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Lee County Department of Community Development  
1500 Monroe Street  
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August 8, 2017

**Re: Information on Phasing**

Mr. Dunn,

In our meeting on July 17, 2017, Mikki Rozdolski asked that we provide additional information explaining the need for phasing out of the citrus operations, and explaining how the county will be assured that the restoration will be completed. Per that request, attached are the following documents that justify both a phased restoration plan and a phase out of citrus grove operations. Within these documents is also a very specific analysis of the water supply, water quality and habitat benefits that are achieved with each phase.

1. *Memo from Progressive Water Resources on the phase out of Agriculture*
2. *Restoration Plan from Passarella and Associates*
3. *Nutrient Loading Analysis by Phase*
4. *General Restoration Cost Comparison*
5. *Agricultural Use Access Plan*
6. *Proposed Text Amendment*

As we discussed in our meeting, a citrus grove development is a very different type of agricultural activity from row crops. While eliminating row crops from the first development order is logistically not difficult, a farmer simply does not plant the next cycle of crops. The elimination of row crops is a passive action. The elimination of citrus trees requires action and is a very difficult and complex task, and if it is not accomplished in manageable steps the process could cause environmental harm. Mature trees that have been on the site, in some cases for decades, would need to be mechanically removed and then disposed of. The logistics of achieving that, especially over a 1,460-acre property is far more difficult and expensive than Policy 33.3.4.2i. ever envisioned. The policy assumes that one would require that "row crops" not be planted in the next cycle. The policy specifically addressed row crops, and it did not address citrus.

For that reason alone, elimination of all agricultural activities at the time of first development order would not be practical. However, in addition there is a very real need and justification for citrus operations to be treated differently from row crop operations. The infrastructure required for the development of a citrus grove is far more extensive and costly to put in and far more expensive to take out. The drainage ditches are generally more extensive and deeper and the trees and root system are more extensive, making removal a cost that row crop operations do not have. The irrigation system is much more extensive. The cost

estimates for restoration of citrus groves are generally as much as 50% higher than for row crops. In this case the restoration cost will likely be about \$7,000 per acre more for restoration of the grove than for row crops.

Providing a phase out of agriculture for citrus operations specifically does not give citrus operations any advantage over other types of agricultural uses because the limited duration of additional agricultural operation will not offset the increase in cost to removal of the grove's infrastructure. The county will continue to receive very tangible positive environmental benefits with each phase of citrus removal and property restoration.

Finally, as detailed in the memo from Progressive Water Resources, removal of this citrus grove all at once is likely to lead to soil erosion and sedimentation issues. While the phase out of row crops would provide significant immediate benefits for water quality, water quantity and habitat restoration, the hasty removal of the grove and all of the infrastructure may create environmental problems off-setting some of the benefits gained.

As stated about, the phasing of the grove removal will lead to significant immediate benefits to water quality, water quantity and wildlife habitat. The first phase of grove removal and restoration alone would lead to a reduction of over 800,000 gallons of water per day from the water table aquifer, a reduction 442.7 kg TN/year of nitrogen and a reduction of 445 kg TN/year of phosphorus in to the impaired Imperial River watershed. Similarly, the habitat benefits include the restoration of short hydro period wetlands, additional foraging areas for wading birds, and an overall increase in 184 acres of native upland and wetland habitat and an additional 46 acres of wetland enhancement.

As we discussed, there is no intent to have long term grove operations. The access plan provided can ensure that grove operations are phased out in a way that is compatible with the initial phases of development. The intent of the proposed text amendment is simply to phase out the grove in a practical timeframe while still achieving the same long-term benefits of restoration with a time certain end date, and achieving significant short-term benefits in the first phase.

Please feel free to contact me if you have any questions.

