a development that is economically viable to support the infrastructure commitments related to the Project. The Conservation Program includes perpetual preservation of 51.41 acres of On-site Preserves (includes an additional 5.89 acres over Alternative 5), restoration of the On-site Preserves, and habitat enhancement and connectivity for the Covered Species through creation of 3.88 acres of Stepping Stones and the Southern Corridor, public education and outreach, and creation of roosting opportunities for FBB through installation of bat boxes. These efforts are above and beyond the functional assessment and provide additional value beyond the 3.10 HVU discussed above. Also, the addition of 50.96 acres of Off-site Mitigation Area and conservation measures provides additional value beyond the 3.10 HVU discussed above and results in a substantial conservation benefit to the Covered Species.

**4.2 Summary of Alternatives**

**Table 4-1. Summary of Alternatives**

Alternative	Description	Commercial (sq ft)	Residential Units	Development Areas (acres)	Stepping Stones (acres)	On-site Preserves (acres)	Mitigation Areas - Preserves & Stepping Stones	Overall Habitat Unit Value Delta	Net Conservation Gain
1	No Action	0	0	0	0	0	0	N/A**	No
2	Redevelopment Only / No Restoration	80,000	250	25.44	0	0	0	N/A**	No
3	Maximum Build-out*	370,000	1,056	100.12	0	37.96	37.96	N/A**	No
4	County Approved in 2013	370,000	900	94.07	0	43.36	43.36	-4.02	No
5	County Approved/ Stepping Stones and Southern Corridor	370,000	900	91.80	2.86	45.52	48.38	-0.64	No
6	Preferred Alternative	289,000	900	86.49	3.88	51.41	106.25	+3.10	Yes
*Requires canopy and subcanopy replacement for 4.9 acres to be included in landscape plan. **Habitat functional analysis not performed for these alternatives.									

Figure 4-1. Alternative 2 Site Plan “Redevelopment Only /No Restoration”

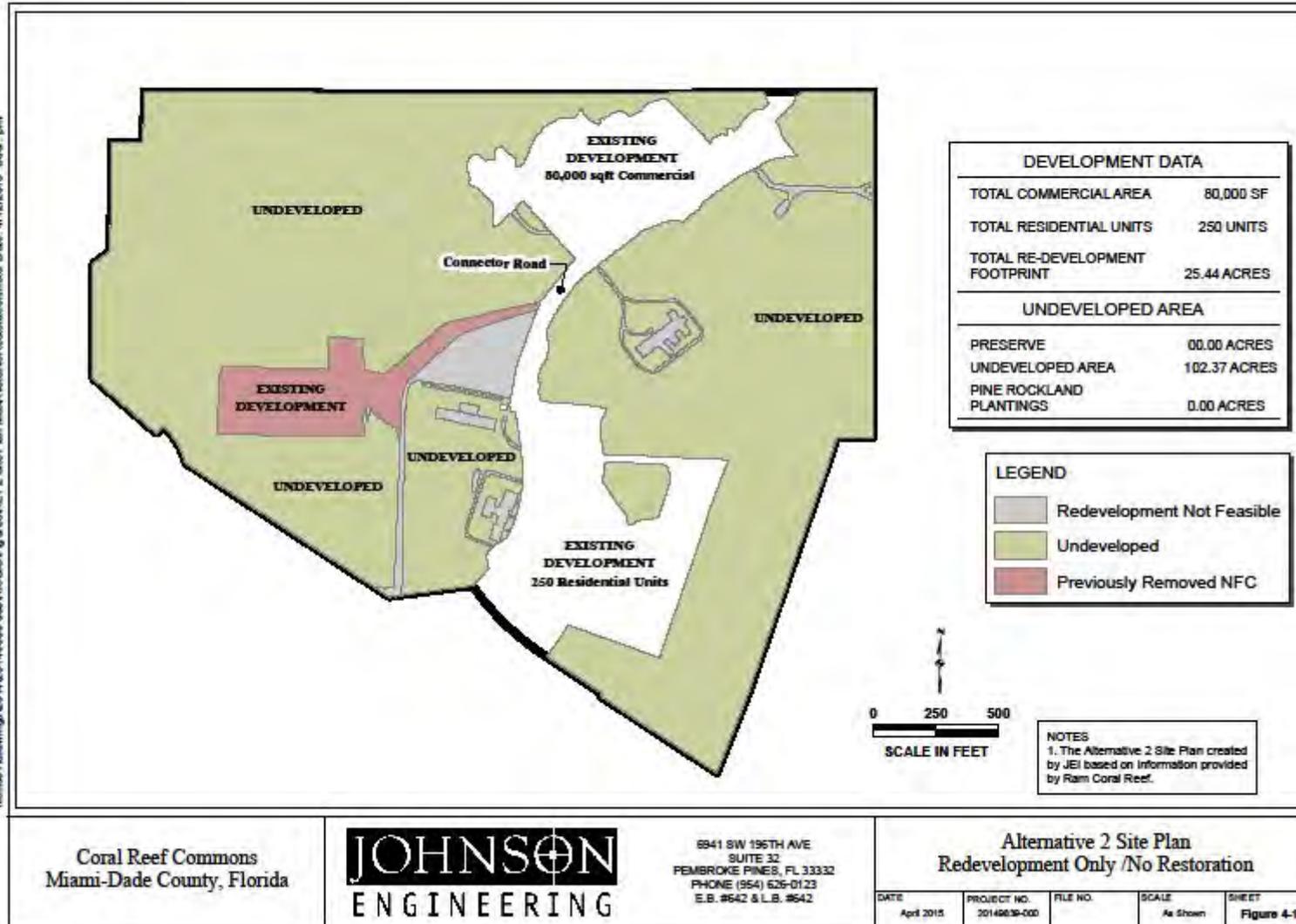
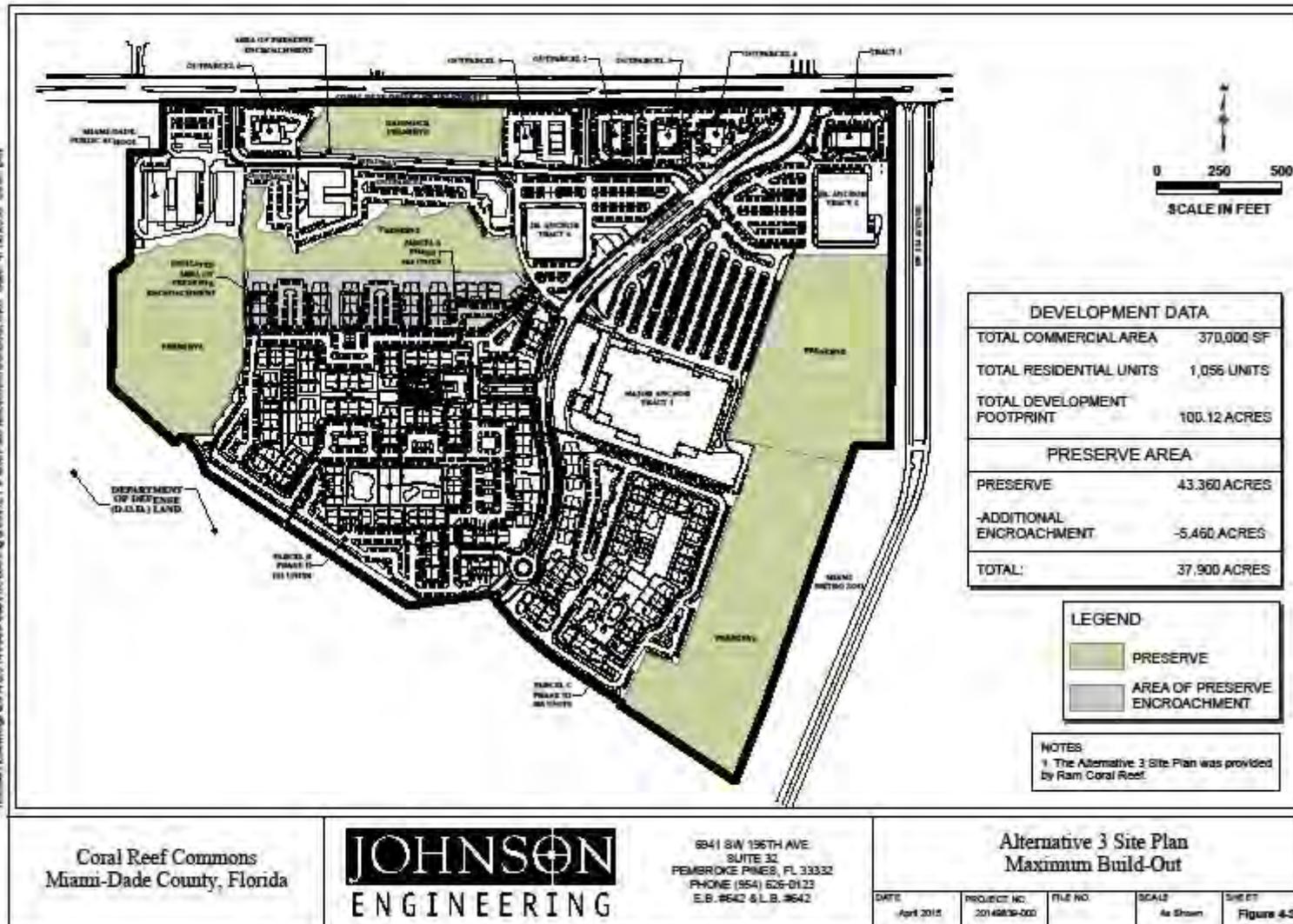


Figure 4-2. Alternative 3 Site Plan “Maximum Build-out”



Coral Reef Commons  
 Miami-Dade County, Florida

**JOHNSON**  
 ENGINEERING

8941 SW 136TH AVE  
 SUITE 32  
 PEMBROKE PINES, FL 33332  
 PHONE (954) 626-0123  
 E.B. 9642 & L.B. 9642

Alternative 3 Site Plan  
 Maximum Build-Out

DATE	PROJECT NO.	FILE NO.	SCALE	SHEET
April 2015	20148879-000		As Shown	Figure 4-2

Figure 4-3. Alternative 4 Site Plan “County Approved Zoning in 2013”

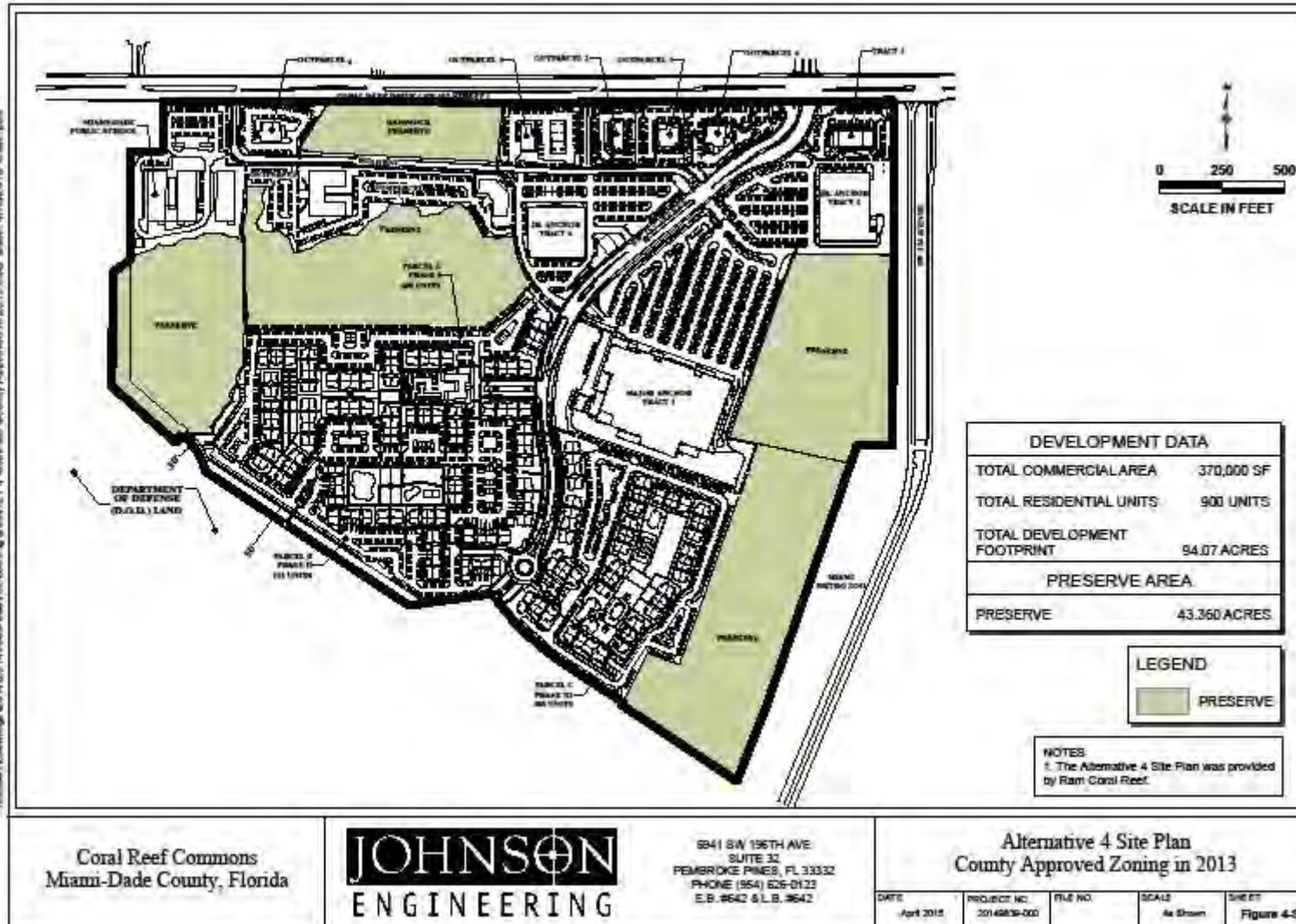
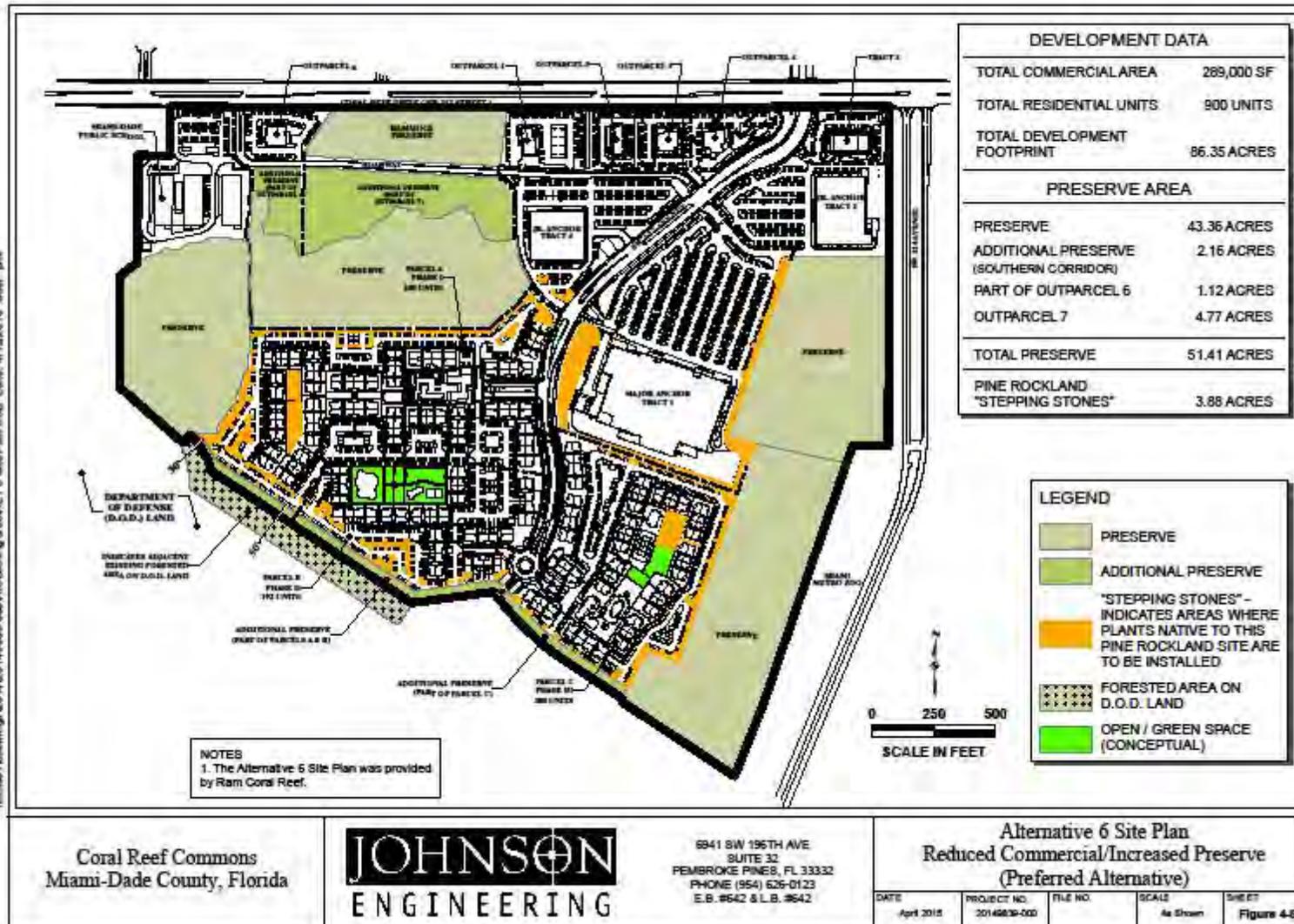




Figure 4-5. Alternative 6 Site Plan “Preferred Alternative” (Figure 1-A depicts the Off-site Mitigation Area)



Coral Reef Commons  
 Miami-Dade County, Florida



6941 SW 196TH AVE  
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Alternative 6 Site Plan  
 Reduced Commercial/Increased Preserve  
 (Preferred Alternative)

DATE	PROJECT NO.	FILE NO.	SCALE	SHEET
April 2018	2014829-000		As Shown	Figure 4-5

### 4.3 Proposed Action Covered by the Incidental Take Permit

#### 4.3.1 Development of the CRC Property

The proposed actions to be covered under the HCP and ITP consist of the construction of mixed-use development within 86.49 acres and all activities associated with such development for the duration of the ITP. The development consists of 289,000 sq ft of commercial real estate, which will include larger and smaller retailers and a MDC public school and the construction of 900 residential units. Construction of associated features such as roadways, parking lots, sidewalks, and infrastructure will also be required for the Project. All construction and operation activities related to the Project will be covered under the ITP. The Development Areas under the Preferred Alternative (Alternative 6) encompass approximately 82.61 acres. Approximately 3.88 acres of the Development Areas footprint will consist of pine rockland planted Stepping Stones, which serve as mitigation and have been strategically placed within the Development Areas based on USFWS guidance. The Development Areas include the redevelopment of 32.82 acres of previously developed land, 20.80 acres of disturbed upland, and 32.87 acres of pine rocklands. **Table 4-2** includes a summary of the land use within the Development Areas.

**Table 4-2. Summary of Land Use within the Development Areas**

<b>Land Use Categories with Subcategories</b>	<b>Subtotal Acres</b>	<b>Total Acreages</b>
<b>Developed Land</b>		<b>32.80</b>
<i>Impervious surface</i>	<i>11.59</i>	
<i>Impervious surface (historic structure)</i>	<i>1.06</i>	
<i>Cleared and sodded</i>	<i>16.14</i>	
<i>Monkey Cages</i>	<i>4.01</i>	
<b>Disturbed Upland</b>		<b>20.78</b>
<i>Exotic hardwood dominated</i>	<i>10.1</i>	
<i>Historically marl prairie</i>	<i>8.92</i>	
<i>Scraped, dominated by turf species</i>	<i>1.76</i>	
<b>Pine Rockland</b>		<b>32.91</b>
<i>Less than 50% Burma reed</i>	<i>6.59</i>	
<i>Burma reed dominated</i>	<i>6.75</i>	
<i>Historically scraped w/o canopy</i>	<i>6.58</i>	
<i>Historically scraped but with pine canopy</i>	<i>0.9</i>	
<i>Historically scraped but with pine canopy, dominated by Burma reed</i>	<i>4.37</i>	
<i>Fire suppressed</i>	<i>0.77</i>	
<i>Severely fire suppressed, dominated by Burma reed</i>	<i>6.95</i>	
	<b>Total Acreage</b>	<b>86.49</b>

#### ***4.3.2 Conservation Program - Land Management Actions***

The Project includes implementation of the Conservation Program, including the preservation and restoration of the On-site Preserves (51.41 acres), including the East Preserve, the West Preserve, the Rockland Hammock, and the Southern Corridor and the Off-site Mitigation Area (50.96 acres). The Conservation Program also includes the Stepping Stones (3.88 acres), pine rockland plantings within the 86.49-acre Development Areas that provide enhanced connectivity between the On-site Preserves. Restoration activities in the On-site Preserves will include prescribed burning, exotic removal via chemical and mechanical means, hardwood removal of canopy and subcanopy, mechanical disturbance treatments, and supplemental pine rockland plantings in the Southern Corridor and Stepping Stones. In addition, the Off-site Mitigation Area will have a Burn Plan implemented, details in **Appendix J1**. The Conservation Program will provide a substantial benefit to the Covered Species in **Tables 1-1** and **1-2**. All activities related to the Conservation Program will be covered under this HCP for the duration of the ITP.

## **5.0 HABITAT FUNCTIONAL ASSESSMENT FOR THE CRC PROPERTY**

### **5.1 USFWS Precedent for Habitat Functional Assessment**

In situations where it is impractical to detect or monitor take of individual species, habitat as a surrogate may be used to express the amount or extent of anticipated take. Examples of appropriate use of habitat when estimating take include species that have a low detection probability, species with large temporal fluctuations in population numbers, lack of information on a species, and when multiple species are being considered. The USFWS states that in these situations, evaluating impacts to a surrogate such as habitat, ecological conditions, or similar affected species may be the most reasonable and meaningful measure of assessing take of listed species (DOI 2015a).

The USFWS has developed habitat functional assessments for numerous listed species, including the Florida panther (*Puma concolor coryi*) and wood stork (*Mycteria americana*). These habitat functional assessments are utilized to evaluate habitat impacts and appropriate mitigation requirements. Habitat assessments have also been developed by the USFWS in situations when a species' existence is heavily dependent on the occurrence of a specific biological feature, such as a single host plant. Examples include the habitat assessments developed for the federally endangered quino checkerspot butterfly (*Euphydryas editha quino*), Myrtle's silverspot butterfly (*Speyeria zerene myrtleae*), and Behren's silverspot butterfly (*Speyeria zerene behrensii*).

### **5.2 CRC Property Habitat Functional Assessment**

The Applicant worked with the USFWS to develop a habitat functional assessment for the CRC Property to classify the quality of habitats on-site, assist in minimization of impacts, and to quantify impacts and mitigation. In the development of the functional assessment, the Applicant and USFWS, together, identified characteristics that were the most appropriate for assessing pine rockland habitats and its function and value to the Covered Species. The functional assessment was applied to the entire CRC Property.

The characteristics used for the functional assessment were selected using the best available science, and include connectivity, habitat fragmentation, as well as information relied upon by USFWS in its designation of critical habitat for some of the Covered Species. The presence of pine rockland herbaceous species as one of the characteristics accounts for the presence of nectar plants and croton. In the course of developing the functional assessment, Applicants assessed the post-development conditions for nectar plants, finding a 16% higher post-development condition than existing condition. Croton density is being included in the success criteria for the On-site Preserves (Section 7.7).

On balance, the characteristics chosen for the functional assessment are representative of the factors commonly found in pine rocklands, and when highly functioning, benefit all the Covered Species.

#### **5.2.1 Pine Rockland Functional Assessment**

Several characteristics are referenced in determining the quality of a pine rockland habitat. These include an open canopy composed of south Florida slash pine, native pine rockland herbaceous flora, a limestone substrate with exposed limestone and bare soil, fire frequency, low-levels of invasive plant species, and habitat connectivity (DERM 1994; USFWS 1999; Maguire 1995; Possley et al. 2014; URS 2007; Snyder et al. 1990; FNAI 2010; Possley et al. 2016).

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The functional assessment developed for the CRC Property utilized the above six characteristics. Each characteristic received a score from 0 to 1, utilizing 0.2 increments. Relative descriptive values were assigned to the range of scores, with 0 to 0.2 being low quality, 0.4 to 0.6 moderate quality, and 0.8 to 1 high quality. The metrics utilized in determining the score for the six characteristics were based on analysis of site specific data and the best available science. Weighting was assigned to each characteristic based on the relative value for pine rockland habitat with particular attention to obligate species. The scoring metrics and weighted values were based on input from USFWS.

For the CRC Property habitat mapping, all of the individual polygons were assigned a unique ID (**Figure 7-1**) and termed “assessment area” for the functional assessment. To determine the functional score (referred to as Habitat Value) for an assessment area, the characteristic’s weighted value was multiplied by the characteristic’s score to provide the Habitat Value. Habitat Values ranged between 0 and 1, with 1 being the highest Habitat Value possible. The Habitat Values were multiplied by the acres for each assessment area to determine the number of Habitat Value Units (HVU), which when summed can be applied to a defined area (e.g., plan area, development/impact area, mitigation area). The six characteristics, associated weighting and scoring metrics can be found in **Table 5-1**.

**Table 5-1. Habitat Functional Assessment Characteristics, Weighting and Scoring Metrics**

Habitat Functional Assessment		Scoring Metrics					
Characteristic Weighted Value	Habitat Functional Characteristic	Low		Moderate		High	
		0	0.2	0.4	0.6	0.8	1.0
0.20	% Overall Canopy cover (Hardwood cover)*	≥90% or <1%	75-89%	50-74%	25-49%	16-24%	1-15%
0.20	% Non-native plants	≥90%	75-89%	50-74%	25-49%	5-24%	<5%
0.15	Fire frequency **	Non-pyrogenic	>25 years	16-24	11-15 yr	8-10 yr	3-7 yr
0.10	Soil Condition	impervious	Non-PR	high organic	scraped	PR	PR with 25% bare
0.20	Presence of PR herbaceous species	<5%	5-24%	25-49%	50-69%	70-84%	≥85%
0.15	Connectivity	Use adjacent functional score on each side of polygon. Those are averaged by number of sides to get connectivity score					

\* or subcanopy if mature and functioning as canopy

\*\* or other natural or artificial disturbance regime that mimics the natural ecological process

Below is a description of the six characteristics and the metrics used to determine appropriate scores.

### Canopy

For canopy cover, both pines and hardwoods play a significant role in the functionality of a pine rockland. Pine rocklands and associated floral and faunal species require an open canopy with a sparse understory (USFWS 1999; FNAI 2000). Hardwood cover has been determined to be a critical factor in the function of pine rocklands and can ultimately influence the transition of a fire-dependent (pyrogenic) community to a non-pyrogenic community (Robertson 1953; Snyder et al. 1990; Wade et al. 1980; Berendse 1998; De Deyn et al. 2003; Jia et al. 2005; FNAI 2010; Read and Lawrence 2003; Safford 1919; Vituosek and Reiners 1975; Whitney et al. 2004; Possley et al. 2014).

Pine rocklands should be maintained with sparser canopies and/or hardwood cover ranging from 10 to 90 trees per acre or < 25% canopy cover (URS 2007; Possley et al. 2014; Maguire 1995; DERM 1994). Managing pine rocklands canopy cover in this range is desirable for several reasons: 1) less smoke is produced by grass-pine needle (fine fuel) combustion, 2) open, grassy understory is ideal for pine reproduction leading to a multi-aged canopy; 3) extinguishing prescribed burns (mop-up) is less problematic; 4) open canopies enhance herbaceous diversity (Maguire 1995). Due to the importance of canopy cover for pine rockland habitat, this characteristic was assigned a weighed value of 0.2.

**High Quality** – A range of 1-24% canopy cover was classified as high quality. This range was divided into two classification intervals in order to capture the sparser (desired) canopy cover as highest functioning or optimal range (1-15% cover) which received a score of 1.0. Assessment areas with 16-24% canopy cover were assigned a score of 0.8.

**Moderate Quality** – The ranges of 25-49% and 50-74% canopy cover were classified as moderate quality, based on standard cover classification ranges established by Daubenmire (1959). The assigned score for 25-49% canopy cover was 0.6 and the assigned score for 50-74% canopy cover was 0.4.

**Low Quality** - The ranges of 75-89% and greater than 90% canopy cover were classified as low quality, based standard cover classification ranges established by Daubenmire (1959) and on trajectories of pine rockland succession (Possley et al. 2014). Assessment areas with 75-89% canopy were assigned a score of 0.2 and assessment areas with greater than 90% canopy cover were assigned a score of 0.

### Non-native Plants

Non-native Plants in this HCP are Category I invasive exotics as defined by the Florida Exotic Pest Plant Council's (FLEPPC) List of Invasive Plant Species; most commonly Burma reed, one of the greatest threats to pine rocklands (USFWS 1999; DERM 1994; Maguire 1995). Invasive plants alter the environment so that it is no longer hospitable for native plants. Invasive plants function in a similar fashion to hardwood encroachment, effectively shading native herbaceous species resulting in monocultures of the invasive species (Bias et al. 2003; Callaway and Aschehoug 2000). They change the fuel structure and composition and can increase the intensity of fires. In some cases, such as with Brazilian pepper, the pyrogenics of a vegetative community are altered, further suppressing fire (Brooks et al. 2004; Stevens and Beckage 2009).

While invasive cover can in part be controlled by prescribed fire, invasive cover in modern management of pine rocklands requires more intensive management. More intensive management can be performed in conjunction with prescribed fire or completely independent of

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fire. Due to similar influences on functionality as canopy, this characteristic was given a weighted value of 0.2.

*High Quality* – Areas with less than 5% cover by invasive plants were assigned a score of 1. This was based on the identified desired future conditions for MDC-owned preserves, which state that pine rocklands will exhibit invasive species total coverage at or below the maintenance standard of 5% areal total cover (MDC 2012a). The range of 5-24% cover by invasive plants was based standard cover classification ranges established by Daubenmire (1959) and was assigned a score of 0.8.

*Moderate Quality* – The ranges of 25-49% and 50-74% cover by invasive plants were classified as moderate quality, based on standard cover classification ranges established by Daubenmire (1959). The assigned score for 25-49% cover by invasive plants was 0.6 and the assigned score for 50-74% invasive plants was 0.4.

*Low Quality* – The ranges of 75-89% and greater than 90% cover by invasive plants were classified as low quality, based on standard cover classification ranges established by Daubenmire (1959) and on trajectories of pine rockland succession (Possley et al. 2014). Assessment areas with 75-89% invasive plants cover were assigned a score of 0.2, and assessment areas with greater than 90% invasive plants cover were assigned a score of 0.

*Fire Frequency*

Historically, fires would have occurred approximately two times per decade within pine rocklands (Myers 1990; Snyder et al. 1990). Current consensus on recommended fire return intervals for pine rocklands and BSHB is 3 to 7 years (USFWS 1999; FNAI 2010; Green et al. 2008; URS 2007; USFWS 2014). BSHB and Florida leafwing butterfly have been observed in areas that have experienced fire or other disturbance regimes at intervals up to 10 years (Salvato and Salvato 2010). These fires help to maintain the primary characteristics of pine rocklands, including the open canopy, sparse understory, low levels of organic litter, and herbaceous diversity (USFWS 1999; Snyder et al. 1990; O'Brien et al. 2010). Alternative means such as mechanical and chemical treatments can be utilized to maintain the vegetative structure of pine rocklands; however, fire provides some benefits that may not be mimicked by artificial disturbance (Brose and Wade 2002; Maschinski et al. 2005; Menges and Gordon 2010). Fire acts to promote herbaceous diversity through stimulating flowering in many species of plants (Snyder et al. 1990; Robertson 1953; Myers 1990; Herndon 1987), and is the most effective means for reducing organic accumulation and maintaining patches of bare soil (O'Brien et al. 2010). Due to the importance of fire, this characteristic received a weighted value of 0.15.

*High Quality* – Fire intervals ranging from 3 to 10 years were considered high quality for this characterization. Fire intervals ranging from 3 to 7 years were assigned a score of 1.0 and fire intervals ranging from 7 to 10 years were assigned a score of 0.8.

*Moderate Quality* – USFWS (1999) lists the longest fire return interval as 10-15 years for pine rocklands. Based on this, fire frequency intervals between 11 to 15 years were assigned a score of 0.6. Due to the influence of hardwood species establishment after 15 years (Wade et al. 1980), fire frequency between 16 to 24 years was assigned a score of 0.4.

*Low Quality* – The time pine rocklands approach end stages of transitioning to hardwood hammocks has been listed as 20 to 30 years (Robertson 1953; Wade et al. 1980; Snyder et al. 1990). This range was assigned a score of 0.2. Succession of a pine rockland to a climax

community (non-pyrogenic hardwood forest) was assigned a score of 0, as the loss of flammability corresponds with the ecological point-of-no-return for pine rocklands and other pyrogenic communities (Possley et al. 2014).

#### Soil Condition

Soils are a limiting characteristic of pine rocklands, with this community type only occurring on oolitic limestone rock outcrops, such as the one composing the Miami-Rock Ridge (USFWS 1999). This characteristic was assigned a 0.1 weighted value. This weighted value was due to the substrate's ability to undergo significant damage (e.g., scraping) and still exhibit a recovery of the vegetative community, provided the limestone substrate is still present along with a seed bed of native plant species (Personal communication Steve Woodmansee 1/28/2015; DERM 1994).

*High Quality* – Pine rockland soils that do not show signs of severe substrate modification (scraping or blading) and have 25% bare rock or soil, were assigned a score of 1. Intact pine rockland soils, which do not exhibit 25% bare rock or soil, were assigned a score of 0.8.

*Moderate Quality* – Areas that exhibited signs of severe substrate modification, such as scraping, were assigned a score of 0.6. In these areas, sand pockets and associated seedbeds have been altered; however, the oolitic substrate is still present and can support some pine rockland associated species. Also, while pine rocklands with damaged substrates can recover, they are prone to invasive infestations from the historical disturbance and may have had herbaceous diversity impacted through removal of native seedbed (Fridley 2011; DERM 1994; White and Pickett 1985). A score of 0.4 was assigned to soils with high levels of organic accumulation not yet exhibiting characteristics of a non-pyrogenic community. This score was based on the significant correlation between accumulation of organic material and loss of herbaceous diversity (Possley et al. 2014). Also, Wade et al. (1980) indicated that after 15 years of fire suppression, organic accumulation from hardwood encroachment begins to limit a community's ability to carry fire.

*Low Quality* – Areas where the soil alteration is such that it no longer represents and supports vegetation associated with a pine rockland community and is indicative of a non-pyrogenic community (Possley et al 2014; DERM 1994) were assigned a score of 0.2. A score of 0 was assigned to areas with the presence of an impervious surface such as an existing building, concrete pad or asphalt road.

#### Pine Rockland Herbaceous

Quantifying desirable species presence for a particular habitat type is a known methodology to determine the functionality of a habitat (Bradley et al. 2000; § 373.414(18), Fla. Stat.). Because high quality pine rocklands are characterized by a diverse herbaceous understory, this characteristic was included in the functional assessment and was assigned a weighted value of 0.20. Desirable herbaceous species were identified using the Woodmansee report (2014) (**Appendix D**). Percentages of desirable herbaceous species do not represent total herbaceous cover. Instead, they represent a percent of total herbaceous cover attributed to the desirable species.

*High Quality* – USFWS considered areas with 85% or greater cover by pine rockland herbaceous species as optimal, and this coverage was assigned a score of 1.0. Assessment areas with 70-84% cover by pine rockland herbaceous species were assigned a score of 0.8.

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*Moderate Quality* –Pine rockland herbaceous species with 25-69% cover were considered moderate quality, based on standard cover classification ranges established by Daubenmire (1959). The assigned score for 50-69% cover was 0.6 and the assigned score for 25-49% cover was 0.4.

*Low Quality* –Pine rockland herbaceous species with less than 25% cover were considered low quality, based on standard cover classification ranges established by Daubenmire (1959). The assigned score for 5-24% cover was 0.2 and the assigned score for less than 5% cover was 0.

*Connectivity and Fragmentation (Habitat Matrix)*

The connectivity and fragmentation characteristic was incorporated into the functional assessment based on USFWS guidance. This characteristic was included because habitat conditions can influence species populations by affecting the dispersal of individuals between suitable habitats, either acting as barriers or conduits for dispersal (Johnson et al. 1992; Kuefler et al. 2010; Ricketts 2001). Anthropogenic activities and urban development can influence natural habitats and their inhabitants as a result of increased invasive plants, feral animal predation, and exposure to pesticides. (Fahrig 2007; Possley et al. 2016; McKinney 2002). Types of urban development have varying levels of effect on native species. The following are types of urban development listed in order of more to less for their effect to native species: buildings/impervious surfaces; managed vegetation (lawns/greenspaces), ruderal vegetation (abandoned lots and farmland or other greenspace that is cleared but not managed), and natural remnants of vegetation (subject to varying levels of degradation) (McKinney 2002; Blair and Launer 1997).

To assess connectivity and habitat fragmentation for the existing conditions, the existing condition functional score for adjacent polygons was used. For polygons along the perimeter of the property, the adjacent land use functional score was the same as the source polygon if the habitats were contiguous and uniform in characteristics. For adjacent roadways, the functional score was 0 (e.g., southeastern boundary and SW 152nd Street), the same as the score given to internal roadways. Along the southern portion of the western boundary of the CRC Property, there is a cleared area that appears to have been scraped and has maintained vegetation but still exhibits signatures (based aerial imagery) of oolitic substrate (indicative of an area that has not been sodded). This area was given an identical score for Polygon # 58 (0.14) due to the similarities in characteristics. To assess connectivity and habitat fragmentation for the proposed conditions, the post condition functional score for adjacent polygons was used. This characteristic was assigned a weighted value of 0.15.

Using ArcGIS 10.2.2 ESRI®, a “Polygon Neighbors” analysis was run to determine the length of coincident edges of neighboring polygons for each polygon ID (source polygon). The unique ID, length of coincident edges (feet), and functional score were extracted for each neighboring polygon and associated with the source polygon’s unique ID. Functional statistics and other source polygon attributes were joined with the results of the Polygon Neighbors analysis through associating the source polygon unique IDs, and the combined statistics were exported to Excel. For each source polygon, the percentage of its perimeter sharing a coincident edge with a neighbor polygon was calculated and multiplied by the neighbor polygon’s functional score to determine the relative influence of the neighboring polygon’s function on the source polygon. These scores were summed to provide a connectivity score for the source polygon. The resulting connectivity scores for each source polygon were imported and joined in ArcGIS with the

functional assessment calculation for existing conditions. This analysis was run for post development and mitigation conditions. For the proposed conditions, development was assigned a score of 0 and preserves assigned respective post condition functional values. Because the results reflected a corresponding decrease in habitat functioning of a source polygon with decreasing habitat function, this methodology was able to assess connectivity and fragmentation.

### ***5.2.2 On-Site Mitigation Lag Time (Temporal Lag)***

Mitigation activities for the On-site Preserves are scheduled to begin following issuance of the ITP, and will vary in level of intensity based on existing conditions. As described in **Section 7.0** of the HCP, the initial approach for mitigation activities includes removal of invasive species within the On-site Preserves with subsequent maintenance events. This will provide functional lift in the On-site Preserves' condition. Units will be rotationally burned, with pine thinning and hardwood reduction occurring before a burn. The highly degraded On-site Preserves management units will be burned first, occurring as soon as suitable burn conditions are present. The remaining management units will be rotationally thinned and burned over the following two years. This approach will allow for recovery of previously managed units and migration of Covered Species.

In order to account for the time it takes to improve habitat functionality within the On-site Preserves and offset the functional loss within the Development Areas, USFWS recommended the incorporation of temporal lag for the post-mitigation conditions functional assessment. Temporal lag is considered the period of time between when functions are lost at an impact site and when those functions are replaced by mitigation. Applying temporal lag to post-mitigation conditions reduces the attributed value of the proposed mitigation.

Temporal lag was applied to the functional assessment for the post-mitigation conditions within the On-site Preserves. Some areas are anticipated to have mitigation lift, which would not result in a lag time (e.g., rockland hammock mitigation activities already commenced and Unit 2 removal of invasives will address primary issue). However, to provide a uniform approach to applying temporal lag, all areas were assigned a lag factor based on the timing of the initial prescribed burn. As outlined in the CRC Burn Plan (**Appendix J**), the initial prescribed burning for the On-site Preserves will be implemented within three years. The first round of burning will commence upon issuance of the HCP and will include management units 4, 5, 9, 10, and 13. Management units 1, 3, 8, and 12 will be burned in the second year. The final two units will be burned during the third year (Management Units 2 and 11).

Based on a study conducted on prescribed fire in pine rocklands within ENP, which had a similar plant composition as that found within the CRC Property, herbaceous cover reached their pre-burn biomass within 7 months following dry season burns and by one year after wet season burns (Snyder 1986). Based a one year recovery for herbaceous cover after a prescribed burn, a temporal lag of 1.03 was assigned to the management units burned in the first year. A temporal lag of 1.07 was assigned to the units burned in the second year and a temporal lag of 1.10 was assigned to the units burned in the third year.

### **5.3 Habitat Functional Assessment Summary**

Although only 79.97 acres of pine rocklands occur on the CRC Property, the habitat functional assessment was applied to all land uses within the CRC Property (137.90 acres) for both existing and post-development/mitigation conditions. Of the 137.90 acres, 124.14 acres received a

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functional score greater than zero, with functional value evaluated on 45.17 acres of non-pine rockland habitat. For post-mitigation scores within the On-site Preserves, a corresponding temporal lag factor was applied to determine the final number of HVUs that are anticipated to result from the mitigation activities.

The existing functional value (expressed in terms of HVUs) was determined to be 40.72 HVUs for the CRC Property. The Development Areas encompass 86.49 acres with an existing value of 14.37 HVUs. These areas were considered to have a zero (0 HVU) value in post-development conditions. The post functional assessment for the CRC Property was determined to be 43.82 HVUs. This is a net increase of 3.10 HVUs. Although the Stepping Stones will enhance the functional value of the On-site Preserves, they were conservatively considered developed in the post functional assessment and received no functional value. The Stepping Stones will provide additional habitat enhancement and connectivity for the Covered Species, and are specifically designed to benefit BSHB because of the inclusion of pineland croton and butterfly nectar plants in the planting list.

The existing functional value within the On-site Preserves (51.41 acres) was determined to be 26.35 HVUs. Following the mitigation activities and accounting for temporal lag of mitigation benefits, the 51.41 acres of the On-site Preserves are expected to have a functional value of 43.82 HVUs. This is a net increase of 17.47 HVUs for the On-site Preserves.

Results of the habitat functional assessment are summarized in **Table 5-2**. Detailed results of pre- and post- conditions for Development Areas and the On-site Preserves for the habitat functional assessment are included in **Appendix G. Figure 5-1** depicts the unique polygon identification numbers associated with each habitat value for the existing conditions functional assessment.

**Table 5-2. Summary of Habitat Functional Assessment Results**

Summary of Functional Assessment				
Area	Habitat Value Unit (HVU)			Functional Gain
	Acres	Existing Value	Post- Value	
CRC Property	137.89 acres	40.72	43.82	3.10
Development Areas	86.49 acres	14.37	0	N/A
On-site Preserves	51.41 acres	26.35	43.82	17.47

Habitat Functional Assessment Conclusion

The habitat functional assessment demonstrates that all impacts are fully offset by the mitigation activities within the 51.41 acres of On-site Preserves. The increase in HVUs above existing condition supports the conclusion that the On-site Preserves mitigation activities will improve the quality and functional value, offsetting the potential impacts to Covered Species. The net improvement in pre- and post-conditions of the CRC Property also demonstrates the Applicant has minimized and mitigated for potential impacts to the maximum extent practicable, as required by the ESA. The Off-site Mitigation Area provides additional conservation benefit to the Covered Species above and beyond the full offset provided by the On-site Preserves.

Figure 5-1. CRC Property Habitat Functional Assessment – Existing Conditions



## **6.0 THE CONSERVATION PROGRAM: BIOLOGICAL GOALS AND OBJECTIVES AND MEASURES TO MINIMIZE IMPACTS**

The Conservation Program of the HCP (**Sections 6.0 and 7.0**) includes the overall comprehensive efforts by Applicant to avoid, minimize and mitigate the potential impacts of the take. **Section 6.0** outlines the Biological Goals and Objectives of the HCP and lists the minimization measures that will be implemented during construction and in the On-site Preserves, Stepping Stones and Development Areas for the duration of the ITP. The BMPs in **Section 6.0** apply to the 137-acre CRC Property, and the BMPs for the Off-site Mitigation Area are included in **Appendix J1**. The Conservation Program is designed to provide a net conservation gain consistent with the USFWS Mitigation Policy (DOI 2016c), and the Endangered Species Act Compensatory Mitigation Policy (DOI 2016d).

The Conservation Program demonstrates that the Applicant is fully offsetting the impacts of the incidental take through its avoidance, minimization and mitigation efforts. The Conservation Program demonstrates that the biological value that may be lost from the covered activities in this HCP will be replaced with higher functioning value. The relevant sections of the HCP supporting this conclusion are **Section 5.0**, the functional assessment of the On-site Preserves, the additional mitigation measures in **Section 7.0** (e.g., monitoring, Stepping Stones, bat boxes, outreach and education and Off-site Mitigation Area), in addition to this section. The Conservation Program provides substantial conservation benefits to the Covered Species through implementing the restoration of pine rockland habitats, including exotic vegetation removal, hardwood removal, the reintroduction of prescribed fire (both in the On-site Preserves and Off-site Mitigation Area), enhancing habitat connectivity through Stepping Stones, by enhancing habitat through installing bat boxes, by monitoring and reporting, and by outreach and education to enhance community knowledge of pine rocklands and enhancement through prescribed burning.

### **6.1 Biological Goals and Objectives**

The biological goals of this HCP provide guidance for the successful implementation of the Conservation Program discussed in this section. These goals will be accomplished through a dedicated funding source, as identified in **Section 11.0**. Each goal has defined objectives that are the specific, measurable actions to be implemented.

*Goal 1: Reduce on-going threats within the Mitigation Areas, and contribute to the recovery of federally listed pine rockland species that occur within the Project by increasing their population size and enhancing their long term viability.*

Objective 1. Manage On-site Conservation Areas to achieve success criteria as described in **Sections 7.2.4 and 7.7**.

Objective 2. Provide connectivity from On-site Preserves to adjacent pine rocklands and serve as a potential site for recruitment of pine rockland species, thereby assisting in expanding population of listed species both on-site and in adjacent habitats.

Objective 3. Provide long-term protection and management of biological integrity and species diversity that is a characteristic of pine rocklands by preserving, restoring and managing the On-site Preserves and the Off-site Mitigation Area.

Objective 4. Implement Best Management Practices (BMPs) measures for commercial and residential entities within the CRC Property to reduce impacts from human activity on the On-site Conservation Areas.

Objective 5. Implement biological monitoring program to validate success criteria and guide management decisions for the Project.

*Goal 2: Preserve and manage pine rocklands and rockland hammock within the CRC Property in perpetuity.*

Objective 1. Establish Master Association to administer the On-site Conservation Areas and all actions related to habitat management consistent with the ITP.

Objective 2. Dedicate funding resources adequate to achieve and maintain the Conservation Program over the life of the Project.

Objective 3. Implement long-term habitat restoration and management in the Mitigation Areas.

Objective 4. Minimize pesticide use to extent practicable by CRC/Master Association within the On-site Preserves and Stepping Stones.

*Goal 3: Restore the On-site Preserves and enhance the Off-site Mitigation Area to promote recruitment and support long-term viability of pine rockland species.*

Objective 1. Implement a Burn Plan for the On-site Preserves and Off-site Mitigation Area.

Objective 2. Implement Adaptive Management Plan to balance burning and non-burning applications to meet success criteria on CRC Property.

Objective 4. Implement a biological monitoring program for Mitigation Areas.

*Goal 4: Promote public education and awareness of pine rockland habitat and associated species.*

Objective 1. Establish a community education and outreach program within the CRC Property to promote awareness of pine rocklands and their importance, and to ensure the minimization of impacts to the On-site Conservation Areas from daily operations.

## **6.2 Measures to Minimize Impacts of the Project**

The Applicant will implement the following measures on the CRC Property, to the maximum extent practicable, to minimize and mitigate impacts. 16 U.S.C. § 1539(a)(2)(B).

### **6.2.1 CRC Property Design**

#### **6.2.1.1 Development Areas**

Alternative 6, the Preferred Alternative, was developed through an evolution of alternatives that were designed to minimize impacts to pine rocklands and to allow for significant and contiguous On-site Preserves. The Development Areas are concentrated within and around previously developed areas adjacent to the “spine road” (SW 127th Ave), which bisects the CRC Property, and along SW 152nd Street located immediately north of the property. SW 152nd Street is a major east-west urban principal arterial roadway with extensive residential development located to the north. The vegetative communities adjacent to SW 152nd Street proposed to be developed

are classified as exotic dominated hardwoods, and have never been identified as pine rocklands by previous USFWS assessments. The Preferred Alternative allows for the majority of the Development Areas (>62% or 53.35 of 86.35 acres of the Development Areas) to be confined to previously developed areas and disturbed uplands not classified as pine rocklands.

#### **6.2.1.2 On-site Conservation Areas**

The Conservation Program will preserve and restore over 51.41 acres of On-site Preserves, and create 3.88 acres of Stepping Stones, collectively, the On-site Preserves and the Stepping Stones are the On-site Conservation Areas. The design and management of the On-site Preserves were developed to maximize habitat functional values for the Covered Species, allow for connectivity to adjacent offsite pine rocklands, and minimize potential effects of habitat fragmentation and conflicts with the Wildland Urban Interface (WUI). The On-site Preserves include the largest contiguous portions of pine rocklands on the CRC Property, which occur along the eastern and western sides of the CRC Property, and are contiguous or in close proximity to off-site pine rocklands.

As documented by the habitat functional assessment, pine rocklands on the CRC Property are currently fragmented by existing development or are functionally fragmented by severely degraded areas. To minimize impacts from the internal fragmentation from existing development and the proposed development, additional minimization measures were included in the Preferred Alternative. These include the addition of 3.88 acres of Stepping Stones, native pine rockland plantings, and a 2.16-acre Southern Corridor (part of the total On-site Preserves acreage) along the southern boundary of the CRC Property. Stepping Stones, which serve as refugia and foraging sources of native plantings, are identified as a recovery strategy for ITA Species. To minimize effects of fragmentation and enhance preserve connectivity, the 3.88 acres of Stepping Stones incorporated into the 86.49-acre Development Areas were strategically located based on guidance provided by USFWS. The Stepping Stones were located to provide potential refugia and connectivity from the East and West Preserves for the Covered Species. To further enhance connectivity between the East and West Preserves, a 2.16-acre Southern Corridor will be included, which is contiguous with 2.56 acres of pine rocklands located on the DOD property to the south.

The management units within the On-site Preserves are designed to maintain small units, which are discussed under On-Site Preserve Management Minimization Measures and BMPs (**Section 6.2.4**) and in the CRC Burn Plan (**Appendix J**), but were also designed to minimize the installation of new firebreaks by utilizing existing features such as existing asphalt trails, enhancing historical firebreaks or trails and utilizing paved surfaces. The creation of new firebreaks will be further minimized by selecting the shortest distance required to define the unit. Firebreaks will not permanently alter the habitat (e.g., not altering limestone substrate), as they will be maintained through mowing and will not utilize plowing or disking to establish breaks.

#### **6.2.2 Construction Minimization Measures and Best Management Practices (BMPs)**

To minimize impacts which may potentially result from construction activities, the following minimization measures and BMPs shall be implemented.