**DeLisi, Inc.**



Daniel DeLisi, AICP

cc. Pan Terra Holdings, LTD  
Neale Montgomery, Pavese Law Firm

## Technical Memorandum



**TO:** Alvin “Chip” Block, AICP Principal Planner  
Department of Community Development – Zoning Section

**FROM:** David J. Brown, P.G., Progressive Water Resources, LLC

**SUBJECT:** **Proposed Development Phasing Plan**  
**DCI2016-00018 - Major Plan Development Application**  
**Verdana - Pan Terra Holdings, LTD**

**DATE:** July 24, 2017

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### 1.0 BACKGROUND

In a meeting held on May 2, 2017 with Lee County staff, Pan Terra Holdings, LTD expressed a desire to construct the proposed Verdana development in Phases, whereby the existing citrus operation would be reclaimed in a coordinated and strategic manner. In the meeting and in subsequent correspondence, Lee County staff has expressed concerns regarding the timing of the proposed restoration phasing, including the creation of the historical flow-way. As a result, Lee County staff have expressed a desire that the north-south trending flow-way be completed concurrent with Phase 1 of the development. In addition, Lee County staff has requested a basic water budget be provided to address how the proposed phased reclamation of the existing citrus operation will provide a “net-gain” or benefit to the water resources as a result of the proposed land use change.

On June 26, 2017, Progressive Water Resources, LLC (PWR) provided additional details at the Land Planning Agency (LPA) meeting regarding phasing of the project in regards to the onsite groundwater gradient. Much of PWR’s presentation involved how the proposed citrus reclamation phases were designed to align with the groundwater gradient to safeguard earlier phases of the property that will have already been restored. This discussion predominately involved how the proposed Phasing Plan would minimize groundwater-related impacts from the still operational phases of the grove with those up-gradient areas that had already been reclaimed. Since the June 26, 2017 LPA meeting, the Applicant has spent considerable effort in improving the Phasing Plan to not only consider the onsite groundwater gradient, but also the topographic gradient and native soils, including the potential for adverse impacts to offsite existing land use, particularly Audubon’s Panther Island Mitigation Bank located immediately south the Verdana property. The updated Phasing Plan, provided for staff’s consideration, is shown on the attached **Figure 1**.