### **6.2.2.1 Pre-Construction Surveys and Activities on the CRC Property**

#### **FBB**

In September 2014, FBB roost surveys were conducted on the CRC Property for all abandoned buildings and the chimney site. There was no evidence of bat use within any of the structures and the USFWS approved the demolition of these structures in an email dated September 17, 2014. Since the demolition of these structures has been postponed, the FBB roost surveys will be updated for all of the abandoned buildings and chimney site (the “structures”) prior to construction. In addition, a FBB roost survey will be conducted for portions of the remaining areas to be developed. The FBB roost survey area will encompass a 100 meter radius around FBB monitoring stations 2, 6, 7, 7.5 (7a), 10, 13A, 15, 16, 19, 20, 22, and 23 (see **Figure 6-1**). The survey area will include only the Development Areas, with the On-site Preserves excluded (to be surveyed prior to commencement of activities in the On-site Preserves). Within the survey area, all trees with a diameter at breast height (DBH) equal to or greater than 10 inches, all snags with a DBH of greater than or equal to 8 inches, and all utility poles (collectively referred to as uprights) will be visually surveyed for cavities. Suitable cavities have an entrance (cavity or hollow) of at least 2” in diameter or could be a sheltering crevice created by loose exfoliating bark. All uprights found to have cavities suitable for FBB roosting will be documented with GPS points. If potential roost locations are recorded, the interior of cavities will be peeped using a camera. The presence of guano or bats would indicate positive findings, while the absence of guano or bats would indicate negative findings. Pre-construction FBB roost surveys will occur no more than 60 days in advance of construction. In the event the pre-construction FBB roost surveys are conducted more than 60 days prior to construction, verification of the previous survey will be conducted no more than 60 days in advance of construction.

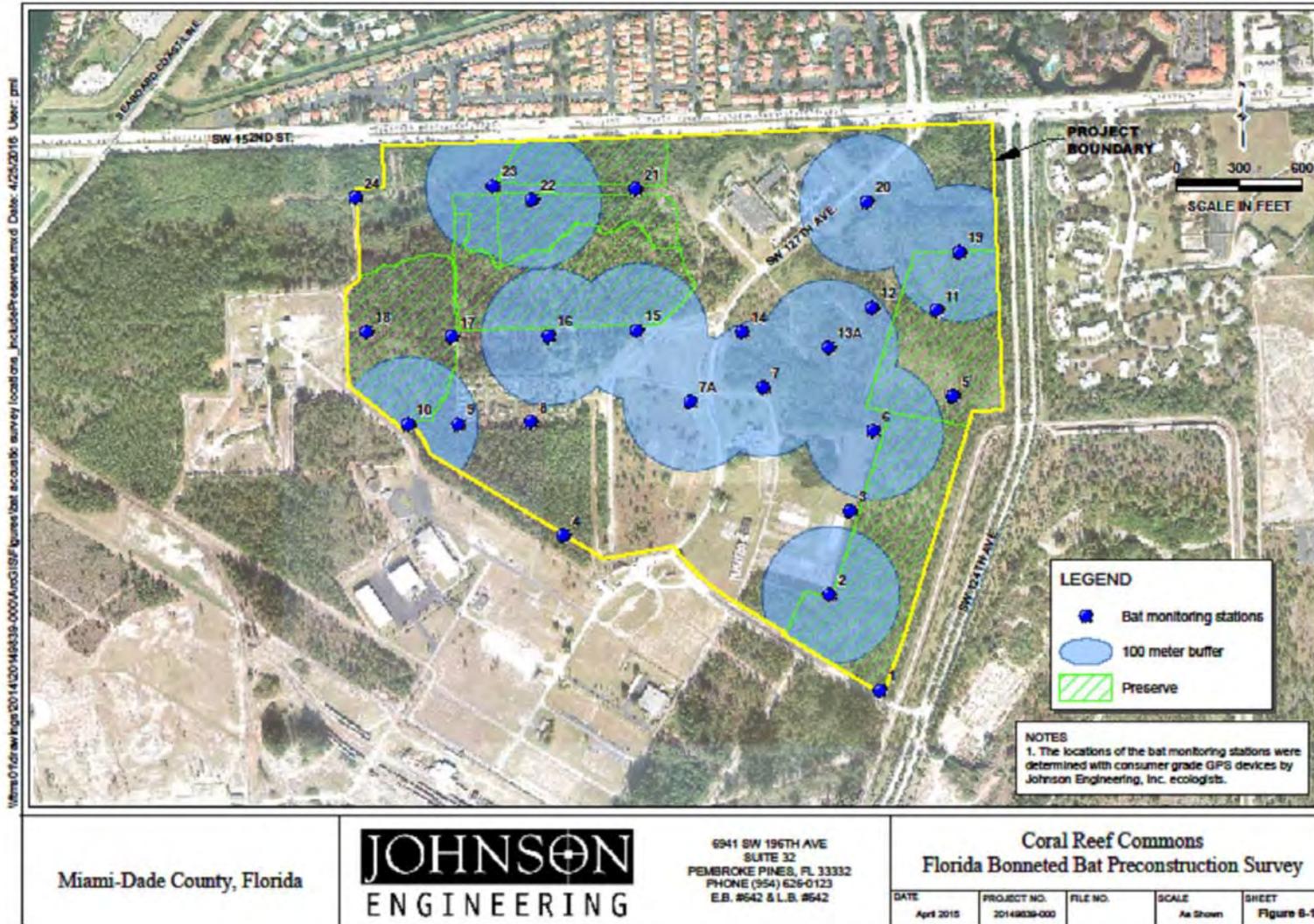
If a FBB roost is identified during the pre-construction roost surveys, the USFWS will be contacted and the following measures will be implemented to minimize take of individuals. Ecologists will wait until bats have flushed from the roost on their own accord for nighttime foraging. The roost will be peeped to confirm no juveniles or adults remain, and the entrance to the roost structure will be blocked with grating or other appropriate exclusion material. If peeping is not practicable, an observer will be stationed to monitor activity at the roost. The observation monitoring will start 30 minutes to an hour before sundown and the roost structure will be blocked one hour after the last bat has been observed leaving the roost. Demolition of building or roosting structure will occur the following day under the supervision of an ecologist to ensure no bats have returned to the roost. In addition, an artificial bat box will be established in the closest preserve.

If pups are present within a roost, the following measures in order of preference will be implemented. (1) If possible, a 100’ buffer will be established around the roost and removal of the roost structure will occur when the breeding period is completed and the pups are able to fly and hunt on their own. (2) If the roost can be moved, an artificial bat box will be established in the closest preserve and the roost will be transferred intact. The expectation is that the mother will return to the new roost and continue nursing, raising and training the young on how to forage. (3) If the roost cannot be moved, any pups would be transferred to an artificial bat box established in the closest preserve. Pups and bat box would be monitored through daily visual observation or by a remote wildlife camera to record movement at the box entrance. If the pups are abandoned, the pups would be taken to a qualified wildlife rehabilitator, such as the adjacent

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Zoo Miami, following coordination and approval by USFWS. In the event a roost is inadvertently knocked down and live pups are found, the same protocol would be followed.

Figure 6-1. FBB Preconstruction Survey Areas on the CRC Property



### Listed Plants

To minimize impacts to listed plant species, the Applicant authorized FTBG to remove and salvage numerous plants, including three tiny polygala specimens from the Development Areas on the CRC Property. These activities occurred in June 2014. A copy of the plant removal report is attached as **Appendix E**.

#### **6.2.2.2 Construction Worker Education**

Construction personnel will be made aware of the requirements contained in the HCP. All contractors will be provided with a copy of Section 6.0 of the HCP, the ITP and identification material on the Covered Species (Appendix E1). A copy of Section 6.0 of the HCP and identification material will be included as an attachment to all contractors' contracts. Construction educational material will include large, durable, weather-resistant posters that will be displayed at the entrance of the project and within the construction areas. Educational material will also include laminated cards that can be kept on workers for quick identification. The Applicant prepared educational material, which is attached as **Appendix E1**.

#### **6.2.2.3 Construction BMPs**

BMPs are standard practices that will be implemented during construction activities. All contractors will be required to adhere to BMPs standards for their industry and the BMPs below. The HCP Coordinator will enforce adherence to the Construction BMPs. These BMPs are as follows:

- Eastern Indigo Snake Standard Protection Measures will be implemented (**Appendix H**) and the same measures (tailored to rim rock crowned snake for identification and educational materials) will be implemented for rim rock crowned snake;
- Speed limits will be enforced and speed limit signs restricting speed to 15mph will be posted within the CRC Property;
- Silt fencing will be installed around all ground disturbing activities;
- Construction materials and equipment will be staged within previously disturbed areas and outside of the On-site Preserves boundaries;
- Construction limits will be surveyed and flagged prior to commencing construction activities;
- All On-site Preserves boundaries will be delineated with enviro-fencing (orange fencing; a minimum of three feet in height) and staked with a minimum of one inch by one inch wood stakes or appropriate sized steel rods;
- Signs will be placed every 300 ft along the On-site Preserves boundary stating "Nature Preserve Area – Unauthorized Access Prohibited";
- Adhere to the Storm Water Pollution Prevention Plan (SWPPP) as required by National Pollutant Discharge Elimination System (NPDES) permit. The SWPPP will include a site map showing the On-site Preserves and site-specific BMPs that will be implemented to prevent runoff into the On-site Preserves. A template for the SWPPP can be found in **Appendix H1**;

- Construction workers will not be permitted to bring pets on-site;
- Construction workers will report all observations of Covered Species to the HCP Coordinator. These observations will be relayed to USFWS;
- Any lighting required for night time construction or safety purposes will direct light towards the intended target for illumination and will not be directed towards the On-site Preserves;
- In the unanticipated event that a gopher tortoise is found on site during construction, CRC will follow the FWC requirements for gopher tortoise relocation.

**6.2.3 Community (Residential and Commercial Operations) Minimization Measures and BMPs**

To minimize impacts and assist in meeting the biological goals and objectives of the HCP, the following BMPs will be implemented within the community in both the residential and commercial operations:

- A. Speed limits of 15mph will be posted within the residential complex and the commercial speed limit of 25mph will be posted;
- B. Pets will be required to be leashed within CRC;
- C. CRC design includes a dog park within the community, positioned away from the On-site Preserves. Dogs will only be allowed off-leash within this area, which is contained by a secure fencing. The inclusion of this amenity will assist in minimizing unleashed pets within the community;
- D. All tenants (commercial and residential) will be required to sign documentation that includes acknowledgement of the pet and waste disposal regulations, of applicable regulations for pesticide, insecticide and treatments of rodents and household pests requiring label requirements for application and storage;
- E. Property Management will enforce the community BMPs;
- F. Waste and recycling receptacles and dumpsters will be placed throughout the community and commercial areas. A private waste disposal and recycling service will be contracted to maintain these receptacles;
- G. Landscaping standards will utilize native and non-invasive plant species, in accordance with MDC zoning approval;
- H. Identification material for the Covered Species will be made available for tenants;
- I. Tenants will be educated on the appearance of indigo snakes and requested to report observations of indigo snakes in the community to the HCP Coordinator;

- J. Tenants will be advised to contact the HCP Coordinator if they observe a gopher tortoise outside of the preserve and instructed to not collect or move the individual;
- K. Engineering designs will be incorporated that discourage bats and other wildlife from using buildings or structures.
- L. Tenants will be discouraged from outdoor feeding of cats.

#### **6.2.3.1 Lighting for CRC Property**

Lighting used for streets and parking lots will be engineered to achieve Illuminating Engineering Society of North America (“IESNA”) cutoff classification or equivalent criteria as well as compliance with applicable municipal requirements as of the date of this HCP.

#### **6.2.3.2 Firewise Community for CRC Property**

The following BMPs will be implemented to create a firewise community for the CRC Property:

- A. ***All lessees, property owners, and/or tenants within the CRC Property will be required to sign documentation acknowledging fire management activities within the CRC Property and on adjacent properties in the Richmond Area;***
- B. Construction and landscaping will follow firewise guidelines ([www.firewise.org](http://www.firewise.org));
- C. Home Ignition Zones (HIZ) will be established and maintained to allow a defensible space between residential units and the On-site Preserves;
- D. Fire hydrants will be strategically and specifically installed along the On-site Preserves boundaries to facilitate prescribed burning, quick mop up, and enhance efficiency of any wildfire suppression;
- E. The HCP Coordinator and Property Management will keep electronic and hard copies of the HCP Administrative Report, which will include On-site Preserves management, planned burns, approximate timing and areas. Electronic or hardcopies will be provided upon request;
- F. Prior to prescribed burning of the On-site Preserves, signs will be posted at the entrance of the CRC Property giving notice of the expected dates of prescribed burns;

In an effort to promote and educate the important benefits of prescribed burning, outreach and coordination with adjacent landowners will include:

- G. The HCP Administrative Report recommendations for burn management for the On-site Preserves will be provided to designated contacts of adjacent landowners or Home Owner Associations (HOAs), upon request;
- H. The HOA President of adjacent residential communities to the north within 0.5 mile will be notified of CRC prescribed burns prior to burning;
- I. Signs will be posted along SW 152nd Street with planned dates of planned burns;

- J. Outreach and education will include additional mechanisms detailed in Section 6.2.4 below.

### **6.2.3.3 Community Pesticide Use for CRC Property**

Integrated Pest Management (IPM) shall be utilized for the CRC Property, to the extent practicable. IPM shall involve a planned approach to pest related problems, by identifying pests and taking appropriate action as needed. The term pesticide includes insecticides, fungicides, herbicides, *etc.*, unless otherwise specified. This approach will include the following BMPs:

- All contractors and workers will be provided with the educational and identification material referenced in the construction section;
- Application of any pesticide will adhere to pesticide labels in accordance with federal regulations;
- Application of insecticides within the Stepping Stones will be restricted. Pest management of insects will be restricted to target those pests that are problematic to the species covered by the ITP and/or meeting success criteria;
- Application of herbicides within these areas will conform to the standards established for the On-site Preserves management in **Section 6.2.4.3, Q. & R.**;
- Application of insecticide and rodenticide will adhere to Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), 7 U.S.C. § 136 *et seq.* requirements as to application, storage, and label requirements;
- All application equipment will be maintained in good working order;
- Equipment will be checked for leaks and malfunctions before use to minimize the potential for accidental spills;
- Pesticide application equipment and pesticide containers will be rinsed in a manner to minimize drainage into waterbodies;
- MDC Mosquito Control District will provide mosquito control within the CRC Property. Any FWS imposed requirements on the MDC Mosquito Control District's operations are expected to be applicable to the CRC Property;
- Education will also be an IPM component for lessees, property owners, and/or tenants, and is discussed in Outreach and Education **Section 7.3**.

### **6.2.4 Mitigation Areas Preserves Management Minimization Measures and BMPs**

To minimize impacts which may potentially occur from restoration activities, The Mitigation Areas restoration management techniques will be conducted according to the following conditions. Some of the BMPs for the Off-site Mitigation Area are included below. For a complete list of BMPs for the Off-site Mitigation Area, see **Appendix J1**.

#### **6.2.4.1 FBB Surveys and Activities for On-site Preserves and Off-site Mitigation Area**

A FBB roost survey will be conducted for portions of the On-site Preserves. The FBB roost survey for the On-site Preserves will encompass a 100 meter radius around FBB monitoring stations 2, 6, 10, 13A, 15, 16, 19, 22, and 23 (see **Figure 6-1**). This survey area will include only the On-site Preserves, with Development Areas excluded (to be surveyed prior to commencement of activities in the Development Areas). In addition, a FBB roost survey will be conducted on the Off-site Mitigation Area prior to the initial burn. Within the survey areas, all trees with a diameter at breast height (DBH) equal to or greater than 10 inches, all snags with a DBH of greater than or equal to 8 inches, and all utility poles (collectively referred to as uprights) will be visually surveyed for cavities. Suitable cavities have an entrance (cavity or hollow) of at least 2" in diameter or could be a sheltering crevice created by loose exfoliating bark. All uprights found to have cavities suitable for FBB roosting will be documented with GPS points. If a roost location is recorded, the interior of cavities will be peeped using a camera. The presence of guano or bats would indicate positive findings, while the absence of guano or bats would indicate negative findings. Pre-construction FBB roost surveys will occur no more than 60 days in advance of canopy thinning and fuel reduction activities. If the pre-construction FBB roost surveys are conducted more than 60 days prior to canopy thinning and fuel reduction activities, verification of the previous survey will be conducted no more than 60 days in advance of these activities.

If a roost is identified in the On-site Preserves or Off-site Mitigation Area during the pre-construction survey, a 100' buffer will be established around the roost. Use of chemical treatments will be limited within the 100' buffer. To protect the roost structure during burning activities, applicable USFWS guidelines for Red Cockaded Woodpecker Cavity Tree Protection, Chapter 8k-5c and d (USFWS 2003) will be implemented. This will include hand removal of the subcanopy within the 100' buffer, raking away of fine fuels from the base of the roost structure, and establishing a wetline around the roost structure.

#### **6.2.4.2 General On-site Preserves BMPs**

- A. Eastern Indigo Snake Standard Protection Measures will be implemented (Appendix H) and the same measures (tailored to rim rock crowned snake for identification and educational materials) will be implemented for rim rock crowned snake;
- B. Recommendations for management will be developed by the Preserve Biologist through coordination with the HCP Coordinator and Burn Manager and other appropriate entities and will be included in the HCP Administrative Report. The recommendations will detail management activities within specific management units for the coming year. Management units will be evaluated based on site conditions, previous land management activities, monitoring results, and restoration or burn objectives. The recommendations will identify and prioritize management actions for each management unit and develop an annual implementation schedule;
- C. Public utilization of the On-site Preserves, including residential and commercial tenants, will be prohibited included in tenant leases;

- D. On-site Preserves will be marked. Maximum sign spacing shall be 300 ft. Signs will read “Nature Preserve Area – Unauthorized Access Prohibited.”

The following BMPs are applicable to contractors conducting land management activities within the Preserves:

- E. Dumping, littering, and unauthorized clearing within the On-site Preserves is prohibited;
- F. Hunting, trapping, or harassing wildlife is prohibited;
- G. Unauthorized harvesting of plants is prohibited;
- H. Smoking will be prohibited;
- I. Feeding of wildlife will be prohibited.

#### **6.2.4.3 Contractor Education**

All contractors and their personnel, conducting work within the On-site Preserves, will be made aware of the pine rockland habitat and species potentially present on site. A kick-off meeting will be held with each contractor and the Preserve Biologist to discuss the specifics of conducting work within this habitat type. The Contractors will be provided with a copy of Section 6.0 of the HCP, the ITP and identification material on the Covered Species (Appendix E1). Management BMPs, restrictions, and other applicable conditions will be incorporated into all contracts.

Educational material will include photographs of the species, and/or conspicuous signs of the species presences (tree cavity or burrow), written description of the species, instructions to follow if species is observed (e.g., cease heavy machinery operation until species leaves on own accord or qualified ecologist has deemed safe), and appropriate contact and reporting information for all observations. Educational material will also include laminated cards that can be kept on workers for quick identification. All workers will be required to have identification material available. All treatment crews will be provided education materials regarding identifying the listed plants. The Applicant prepared educational material, which is attached as **Appendix E1**.

#### **6.2.4.4 BMPs for On-site Conservation Areas Land Management Activities**

- A. Restoration activities (e.g., hardwood removal and prescribed burning) will be conducted first on degraded areas, which have been demonstrated to have reduced use or presence of listed species;
- B. Management units have been designed to be small (approx. 3-5 acres) to promote mosaic style management and prescribed burning, which will minimize direct impact of management on species and will assist in smoke management;
- C. Management units were designed to utilize existing features (e.g., existing firebreaks, asphalt trails) and proposed features (e.g., paved areas), in order to minimize the creation of new firebreaks;

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- D. New firebreaks will be established through non-permanent methods such as mastication and mowing, and avoid known listed plant populations, to the extent practicable;
- E. Known populations<sup>8</sup> of federally listed plants will be marked with flagging and/or delineated on contractor maps to prevent disturbance during hardwood reduction, invasive treatment and establishment of new firebreaks;
- F. Any federally listed plant species in Table 1-2 noted during the field inspections or monitoring will be recorded with GPS coordinates, marked with flagging to prevent damage during management activities;
- G. Flagging of known listed plant locations will occur prior to the initial hardwood removal in Year 1 in all management units of the On-site Preserves;
- H. When feasible, hand removal for pines, management of invasive species and hardwoods will be preferentially used over mechanical treatments that involve heavy equipment;
- I. Roller-chopping will be a prohibited mechanical treatment method;
- J. Debris from thinning will be stacked in burn piles and/or transported off site;
- K. Any equipment used for mechanical treatments of hardwoods within the On-site Preserves will utilize rubber tired vehicles, if available, otherwise the use of rubber tracked vehicles will be selected;
- L. Mechanical equipment utilized within the On-site Preserves will be the minimum size and weight necessary to perform the task will be preferentially selected;
- M. All equipment will be properly inspected and maintained;
- N. Heavy equipment will not be stored within the On-site Preserves boundary;
- O. Mechanical access will be through adjacent development and along fire breaks;
- P. When mastication and mowing result in fuel accumulation, burning will be conducted before the chips and fine fuels dry out. Raking will be selectively used in certain areas to reduce hazardous fuel loads;
- Q. To minimize the introduction of exotic and nuisance plant species, decontamination of equipment will be conducted prior to conducting land management activities;
- R. Application of pesticide will adhere to labels and will conform with applicable EPA requirements;
- S. To the extent practicable, insecticides will be applied by hand;
- T. Chemical control for invasive plants will not be conducted on days with excessive windy conditions to reduce drift and non-target damage;

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<sup>8</sup> Known populations of federally listed plants are as established in the Woodmansee 2014 Report (Appendix D) and as applicable, opportunistic sightings/GPS locations of listed plants recorded during future Biological Monitoring events. *See* Vegetative Monitoring, Section 7.6.1.

- U. Pesticides will not be stored within the On-site Preserves boundaries;
- V. Pesticide application equipment and pesticide containers will be rinsed in a manner to minimize drainage to water bodies;
- W. Herbaceous chemical control will give preference for systemic herbicides that exhibit low soil activity such as glyphosate to the greatest extent possible. Combining the use minor amounts of herbicides that exhibit some soil activity such as Imazapyr may be necessary in some cases for problematic herbaceous species that have extensive rhizomatic structures, or if plants have become resistant to a particular herbicide. These types of herbicides will only be utilized when deemed necessary for effective control;
- X. Application of insecticide and rodenticide will adhere to Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), 7 U.S.C. § 136 et seq. requirements as to application, storage, and label requirements;
- Y. All prescribed burns will be conducted to promote a mosaic pattern discussed in CRC Burn Plan (Appendix J);
- Z. If a roost or other (non-ephemeral) occupied refuge (e.g., gopher tortoise burrow) becomes established within the On-site Preserves, this area will be flagged during management activities;
- AA. A wetline will be established around ½ acre portions of pineland croton patches during the initial prescribed burning in Management Units 1, 2, 8, 11 and 12;
- BB. Prescribed burning will be conducted in accordance with Florida Statutes and MDC Code, and planned and carried out by a designated Certified Prescribed Burn Manager (as licensed by the FFS) and fire crews utilizing the FFS Prescribed Burn Plan form;
- CC. Site plans have been designed to incorporate hydrants strategically along the boundary of the On-site Preserves to allow quick mop up of prescribed burn activities, and to reduce response time for wildfire control and to reduce unnecessary use of mechanical means for controlling potential wildfires.

#### **6.2.4.5 *Smoke Management***

- A. Appropriate weather forecasting and smoke dispersion models, such as the “Forestry Smoke Screening Tool: Florida Forest Service- FDACS”, will be used prior to conducting prescribed burning to minimize impacts on smoke-sensitive areas;
- B. Monitoring of the prescribed burn will be conducted to ensure minimization of associated hazards and will continue until there is no potential for the fire to reignite and cause an uncontrolled fire;
- C. Fuel loads will be minimized prior to burning through mechanical treatments and/or removal where feasible;

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- D. Heavy fuels such as woody vegetation and downed trees, which cause heavy smoke output, will be reduced, and fine fuels such as herbaceous grasses, which are easily combustible and produce less smoke will be increased;
- E. Burn when weather and fuel moisture conditions will minimize smoke production;
- F. Burns will be conducted when winds are blowing away from smoke sensitive areas;
- G. Burns will be conducted when Atmospheric Dispersion Index is 41 or greater as defined by the FFS;
- H. Firing techniques will be used that will best minimize smoke while meeting burn objectives;
- I. Mop up will occur immediately following flame front;
- J. Size of burn units will be kept consistent with the CRC Burn Plan;
- K. Heavy fuels will be mopped up within 50 feet of control lines;
- L. Smoke signals will be placed on public roads adjacent to burn areas;
- M. Burns will be mopped up before nighttime inversions trap smoke near the ground;
- N. Mop up activities, when practicable, will avoid pooling water within the On-site Preserves.

## **7.0 CONSERVATION PROGRAM: ON-SITE AND OFF-SITE MITIGATION PLAN, MONITORING AND REPORTING**

The Conservation Program of the HCP (**Sections 6.0 and 7.0**) includes comprehensive efforts by the Applicant to avoid, minimize and mitigate the potential impacts of the take. **Section 7.0** addresses the mitigation plan components of the Conservation Program. These include the On-site Preserves Mitigation Plan, Stepping Stones, installation of Bat Boxes, the Education and Outreach Plan, Off-site Mitigation Area Mitigation Plan, Success Criteria and Monitoring requirements. The Conservation Program demonstrates that the Applicant will fully offset the impacts of the incidental take. The Conservation Program not only offsets the impacts of take, it provides substantial conservation benefits to the Covered Species, by employing efforts to rectify and reduce potential impacts.

The Mitigation Plan in this section includes the following measures which offset the impacts to the Covered Species and provide substantial benefits to the Covered Species and a net conservation gain:

- Implementing the 51.41-acre On-site Preserves Mitigation Plan
- Creating 3.88 acres of Stepping Stones within the Development Areas
- Community outreach and education
- Installation of bat boxes
- Implementing a prescribed burn plan for the 50.96-acre Offsite Mitigation Area
- Achieving and Maintaining success criteria in the On-site Conservation Areas
- Monitoring requirements for the Mitigation Areas
- Proposed encumbrances for On-site Preserves and Off-site Mitigation Area (**Section 11.0**)

### **7.1 On-site Preserves Mitigation Plan Overview**

The On-site Preserves Mitigation Plan includes 51.41 acres of On-site Preserves that will be preserved on-site and placed under a conservation encumbrance and managed in perpetuity. The details of the conservation encumbrance are included in **Section 7.9**. The On-site Preserves include 47.06 acres of pine rockland enhancement and preservation, 0.39 acres of sod that will be removed and planted with pine rockland plant species, within a portion of the Southern Corridor, 3.85 acres of upland enhancement and preservation and 0.11 acres of impervious areas that will be utilized as firebreaks or for preserve access. **Table 7-1** provides a summary of the existing and proposed conditions for the On-site Preserves and **Figure 7-1** depicts the location and classification of the On-site Preserves. Following is a brief description of each preserve classification.

**Pine Rockland Enhancement and Preservation:** Approximately 47.06 acres of pine rocklands will be enhanced and preserved. This includes  $\pm 45.2$  acres within the East and West Preserves and  $\pm 1.8$  acres in the Southern Corridor. As a result of lack of management and fire suppression, the majority of these areas have been colonized with invasive plant species. Lack of fire has also resulted in a dense pine canopy and hardwood encroachment, which affect the plant community composition and create hazards for prescribed burning. Mitigation activities for the 45.24 acres

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of pine rockland within the East and West Preserves will consist of eradication and maintenance of invasive plant species, canopy thinning, fuel reduction and prescribed burning. Mitigation activities for the pine rocklands in the Southern Corridor will consist of pine thinning and maintenance of invasive plant species.

**Pine Rockland Plantings:** The 0.39-acre sod area located within the On-site Preserves along the southern boundary of the CRC Property (Southern Corridor) will be chemically treated, removed and planted with desirable pine rockland species. Plant species will include those identified in the “Dade County Native Plant Communities” for pine rocklands and rockland hammocks (**Appendix I**) and BSHB forage species identified in **Table 7- 2**, and other pine rockland species native to the area. If available, plantings may also include deltoid spurge and tiny polygala.

**Upland Enhancement:** The 3.85 acres of upland enhancement includes 3.72 acres of rockland hammock and 0.13 acres of historic marl prairie. The mitigation plan for these areas will consist of invasive plant management.

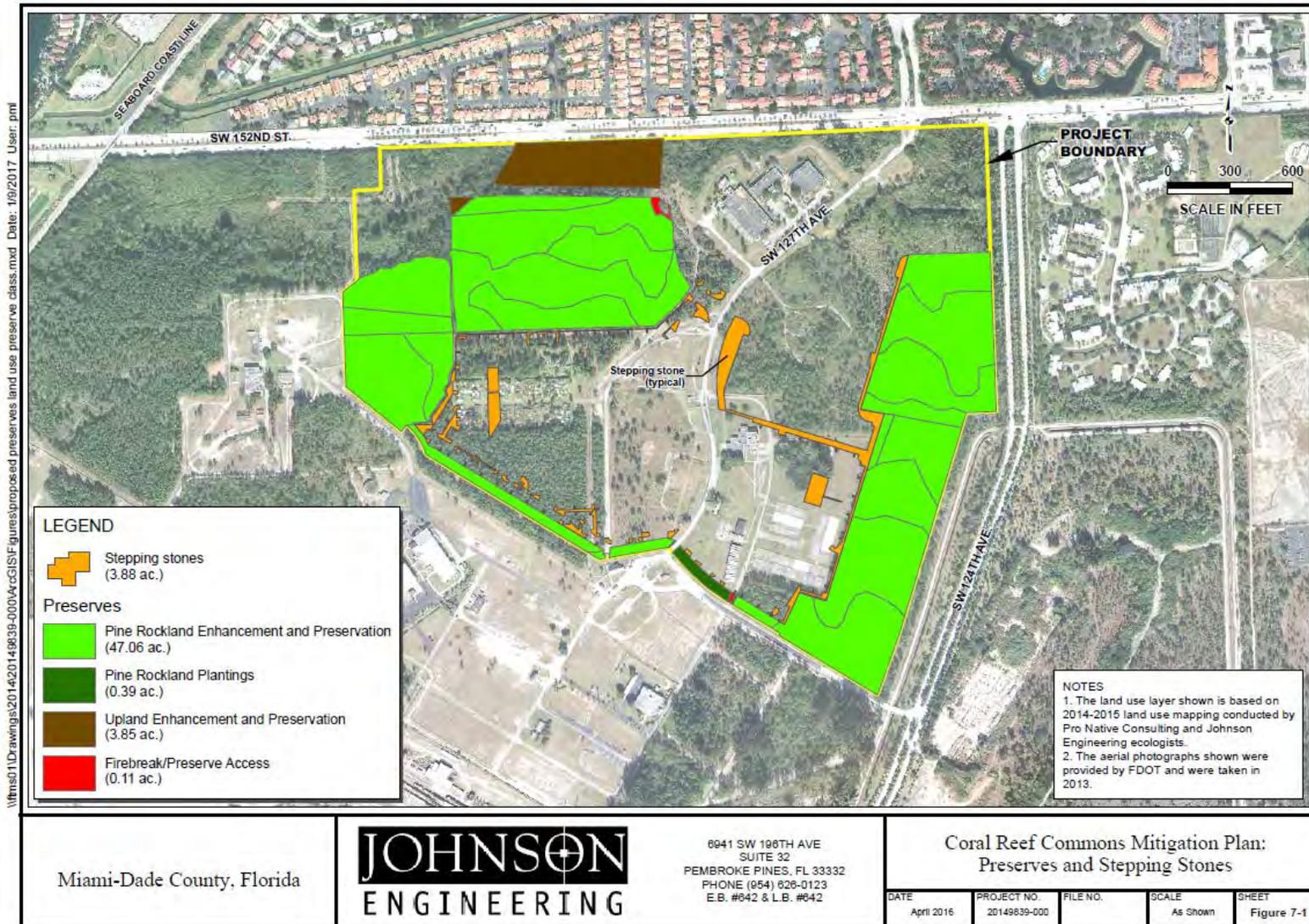
**Firebreak/Preserve Access:** Approximately 0.11 acres of impervious surface occurs within the mitigation areas and will be utilized as firebreaks and for preserve access.

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**Table 7-1. On-site Preserves Existing and Proposed Conditions**

<b>Pine Rockland Enhancement and Preservation</b>		
<b>Existing Land Use</b>	<b>Proposed Land Use</b>	<b>Acreage</b>
<i>Less than 50% Burma reed</i>	<i>Pine Rockland Enhancement and Preservation</i>	15.22
<i>Burma reed dominated</i>	<i>Pine Rockland Enhancement and Preservation</i>	19.22
<i>Historically scraped with pine canopy</i>	<i>Pine Rockland Enhancement and Preservation</i>	5.33
<i>Historically scraped with pine canopy, Burma reed dominated</i>	<i>Pine Rockland Enhancement and Preservation</i>	4.68
<i>Fire suppressed</i>	<i>Pine Rockland Enhancement and Preservation</i>	1.13
<i>Severely fire suppressed, dominated by Burma reed</i>	<i>Pine Rockland Enhancement and Preservation</i>	1.16
<i>Historically scraped w/o canopy</i>	<i>Pine Rockland Enhancement and Preservation</i>	0.32
<b>Pine Rockland Total</b>		<b>47.06</b>
<b>Pine Rockland Plantings</b>		
<b>Existing Land Use</b>	<b>Proposed Land Use</b>	<b>Acreage</b>
<i>Cleared and sodded</i>	<i>Pine Rockland Plantings</i>	0.39
<b>Pine Rockland Plantings Total</b>		<b>0.39</b>
<b>Upland Enhancement and Preservation</b>		
<b>Existing Land Use</b>	<b>Proposed Land Use</b>	<b>Acreage</b>
<i>Historically marl prairie, exotic dominated</i>	<i>Upland Enhancement and Preservation</i>	0.13
<i>Rockland hammock Burma reed dominated</i>	<i>Upland Enhancement and Preservation</i>	3.72
<b>Upland Enhancement and Preservation Total</b>		<b>3.85</b>
<b>Firebreak/Preserve Access</b>		
<b>Existing Land Use</b>	<b>Proposed Land Use</b>	<b>Acreage</b>
<i>Impervious surface</i>	<i>Firebreak/Preserve Access</i>	0.11
<b>Firebreak/Preserve Access Total</b>		<b>0.11</b>
<b>Total On-site Preserves</b>		<b>51.41</b>

**Figure 7-1. CRC On-site Mitigation Plan: On-site Preserves and Stepping Stones**



## **7.2 Stepping Stones**

The On-site Preserves Mitigation Plan includes the creation of 3.88 acres of pine rockland plant landscaping within the Development Areas, called Stepping Stones. The Stepping Stones equate to over 4% of the Development Areas. These areas have been strategically positioned based on USFWS guidance to enhance connectivity between the northern and southern portions of the East and West Preserves (**Figure 7-1**). By enhancing the connectivity, the Stepping Stones will benefit some of the Covered Species, especially the BSHB. The Stepping Stones areas occur in separate development tracts and will be constructed concurrent with the development of the tract they are located within.

### ***7.2.1 Stepping Stones Plantings***

The Stepping Stones will be planted with pine rockland species and will consist predominantly of pineland croton (50-75% composition), the BSHB host-plant, complimented by other plant species. **Table 7-2** includes a list of plant species that may be used in the landscaping of the Stepping Stones. The remaining 25-50% of the plantings will be composed of native pine rockland plant species such as those listed in the “Dade County Native Plant Communities – Pine Rocklands” (**Appendix I**). These plant species include butterfly nectar plants. Limited mulch may be used in the Stepping Stones as weed control around the plantings.

### ***7.2.2 Stepping Stones Invasive Plant Management***

For the Stepping Stones, invasive exotic plant species will be managed to not exceed 15% total coverage. Invasive exotic species are defined as Category I species in the Florida Exotic Pest Plant Council (FLEPPC) List of Invasive Plant Species and Prohibited Plant Species in Miami-Dade County (MDC Code Section 24-49.9). Application of foliage and soil applied herbicide within the Stepping Stones will be done with hand-held or backpack sprayers, and will target only invasive exotic species.

### ***7.2.3 Stepping Stones Monitoring***

Qualitative monitoring of the Stepping Stones in the developed areas will be conducted during the monitoring events discussed in Section 7.7 for the On-site Preserves. Qualitative monitoring will include visual estimates on survival of planted species, invasive plant species coverage, and photograph documentation. Results of the qualitative monitoring for the Stepping Stones will be included in the annual monitoring reports. Results of the qualitative monitoring for constructed Stepping Stones will be included in the annual qualitative reports as part of the long-term monitoring.

### ***7.2.4 Stepping Stones Success Criteria***

The success criteria for the Stepping Stones will be 85% relative coverage by desirable pine rockland and native species, with invasive exotic plant species constituting no more than 15% total coverage. Relative coverage is the cover of pine rockland species as a percentage of the total plant cover. Total plant cover is defined as all plants including pine rockland plants, non-pine rockland plants, natives and exotic species.

**Table 7-2. Stepping Stones Plant Species**

Scientific Name	Common Name	CRC Presence
<i>Acacia pinetorum</i>	pine acacia	N
<i>Byrsonima lucida</i>	locustberry	Y
<i>Croton linearis</i>	pineland croton	Y
<i>Cynanchum blodgettii</i>	Bloggett's swallowwort	Y
<i>Flaveria linearis</i>	Narrowleaf yellowtop	Y
<i>Forestiera segregata</i>	Florida privet	Y
<i>Lantana involucrata</i>	button sage	Y
<i>Melanthera nivea</i>	snow squarestem	N
<i>Phyla nodiflora</i>	capeweed	N
<i>Pithecellobium keyense</i>	Florida keys blackbead	N
<i>Rhynchospora colorata</i>	starrush whitetop	Y
<i>Rhynchospora floridensis</i>	Florida whitetop	Y
<i>Serenoa repens</i>	saw palmetto	Y

### 7.3 Community Outreach and Education

The Conservation Program includes community outreach and education. Community outreach and education will be an important component for increasing awareness of protecting and managing pine rocklands and will continue throughout the life of the permit. The goals of the public outreach and education program will be to promote awareness of the following:

- A. Understanding pine rockland habitats;
- B. Identification of pine rockland associated species;
- C. Understanding the role and importance of prescribed fire in pine rocklands;
- D. Understanding the importance of prescribed fire in benefitting listed species habitat, reducing hazardous fires, and promoting community safety in the CRC Property and in adjacent Richmond Area lands;
- E. Knowledge of pest management practices appropriate for the residential and commercial development;
- F. Tenant and resident education of the HCP requirements and education on applying the BMPs within residences and businesses, as applicable.

Education will be accomplished through the following mechanisms:

- G. Creation and distribution of informational pamphlets on pine rocklands, prescribed fire, pest management, and HCP commitments;
- H. Creation and distribution of species identification material to construction workers and contractors conducting restoration activities;
- I. Posting educational information in common areas within the residential and commercial development;
- J. Coordination with adjacent land owners and Home Owner Associations regarding notice of the on-site prescribed fire activities and schedule;

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- K. Installation of educational signage adjacent to some Stepping Stones or along perimeter of the On-site Preserves within residential and commercial development;
- L. Availability of HCP and Annual Reports to CRC community;
- M. Designation of a HCP Coordinator who will be responsible for outreach and education, which may include an interactive event with the CRC community;
- N. Providing educational material to lessees, property owners, and/or tenants.

#### **7.4 Bat Boxes**

The Conservation Program includes the installation, monitoring and maintenance of six (6) bat boxes in the On-site Preserves. Because FBBs have been documented to roost within specialized bat boxes in urban areas, installation and maintenance of these bat boxes provides roosting opportunities on site and further offsets impacts to FBB. (Marks and Marks 2008). All six (6) bat boxes will be installed within the On-site Preserves within three years of permit issuance, after the initial burn has been completed for all the On-site Preserves. Two bat boxes will be installed in each of the three years or earlier. The bat boxes will be located to minimize the potential for disturbance to bats using the bat box, to the extent practicable. The location for the bat boxes within the On-site Preserves will be determined after the initial restoration activities have occurred and will be coordinated with USFWS. Bat boxes will be constructed based on recommended schematics provided by the FBC or USFWS, if available. During the annual monitoring events, bat boxes will be inspected for evidence of use by roosting bats, such as guano (feces), staining, odors, carcasses, or roosting bats. Any identified bat species utilizing bat boxes will be reported to USFWS and FWC.

#### **7.5 On-site Preserves Mitigation Land Management Activities**

##### ***7.5.1 Invasive Exotic Plant Management***

Florida is prone to infestations of exotic plants due to the lack of severe freezes, presence of disturbed habitats and the numerous lakes, streams, and rivers that connect many of the habitats (Simberloff 1997). Infestations of invasive exotic species reduce biological diversity which adversely impacts wildlife. These infestations can also alter natural processes such as fire frequency and intensity ([http://www.fleppc.org/FLEPPC\\_main.htm](http://www.fleppc.org/FLEPPC_main.htm) accessed March 23, 2015). Category I invasive exotics as defined by the FLEPPC List of Invasive Plant Species and Prohibited Plant Species in Miami-Dade County (MDC Code Section 24-49.9) will be managed within the On-site Conservation Areas as stated in Section 7.7. Category II invasive exotic plants, as defined by the FLEPPC List of Invasive Plant Species and other plants reaching a problematic, invasive level will also be managed to reasonable and achievable levels.

Invasive plant management will occur in all management units after issuance of the ITP, and in Management Unit 6, after sod is removed. Burma reed will be cut using the appropriate hand tools (e.g., weedeater with metal blades) without the use of chemicals in units that will be burned in the first year (Management Units 4, 5, 9, 10, and 13). Herbicides (5% glyphosate solution) will be applied to Burma reed regrowth during the second invasive plant treatment, which will occur approximately 4-6 weeks after the burn when sprouts are approximately 12 inches long (Langeland et al. 2009). Burma reed is commonly the first plant to resprout after a fire, allowing herbicides to safely be applied with less concern for non-target plant mortality (Rasha 2005).

Within Management Units 1, 2, 3, 7, 8, 11, and 12, Burma reed will be hand removed and the cut stems will be treated with a 10% Triclopyr solution (Langeland et al. 2009). Cut stems will be bundled and hauled offsite or piled for burning (Leposky 2013). All other FLEPPC Category I invasive plants will be treated in conjunction with Burma reed and in a manner that is appropriate to the biology of a particular species. This will include the removal of invasive hardwood species, such as Brazilian pepper, earleaf acacia, and Australian pine. Follow-up treatment of invasive plants will occur several times during the first few years, with frequency and timing of events varying based on initial extent of the infestation and subsequent intensity of invasive regrowth. Prior to creation or maintenance, all firebreaks will be treated for invasive plants. Treatment prior to maintenance will be a standard practice to prevent linear spot infestations which can serve as sources for spreading inwards.

Chemical treatments of invasive species will be timed to occur after a prescribed burn or mechanical treatment in order to reduce the amount of herbicide required and to increase effectiveness of control through exhausting plant reserves. Burma reed may create high intensity fires and will be removed prior to prescribed burning. Any necessary follow-up treatments therefore will be timed to occur before target species are able to reproduce.

Herbaceous chemical control will give preference for systemic herbicides that exhibit low soil activity, such as glyphosate, to the greatest extent practicable. Combining the use minor amounts of herbicides that exhibit some soil activity, such as Imazapyr, may be necessary in some cases for particularly problematic herbaceous species that have extensive rhizomatic structures, or if plants have become resistant to a particular herbicide. In such cases, these types of herbicides will be utilized at the minimum amount necessary for effective control.

Chemical control of hardwoods will involve cut stump treatments. Large hardwoods will be horizontally cut and immediately treated with an U.S. Environmental Protection Agency approved herbicide, such as Triclopyr, with a visual tracer dye applied. Cut hardwoods will be transported offsite or will be piled and burned in appropriate locations. Follow-up treatments or treatments of smaller hardwoods may involve basal bark treatments, provided treated hardwoods can reasonably be consumed by prescribed fire and/or will not contribute substantially to fuel loading. To minimize the potential for drift and non-target damage, foliar chemical treatments will not be conducted when winds exceed 10 mph or when rain is reasonably predicted to be imminent, such that herbicides will not have the appropriate time to dry and be absorbed by the target plant (Fishel 2010). When necessary, the appropriate adjuvants will be utilized, such as dyes, spreaders, stickers, etc.

### ***7.5.2 Mechanical Treatment***

Many of the pine rocklands have a dense pine or hardwood canopy that will require thinning to reach optimal canopy cover, achieve target herbaceous diversity, and to prevent fire from carrying into the canopy creating high intensity fires. The canopy will be hand thinned where feasible but in some areas may need to be mechanically thinned. In addition, areas of dense understory will need to be selectively masticated to reduce fuel load. Mastication and mowing will be conducted for the creation and management of firebreaks.

The “CRC Fire Reintroduction and Prescribed Burn Plan” (CRC Burn Plan) in **Appendix J** provides details on mechanical treatment for canopy thinning, fuel reduction, firebreaks and use of mechanical treatments during times when burning is not feasible.

### ***7.5.3 Prescribed Burning***

Pine rocklands are a fire-adapted community, typically experiencing fire on a 3-7 year rotation. Prescribed burning will be an important component of the On-site Preserves Mitigation Plan for the 45.24 acres of pine rocklands located within the East and West Preserves. See also Letter from Steelman, Appendix A. The CRC Burn Plan for these areas can be found in **Appendix J**.

### ***7.5.4 Planting***

Planting will occur within the 0.39-acre sod area within the southern boundary of the CRC Property and within the Stepping Stones. Plantings may also be used for other areas as needed to meet success criteria. Planting will include the species identified in the “Dade County Native Plant Communities” for pine rocklands and rockland hammocks (**Appendix I**) and BSHB forage species identified in **Table 7-2**, and may also include other native pine rockland species. If available, plantings will also include deltoid spurge and tiny polygala in areas that do not conflict with the On-site Preserves Mitigation Plan.

### ***7.5.5 On-site Preserves Management Units***

Management units within the On-site Preserves have been established based on existing and proposed geographic features, habitat types, listed species occurrences, and management needs (see **Figure 3-1** in **Appendix J**). The boundaries of these units may be altered based on site specific conditions. The size of the management units have been designed to minimize effects of land management activities (approximately 3-5 acres) to Covered Species and encourage a mosaic habitat.

## **7.6 On-site Preserves Mitigation Monitoring**

The purpose of this monitoring program is to evaluate the degree of success and trends for the On-site Preserves using established protocols, to evaluate and recommend changes to the mitigation and/or maintenance program, and to verify that management activities reach the established success criteria. The monitoring program includes short-term and long-term monitoring.

### ***Short-Term Monitoring***

The short-term monitoring program will document and report on baseline (prior to the start of the mitigation activities) conditions, time zero conditions (after commencement of initial mitigation activities), and annual monitoring events to track the success of the On-site Preserves. The short-term monitoring period consists of five (5) years and will involve the submittal of seven (7) reports (Baseline, Time-Zero, and five annual reports). This period may be shortened if the On-site Preserves are determined to be successful prior to five (5) years. Conversely, if success criteria are not reached in 5 years, annual monitoring and reporting will continue until they have been reached. Each monitoring report will be submitted as an attachment to the annual HCP Administrative Report. Monitoring reports will be submitted to the USFWS and FWC within sixty days (60) of data collection. Once success criteria have been met the long-term monitoring program will be implemented.

### ***Long-Term Monitoring***

Following achievement of success criteria, quantitative monitoring and reporting will occur every five years. If during the long-term monitoring period portions of the On-site Preserves or

Stepping Stones fail to continue to meet the success criteria for two consecutive years, the HCP Coordinator will meet with the USFWS to determine if additional quantitative monitoring requirements are needed.

Qualitative monitoring and reporting will be conducted annually for the life of the permit. To ensure the On-site Preserves and Stepping Stones maintain compliance with the success criteria, in addition to other elements of the Conservation Program, the Preserve Biologist or HCP Coordinator will develop an annual work plan identifying management activities for the year. The annual work plan will identify areas requiring invasive plant treatment, management units planned for burning, remedial measures if needed, planned community outreach and education, and an implementation schedule. The annual qualitative reports will include a summary of the previous year's annual work plan activities completed, and the annual work plan for the following year. The HCP Coordinator will meet with the USFWS annually, or as otherwise mutually agreed upon, to review the HCP and Conservation Program.

### ***7.6.1 Vegetation Monitoring***

A total of nine (9) permanently marked transects will be established within the On-site Preserves (**Figure 7-2**). The starting point of each transect will be randomly selected from a subset of possible points within representative land use subcategories from baseline conditions (Nur et al. 1999). Transect direction will be oriented to best represent each land use subcategory, and may be field-adjusted where appropriate. Data will be sampled in four quadrats along each transect. Each quadrat will be geographically referenced using a submeter GPS unit, and will be permanently marked with rebar and/or PVC pipe during the Time Zero Monitoring event. Three strata (if present) will be sampled in each quadrat to include: canopy (hardwoods >10cm [4in] DBH), subcanopy (hardwoods excluding <10cm), and ground cover including bare ground. The canopy and subcanopy will be sampled in 30ft<sup>2</sup> quadrats, and the ground cover will be sampled in 2ft by 10ft quadrats. Except for the Baseline Monitoring, for ground cover, each quadrat is divided into 2 ft by 1 ft subsections. For ground cover, all plant species are identified in the quadrat, frequency for each plant species is determined by counting the number of subsections in which that species is present, cover is estimated for each species over the entire quadrat, and bare ground frequency and cover are also estimated. Cover for each species recorded within all strata will be estimated using a modified Daubenmire method, with a 7 category classification system: <1%, 1-9%, 10-29%, 30-49%, 50-69%, 70-89%, and >90% (Daubenmire 1959). Pine regeneration will be measured through documentation of all pine seedlings (<10cm) within the canopy quadrat.

Percent cover, frequency, and species composition will be reported for each species per strata, quadrat or transect, and/or pooled as appropriate. This method will provide a large number of individual frequency measurements for each recorded species while the use of cover classes will enable more consistent percent cover estimates to be made among sampling events. Unlike traditional square quadrat techniques, use of an elongated quadrat provides a larger, spatially contiguous area of measurement. This will allow small changes in vegetative patterns to be elucidated. This analysis will yield a thorough assessment of the developing plant community and allow for detailed tracking of the migration of herbaceous species. Bare ground will be recorded along each vegetation transect. Monitoring results will also specifically describe pineland croton cover, frequency and composition documented within each transect, as well as provide qualitative observations of pineland croton occurrence outside monitoring transects.

Vegetation in the Southern Corridor will be qualitatively monitored to determine coverage by desirable species and invasive plant species. Any federally listed plant species in **Table 1-2** noted during the field inspections or monitoring will be recorded with GPS coordinates and re-inspected during subsequent monitoring events.

#### ***7.6.2 Canopy Cover Monitoring***

Canopy cover will be measured along vegetation transects beginning after initial pine thinning has occurred. Because only minor changes in canopy cover will occur, in the absence of mechanical treatments, it is not anticipated that subsequent canopy monitoring will be needed on an annual basis.

Monitoring will generally follow the “Methods for Baseline Vegetation Sampling and Follow-up Monitoring on Recipient Sites” in Appendix 7 of the FWC’s Gopher Tortoise Permitting Guidelines (FWC 2008). At each plot, the surveyor will walk 15 meters perpendicular to the transect on each side of the transect line (a total of 30 meters). Every 1.5 meters (10 samples on each side), a densitometer will be used to measure the percent canopy cover. Measurements will be totaled, divided by 20 (i.e., the number of samples) and multiplied by 100 to obtain the average canopy cover at that plot, and/or pooled to measure percent canopy cover by transect or management unit.