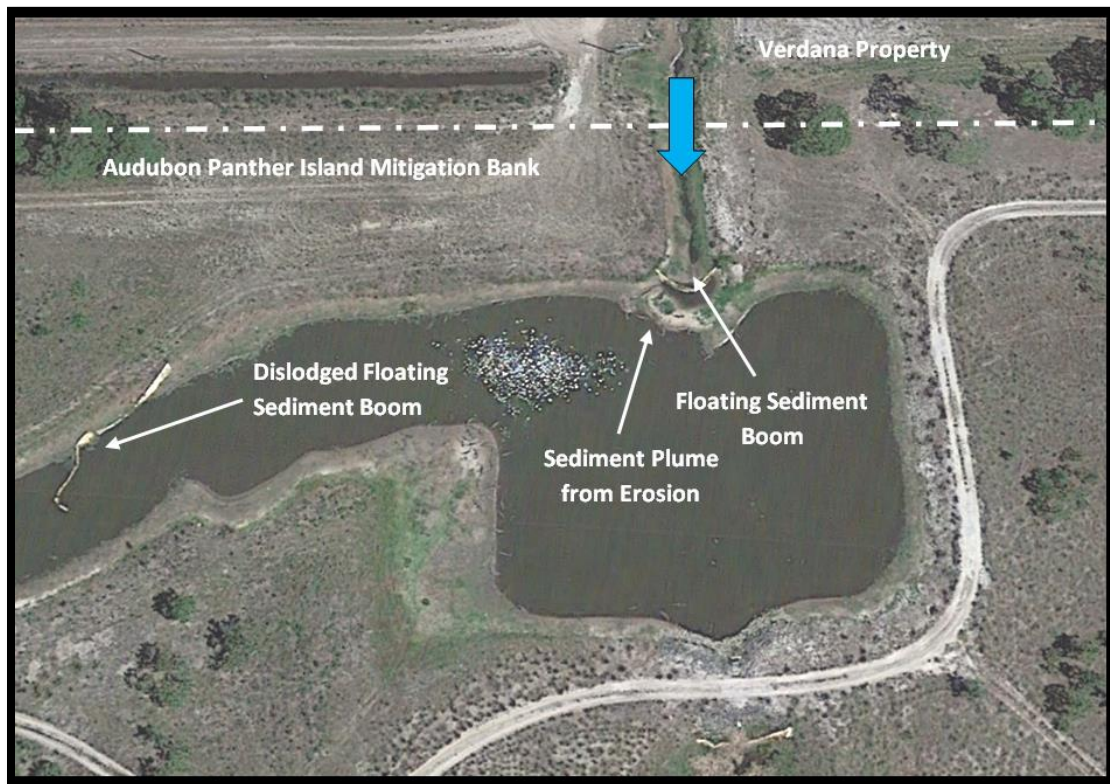
### 2.0 EXISTING CONDITIONS

As shown on the attached **Figure 2**, the native undisturbed soils onsite are highly variable and appear to transition from north to south, corresponding to differences in land surface elevation. A review of the National Resources Conservation Service (NRCS) soils map indicates that it represents “pre-citrus” development conditions of the site since the historical flow-way; evidenced by the Felda Fine Sand, Depressional Soils (light



blue linear feature trending southwest to northeast) are clearly evident in the central to southwest sections of the property. Recent aerial photographs and onsite observations indicate that post-citrus development soils are highly disturbed and the historic flow-way has been eliminated, with the exception of remnants that still exist within the 40-acre out parcel that is not part of the development plan. The elimination of the historic flow-way and onsite disturbance of native soils were clearly evident during County staff's June 5, 2017 site inspection. Despite the development of the citrus grove and disturbance of native soils, the inherent properties of the soils generally remain.

NRCS data indicates that all of the soils onsite are characterized as Hydrologic Soils Group D. "D Group" soils have a high runoff potential, especially when thoroughly wet, as can occur during the rainy season. The D Group soils onsite are also described as poorly-drained or very poorly-drained which is characteristic of low permeability. As also indicated by the NRCS, the native soils onsite exhibit a fine-grained texture and therefore can be easily eroded and/or transported by stormwater runoff. Despite the grove having existed for decades, the fine-grained soils continue to erode and are transported by stormwater to the south and into the Panther Island Mitigation Bank as shown in **Figure 3** below.



**Figure 3.** 2012 aerial image of the permitted stormwater outfall for the existing citrus grove. The sediment basin constructed on the Panther Island Mitigation Bank has two floating sediment booms to protect downstream receiving areas and environmental systems.

Two floating sediment booms are clearly visible in the aerial image, with one boom appearing to have been dislodged by high surface water flows from the existing citrus grove. Floating booms are designed to contain displaced silt, turbidity, sediment, floating vegetation, and debris. Despite their use at the Panther Island



Mitigation Bank, the historic citrus operation appears to discharge sediment and vegetative debris despite having existed for decades. Therefore, the proposed Phasing Plan must not in any way increase sediment or turbidity above historic levels into downstream receiving environmental systems.

It is important to note that the Panther Island Mitigation Bank maintains a third floating sediment boom near the southwest corner of the citrus grove. This location was observed by County staff during the June 5, 2017 site inspection and was historically the site for unpermitted discharges of stormwater into the mitigation bank. Although unpermitted discharges preceded the Applicant's ownership of the property, the breach was repaired by the Applicant to return the area back to permitted conditions. The earthen dike used to repair the breach was pointed out to County staff during the site visit. The breach identified to staff is further evidence of surface water discharges occurring during large stormwater events and the high runoff potential of the onsite soils.

As described above, the native soils, although greatly disturbed, still exhibit high runoff potential and sediment transport due to their fine texture and grain size. However, to more comprehensively understand the Verdana property in the context of the proposed Phasing Plan, the existing topographic gradient must also be described. As previously explained in PWR's August 2016 Characterization of Ground and Surface Water Resources Report submitted to County staff, LiDAR imagery indicates that the site exhibits the highest land surface elevations in the northeast corner of the property, with an elevation of approximately 27 feet NAVD 88. The lowest elevations are found in the southwest corner of the property at approximately 19 feet NAVD 88. The approximate 8-foot differential in elevation facilitates significant surface water drainage of the grove and also greatly influences stormwater runoff volumes and rate.