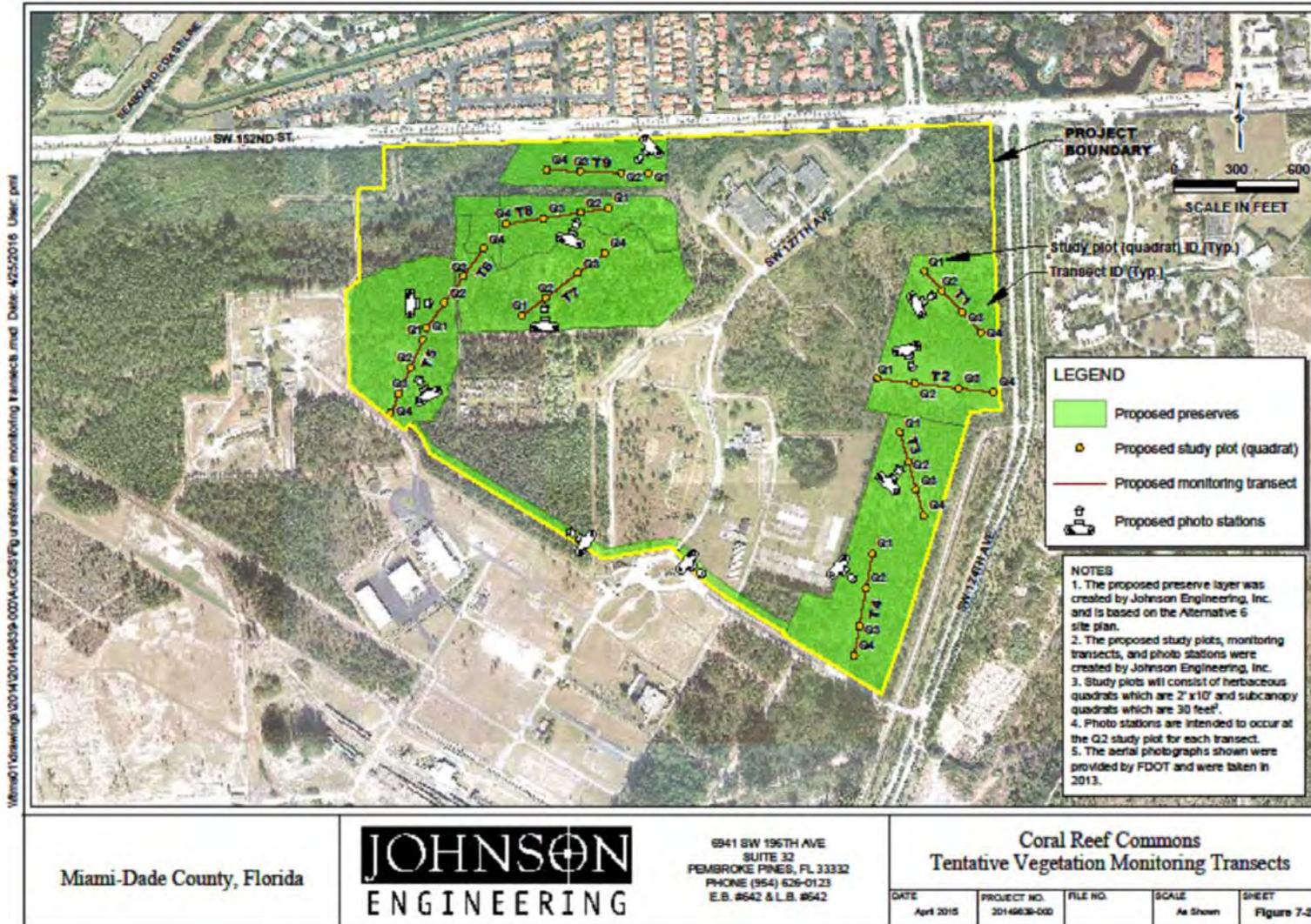
#### ***7.6.3 Photographic Documentation Monitoring***

Photographs will provide qualitative physical documentation of the condition and appearance of the On-site Preserves, as well as document any changes over time. During vegetation monitoring, the surveyor will take a 360° panoramic photograph at the second plot of each vegetation transect and a 180° panoramic photograph at the two photo stations located with the Southern Corridor.

#### ***7.6.4 Wildlife Utilization***

Wildlife utilization will be documented by qualitative monitoring. Qualitative monitoring will consist of recording evidence and signs of wildlife (e.g., direct sightings, vocalizations, burrows, nests, tracks, droppings, etc.) during vegetation monitoring events and other site visits.

Figure 7-2. On-site Preserves Tentative Monitoring Transect Locations



### 7.7 On-site Preserves Success Criteria

Three levels of success criteria are established for the On-site Preserves pine rockland mitigation areas. The success criteria are based on the identified characteristics in the functional assessment and include three upper level functional score classification ranges as targets for success. The three levels of On-site Preserves success criteria correspond to the functional assessment scoring metrics as follows:

- Level 1 success criteria - Functional Assessment Scoring Metric of .6
- Level 2 success criteria - Functional Assessment Scoring Metric of .8
- Level 3 success criteria - Functional Assessment Scoring Metric of 1.0

Croton density was also added to the pine rockland success criteria. **Table 7-3** provides the pine rockland mitigation areas success criteria. For the upland enhancement areas, only % Non-native plants is applicable. Parameters for evaluating the existing pineland croton density within the CRC Property were determined by quantifying the occurrence of pineland croton within each habitat polygon ID. Croton densities ranged from 0 to 16.95 plants per acre. Densities were correlated with the five classifications by dividing the range of density values into five groups based on the Jenks' natural breaks classification scheme. Based on the Jenks' classification scheme, corresponding existing relative abundance values for pineland croton were: abundant (optimal) 9 to 17, common (high) 6 to 8, occasional (moderate) 2 to 5, sparse (low) 1, and negligible (no value) <1.

For the croton density success criteria, the optimal, moderate and occasional croton densities referenced above will be utilized and rounded to the appropriate whole number. The Level 1 success criteria the croton density is 2 to 5, Level 2 success criteria is 6 to 8, and Level 3 success criteria is 9 to 17.

Success criteria for soil conditions will be based on an assessment of percent cover of open soil or rock. Success criteria for soils are only applicable to the areas consisting of non-modified pine rockland soils. This is because soils previously classified as scraped would retain that classification regardless of restoration activities. It is acknowledged that the desired post-restoration condition for soils will include 25% open ground that occurs in patches throughout applicable On-site Preserves. For Covered Species, the success criteria for soil conditions addresses potential Miami tiger beetle habitat.

Percent composition of desirable pine rockland species was based on those species listed in **Appendix F**. Following restoration activities, additional pine rockland species may occur and will be added to this list and used for evaluating this category.

**Table 7-3. On-site Preserves Success Criteria**

<b>Pine Rockland Criteria</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>
% Canopy cover	25-49%	16-24%	1-15%
% Total cover of Non-native plants <sup>9*</sup>	25-49%	5-24%	<5%
Fire frequency **	11-15 yr	8-10 yr	3-7 yr
% bare rock or soil***	5%	10%	25%
% Composition PR desirable herbaceous species	50-69%	70-84%	≥85%
Croton density	2-5	6-8	9-17

\*Only criteria applicable to upland enhancement areas

\*\*Or other natural or artificial disturbance regime that mimics the natural ecological process

\*\*\*Only applicable to areas previously identified as unmodified pine rockland soil (scraped)

Evaluation of the On-site Preserves success criteria will be included in each monitoring report. Once Ram Coral Reef’s monitoring data documents the success criteria have been achieved, Ram Coral Reef will seek concurrence from USFWS. Upon verification by the USFWS, the annual monitoring will transition into the long term maintenance and monitoring phase. If one of the criteria does not meet the Level 3 success criteria, as long as the Applicant can demonstrate the post-restoration functional value exceeds the existing condition functional value of the CRC Property (contained in **Section 5.0** and **Appendix G**), the Mitigation Plan will be deemed to have achieved the success criteria.

### **7.8 On-site Preserves and Stepping Stones Long Term Management**

The long term management requirements for the On-site Preserves and Stepping Stones are not anticipated to require intensive management, as the objective is for these areas is to be self-sustaining natural areas. Long term maintenance will primarily consist of periodic invasive plant treatments and prescribed burning on a 3 to 7 year basis. To ensure the On-site Preserves and Stepping Stones maintain compliance with their respective success criteria, the Preserve Biologist or HCP Coordinator will develop an annual work plan identifying management activities for the next year. The annual work plan will identify areas requiring invasive plant treatment, management units planned for burning, remedial measures if needed, and an implementation schedule. The annual work plan will be included in the monitoring reports and the HCP Administrative Report, as appropriate.

### **7.9 On-site Preserves Conservation Encumbrance**

Applicant will record a conservation encumbrance over the On-site Preserves to ensure these areas are protected. To provide the USFWS with assurance of the perpetual protection, the Applicant will encumber the On-site Preserves; the encumbrance cannot be vacated or modified without prior approval of USFWS; and USFWS will be provided the right to enforce the encumbrance. A draft copy of a proposed encumbrance is attached as **Appendix N**.

<sup>9</sup> Non-native plants are defined as Category I invasive exotics as defined by the Florida Exotic Pest Plant Council’s (FLEPPC) List of Invasive Plant Species.

## **7.10 Off-site Mitigation Area Mitigation Plan**

The Conservation Program also includes 50.96 acres of Off-site Mitigation Area at the UM Richmond Campus (see **Figure 1-1**). The Off-site Mitigation Area will include the preservation of the 50.96 acres and the implementation of a prescribed burn plan. The additional UM Richmond Campus mitigation is above and beyond the On-site Preserves mitigation plan, which offsets potential incidental take impacts (as demonstrated by the functional assessment). The Off-site Mitigation Area provides a substantial conservation benefit to the Covered Species by protecting and enhancing additional pine rockland habitat. Knisley (2014) reported the patches that previously supported MTB adults at the UM Richmond Campus had become overgrown and less suitable for MTB. Implementing the prescribed burn plan at the Off-site Mitigation Area will directly benefit the MTB, in addition to the other Covered Species.

As background, approximately fifty-five acres of the pine rockland habitat within the UM Richmond Campus was previously protected through a recorded deed restriction and included Parcel A (50.96 acres) and Parcel B (4.49 acres). Parcel A is the Off-site Mitigation Area. The Applicant will record a deed restriction (or other conservation encumbrance) on the 50.96-acre Off-site Mitigation Area. Currently, the Off-site Mitigation Area has a deed restriction which is limited to the listing of the deltoid spurge and allows the owner to vacate the restriction. The revised encumbrance will allow for further protections, broadening the deed restriction.

### ***7.10.1 Off-site Mitigation Area Conservation Encumbrance***

Applicant will record a deed restriction or other similar encumbrance on the Off-site Mitigation Area to provide assurances that the lands will be protected. Currently, these lands have a deed restriction which limits the protections to the listing of the deltoid spurge and provides the landowner with the ability to vacate the restriction. The revised encumbrance will allow for further protections, broadening the deed restriction. A copy of the existing deed restriction is attached as **Appendix O**. As part of the HCP, upon the issuance of the ITP, the University will execute the necessary documentation to amend paragraph 6 of the Declaration of Restrictions attached as Exhibit B to that certain deed from the United States of America to the University of Miami, recorded at Book 19378, pages 3313-3332, in the Official Records of Miami-Dade County, Florida. See **Appendix O**.

Should the Applicant utilize a deed restriction as the conservation encumbrance on the Off-site Mitigation Area, the proposed amended paragraph 6 would be incorporated into the Declaration of Restrictions and would read as follows:

The covenants and restrictions contained herein shall be subject to modification or termination by the Grantee; however, such modification or release shall only be with the written consent, which consent shall not be unreasonably withheld, of the Service (or subsequent federal government units having jurisdiction under the Endangered Species Act over the deltoid spurge, leaf wing butterfly, Bartram hairstreak butterfly, Florida bonneted bat, indigo snake, or the Miami tiger beetle) so long as the deltoid spurge, leaf wing butterfly, Bartram hairstreak butterfly, Florida bonneted bat, eastern indigo snake, or the Miami tiger beetle is listed as either endangered or threatened under the Endangered Species Act.

### ***7.10.2 Off-site Mitigation Area Prescribed Burn Plan***

The Applicant proposes to enhance the Off-site Mitigation Area by implementing a prescribed burn plan (Off-site Mitigation Area Burn Plan). The range of the burn area will be between 45.60 acres to 48.65 acres. See Appendix J1 for specifics of the Off-Site Mitigation Area Prescribed Burn Plan.

The main goal of the current UM Richmond Campus Conservation Management Plan is to control invasive plant species. Based on the “Year Thirteen Management Report” prepared by Biscayne Environmental, Inc. (see **Appendix K**), invasive plant species are being managed on Parcel A. The current UM Richmond Campus Conservation Management Plan also states “Prescribed burning may be required every 3 to 5 years”. However, burning is not mandated and is not occurring at the recommended frequency to maintain pine rocklands in a condition beneficial to the Covered Species. Therefore, the Off-site Mitigation Area Burn Plan will mandate prescribed burning on a minimum of 45.60 acres, in a manner and frequency to enhance the habitat and provide substantial benefit to the Covered Species.

Parcel A is divided up into seven fire control cells (cells 9-15) with established fire breaks. Fire control cells 11, 13 and 15 are located entirely on Parcel A and fire control cells 9, 10, 12 and 14 overlap onto Parcel B. The last prescribed burn on Parcel A was conducted in 2003 in fire control cells 15 and 16, which combined represent approximately one third of the Parcel. Wildfires were recorded in August 2004 in cells 9-13 and in September 2006 within cell 15. As evidenced by comparing 2004 and 2016 aerial imagery, the lack of a regular fire for Parcel A has resulted in an increase in pine canopy cover. The lack of fire also increases the probability of wildfire that can be destructive to the pineland, as well as smoke impacts and spot fire concerns, to the surrounding residences and major transportation corridors.

As part of this HCP’s Conservation Program, the Applicant will implement a prescribed burn plan for 45.60 acres on Parcel A on a 3-7 year rotation. Although not part of the Off-site Mitigation Area, field conditions may necessitate prescribed burning and/or pine canopy thinning in portions of Parcel B. The range of the burn area will be between 45.60 acres to 48.65 acres. The burn plan will commence upon issuance of all requisite permits. Prior to implementing the initial burn, canopy reduction (pine thinning) and understory reduction will be conducted based on recommendations by the Burn Manager. Pines will be hand thinned where feasible, but in some areas may need to be mechanically harvested. Any equipment utilized for canopy reduction will be rubber-tired or rubber tracked vehicles, as they are able to spread the weight over a larger surface, resulting in less compaction and minimizing the crushing and break up of limestone seen with metal tracks (O’Brien et al. 2010). The firebreaks within the Off-site Mitigation Area have already been established. Maintenance of the firebreaks will be required prior to implementing the Off-site Mitigation Area Burn Plan.

The goal is to implement the burn plan in three phases in one year with one to four months intervals between each phase. The intervals will be based on observed native plant regrowth within the previous burned phase. The first phase of burning will include fire control cells 11, 12 and 14. The second phase of burning will occur in fire control cell 13, and the third phase of burning will include fire control cells 10 and 15. Following the initial fire to the fire control cells, burns will occur in a mosaic pattern, with fire applied in alternating fire control cells.

HCP for Coral Reef Commons  
Ram Coral Reef

The Off-site Mitigation Area Burn Plan is attached as **Appendix J1** and includes BMPs to minimize effects to species.

***7.10.3 Off-site Mitigation Area Monitoring***

The HCP will require that the monitoring program described in Appendix O continue for the Offsite Mitigation Area and will include reporting on the Off-site Mitigation Area Burn Plan. The reports will be submitted annually to the USFWS and FWC for the duration of the permit. The annual monitoring reports will include an assessment of the previous year's vegetation management and prescribed burning activities and identify land management activities for the coming year. Qualitative wildlife utilization observations will be included in the Off-site Mitigation Area monitoring reports, similar to Section 7.6.4.

## **8.0 POTENTIAL EFFECTS OF PROPOSED ACTIONS**

This section includes a discussion of the potential beneficial and adverse direct, indirect and cumulative effects of the Proposed Action on the Covered Species. Beneficial effects are those resulting from the Conservation Program in **Sections 6.0** and **7.0**. Potential adverse effects include: (1) Construction of the development; (2) Operation of the residential and commercial community; and (3) Land management activities for the On-site Preserves and Off-site Mitigation Area. Land management activities are analyzed in the adverse effects with the recognition that these activities have long term beneficial effects for the Covered Species.

### **8.1 Covered Species**

The Covered Species in this HCP are listed in **Table 1-1** and **Table 1-2**. The identified Covered Species include a majority of species not documented on the CRC Property but could potentially occur due to the habitat type or after implementation of the Conservation Program for the On-site Preserves and Off-site Mitigation Area. No adverse effects are anticipated for two of the Covered Species, the white-crowned pigeon and clamshell orchid. Following is a discussion of the beneficial and adverse effects from the Proposed Action.

### **8.2 Beneficial Effects of the Conservation Program on Covered Species**

The Conservation Program of the HCP (**Sections 6.0** and **7.0**) includes the overall comprehensive efforts by Applicant to minimize and mitigate the impacts of any potential incidental take. The Conservation Program not only offsets the impacts of potential incidental take, it provides substantial benefits to the Covered Species. The net beneficial effects of the Conservation Program on the Covered Species is the preservation and enhancement of approximately 106.25 acres of habitat.

#### ***8.2.1 On-site Preserves Beneficial Effects on Covered Species***

CRC will establish 51.41 acres of On-site Preserves that will be permanently conserved under a conservation encumbrance. The On-site Preserves consist of (1) Pine Rockland Enhancement and Preservation, 47.06 acres, (2) Pine Rockland Plantings, 0.39 acres (3) Upland Enhancement and Preservation, 3.85 acres; and (4) Firebreak/Preserve Access, 0.11 acres. The On-site Preserves include a 2.16-acre Southern Corridor to enhance connectivity for species between the East and West Preserves.

In addition, the Applicant will establish 3.88 acres of pine rockland plant landscaping within the Development Areas called Stepping Stones. The On-site Preserves and the Stepping Stones, are depicted in **Figure 7-1**.

The orientation of the On-site Preserves, adjacent to pine rockland habitat to the south, west and east of the CRC Property, minimizes habitat fragmentation, increases the value of these preserves for the Covered Species, and allows species to disperse from the CRC Property to other portions of the Richmond Area. In particular, it will benefit species with low mobility, such as the MTB, or those that must traverse habitat exclusively by land, such as the rim rock crowned snake. The Stepping Stones provide additional value to the Covered Species, allowing for connectivity between the On-site Preserves.

The management plan for the On-site Preserves includes canopy reduction, exotic vegetation removal and maintenance, and prescribed burning, all of which will enhance habitat for the Covered Species.

Specific to the MTB, the success criteria for soils in the 47.45 acres of pine rocklands is 25% bare rock or soil. When the On-site Preserves are managed at the optimum success criteria, the On-site Preserves anticipated to enhance the carrying capacity of MTB on-site.

Regarding the BSHB, the On-site Preserves and Stepping Stones will be managed to provide pineland croton and other species that will support the lifecycle, as well as foraging opportunities, of the BSHB.<sup>10</sup> To ensure pineland croton is available for the BSHB life cycle, croton density was included in the success criteria. When managed at the optimum success criteria (Level 3), the On-site Preserves are anticipated to serve as a source population of BSHB to the adjacent pine rocklands.

To enhance foraging habitat and potential roosting habitat for FBB, the On-site Preserves will be managed so that canopy cover is maintained at 15% or less. Foraging and potential roosting habitat will also be improved as a result of the prescribed burning activities. Fire has been shown to reduce canopy clutter (Boyles and Aubrey 2006, Dickinson et al. 2009), promote higher insect abundance and diversity (e.g., USFWS 2007), and can create or restore available roost trees (Boyles and Aubrey 2006, Dickinson et al. 2009, Lacki et al. 2009). FBBs are also known to use developed areas for foraging (Belwood 1992), thus foraging behavior is expected to continue over the developed portions of the CRC Property as well.

The Covered Species include 13 plants that are adapted to a fire ecosystem; therefore, the implementation of prescribed fire on 45.24 acres of pine rockland preserves will be beneficial for each of the species. Implementation of prescribed fire is expected to provide benefits to these plant species through habitat improvement and ongoing maintenance of improved habitat quality. Implementation of regular prescribed fire in pine rocklands reduces fuel loading, which lowers the intensity fires, reducing the amount and frequency that plants are killed from burning. Regularly occurring fire will also maintain an open understory that promotes plant species diversity. In addition, many fire dependent plant species respond positively to the occurrence of fire. These responses may include increased flower, fruit and seed production as well as improved germination and seedling establishment.

The beneficial effects of the Conservation Program include the permanent conservation, enhancement and maintenance of 51.41 acres of habitat for the Covered Species.

### *8.2.2 Off-site Mitigation Area Beneficial Effects on Covered Species*

The Project also includes 50.96 acres of Off-site Mitigation Area on the UM Richmond Campus, the only other privately-owned parcel in the Richmond Area. The Applicant will record a deed restriction. Currently, the property has a deed restriction which is limited to the listing of the deltoid spurge and allows the owner to vacate the restriction. The revised encumbrance will allow for further protections, broadening the deed restriction.

The Applicant proposes to enhance the Off-site Mitigation Area by implementing a prescribed burn plan for a minimum of 45.6 acres (**see Off-site Mitigation Area Burn Plan in Appendix J1**). Knisley (2014) reported the patches that previously supported MTB adults at the UM Richmond Campus had become overgrown and less suitable for MTB. Implementing the Off-

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<sup>10</sup> The Florida leafwing (leafwing) is currently only known to occur in ENP on Long Pine Key, and it is not present in the Richmond Area, including the CRC Property and the UM Richmond Campus. For **Section 8.0**, if leafwing was introduced and colonized the Richmond Area, the effects of the action and estimate of take are similar to BSHB and leafwing is, therefore, not further discussed.

site Mitigation Area Burn Plan will directly benefit the MTB, in addition to the other Covered Species. In particular, the beneficial effects to BSHB, FBB, and the listed plant species described above are anticipated to occur on the UM Richmond Campus as well because it protects and restores pine rockland habitat and maintains connectivity with other parcels in the Richmond Area.

### ***8.2.3 BMPs Beneficial Effects on Covered Species***

As detailed in **Section 6.0** and the burn plans in **Appendix J** and **J1**, the Applicant has developed numerous BMPs to minimize impacts which may potentially result from construction activities, residential and commercial operations, and management of the on-site and offsite mitigation areas.

### ***8.2.4 Habitat Functional Assessment Demonstrates Benefit and Net Gain to Covered Species***

The Applicant worked with the USFWS to develop a habitat functional assessment for the CRC Property to classify the quality of habitats on-site, assist in minimization of impacts, and to quantify impacts and mitigation requirements. Because the USFWS determined pine rockland habitat provides the desired characteristics for the Covered Species, the habitat functional assessment was based on specific characteristics of pine rockland habitat and based on the best available science.

The habitat functional assessment was applied to all land uses within the CRC Property (137.90 acres) for both existing and post-development/mitigation conditions. The existing functional value (expressed in terms of HVUs) was determined to be 40.72 HVUs for the CRC Property. The Project will develop 86.49 acres (including 3.88 acres of Stepping Stones). The post functional assessment for the CRC Property was determined to be 43.82 HVUs. This is a net increase of 3.10 HVUs and based on the management of the On-site Preserves achieving the identified success criteria (**Section 7.7**). This improvement of 3.10 HVUs will, overtime, have a beneficial effect for all the Covered Species.

The “Stepping Stones” will also enhance the functional value of the On-site Preserves. They were considered developed in the post functional assessment and conservatively received no functional value. However, the Stepping Stones will provide additional habitat enhancement for some of the Covered Species, and are specifically designed to benefit BSHB because of the inclusion of pineland croton and butterfly nectar plants in the planting list.

The USFWS states that the Miami tiger beetle is found exclusively in pine rocklands (DOI 2015d at 79536 and 79538), specifically the Richmond Pine Rocklands. In addition to observations of the MTB in pine rockland habitat within the Richmond Pine Rocklands, adult MTB have also been observed in other types of degraded habitat within pine rocklands including: an old degraded road in Zoo Miami, dirt roads at the USCG site and University of Miami Richmond Campus (Knisley 2014), and an altered pine rockland area that has been cleared and mowed (Possley 2014). Even though only 79.97 acres of pine rocklands occur on-site, as stated previously, the habitat functional assessment was applied to all land uses within the CRC Property (137.90 acres) for both existing and post-development/mitigation conditions. Because Miami tiger beetles need bare or sparsely vegetated, sandy habitat patches that are found within pine rockland habitat to survive (USFWS 2015a), soils was included as one of the characteristics to evaluate Project’s effects on the MTB. Out of the 137.90 acres, 124.14 acres

received a functional score greater than zero, thereby attributing functional value for the MTB to 45.17 acres of non-pine rockland habitat. Furthermore, connectivity and adjacency to pine rockland areas was included in the habitat functional assessment.

### **8.3 Development Activities Potential Adverse Effects on Covered Species**

The CRC Development of 82.61 acres may result in permanent effects and temporary construction effects to Covered Species. This section discusses the permanent effects from the development, temporary effects from construction, and effects from the operation of the development. The construction and operation of the Development Areas may result in impacts to the Covered Species including potential mortality or harm through habitat modification. These effects are minimized through the minimization measures in **Section 6.0** and mitigated through the measures in **Section 7.0**.

#### **8.3.1 Development - Removal of Habitat**

The CRC Development consists of 86.59 acres to be developed. However, 3.88 acres of these will be developed as Stepping Stones to benefit the Covered Species. The development and construction of the Project removes 82.61 acres of potential habitat for the Covered Species. The permanent removal of this habitat was assessed in the habitat functional assessment to determine the function and value of the habitat to Covered Species.

The Conservation Program will address this loss of habitat, by offsetting the impacts and providing an overall net gain in functional value post-development when compared to the current functional value of the habitat. Minimization measures in **Section 6.0** will minimize impacts of CRC development on all the Covered Species.

No roosts have been observed on CRC Property and no adverse impacts are anticipated to FBB roosts as a result of loss of habitat and construction activities. To avoid and minimize any potential effects, the Applicant will conduct pre-construction roost surveys for the development areas (**Sections 6.2.2.1**) following USFWS guidance. The pre-construction roost surveys include protective measures in the event a FBB roost is discovered. To further minimize adverse effects from the loss of potential roosting habitat, the Applicant will establish six (6) bat boxes within the On-site Preserves.

Ridgley *et al.* 2014 stated “Pine rockland does not directly appear to be an important foraging location” for the Florida bonneted bat”. In addition, Florida bonneted bats are “fast hawking” bats that rely on speed and agility to catch target insects in the absence of background clutter, such as dense vegetation (Simmons *et al.* 1979, pp. 16-21; Belwood 1992, p. 221; Best *et al.* 1997, p. 5). Approximately 70% of the non-developed areas currently have greater than 50% cover by exotics and/or canopy. Thus, the on-site pine rocklands likely do not support foraging habitat for FBB. Nonetheless, foraging and roosting habitat will be improved as a result of the management plan for the On-site and Offsite Mitigation Areas.

Although not observed, any eastern indigo snake or rim rock crowned snake in the Development Areas may be impacted by the loss of habitat. Rim rock crowned snakes and eastern indigo snakes that are displaced from their home range may be impacted if they cannot find sufficient resources, either because they are not available (due to other urbanization nearby) or because the adjacent habitat is already occupied by another rim rock crowned snake or indigo snake. The Applicant has reviewed the Recommended Conservation Practices, Measures to Avoid Take, and Minimization and Mitigation Options contained in the Rim Rock Crowned Snake Species

Conservation Measures and Permitting Guidelines (FWC 2016a) and is implementing selected measures, including implementing standard protection measures tailored to rim rock crowned snake. The Applicant will minimize any potential adverse effects of construction activities to the eastern indigo snake and rim rock crowned snake by applying the principals of the USFWS's Standard Protection Measures for Eastern Indigo Snakes for both species (see **Section 6.2.2.3** and **Appendix H**). These measures include sharing information with FWC consistent with the Rim Rock Crowned Snake Species Conservation Measures and Permitting Guidelines (FWC 2016a).

Gopher tortoises have not been documented on-site; consequently there are no anticipated effects during construction. In the unanticipated event that a gopher tortoise is found on site during construction, CRC will follow the FWC requirements for gopher tortoise relocation.

### ***8.3.2 Development - Fragmentation of Habitat***

Fragmentation of pine rockland habitat is a concern for species with low mobility, and may result in the isolation of populations. The Development Areas (86.49 acres) may fragment the CRC habitat by removing vegetation in the center of the CRC Property. With the assistance of the USFWS, the Applicant included connectivity and fragmentation as one of the characteristics in its habitat functional assessment to insure this effect was appropriately assessed on the CRC Property.

To reduce the effect of fragmentation and to create connectivity for the Covered Species between the On-site Preserves, CRC will establish a 2.16-acre corridor at the southern edge of the CRC Property. The 2.16-acre Southern Corridor includes  $\pm 1.8$  acres of existing pine rockland habitat and 0.39 acres of pine rockland plantings. In addition, CRC will plant 3.88 acres of Stepping Stones with pine rockland species, including pineland croton and butterfly nectar plants, connected and adjacent to the preserves, to reduce the effects of habitat fragmentation. (**Figure 7-1**).

Lastly, the Off-site Mitigation Area reduces habitat fragmentation by preserving and implementing a prescribed burn within a minimum of 45.60 acres of pine rockland habitat (**Appendix J1**) that is part of the greater Richmond Area.

When assessed collectively, the minimization and mitigation measures the Applicant is undertaking in the On-site Conservation Areas and Off-site Mitigation Area, reduce the effects of habitat fragmentation on the Covered Species.

### ***8.3.3 Temporary Impacts from Development's Construction Activities***

Temporary impacts are effects of the Proposed Action that alter the behavior of a Covered Species for the short duration of a temporary activity; alter the habitat conditions or functions that support Covered Species for a short period following implementation of the activity. Temporary effects to the On-site Preserves include disturbances, such as noise and lighting associated with the operation of construction equipment.

Construction activities on-site may result in temporary impacts through the increased presence of humans and/or associated equipment, vehicles and/or machinery. The disturbance effects of construction will be minimized by installing silt fencing around all ground disturbing activities, and by staging all construction material and equipment within previously disturbed areas and

outside of the preserve boundaries. In addition, all On-site Preserve boundaries will be delineated with enviro-fencing to preclude entry and disturbance during construction.

The Applicant will minimize potential adverse effects from ponding by adhering to the SWPPP. Silt fencing around all ground disturbing activities will also minimize water flow off-site (see **Section 6.2.2.3** and **Appendix H1**).

Nighttime lighting during construction has the potential to affect FBBs. The FBB's behavioral response to artificial lighting and ecological light pollution have not been examined, and effects are not known. The Applicant does not anticipate using nighttime lighting as part of general construction; however, it may be necessary for some elements. Any lighting required for night time construction of safety purposes will direct light towards the intended target for illumination, which is expected to reduce effects to FBB (see **Section 6.2.2.3**).

Therefore, temporary impacts to the Covered Species during the Development's construction activities will be minimized by the implementation of measures detailed in **Section 6.0**.

#### **8.3.4 Community (Residential and Commercial) Operation**

The operation of the residential and commercial development within the CRC community over the course of the ITP may result in adverse effects on the Covered Species. The potential adverse effects and minimization measures to minimize these effects are detailed below.

##### Predation

Human presence may result in the increased potential for predation for some of the Covered Species from introduced predators, such as domestic dogs and cats. These threats will be minimized through the requirement of dogs to be leashed, exclusion of residents from the preserves (through posted signs), and through the educational materials and kiosks. Based on the implementation of the minimization measures discussed in **Section 6.2.3**, residential and commercial development is not expected to increase the predation threat to the Covered Species, and any issues with nuisance species will be addressed through the BMPs and the education program in **Section 6.0**. Tenants will be educated on proper application regulations for pest control and any pesticide treatment. It is unlikely that the any predator population will become elevated enough in numbers because of the community's presence that it will adversely affect the Covered Species.

##### Collection

The presence of the Community could attract collectors of the Covered Species, which may be subject to collection by enthusiasts. To minimize the threat of collection, public utilization of the preserves including residential and commercial tenants will be prohibited and included in the tenant leases, the preserves will be marked with signs indicating "Nature Preserve Area – Unauthorized Access Prohibited", and the community will be educated as described in **Section 6.0**. Collection is not expected to occur on the Off-site Mitigation Area as it is secured and patrolled and not accessible to the public.

##### Vehicles

Vehicular traffic could adversely affect the Covered Species; however, the speed limit within the Community will be relatively slow, 25mph and 15mph, respectively. Consequently, it is anticipated to be a rare and unlikely event that a Covered Species will be directly impacted by

traffic. Furthermore, the vehicle traffic is expected to be intermittent, allowing opportunity for Covered Species to pass through the main roadway between the preserves unimpeded. Although there is a potential to affect the Covered Species, this effect is minimized by low speed limits and intermittent traffic.

#### Pesticide/Mosquito Control

The use of pesticides for landscaping and mosquito control may have an effect on the Covered Species. Applicant has developed community minimization measures and best management practices (**Section 6.2.3.3**) to minimize the adverse effects of pesticide use to the Covered Species. In addition, the community IPM will include education for the lessees, property owners, and/or tenants on proper pest management. For rats, application of insecticide and rodenticide will adhere to Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), which mandates EPA regulate the use and sale of pesticides to protect human health and preserve the environment.

Mosquito control within the Development Areas and On-site Preserve areas will be conducted by Miami-Dade Mosquito Control District (MDMC). MDMC follows application guidance from the USFWS that avoids and minimizes the likelihood of adversely effecting BSHB by implementing buffers to occupied and critical habitat. The buffers instituted for the BSHB are anticipated to protect other Covered Species to some degree as well. The effects of MDMC's program will be evaluated through consultation with MDMC and the USFWS; therefore, it will not be considered further in this HCP.

Therefore, the minimization measures minimize the effects of pesticides and mosquito control on the Covered Species.

#### Human Use of the On-site Preserves and Off-site Mitigation Area

Although unauthorized human access to the On-site Preserves will be prohibited, there is a possibility of trespassing. Public utilization of the On-site Preserves including residential and commercial tenants will be prohibited and included in the tenant leases, and the preserves will be marked with signs indicating "Nature Preserve Area – Unauthorized Access Prohibited". In addition, the Community will be educated as detailed in **Section 6.0**. It is not anticipated that trespass in the On-site Preserves will occur, but the effect is nonetheless minimized by signage, notice and education. Moreover, the Off-site Mitigation Area is located on private property with restricted access, therefore, human use of the Off-site Mitigation Area is not expected.

#### Lighting

There may be an effect on Covered Species from lighting within the Development Areas. **Section 6.2.3.1** describes how lighting used for parking lots will be engineered to achieve IESNA requirements as well as meet municipal/code requirements. These requirements will minimize the amount of ambient light and are consistent with what the USFWS commonly refers to as "wildlife friendly" lighting. The IESNA lighting at the CRC Property is not expected to adversely affect the Covered Species.

### **8.4 Covered Species Adverse Effects – Preserve Management Activities**

Preserve management activities will have a long term beneficial effect on the Covered Species; however, this HCP recognizes that impacts to Covered Species may occur during the preserve management activities if the Covered Species are present. Minimization measures in **Section 6.0**

and in the Off-site Mitigation Area Burn Plan (**Appendix J1**) are specifically tailored to minimize effects to covered species during the preserve management activities.

The On-site Preserves Mitigation Plan includes 51.41 acres of On-site Preserves that will be preserved and managed in perpetuity. The On-site Preserves consist of 47.06 acres of pine rockland enhancement and preservation, 0.39 acres of pine rockland plantings within a portion of the Southern Corridor, 3.88 acres of upland enhancement and preservation and 0.11 acres of impervious areas that will be utilized as firebreaks or for preserve access. The On-site Preserves Mitigation Plan includes a combination of mechanical, chemical, and prescribed fire treatment in order to reach success criteria and for long-term maintenance. Chemical treatment of invasive plants will occur in all of the on-site mitigation areas and for maintenance of the 3.88 acres of Stepping Stones. Prescribed burning will be conducted in the 45.24 acres of pine rocklands within the East and West Preserves. The CRC Burn Plan for the 45.24 acres of pine rocklands in the On-site Preserves can be found in **Appendix J**.

In addition, the Off-site Mitigation Plan includes a prescribed burn plan for a minimum of 45.60 acres in the Off-site Mitigation Area on the UM Richmond Campus. The Off-site Mitigation Area Burn Plan can be found in **Appendix J1**.

As a result of fire suppression, fuel load reduction and canopy thinning will be required prior to implementing prescribed burning in the on-site and off-site preserves. Fuel load reduction techniques will include canopy thinning, both mechanical and by hand, mastication and/or mowing for understory reduction and firebreaks. Mechanical fuel load reduction may also be used as an interim measure to reduce future fuel loads when the requirements of a burn prescription are not appropriate.

The mechanical and chemical treatments and prescribed fire may adversely affect some of the Covered Species. Disturbances include displacement or alteration of normal behavior due to the presence of fire or the human activities associated with land management treatments. Each land management technique is discussed below.

#### *Mechanical Treatment*

Management activities in the On-site Preserves and Off-site Mitigation Area will commence in some areas with mechanical removal of vegetation to reduce exotics and lower the fuel load prior to implementing the first burn. Mechanical treatment will include bringing in equipment into the preserves to manipulate vegetation as well as establish fire-breaks in some areas. As proposed, firebreaks around management units totals 21,755 feet. Most of the firebreaks are considered existing/paved (11,945 feet), which primarily consist of the existing or proposed development boundary along the outside of the On-site Preserves. Firebreaks within the On-site Preserves total approximately 9,810 feet; of this approximately 5,397 feet will be new (created) firebreaks, 1,128 feet enhanced along a historically existing trail that has not been maintained, 2,661 feet of existing firebreaks that will be enhanced and 624 feet of an existing asphalt trail. (**Appendix J**). Canopy reduction (pine thinning) will also be required for portions of the Off-site Mitigation Area (**Appendix J1**).

Effects from equipment will be minimized by using machinery that is the smallest possible to complete the task (thereby reducing its disturbance foot print) and using rubber tired and tracked vehicles (see **Section 6.2.4.4** and **Appendix J1**).

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The Applicant will minimize the likelihood that listed plants will be damaged during these activities because known occurrences of federally listed plants will be flagged/delineated on maps and avoided. This information will be updated through opportunistic observations and during annual biological monitoring.

Herbaceous Chemical Treatment

Herbaceous chemical treatment will be conducted in the On-site Preserves and Stepping Stones to reduce exotic plant species. To minimize the effects to Covered Species, herbaceous chemical treatment will follow the BMPs for land management (see **Section 6.2.4.4**). These BMPs include not conducting chemical treatment on days with excessive windy conditions to reduce drift and non-target damage, chemical application by hand to the extent practicable, and preference for systemic herbicides that exhibit low soil activity. Workers will be educated to identify the Covered Species and not to apply chemical treatment to pineland croton or listed plants. Consequently, adverse effects to the Covered Species are not anticipated from chemical treatment in the Southern Corridor and On-site Preserves. Chemical treatment is not proposed for the Off-site Mitigation Area.

Prescribed Fire

Because pine rocklands are a fire adapted ecosystem, prescribed fire is the preferred method for the long term management of the 45.24 acres of pine rocklands within the East and West Preserves and a minimum of the 45.6 acres of the Off-site Mitigation Area.

BMPs to minimize the effects of prescribed burning include small burn units, using existing features for firebreaks, establishing wetlines around portions of pineland croton patches, and mop-up activities to avoid pooling water to the extent practicable. The BMPs are detailed in **Section 6.0, Appendix J, and Appendix J1**.

Invasive Exotic Plants

The Conservation Program is aimed at eliminating invasive exotic plants and improving the native habitat to a functioning pine rockland. The management activities are not expected to introduce exotic plants into the preserves. However, the effects of a potential increase in exotic vegetation will be minimized by BMPs to prevent the spread of exotics during treatment activities. In addition, the success criteria for the On-site Preserves include a criterion that non-native plant species will be less than 5% total cover and bare ground patches be at least 25% of the area for pine rocklands. Therefore, adverse effects from non-natives is not anticipated.

Pesticides

Pest management of insects in the On-site Preserves will be restricted to target those pests that are problematic to the species covered by the ITP and/or meeting success criteria and will be used as part of the adaptive management strategy. Because of the restrictions in their use and the limited application, it is unlikely that pesticide use in the On-site Preserves will adversely affect the Covered Species.

## **8.5 Covered Species for Which No Adverse Effects Anticipated from Proposed Action**

### **8.5.1 *White-crowned Pigeon***

In Florida, two specific habitat types are critical for the survival of the white-crowned pigeon: mangrove islands for breeding and tropical hardwood hammock for foraging. (FWC 2016b) White-crowned pigeons primarily nest on tidally inundated mangrove islands and then fly daily to forage in tropical hardwood hammocks and, to a lesser extent, pine rocklands that contain an understory of fruit-bearing trees and shrubs (Bancroft and Bowman 2001). The Applicant has reviewed the Recommended Conservation Practices, Measures to Avoid Take, and Minimization and Mitigation Options contained in the White-Crowned Pigeon Species Conservation Measures and Permitting Guidelines (FWC 2016b) and although many of the measures are focused on mangrove island breeding habitat and tropical hardwood hammock foraging habitat (both of which do not occur at the CRC Property or the UM Richmond Campus), the Applicant is implementing selected measures, including providing educational materials on the white-crowned pigeon. The On-site Preserves and the Off-site Mitigation Area could potentially serve as foraging habitat for the species once effectively managed.

The white-crowned pigeon was not documented within the CRC Property during any of the site surveys and is likely currently absent from the CRC Property year-round. It is also expected to be absent from the UM Richmond Campus. Based on its absence from the CRC Property, construction is not likely to adversely affect the species.

However, there is some possibility that this species may occur within the Richmond Pine Rocklands in the future, including the mitigation areas (On-site Preserves or Off-site Mitigation Area) for foraging or wintering activities. The land management that occurs may disturb the visiting individual and encourage it to forage elsewhere temporarily but no adverse effects are expected from this type of disturbance. In general, the improved habitat quality in the mitigation areas will improve foraging opportunities for any white-crowned pigeons that may choose to use the properties in the future.

### **8.5.2 *Clamshell Orchid***

Clamshell orchids grow on trunks and branches of pond apple, cypress, live oak, and buttonwood trees in swamps and hammocks in southern Florida, the West Indies, Central and South America (FNAI 2000). This species was not documented within the CRC Property during 2014 rare plant surveys (Woodmansee 2014). Although not presently known to occur within the CRC Property, the clamshell orchid is a rockland hammock species and has the potential to occur in the future within the 3.72 acres of on-site rockland hammock preserve. The land management activities (*i.e.*, invasive exotic removal) in the rockland hammock are not likely to adversely affect this species. In general, preservation and maintenance of a high quality rockland hammock within the On-site Preserves may improve the likelihood that clamshell orchids could occupy the CRC rockland hammock in the future.

## **8.6 Cumulative Effects**

Cumulative effects analysis is a regulatory requirement of section 7 of the ESA. In the case of issuance of a section 10(a)(1)(B) permit, USFWS must conduct an intra-Service consultation under section 7 (USFWS 1996). A cumulative effects analysis has, therefore, been included as part of this HCP to assist in the USFWS's issuance of the section 10(a)(1)(B) ITP, when it

conducts its internal section 7 consultation. Cumulative effects are defined as “those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation.” 50 C.F.R. § 402.02. The cumulative effects analysis considers potential effects for the Covered Species.

The cumulative effects analysis is based on GIS data provided by USFWS , which was used in the economic analysis for designation of BSHB critical habitat, and the pine rockland joint delineation conducted by IRC, USFWS, and DERM in 2003 and 2004, provided by Steve Woodmansee (1/20/2015). Other data used in the analysis and obtained directly from MDC included NAM’s 2014 Natural Area Inventory (provided by Joe Maguire [NAM] on February 27, 2015), and MDC property tax parcel data (downloaded 12/8/2014 <http://gisweb.miamidade.gov/GISSelfServices/GeographicData/MDGeographicData.html>). Information used in the analysis also included literature review.

As explained below, there are no future State or private activities, not involving Federal activities that are reasonably certain to occur within the action area of the Project.

### ***8.6.1 Action Area***

Action area is defined as “all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.” 50 C.F.R. § 402.02. An action area is determined by the extent of the influence of direct and indirect impacts of an action. Based on the direct and indirect effects discussed in **Sections 8.1** through **8.8**, direct effects from the proposed action are primarily likely to influence Covered Species within the CRC Property and the Off-site Mitigation Area (HCP Plan Area or Project). While it is unlikely that the effects of the Proposed Action will affect species within the larger Richmond Area, the Applicant, has conservatively analyzed the pine rocklands in the Richmond Area as the action area in this cumulative effects analysis. (**Figure 2-1**). This conservative analysis provides assurances that the cumulative effects analysis is comprehensive, despite the unlikelihood that the Proposed Action will have direct or indirect effects on pine rocklands within the Richmond Area.

The Richmond Area is roughly bound by S.W. 152 Street to S.W. 184 Street, and S.W. 117 Avenue to S.W. 137 Avenue (DERM 1994). Based on the 2003/2004 delineation of pine rocklands conducted by IRC, USFWS, and DERM, the 2014 land use mapping within CRC, and MDC’s 2014 Natural Area Inventory, the Richmond Area has 883.1 acres of pine rocklands. The HCP addresses the 79.97 acres of pine rocklands on the CRC Property and 50.96 acres of pine rocklands on the UM Richmond Campus. Thus, the action area totals 752.14 acres within the Richmond Area.

### ***8.6.2 Status of Pine Rockland within the Action Area***

Of the 752.14 acres of pine rockland habitat in the Richmond Area outside of the HCP Plan Area, 157.6 acres are owned by the federal government, 578.4 acres are owned by MDC, and 16.14 acres are privately owned by the Applicant. The majority (567.79 acres) of the non-federal lands currently have some form of protection to preclude development; that is, 95% of the non-federal pine rocklands in the Richmond Area are protected. **Table 8-1** provides a breakdown of the pine rockland acreage and protected acreage for non-federal lands.

**Table 8-1. Richmond Area Non-Federal Pine Rockland Ownership Outside HCP Plan Area**

Property Name	Status	Protection Mechanism	Pine Rockland Acreage	Protected
Gold Coast Railroad Museum	County/Conservation	NFC and PE	9.1	5.9
Martinez Pineland	County/Conservation	E	110.0	110.0
Larry & Penny Thompson Park	County/Conservation	NFC and PE	200.0	200.0
Zoo Miami	County/Conservation	NFC and P/PE	252.3	244.0
Southern Anchor Affordable Housing	County		2.2	0.0
Robert Morgan Educational Center	County	NFC	4.8	3.4
UM Richmond Campus (remaining lands)	Private	Deed	16.14	4.49
<b>Total Pine Rockland Acreages</b>	<b>Non-Federal Lands with Protection Mechanism</b>			<b>567.79</b>
	<b>Total Non-Federal Lands</b>			<b>594.54</b>

NFC - County Code §24-5  
 E - EEL Preserve

P - Park Preserve  
 PE - Park Preserve/EEL Funding

Federally-owned pine rocklands are not considered in the cumulative effects analysis because effects on those lands would involve federal actions. Furthermore, the existing prescribed burning program on the MDC-owned pine rocklands is not considered in the cumulative effects analysis because a federal action exists approving the prescribed burning program. *See* USFWS Biological Opinion dated November 19, 2013; USFWS Confirmation of Conference Opinion dated December 11, 2014.

**8.6.3 Future Non-Federal Actions that Are Reasonably Certain to Occur**

Only non-federal actions in the action area that are reasonably certain to occur should be considered in this cumulative effects analysis. Presently, there are no other known development projects occurring within the Richmond Area.

The effects of an expanded entertainment area at Zoo Miami are not considered in this cumulative effects analysis because (1) it would likely involve federal action and (2) it is not reasonably certain to occur.

A Zoo Miami expansion would likely involve federal action, which is outside the scope of this cumulative effects analysis. The federal action would occur because land needed to proceed with a project is owned by the U.S. Coast Guard and a federal land transfer to MDC would need to occur. Expansion of Zoo Miami may require use of U.S. Coast Guard lands that currently support Coast Guard satellite equipment. Expansion requires not only acquisition of the U.S.

Coast Guard land but appropriate relocation of the U.S. Coast Guard equipment, all of which requires federal action.

Even if a Zoo Miami expansion could occur without federal action, the expansion is not reasonably certain to occur. The concept of an expanded entertainment area at Zoo Miami has existed for more than 20 years, but, to date, no concrete steps have been taken to advance the development of the project, such as securing necessary land rights or seeking authorization from relevant state, federal or local agencies for project approval. It therefore remains speculative as to whether the project will ever occur. Factors that contribute to whether a project is reasonably certain to occur include: the existence of concrete development plans and securing land rights, re-zoning and permitting applications, and existence of contracts and funding for the full project.

To our knowledge, no defined project plan exists, land rights may not have been secured and no application for local, state or federal approval has been filed. Therefore, without knowing the scope of the potential project, it is impossible to conduct a meaningful assessment of its effect on pine rocklands without pure speculation.

It is also unknown whether any contracts or proposals have been chosen or are proceeding forward. In 2012, MDC published an invitation to negotiate, soliciting proposals for an expanded Zoo Miami. An invitation to negotiate is more conceptual than an RFP and further signals the lack of concrete planning. In 2014, the MDC Board of County Commissioners voted to reject all proposals from the invitation to negotiate and authorized the Mayor's office to negotiate a proposal. No public proposal has come from the Mayor's office to our knowledge.

Lastly, no proposal has been funded. MDC's grant of a relatively small amount of money to pursue potential relocation of the U.S. Coast Guard facilities does not equate to funding of the overall proposal. In fact, the funds were aimed at only the threshold, initial step of acquiring the land in question. This further supports the lack of land ownership or control necessary. Based upon our knowledge, no formal steps or applications have occurred to acquire the U.S. Coast Guard lands. Moreover, the initial funding provided was \$13.5 million. Depending on the scope of the project, which remains unknown, this grant may only represent less than 2% of the proposal's costs.

Based on the totality of the factors above, the details of a potential expanded Zoo Miami are not sufficiently concrete at this time for the USFWS to gather information useful to itself or the public. With no concrete plan, lack of necessary land control, with no application for permits, with no adequate funding, the proposal cannot be rationally or meaningfully assessed for its effects on pine rocklands. As such, an expansion project at Zoo Miami would likely require federal action and is not reasonably certain to occur and cannot be assessed at this time.

#### ***8.6.4 Cumulative Effects of Proposed Action***

No future State or private activities, not involving Federal activities, are reasonably certain to occur within the action area. Land management activities occurring within the action area are already approved through a USFWS Biological Opinion (USFWS 2013). Future land development is too speculative and not reasonably certain to occur, or else would necessarily include federal action. Furthermore, 95% of the non-federal pine rocklands in the Richmond Area are protected. Therefore, no cumulative effects will result from the Proposed Action.

## 8.7 Estimates of Potential Take

The Project will convert 82.61 acres of land to a residential and commercial development. The Project will also include land management activities on 51.41 acres of On-site Preserves, 3.88 acres of Stepping Stones, and 50.96 acres of Off-site Mitigation Area (and potentially up to an additional 3.05 acres on the UM Richmond Campus), which may also result in incidental take of the ITA Species. Acreage is being used as a surrogate for the potential incidental take of the Covered Species in **Table 1-1** only (the ITA Species).

### 8.7.1 Impact of Potential Take

The impact of the potential incidental take on each of the ITA Species is minimal, and the Project has a substantial net benefit on all the Covered Species by protecting approximately 106.25 acres of pine rockland habitat and managing the lands through the Conservation Program. Analysis of the impact to the ITA Species is summarized below.

#### Pine Rockland-Dependent Species

USFWS considers the following species to be pine rockland dependent: BSHB (includes Florida Leafwing), Rim rock crowned snake, and Miami tiger beetle. However, all of the ITA Species may use pine rockland habitat, in addition to other habitat types.