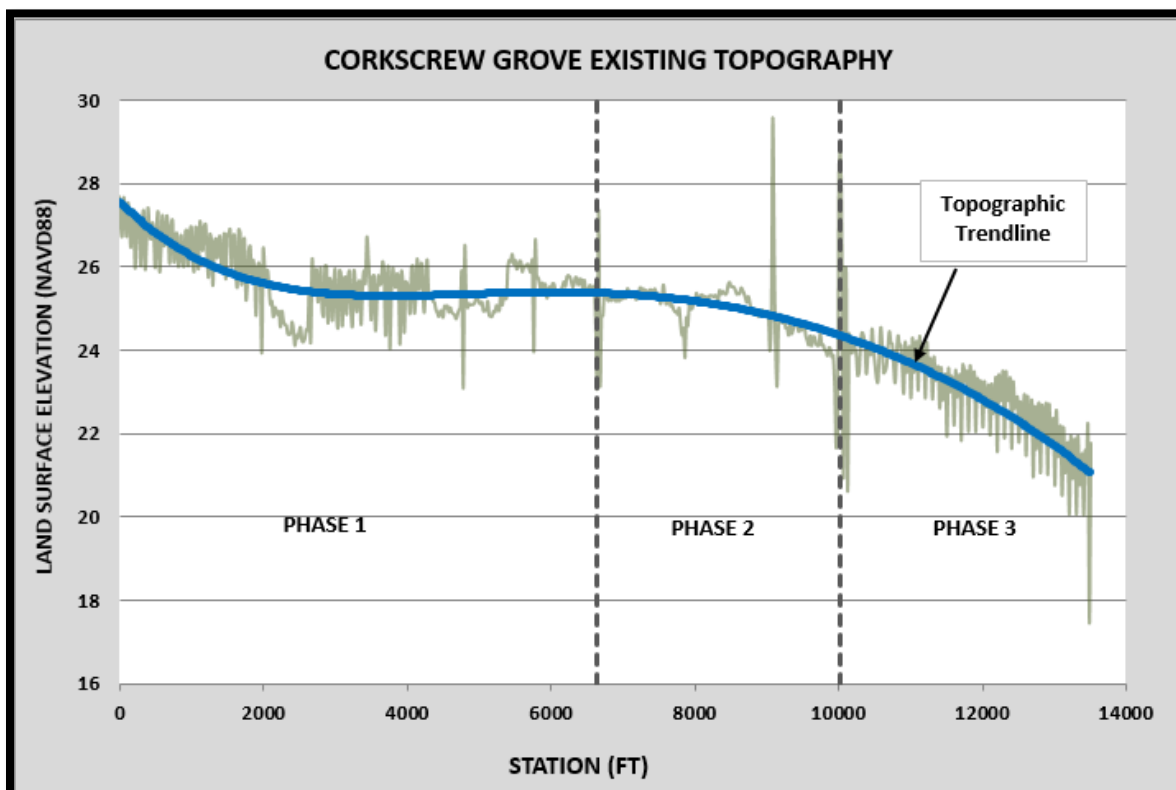


Figure 4. LiDAR topographic profile of the proposed flow-way alignment through Phases 1, 2 and 3.

As shown in **Figure 4** above, a topographic profile was created to analyze the approximate topographic gradient of the proposed flow-way alignment and the varying degrees of fall through the proposed Phasing Plan. To depict the approximate slope of the completed flow-way, a trend line was drawn through the existing LiDAR cross-sectional data. As shown, Phases 1, 2 and 3 have distinct elevation profiles, with topographic falls of approximately 2.5, 1.0, and 4.5 feet, for Phases 1, 2, and 3, respectively. As shown, Phase 3, or the southern portion of the property, exhibits a much steeper topographic profile. Therefore, it is vital that earlier development phases be fully stabilized and restored in regards to erosion prior to initiating any construction activities on subsequent phases.