An estimated 24,300 acres pine rockland habitat remain in South Florida. This is comprised of approximately 2,000 acres in the Florida Keys, 20,000 acres in Everglades National Park, and 2,300 acres in Miami-Dade. The Richmond Pine Rockland includes 883.1 acres of habitat (MDC 2014). Construction will result in the loss of 32.91 acres of pine rockland habitat in the development footprint. This constitutes 3.7% of the potentially occupied pine rockland habitat within the Richmond Area and 0.14% of habitat range wide.

To offset the loss of habitat from Project's development, the Applicant will place 47.45 acres of pine rockland habitat into a permanent habitat preservation and additional habitat preservation on 50.96 acres of pine rockland habitat on the University of Miami Richmond Campus. This preservation acreage constitutes 11% of the pine rockland habitat in the Richmond Area. Of the remaining Richmond Area pine rockland, 64% are already in conservation. All the conservation lands, on-site and offsite, will be managed to be high quality pine rockland habitat that supports the ITA Species. The pine rockland functional assessment for the CRC Property evaluates this conversion of habitat and determined that it would have a functional lift of 3.10 HVUs [baseline condition (40.72 HVUs) to managed condition (43.82 HVUs)].

The effects of habitat fragmentation on the ITA Species are analyzed; however, the long-term management of the On-site Conservation Areas and Off-site Mitigation Area will result in improved habitat quality for the ITA Species. The improved habitat quality will include an increased abundance of pineland croton, which is expected to increase the occurrence and abundance of BSHB. It will also include improved soil and bare ground conditions, which are expected to benefit the MTB. The improved habitat will provide greater opportunity for species recruitment and dispersal between pine rocklands for the ITA Species and the Covered Species.

#### FBB

To date, FBB have been found in the Florida counties of Lee, Collier, Charlotte, Okeechobee, Monroe, Polk and Miami-Dade. The USFWS consultation area for the FBB encompasses approximately 3,821,713 acres. FBB habitat includes but is not limited to: open water, tropical

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hardwood, urban areas and mangrove habitats. Ridgley *et al.* 2014 stated “Pine rockland does not directly appear to be an important foraging location” for the Florida bonneted bat. Within MDC, there are 883,579 acres of natural habitat (14,926 acres of forested uplands and 868,653 acres of mangroves) available to the FBB for foraging and roosting. Locally, within the Richmond Area, there are 883.1 acres of habitat available. In addition, FBB use developed areas for foraging and roosting, providing even greater opportunities locally and county-wide and region-wide. The loss of 73.84 acres of vegetative and forested lands from the development of the CRC Property is a small fraction of the habitat available to the species locally and regionally and will not have a significant effect on the range of the species.

Roosting habitat includes manmade structures, forest and other areas with large or mature trees or other areas with suitable roost structures. Natural roosts primarily includes mature or large live or dead trees snags and trees with cavities, hollows, or crevices, but also includes buildings and other manmade structures such as power poles. Foraging and roosting habitat will be improved as a result of the management plan for the on-site and offsite mitigation areas.

While it is unlikely that FBB roosts are present on site (due to site conditions and results of acoustic surveying) if a FBB roost is present, the roost is not expected to be impacted from construction and/or prescribed fire on from the Project. In addition, if a roost is discovered, BMPs have been developed to avoid and minimize potential take of individuals (see **Sections 6.2.2.1 and 6.2.4.1**).

The loss of habitat that may result from the Proposed Action will not substantially reduce the amount of habitat available to the FBB locally or range-wide. Furthermore, the improved management of the lands placed under a conservation encumbrance both onsite and offsite will provide more protected areas with high quality natural habitat for foraging and roosting within the urban matrix of MDC. Therefore, any potential loss of individuals is not expected to have a significant effect on the population numbers of FBBs locally or range-wide.

*Eastern indigo snake*

Indigo snake habitat is not restricted to pine rockland and rockland hammock habitat. It includes everything from the pristine uplands and wetlands to highly disturbed residential areas (Breininger et al. 2012). Within MDC there are 987,848 acres of habitat available to the indigo snake not including residential areas. Locally, within the Richmond Pine Rocklands there is 1,140 acres of habitat available. The loss of 73.84 acres of vegetative lands from the Development Areas is a small fraction of the habitat available to the species locally and regionally and will not have a significant effect on the range of the species. In addition, standard BMPs will be implemented to avoid and minimize any potential effect.

*Gopher tortoise*

The gopher tortoise has a wide-ranging distribution, is not restricted to specialized habitats, occupies a patchy distribution within occupied habitats and may not occupy all suitable habitats. Gopher tortoises have not been documented on the CRC Property or Off-site Mitigation Area; consequently no effect on this species is expected.

*White-crowned pigeon*

The construction and operation of the Community and management of the Mitigation Areas is not anticipated to affect the white-crowned pigeon. See **Section 8.5.1**.

Conclusion

For all the ITA Species, the effect of the Project is a net conservation benefit through the efforts to minimize and mitigate the potential impacts and protect and enhance approximately 106.25 acres of pine rockland habitat.

**8.8 Consistency with the South Florida Multi-Species Recovery Plan**

The Conservation Program is consistent with the Recovery Plans for the listed species included in the USFWS South Florida Multi-Species Recovery Plan (“MSRP”) (USFWS 1999). The MSRP includes strategies for restoring pine rockland and tropical hardwood hammock ecosystems and includes discussion of these ecosystems supporting many of the Covered Species (including Florida bonneted bat and Florida leafwing butterfly). The Conservation Program’s reintroduction of prescribed burning, removal of invasive exotic species, conservation of 106 acres of privately-owned land in perpetuity through a conservation easement and deed restriction, and the numerous BMPs which will prohibit access and dumping, minimize pesticide use, implementation of the SWPPP to prevent pollution, community and contractor education, and the robust monitoring program reflect the principles of the restoration plans for these ecosystems (*see* USFWS 1999 Pine Rocklands, Sections 1.2, 1.4, 2.2, 2.4, 2.5, 2.6, 3.4, 3.5, 3.6, 3.7, 6, 8, and 9; Tropical Hardwood Hammock, Sections 1.2, 1.4, 2.4, 2.6, 3.4, 3.5, 3.6, 3.7, 8, and 9).

The MSRP includes recovery plans for eastern indigo snake, deltoid spurge, tiny polygala, small’s milkpea, Garber’s spurge, and crenulate lead-plant. Similarly to the above reasoning, the Conservation Program reflects the principles in the MSRP for these individual species, aiding in their recovery. (*see* USFWS 1999 eastern indigo snake, Sections S2.3, S2.4, S2.5.2, S5, and S5.1; deltoid spurge Sections S1.1, S2.2.2, S4.3, S5, H1.2, H1.3, H1.4, H1.5.1, H1.5.2, H2.1, H2.2, and H2.3; tiny polygala Sections S1, S2, S2.2.2, S4.3, S5, H1.2, H2.1, H2.2, H2.2.1, H2.2.2, H2.3.1, H2.3.2, and H5; small’s milkpea Sections S1, S2.4.2, S5, H1.2, H1.3.1, H1.3.2, H2.1, H2.2, H2.3, H2.4, and H5; Garber’s spurge Sections S1, S2.2.2, S5, H1.2, H1.5.1, H1.5.2, H2.1, H2.2, H2.3, and crenulate lead-plant Sections S1, S2, S2.4.2, S5, H2.2, H2.3.1, H2.3.2, H3.1, H3.2, H3.3, H3.4, and H5).

## **9.0 CONSIDERATION OF CRITICAL HABITAT AND PLANTS FOR SECTION 7 CONSULTATION PURPOSES**

Although critical habitat and listed plants are not required to be analyzed under section 10 of the ESA, the issuance of an ITP is considered a federal action that requires internal section 7 review. To aid in the USFWS's internal section 7 review, analysis of the effects of the action on critical habitat and listed plants is provided below.

### **9.1 Critical Habitat**

Section 7(a)(2) of the ESA prohibits the “destruction or adverse modification” of designated critical habitat by any action authorized, funded, or carried out by a Federal agency. The section 7 regulations define “destruction or adverse modification” as “a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species”.

USFWS has designated critical habitat within the CRC Property and the Off-site Mitigation Area for the BSHB, Florida leafwing butterfly, Carter's small-flowered flax and Florida brickell-bush. The Project will enhance and preserve 101.69 acres of BSHB and Florida leafwing butterfly critical habitat and 102.11 acres of Carter's small-flowered flax and Florida brickell-bush critical habitat. Implementing the Conservation Program will reintroduce prescribed burning and invasive exotic vegetation removal, which will manage the critical habitat for the benefit of the Covered Species. The functional assessment demonstrates a net increase in the habitat value of the lands within the CRC Property following restoration activities. Furthermore, connectivity of the lands will be enhanced through the creation of a Southern Corridor and Stepping Stones throughout the CRC Property and the inclusion of the Off-Site Mitigation Area. Therefore, the Project more than offsets its impacts and will not appreciably diminish the value of critical habitat.

### **9.2 Plants**

The USFWS HCP Handbook provides the following guidance on consideration of plants in the HCP and ITP (USFWS 1996):

*The take prohibition for federally listed plants under the ESA is more limited than for listed animals. Section 9(a)(2)(B) prohibits the removal of listed plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of listed plants on non-Federal areas in violation of state law or regulation. Thus, the ESA does not prohibit the incidental take of federally listed plants on private lands unless the take or the action resulting in the take is a violation of state law. . . .*

*Nevertheless, the [USFWS recommends] that permit applicants consider listed plants in HCPs. This is because the section 7(a)(2) prohibition against jeopardy applies to plant as well as wildlife species; and if the section 7 consultation on a section 10 permit application concludes that issuance of the permit for wildlife species would jeopardize the existence of a listed plant species, the permit could not be issued.*

The State of Florida provides the following protection for state and federally listed flora under Chapter 5B-40 (FAC 1998, amended) “Preservation of Native Flora of Florida”:

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*To willfully harvest, collect, pick, remove, injure, or destroy any plant listed as endangered (5B-40.003) or threatened (5B-40.005) growing on the private land of another or on any public land or water, a person shall obtain the written permission of the owner of the land or water or his legal representative.*

*Those plants listed as endangered under section 4 of the Federal Endangered Species Act of 1973 as amended are restricted in movement and handling under this rule to conform with the regulations of the Endangered Species Act, and rules and regulations of the United States Department of Interior regarding endangered plants.*

Based on the above guidance and state law, impacts to state or federally listed plants through harvesting, collecting, removal, injury, or destruction requires written permission from the owner. Direct impacts to listed plant species during development and restoration activities conducted by the property owner on non-Federal lands are not considered “take” under federal or state law.

Per the guidance in the HCP Manual, federally endangered or threatened plants are discussed in this HCP and are subject to the No Surprises policy, but not included for permit coverage (see **Table 1-2**). Minimization and conservation measures that will be implemented include BMPs for plants as described in **Section 6.0**. Additionally, the restoration activities proposed will result in improved habitat quality for plants, which will likely result in greater carrying capacity for listed plant species in the On-site Preserves and Off-site Mitigation Area.

## **10.0 INCIDENTAL TAKE PERMIT ADMINISTRATION, DATA MANAGEMENT AND COMPLIANCE**

### **10.1 Permit Administration**

Subsection 10.1 addresses the roles of the individuals identified in the HCP who will manage and oversee the implementation of the HCP requirements.

#### ***10.1.1 HCP Coordinator***

The HCP Coordinator will be the administrative position established to manage and oversee the implementation and requirements of the HCP. The HCP Coordinator will initially be an employee of the Applicant. The selection of the HCP Coordinator will be in the sole discretion of the Applicant. The HCP Coordinator will be the primary contact for the Applicant. Any subsequent permittees will appoint an HCP Coordinator.

#### ***10.1.2 Preserve Biologist***

Applicant may choose to retain a Preserve Biologist. If retained, the Preserve Biologist will report to the HCP Coordinator and will be responsible for overseeing and assisting in the implementation of the Conservation Program, as applicable. The Preserve Biologist will be retained at the sole discretion of the Applicant.

### **10.2 Data Management**

Subsection 10.2 addresses how the Applicant will manage the data collected and analyzed as a requirement of the HCP. All collected data will be made available to USFWS and FWC, upon request.

### **10.3 HCP Administrative Reporting**

Subsection 10.3 addresses the annual reporting requirements to the USFWS. Annual HCP Administrative Reports will be submitted to USFWS and FWC at the end of the reporting year throughout the life of the permit. The reporting period will cover January 1 through December 31 and will be submitted by March 31 following the end of the reporting period. The intent of the annual HCP Administrative Report is to provide the USFWS and FWC with a broad assessment of the implementation of the HCP programs, procedures, and policies in accordance with the terms and conditions of the ITP. To the extent practicable, information will be provided in a tabular format along with brief interpretative text, as necessary, to clarify presented data. Identified program deficiencies and recommendations for improving HCP performance will be provided. The Mitigation Monitoring Reports (**Section 7.0**) will be provided as an attachment to the annual HCP Administrative Report. Following review of the Annual HCP Administrative Report, a meeting between the HCP Coordinator and USFWS will be scheduled within 60 days of the annual report submittal. The annual HCP Coordinator and USFWS meetings will occur until the Mitigation Areas have reached the identified success criteria.

### **10.4 Mitigation Assurances and Non-Compliance**

The annual HCP Administrative Report to USFWS will include an overall assessment of HCP performance and ITP. This report will identify non-compliance issues with the terms of the ITP and will include recommendations to address such issues. The USFWS and Applicant will have ongoing communication to review and assess the extent to which the HCP is achieving the identified biological goals, objectives and success criteria of the HCP Conservation Program.

The adaptive management strategies, contained in **Section 12.2**, provide additional guidance in addressing compliance issues identified in the HCP Administrative Report.

### **10.5 Amendment Process**

The Applicant or operating entity may from time to time request changes to the HCP and/or ITP to improve HCP performance, streamline permit administration, and/or eliminate unnecessary restrictions on activities that are demonstrated to provide no conservation benefit. These requests must be submitted to the USFWS in writing with appropriate supporting data. Over the life of the ITP, administrative changes to the ITP may be requested at any time.

## **11.0 COST ESTIMATES, FUNDING ASSURANCES AND LONG TERM ASSURANCES**

This section addresses the cost estimates to undertake the Conservation Program and the funding mechanisms provided to assure that the HCP requirements and the Conservation Program will be adequately funded. In addition, this section addresses the long term operational entity and perpetual protections provided to assure that the Project will be operated in compliance with the HCP requirements.

### **11.1 Cost Estimates for Conservation Program**

The costs estimates below are provided to insure the Conservation Program included in **Sections 6.0** and **7.0** of the HCP will be adequately funded during the initial work and the long term management of the Project. The estimates below were calculated conservatively to be at the higher range of such costs. This conservative estimate provides sufficient funding to account for any adaptive management, changed circumstances (addressed in **Section 12.0** of the HCP) that may need to be implemented.

#### ***11.1.1 Incidental Take Permit Management Costs***

Applicant will designate an employee to be the HCP Coordinator during the initial implementation of the HCP. Should the permit be transferred to a master association or future permittee, the obligation to designate an HCP Coordinator shall be a requirement of the ITP. The HCP Coordinator is an employee of the Applicant whose salary will be paid by the Applicant directly. The HCP Coordinator's responsibilities are detailed in **Section 10.0** of the HCP.

#### ***11.1.2 Minimization Measures Costs***

The on-site minimization measures are part of the Conservation Program and are detailed in **Section 6.0** of the HCP. Cost for on-site initial implementation (Years 1-5) of minimization measures are included in **Table 11-1**. Costs for on-site long term implementation are included in the long term costs section below. Minimization measures costs for the Off-site Mitigation Area are in **Appendix J1**.

#### ***11.1.3 HCP and Monitoring and Reporting Costs***

The Conservation Program includes monitoring and reporting requirements. These requirements are contained in **Sections 7.0** and **10.0** of the HCP. The initial costs (Years 1-5) for the on-site monitoring and reporting are contained in **Table 11-1**. Costs for on-site long term monitoring and reporting are included in the long term costs section below. Costs for monitoring and reporting relating to the Off-site Mitigation Area are in **Appendix J1**.

#### ***11.1.4 Mitigation Plan Activities Costs<sup>11</sup>***

The Conservation Program includes various land management activities for the on-site mitigation, referred to as the Mitigation Plan. The Mitigation Plan activities are detailed in **Section 7.0** and the CRC Burn Plan in **Appendix J** of the HCP. The cost estimate for Off-site Mitigation Area Burn Plan is included in **Appendix J1**. Below is a brief summary of the activities and costs associated with the Mitigation Plan activities for the on-site initial work

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<sup>11</sup> In addition to the citations indicated, cost estimates for the Conservation Program are based on best professional judgment and experience.

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(Years 1-5) and on-site long term maintenance, as applicable. The cost estimate for the various activities is provided in **Table 11-1**.

*Invasive Chemical Treatment*

Initial invasive vegetation removal costs range from \$3,000 to \$12,500 per acre. Initial invasive removal requires additional follow-up treatments to address regrowth from the extensive Burma reed infestations that have established a seed bed. The number of follow-up treatments necessary per year is expected to vary by level invasive cover prior to initial treatment and will decrease every year until preserves have reached maintenance level at which time treatments are expected to occur 1 to 2 times per year. Follow-up treatments are estimated \$170/acre per event. Both initial and follow-up treatment cost per acre estimates are based on invasive treatment activities previously conducted for Ram Coral Reef in 2014 and experience with similar projects.

*Pine Canopy/Hardwood Reduction*

In preparation for burning, hardwood removal (primarily pine thinning) must be conducted to reduce fuel loads to allow the reintroduction of fire. The estimated costs for pine/hardwood vegetation removal range is from approximately \$2,500 to \$6,000 per acre based on intensity of removal required (Possley et al. 2014). Pine/Hardwood removal will be phased and conducted prior to proposed burns within each management unit. Not all areas within the On-site Preserves will require hardwood removal, expected acres of hardwood removal during the first three phases are as follows: phase 1 - 19.31 acres, phase 2 – 10.7 acres, phase 3 – 6.15 acres.

*Prescribed Burning*

The estimated costs for prescribed burning was also based on Possley et al. 2014, which ranged from approximately \$560 to \$2,400 per acre. The cost estimate for implementing the initial prescribed fire on 45.24 acres of pine rocklands totals \$91,000, for an average cost of \$2,011 per acre.

Prescribed burning activities are anticipated to occur in three phases, the first phase in the On-site Preserves will occur within 18.07 acres, 18.12 acres in phase 2, and 9.05 acres in phase 3. After initial prescribed burning activities, burning will occur on a 3-7 year rotation with approximately 6-10 acres burned within 2-3 management units. If FFS conducts prescribed burning, the estimated cost is \$25 per acre.

*Plantings*

Additional mitigation activities include the planting of 3.88 acres of Stepping Stones and plantings in the Southern Corridor. The planting cost assumes herbaceous plants will be installed on 3' centers and require approximately 18,800 plants, for an average cost of \$3 per plant. Actual planting costs will be based on plant availability and size.

*Bat Boxes*

A minimum of six bat boxes will be installed in the On-site Preserves for potential FBB use. The cost estimate assumes approximately \$250 per bat box (FBN 2017).

**Table 11-1. Summary of On-Site Conservation Program Initial Work Cost Estimates**

Cost Description	Cost				
	Year 1	Year 2	Year 3	Year 4	Year 5
Minimization Measures	\$95,000	TBD	TBD	TBD	TBD
Monitoring/Reporting	\$60,000	\$60,000	\$60,000	\$20,000	\$20,000
Invasive Chemical Treatment	\$343,472	\$34,680	\$26,500	\$17,700	\$17,700
Pine /Hardwood Removal	\$110,660	\$54,000	\$31,000	N/A	N/A
Prescribed Burning	\$40,000	\$36,000	\$15,000	\$10,000	\$10,000
Planting	\$56,400	N/A	\$5,000	N/A	\$5,000
Bat Boxes	\$1,500	N/A	N/A	N/A	N/A
<b>Total by Year</b>	\$707,032	\$184,680	\$137,500	\$47,700	\$52,700
<b>Total Initial Contribution by Applicant</b>				<b>\$1,129,612</b>	

**11.2 Funding Assurances for Initial Work and Long Term Maintenance for the Mitigation Areas**

***11.2.1 Conservation Program - Initial Work Funding Assurances***

The Applicant will establish an escrow account for the Year 1 costs for the On-site Conservation Areas. The escrow account will be drawn upon for funding the Conservation Program activities in Year 1. In addition, the Applicant will establish a letter of credit that will ensure sufficient funding to cover all the work detailed in the sections above for Years 2 through 5. It is anticipated that it will take 5 years for the initial work to be completed and the On-site Preserves will be in long-term maintenance condition. Financial contributions for the first five years of HCP-related activities are expected to be approximately \$1.13 million and are summarized in **Table 11-1**. Draft documents demonstrating the financial assurance for the initial work will be provided to the USFWS for its review and approval as part of the HCP review. The finalization of the financial assurance mechanism shall be a condition of the HCP. The Applicant will, on an annual basis, adjust the amount of financial responsibility provided for the initial implementation of the Conservation Program (Years 2-5). The cost adjustment, along with supporting documentation will be submitted to the USFWS for review and approval. The draft financial assurance documents discussed in this subsection are attached in **Appendix L**.

Funding assurance for the UM Richmond Campus Off-site Mitigation Area is provided in **Appendix L** through the UM audited financial statements.

***11.2.2 Conservation Program - Long Term Funding Assurances***

Perpetual maintenance costs will be funded through the Master Association established for the CRC Property and described in **Section 11.5.2** of the HCP. Once the On-site Conservation Areas have reached maintenance level, the long term maintenance costs are expected to be \$11,000 per year. Once the Off-site Mitigation Area has reached maintenance level, the long term maintenance costs are expected to be \$1,700 per year.

### **11.3 Long Term Operational Assurances On-Site**

#### ***11.3.1 Coral Reef Commons Master Property Owners' Association Will Provide for the Perpetual Maintenance of the CRC Property***

Applicant will establish a Master Association, which will serve as the long term operating entity that will manage and maintain the property and implement the HCP obligations. The Applicant proposes to establish the Coral Reef Commons Master Property Owners' Association, Inc. ("CRC Master Association"), through the First Amendment to the Reciprocal Easement and Operating Agreement. These draft documents are attached as **Appendix M**. The CRC Master Association will have the power and duty to operate and maintain the property including adhering to all requirements contained in the HCP. *See* Article II, Section 1.B. of the First Amendment to the Reciprocal Easement and Operating Agreement. It will have the power to collect funding of annual common expenses through assessments in perpetuity, sufficient to maintain the property, in accordance with the HCP requirements. *See* Article II, Section 1.B. of the First Amendment to the Reciprocal Easement and Operating Agreement. The CRC Master Association shall not be dissolved or modified in a manner that may affect the implementation of the HCP requirements without the prior approval of USFWS. *See* Article V of the First Amendment to the Reciprocal Easement and Operating Agreement.

Applicant envisions transferring the HCP into the name of the CRC Master Association as the long term operating entity, in accordance with the USFWS permit transfer rules, at some point in the future.

#### ***11.3.2 Special Taxing District will be a Contingent Assurance for Perpetual Maintenance of the CRC Property***

In addition, Applicant will have the ability to establish a MDC Special Taxing District as a contingent or backup assurance for funding the preserve maintenance. The Special Taxing District will remain dormant and become active only if the CRC Master Association is dissolved. The CRC Master Association documents are consistent with this understanding. *See* Article IV of the First Amendment to the Reciprocal Easement and Operating Agreement. The multi-purpose Special Taxing District will also fund maintenance of other common areas in CRC, if needed.

If the Special Taxing District is activated, the costs of the maintenance activities will be paid through assessments levied against all of the CRC Property. MDC will collect the assessments at the same time and in the same manner as ad valorem taxes. The assessments are treated as ad valorem taxes on the property tax bill and enforced by the MDC Tax Collector's office. Liens may be imposed for non-payment. The tax rate is determined on an annual basis for the level of maintenance required. Therefore, if maintenance costs increase, the taxes collected will increase to cover the cost of the maintenance required. If the Special Taxing District is activated, the taxes are collected to fund maintenance. However, if the association is reestablished to maintain the preserves, then the Special Taxing District may be deactivated and made dormant again until such time as it may be needed in the future.

Once established, a Special Taxing District cannot be dissolved unless property owners make a petition to MDC and the Board of County Commissioners approves the dissolution. Applicant will grant a perpetual non-exclusive easement to MDC to allow it to access and conduct maintenance work in the unlikely event of a failure to maintain the NFC parcels. This easement

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will be recorded following the approval of the Special Taxing District by the MDC Board of County Commissioners. This provides an additional level of assurance that CRC will be maintained in the long term in accordance with the HCP requirements and that the preserves will remain preserved.

The Special Taxing District documents will be provided to the USFWS when finalized. The final establishment of the CRC Master Association and dormant Special Taxing District shall be a condition of the HCP.

## **12.0 ADAPTIVE MANAGEMENT, CHANGED CIRCUMSTANCES AND UNFORESEEN CIRCUMSTANCES**

### **12.1 Delisting or Listing of Species**

Pursuant to the 1982 ESA amendments, the section 10 process provides for conservation of unlisted and listed species and protects section 10 permittees from uncertainties of future species listings (USFWS 1996):

*“Although the conservation plan is keyed to the permit provisions of the Act, which only apply to listed species, the Committee intends that conservation plans may address both listed and unlisted species...In the event that an unlisted species addressed in the approved conservation plan subsequently is listed pursuant to the Act, no further mitigation requirement should be imposed if the conservation plan addressed the conservation of the species and its habitat as if the species were listed pursuant to the Act.” (H.R. Report No. 97-835, 97<sup>th</sup> Congress, Second Session, and 50 FR 39681-39691.)*

This HCP addresses both listed and unlisted species and addresses the unlisted species as if the species were listed. Therefore, the Covered Species in **Tables 1-1** and **1-2** are adequately covered in the HCP and if the listing status of any of these species should change, the ITP provides authorization to proceed with the Project’s authorized activities.

### **12.2 Adaptive Management Strategy for Conservation Program and Changed Circumstances**

#### Background

Adaptive management is the systematic approach for improving resource management by learning from management decisions. It allows for flexible decision making to meet management goals in the face of uncertainties and changed circumstances (Williams and Brown 2012). A changed circumstance is an event that can potentially affect a covered species or a geographic area and that can be reasonably anticipated (USFWS 2016). Adaptive management is perhaps the most widely invoked approach for decision-making and management in the face of uncertainty related to climate change (Stein 2014). The concept of resilience (the ability of a system to maintain or return to a particular ecological state following a disturbance) is the core principle in the Adaptive Management approach (Stein 2014 at 28).

The Project includes adaptive management to address uncertainties in the implementation of the Conservation Program and the identified changed circumstances<sup>12</sup> discussed below that may affect the success of the Conservation Program. Changed circumstances include the Conservation Program not achieving success criteria in the anticipated timeframes and destructive events, such as hurricanes, severe storms, and wildfires. The Project’s adaptive

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<sup>12</sup> The Applicant’s identification of changed circumstances considered potential future impacts of climate change. Applicant used the best available science in this consideration, including the Revised Guidance for Treatment of Climate Change in NMFS Endangered Species Act Decisions (June 17, 2016) (NOAA 2016) referred to in the USFWS’ HCP Handbook Toolbox. This guidance states an adaptive management approach includes:

- adequate monitoring of climate and biological variables;
- identification of appropriate triggers related to those variables; and
- identification of protective measures that can be implemented without reinitiating when triggers are reached or, alternatively, identification of triggers that inform the decision to reinitiate.

management approach relies on the biological goals and objectives discussed in **Section 6.0** and the success criteria in **Section 7.0** developed for the Conservation Program. In addition, the monitoring program developed to track the success of the Conservation Program allows the implementation and tracking of any adaptive management measures and changed circumstances approaches. This is will include gathering data on future climate change effects as the data is refined. The data collected from the qualitative and quantitative monitoring efforts will be used to assess and implement adaptive management and changed circumstances with updated information over the duration of the approval. The results of the monitoring will be compared to the biological goals, objectives and established success criteria, and appropriate management will be implemented to aid in achieving the success criteria in the HCP. Adaptive management strategies will be included when implemented in the annual HCP Administrative Report.

Adaptive management may include supplemental plantings, changed frequency of invasive exotic plant species treatments, or changes in the on-site or off-site burn plans, as needed, to address uncertainties in Conservation Program or to address the changed circumstances. Specific adaptive management strategies and the related trigger or thresholds that would require adaptive management to be implemented are specified in **Table 12-1**.

Applicant will use the monitoring program, the annual HCP Administrative Report and annual meetings with the USFWS to work with the USFWS on the appropriate adaptive management strategies and the related implementation.

The funding sources developed for the Project account for possibility of implementing adaptive management strategies in the Conservation Program and for responses to changed circumstances. The funding sources are described in **Section 11.0** and in **Appendix L**.

#### ***12.2.1 Adaptive Management Strategy for Conservation Program***

Applicant will collect and analyze the monitoring data to determine if the objectives of the Conservation Program are being met. If the monitoring data validates the Conservation Program is achieving or trending towards the success criteria, as described in **Section 7.0**, then adaptive management will not be required. If the monitoring results indicate that the Conservation Program is not achieving success criteria in **Section 7.0** and has reached one of the thresholds in **Table 12-1**, Applicant will develop and implement appropriate adaptive management strategies, with the assistance of the USFWS.

All of the initial land management activities for the Conservation Program will be completed by the third year, by which time there should be an overall trend of the Mitigation Areas toward meeting the Level 3 success criteria, as applicable. Thus, the third annual monitoring report will serve as the first basis to determine if adaptive management is required. Level 2 of the success criteria was selected as the threshold with the understanding that if the Mitigation Areas are trending toward meeting Level 3 success criteria, adaptive management is likely not required; however, if the Mitigation Areas have achieved Level 2 success criteria and are trending away from Level 2, then adaptive management may be needed. **Table 12-1** identifies the Level 2 success criteria for each parameter and associated adaptive management response. For those parameters that have a range for the Level 2 success criteria the midpoint of the range is used. The Applicant will meet with USFWS within 90 days of submittal of an HCP Administrative Report documenting a threshold has been exceeded to determine if adaptive management is required and confirm appropriate response.

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Thereafter, Applicant will continue to quantitatively monitor the success of the Conservation Program, as described in **Section 7.0**, to determine if adaptive management is needed. The Conservation Program success criteria itemized below in **Table 12-1** apply to the On-site Preserves (as applicable), with one noted threshold applying solely to the Stepping Stones. The fire frequency criteria is the only threshold that applies to the Off-site Mitigation Area.

**Table 12-1. Adaptive Management Thresholds for Conservation Program and Changed Circumstances**

<b>Conservation Program success criteria</b>	<b>Thresholds that may require an Adaptive Response</b>	<b>Adaptive Management Response</b>
% Canopy cover	>20%	Identify reasons for increased cover and measures to reduce canopy cover.
% total cover of Non-native plants*	>15%	Evaluate invasive exotic plant management, frequency/timing and identify whether new methods or strategies are available to improve reduction.
Fire frequency (threshold applies to On-site Preserves and Off-site Mitigation Area)	>9 yrs for 4 or more burn units	Identify constraints of why interval has exceeded desired and what steps are needed to improve rotation.
% bare rock or soil	<10%	Identify approach to increase bare rock and soil.
% Composition PR desirable herbaceous species	<77%	Evaluate land management plan, including prescribed fire frequency/timing and supplemental plantings, and implement corresponding changes in management actions.
Croton density	<7	Evaluate land management plan, including prescribed fire frequency/timing and supplemental plantings, and implement corresponding changes in management actions.
Stepping Stones - % total cover of exotic plant species*	>20%	Evaluate invasive exotic plant management, frequency/timing with USFWS, and implement corresponding changes in management actions.

\* Non-native plants and exotic plant species are defined as Category I invasive exotics as defined by the Florida Exotic Pest Plant Council's (FLEPPC) List of Invasive Plant Species.

***12.2.2 Strategy for Changed Circumstances - Hurricanes, Severe Weather Events and Wildfires (Including as a Result of Climate Change)***

HCPs are required to address changed circumstances that are reasonably foreseeable. Hurricanes, severe weather and wildfires (events) are foreseeable events that are a part of the natural existing regime in the southeastern United States. These events may have an effect on the success of the Conservation Program and have been considered as part of this HCP's Conservation Program, including the monitoring and adaptive management. More intense

hurricanes, severe weather, changes in rainfall patterns, and wildfires are also potential effects of climate change that may likely vary over time. These variations have been considered as part of the Adaptive Management and changed circumstances in the HCP and can be captured in future annual HCP Administrative Reports as better data becomes available over time. The foreseeable effects of sea level rise and saltwater intrusion (other potential climate change effects) are discussed below.

The occurrence of hurricanes, severe weather and wildfire events may create human life and safety issues that must be addressed immediately. If these events necessitate emergency responses not contemplated by the HCP or ITS, USFWS will be notified within 48 hours of initiating such emergency responses. All such emergency responses will be approved, coordinated, and monitored by the HCP Coordinator (detailed in **Section 10.1.1**) and coordinated with other MDC emergency response personnel, to the extent feasible.

If these events affect the success of the Conservation Program, Applicant will assess the effects and report to the USFWS the initial conditions within 90 days following the event. Following this 90 day post event report, Applicant will continue to assess and monitor the affected Conservation Areas to determine if the success criteria in **Section 7.0** is being met or continuing to trend towards success and report the findings in the HCP Administrative Report.

If the monitoring conducted two years after an event concludes that the success criteria in **Section 7.0** is not being met and one of the thresholds in **Table 12-1** is triggered, the USFWS will be notified and the appropriate adaptive management strategies will be implemented. The USFWS and the Applicant will work together to develop a plan to best meet goals and objectives of the HCP within the original resource commitments.

### ***12.2.3 Strategy for Changed Circumstance - Climate Change: Sea Level Rise and Saltwater Intrusion***

#### ***Sea Level Rise***

The HCP utilized the best available science, regional data, and climate change projection tools to analyze the potential for sea level rise to affect the Proposed Action. MDC's elevation and porous substrate contribute to the potential effects of sea level rise ([http://www.miamidade.gov/greenprint/pdf/climate action plan.pdf](http://www.miamidade.gov/greenprint/pdf/climate_action_plan.pdf) accessed 3/27/15). Palm Beach, Broward, Miami-Dade, and Monroe counties signed onto the Southeast Florida Regional Climate Change Compact ("Compact") in January 2010 to coordinate climate change mitigation and adaptation activities in the region (Compact 2010), and the Applicant reviewed the information available from this source as one of the tools to assess climate change.

In 2012, the Compact conducted a vulnerability analysis for sea level rise in the Southeast Florida region. The report summarized the findings and depicted potential vulnerability to sea level rise of one, two, and three feet, across the region using geographic information systems (GIS) mapping (Compact 2012). Applicant analyzed this report and concluded this vulnerability

analysis shows that inundation from sea level rise at three feet is not considered “possible”<sup>13</sup> or “more likely”<sup>14</sup> on the CRC Property or in the vicinity.

In 2015, the Compact was updated and included a “Unified Sea Level Rise Projection” (Compact 2015), which unified the sea level rise projections regionally for use in policy implementation by the partner counties. The Unified Sea Level Rise Projection is built on three key components: (1) the projections used, (2) the timeframe for consideration of impacts, and (3) the range for use in decision making. The Compact used three regionally adapted projections: the National Oceanic and Atmospheric Administration (“NOAA”) High Curve (the “NOAA High”), the U.S. Army Corps of Engineers (“USACE”) High Curve (also known as the “NOAA Intermediate High”), and the median of the Intergovernmental Panel on Climate Change (“IPCC”) AR5 RCP8.5 scenario (Compact 2015 at 4).<sup>15</sup> The scenarios capture the concept of acceleration, recognizing the rate at which sea level rise occurs may increase over time. The Compact’s timeframes include sea level rise projections for 2030, 2060 and 2100. Further out in time, there is a greater difference in the range.<sup>16</sup> The Compact suggests that decision-makers use a range of projections between the IPCC AR5 RCP 8.5 scenario and the NOAA Intermediate High.<sup>17</sup> Ranges are typically used to address the uncertainty surrounding sea level rise, rather than choosing one particular scenario and only using that to project future impacts in an area.

The Compact’s projections allow for a more meaningful assessment of the Proposed Action because they are downscaled or “regionally adapted”. Recognizing that observed and projected climate changes at regional and local levels may vary from global average conditions, regionally-adapted projections are preferable because they provide higher resolution information and are more relevant to assess site-specific conditions.

At the local level, in 2014 the MDC Board of County Commissioners adopted Resolution R-451-14, which established a policy requiring all MDC infrastructure projects to include consideration of the potential impact of sea level rise during all project phases and evaluate existing infrastructure in the face of sea level rise (MDC 2014). This relates to the planning of MDC’s own infrastructure. While this Resolution is not generally applicable to this private development project, the Project’s analysis below included a review of the impacts of sea level rise. The MDC Comprehensive Development Master Plan reveals no further policies requiring a specific scenario, standard or planning horizon with regard to private development applications. The

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<sup>13</sup> “Possible” means “25% to 74.9% probability that the grid cell (land area) has an elevation less than or equal to the MHHW tide level.”

<sup>14</sup> “More likely” means “75% or greater probability that the grid cell (land area) has an elevation less than or equal to the MHHW tide level.”

<sup>15</sup> Use of the IPCC AR5 RCP8.5 scenario is consistent with the first policy consideration on “uncertainty” in the Revised Guidance for Treatment of Climate Change in NMFS Endangered Species Act Decisions (June 17, 2016) (NOAA 2016) referred to in the USFWS’ HCP Handbook Toolbox. Given that this projection is the low end of the range suggested by the Compact, the HCP exceeds this guidance.

<sup>16</sup> Projected sea level rise in the medium and long term has a significant range of variation as a result of uncertainty in future greenhouse gas emissions and their geophysical effects, the incomplete quantitative understanding of all geophysical processes affecting the rate of sea level rise in climate models and current limitations of climate models to predict the future (Compact 2015 at 4).

<sup>17</sup> The shaded zone between the IPCC AR5 RCP8.5 median curve and the NOAA Intermediate High is recommended to be generally applied to most projects within a short-term planning horizon. It reflects what the Work Group projects will be the most likely range of sea level rise for the remainder of the 21st Century (Compact 2015 at 4).

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planning horizon MDC uses for water supply impacts from sea level rise is 2060 (*see* MDWASD 2014), which is generally consistent with the timeframe for this regulatory approval (30 years) and the Compact's guidance. Regardless of MDC policy and its applicability to the Project, sea level rise was robustly considered in this HCP.

*Analysis*

The CRC Property and Off-site Mitigation Area are not within a flood zone.<sup>18</sup> The majority of the On-site Preserves are between 11' to 12' NGVD and are located approximately 5 miles inland from the coast. The Applicant analyzed sea level rise with the best available scientific tools: NOAA's Sea Level Rise and Coastal Impacts Viewer (NOAA 2017)<sup>19</sup> and the University of Florida Sea Level Sketch Tool (UF 2017), both of which incorporate projections from the 2015 Unified Sea Level Rise Projections (Compact 2015). This analysis included coastal inundation and nuisance flooding.<sup>20</sup>

The NOAA Intermediate High projections include 10" by 2030, 26" by 2060, 72" by 2100. The NOAA Intermediate High projections were used because they reflect the upper end of the "range" of conditions as recommended by the Compact for a project within this timeframe.<sup>21</sup> Given the 30-year permit duration, the appropriate future projection would be the 2060 horizon, which shows no impact from 26" of sea level rise (NOAA 2017; UF 2017). In addition, the Applicant assessed beyond the timeframe of the permit, to the 2100 condition (varies from 72" to 81") in the sea level rise modeling tools.<sup>22</sup> This analysis also showed sea level rise will have no impact on the Proposed Action, even in the 2100 condition, using the same NOAA Intermediate High projection (72") (NOAA 2017) and also under the NOAA High projection (81") (UF 2017).<sup>23</sup> All tools utilized show the same conclusion: there are no impacts to the Project from projected sea level rise, even in the 2100 condition, under the recommended range of conditions used by the Compact.<sup>24</sup> This conclusion is true for any projected impacts from tidal or nuisance flooding.

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<sup>18</sup> <http://gisms.miamidade.gov/floodzone/>

<sup>19</sup> Use of this tool is consistent with that taken relative to the final rule listing Florida prairie-clover, Everglades bully, Florida pineland crabgrass, and pineland sandmat (DOI 2017).

<sup>20</sup> The closest tide gauge to the site is Virginia Key in Biscayne Bay. (<https://tidesandcurrents.noaa.gov/map/index.shtml?region=Florida>). Nuisance flooding is defined as a water level measured by NOAA tide gauges ([tidesandcurrents.noaa.gov](https://tidesandcurrents.noaa.gov)) above the local NOAA National Weather Service (NWS) threshold for minor impacts ([water.weather.gov/ahps](https://water.weather.gov/ahps)) established for emergency preparedness. For the Virginia Key tide gauge, the nuisance level is 0.40' above Mean High Higher Water (MHHW) (Sweet and Marra 2016).

<sup>21</sup> The NOAA High curve should be used as follows: The upper curve of the projection should be utilized for planning of high risk projects to be constructed after 2060 or projects which are not easily replaceable or removable, have a long design life (more than 50 years) or are critically interdependent with other infrastructure or services.

<sup>22</sup> NOAA's Sea Level Rise and Coastal Impacts Viewer shows a 6' or 72" condition in 2100 (NOAA 2017). The University of Florida Sea Level Sketch Tool shows an 81" condition in 2100 (UF 2017). The Compact's projections also showed no impacts at 81" by 2100 (NOAA High Condition) (UF 2017; Compact 2015).

<sup>23</sup> This is consistent with second policy consideration (climate change projection timeframe) of the Revised Guidance for Treatment of Climate Change in NMFS Endangered Species Act Decisions (June 17, 2016) (NOAA 2016).

<sup>24</sup> Use of the 2100 scenario and a high end range of 6' is consistent with final rule listing Florida prairie-clover, Everglades bully, Florida pineland crabgrass, and pineland sandmat (DOI 2017).

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The Applicant also considered the Sea Level Affecting Marshes Model (SLAMM) in its climate change analysis. Because this model assesses the processes involved in wetland conversion and shoreline modifications, it is not applicable or relevant to the Project, which does not contain wetlands.

In an abundance of caution, to address the uncertainty regarding future sea level rise projections, the annual HCP Administrative Report will include updated analysis of the latest available climate projections, describe any new impact data and include any recommended adjustments to the Conservation Program based on climate impacts.<sup>25</sup> This will occur at a minimum of every five years or in conjunction with updates to the Compact (or comparable entity).

*Saltwater Intrusion*

The construction of a regional drainage network of canals and control structures to lower the water table and improve drainage has allowed for the westward expansion of urban and agricultural development in southeastern MDC. Some saltwater intrusion into the Biscayne Aquifer in coastal areas has occurred as a result of the reduction in fresh ground water levels, as documented in a recent US Geological Survey (USGS) publication (Prinos et al. 2014).

To provide urban flood control, supply recharge for drinking water production wellfields, and control saltwater intrusion, the SFWMD and the United States Army Corps of Engineers operate the Central and Southern Florida Flood Control Project, which, in the dry season, assists in slowing down saltwater intrusion which would normally occur from lowered ground water levels. SFWMD regulates withdrawals from the Biscayne Aquifer to help prevent saltwater intrusion. SFWMD implemented a rigorous program of chloride and water level monitoring to determine the extent of saltwater intrusion throughout the Lower East Coast (SFWMD 2013).

The MDC Water and Sewer Department (MDWASD) developed a 20-year Water Supply Facility Work Plan in 2014 that adheres to the County ordinance (Resolution R-451-14) requiring all design and construction projects to consider the impact of future sea level rise using a 2060 timeframe (MDWASD 2014). The MDWASD facilities are located over a broad area within 10 miles of the coast from Newton to Hialeah; consequently, the MDWASD has developed an advanced saltwater monitoring network using the expertise of the US Geological Survey (USGS) to track the movement of the saline water (referred as the “Salt Front”) in the Biscayne Aquifer. Prinos et al. (2014) describes the monitoring technologies and monitoring locations used in developing the MDWASD monitoring network, and provides a historical review of saltwater encroachment into the Biscayne Aquifer in the MDC. The data from this monitoring network was used in the renewal of MDWASD public-supply water use permit (13-00017-W; 11/01/2010) for 20 years (Prinos 2014).

The USGS, in cooperation with MDWASD, developed a MODFLOW model with Surface Water Routing and Seawater Intrusion packages (MODFLOW-NWT) to evaluate impacts from wellfield withdrawals, surface water management, sea level rise and movement of the freshwater-seawater interface, “Salt Front”, in the Biscayne Aquifer (Hughes and White 2016). The model study area included 17 surface water basins, portions of Water Conservation Area 3,

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<sup>25</sup> This approach is consistent with the Habitat Conservation Planning Handbook stating: “When appropriate, we should encourage applicants to develop an HCP conservation strategy that integrates consideration of climate change effects throughout the process...” (USFWS 2016; *see also* Stein 2014 at 26).

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Everglades National Park, Florida and Biscayne Bays, and Card and Barnes Sounds, and considered a 30-year horizon for simulating different future scenario conditions. The model was calibrated to 2005 to 2010 conditions to approximate the actual 2011 position of the Salt Front developed from field data by Prinos et al. (2014). One future model scenario incorporated a current linear sea level rise, 0.0073 feet/year (US Army Corps of Engineers, 2011), adjustments for meteorological effects, and a non-linear coefficient from the National Research Council curve III (1987), which added an additional average increase of 0.73 feet over the 30-year simulation period (Hughes and White 2016). This model scenario also incorporated estimated climatic conditions, assumed surface water management controls and projected increases in groundwater Biscayne Aquifer withdrawals.

The model results from this scenario indicated that the Salt Front will remain stable in the Cutler Bay area between Cutler Ridge Drive (SW 200 Street) and Coral Reef Drive (SW 152<sup>th</sup> Street), water table elevations may rise approximately 0.1 to 0.2 feet at the CRC Property, and the exchange of groundwater and surface water in nearby canals will be reduced due to reduced hydraulic gradients. The CRC Property is located on the south side of Coral Reef Drive approximately 1.5 miles west of US Highway 1 and 2 miles west of the Salt Front. Additionally, model results were used to indicate the percentage of time that the water table is deeper than 0.5 feet below land surface after 30 years under the assumed scenario conditions. The water table was deeper than 0.5 feet below land surface 100% of the time at CRC in all model scenario results.

Based on these two USGS studies, the Salt Front in the Biscayne Aquifer has been stable from 1995 to 2011 in the Cutler Bay area between Cutler Ridge Drive and Coral Reef Drive and will remain in approximately the same position for 30 years in this area. Based on these data and model projections, potential for saltwater intrusion from sea level rise in the next 30 years will not affect the ability to implement the Conservation Program and reach the desired success criteria.

To address the uncertainty regarding saltwater intrusion from future sea level rise projections, the annual HCP Administrative Report will include updated analysis of the latest available climate projections, describe any new impact data and include any recommended adjustments to the Conservation Program based related to saltwater intrusion.<sup>26</sup> This will occur at a minimum of every five years or in conjunction with updates to the Lower East Coast Water Supply Plan, the MDWASD Water Supply Facility Work Plan, and/or the Compact (or comparable entity).

Conclusion

The CRC Project will implement adaptive management to address changed circumstances as described in this HCP. The best available science demonstrates that the Project will not be affected by sea level rise and saltwater intrusion during the permit duration. To implement the responses to the triggers identified in **Table 12-1**, the following responses may be undertaken to address the effects of changed circumstances on the Conservation Program:

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<sup>26</sup> This approach is consistent with the Habitat Conservation Planning Handbook stating: “When appropriate, we should encourage applicants to develop an HCP conservation strategy that integrates consideration of climate change effects throughout the process...” (USFWS 2016; *see also* Stein 2014 at 26).

- Modification to the fire frequency to allow for the recovery of pineland croton plants;
- Strategies for uneven-aged forest structure and mimicking the desired density and distribution of pine trees;
- Wet season burns may be conducted, as feasible, to aid in restoring and maintaining the forest canopy structure of uneven-aged pine trees;
- Evaluate land management plan, including supplemental plantings and the invasive exotic plant treatments, and identify whether new methods or strategies are available to meet desired conditions;
- Every five years, reporting on updated climate change data for sea level rise and saltwater intrusion contained in the Lower East Coast Water Supply Plan, the Water Supply Facility Work Plan and/or the Compact (or comparable entity);
- Monitoring of all responses to these events will be reported in the HCP Administrative Report.

### 12.3 Unforeseen Circumstances and the “No Surprises” Policy

Potential reasonably foreseeable changed circumstances are discussed above in Section 12.2. Unforeseen circumstances are changes in circumstances affecting a species or geographic area covered by an HCP that could not have been anticipated. Those changes in circumstances that are not discussed above may be considered unforeseen circumstances. If unforeseen circumstances arise, including dynamic changes to sea level rise or saltwater intrusion projections that exceed those in the above climate change analysis, the Applicant has included procedures to address these unforeseen circumstances. The procedures to address an unforeseen circumstance are that the HCP Coordinator will meet with USFWS to discuss the Conservation Program and this unforeseen circumstance. The five-year reporting requirement on climate change related sea level rise and saltwater intrusion information will aid the HCP Coordinator and USFWS in knowing when a meeting is appropriate.

The “No Surprises” policy applies to all of the Covered Species (**Table 1-1** and **Table 1-2**) of this HCP.<sup>27</sup> The “No Surprises” policy establishes a clear commitment from the USFWS to honor the agreements under an approved HCP for which the permittee is implementing the terms and conditions in good faith (USFWS 1996; USFWS 2016). Under the “No Surprises” policy and 50 C.F.R. § 17.22(b)(5)(iii), USFWS will not require the commitment of additional land or financial compensation beyond the terms and level of mitigation provided within the approved HCP, as long as the Applicant remains in compliance with the provisions of the HCP and the conservation actions are being adequately implemented.

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<sup>27</sup> See, e.g., *California Native Plant Society v. Norton*, 2004 WL 1118537 (Slip Op.) (S.D. Cal. 2004).

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<sup>28</sup> Citations with an (\*) indicate they are cited for the fact they exist and are not relied on for their content.

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**APPENDIX A**  
**Referenced Correspondences**

**APPENDIX B**

**NFC Permit No. NFC2012-012**

## **APPENDIX C**

### **Confidentiality and Access Agreements**

**APPENDIX D**

**Coral Reef Commons Rare Plant and Floristic Inventory and  
Assessment Report (Woodmansee 2014)**

**APPENDIX E**

**FTBG Plant Removal – On-site**

**APPENDIX E-1**  
**Educational Materials**

**APPENDIX F**

**CRC Desirable Plant Species List – On-site**

## **APPENDIX G**

### **Habitat Functional Assessment Detailed Results – On-site**

## **APPENDIX H**

### **Eastern Indigo Snake Standard Protection Measures**

**APPENDIX H1**  
**SWPPP Template**

**APPENDIX I**

**Dade County Native Plant Communities – Pine Rocklands**

**APPENDIX J**

**CRC Fire Reintroduction and Prescribed Burn Plan – On-site  
("CRC Burn Plan")**

**APPENDIX J1**

**Off-site Mitigation Area Mitigation Plan – Burn Plan– Off-Site**

**APPENDIX K**

**UM Richmond Campus Year Thirteen Management Report  
prepared by Biscayne Environmental, Inc.**

**APPENDIX L**

**Draft Financial Assurance Documents**

**APPENDIX M**

**First Amendment to the Reciprocal Easement and Operating  
Agreement – On-site**

**APPENDIX N**

**Draft Conservation Encumbrance – On-site CRC**

**APPENDIX O**

**UM Richmond Campus Existing Deed Restriction – Off-site**