Equally important is the full stabilization of Phase 1 prior to initiating Phase 2, since simultaneous flow-way construction activities through both or all three phases could easily overwhelm the best-designed erosion and sedimentation prevention strategies, resulting in potential catastrophic adverse environmental impacts to the Panther Island Mitigation Bank. Therefore, it is PWR's professional opinion that a continuous flow-way should not be constructed simultaneous with Phase 1 since it would create a direct topographic connection from the highest to lowest land surface elevations. This would expose the flow-way to hundreds of acres of disturbed soil conditions resulting from restoration activities which even the best erosion and sedimentation control procedures would be insufficient to control during significant rainfall events.

### **3.0 GOALS OF THE PROPOSED PHASING PLAN**

Given the property's groundwater and topographic gradients (see PWR's July 2017 Technical Memorandum regarding potential groundwater recharge of the Verdana property), both of which will continue to exhibit generally similar slopes and directions both during and after development and restoration, the proposed updated Phasing Plan has been created that meets the following goals and objectives.

- Project Phasing is critical to the successful water resource restoration of the property and has been designed to align with the verified Water Table Aquifer groundwater flow gradient.
- Project Phasing must recognize the existing land surface topographic gradient and soil characteristics.
- The proposed citrus grove reclamation and flow-way creation must be performed guardedly to prohibit unintentional adverse impacts to downstream-receiving environmental systems through erosion and high turbidity.
- The strategic north-south phasing provides longer flow paths and greater opportunity for more effective sediment and turbidity protective measures to prevent adverse impacts to downstream-receiving environmental systems.
- The proposed Project Phasing is critical to the gradual restoration of groundwater levels in the Water Table Aquifer to further prevent excess erosion and uncontrolled discharges of stormwater.
- The proposed Phasing Plan advantageously provides for corresponding changes in land use while achieving the restoration percentage goals required by the Lee Plan.

#### 4.0 WATER USE CONSIDERATIONS

In order to provide staff with a basic water budget analysis, a general description of both total land area and total irrigated citrus area within each phase is presented in the Tables below. As required by the Lee Plan, each of the proposed phases meet the required 55% land area restoration goals and this ratio is maintained throughout the eventual development of the approximate 1,455-acre property. As shown in **Table 1**, Phase 1 aggressively includes approximately 390 total acres of which approximately 214 acres are proposed to be restored. Further restoration is proposed in Phase 2 and includes approximately 162 acres for a total of approximately 376 acres, when combined with Phase 1. Phase 3 finalizes the site's restoration with approximately 424 acres, for a total of approximately 800 acres fully restored. The importance of careful and step-wise restoration of all three areas cannot be understated.

**Table 1. Proposed Phasing Plan Acres of Restoration and Development.**

Phase No.	Approximate Land Area (ac.)	Approximate Development Area (ac.)	Approximate Restoration Area (ac.)
1	390	176	214
2	295	133	162
3	770	346	424
<b>Total Acres*</b>	<b>1,455</b>	<b>655</b>	<b>800</b>

\*Note: Total acres do not include easement/right-of-way areas.

The proposed restoration of the water resources is equally aggressive and details are provided in **Table 2**, below. As shown, Phase 1 eliminates approximately 304 acres of irrigated citrus grove and 6 existing Water Table Aquifer wells. The elimination (retirement) of all Water Table Aquifer wells in Phase 1 is predicted to exhibit highly beneficial recovery in the Surficial Aquifer System and is expected to be evidenced in the groundwater level monitoring program included in the Verdana Enhanced Lake Management Plan (ELMP). It is also expected that water level conditions will improve at the Southwest International Airport Mitigation Park, located north of Corkscrew Road. Moreover, it is expected that Phase 1 will reduce impacts to Lee County's nearest Water Table Aquifer public supply well in accordance with the policies of the Lee Plan. Phase 2 will eliminate 3 and Phase 4 will eliminate 10 existing Water Table Aquifer wells, respectively.



**Table 2.** Proposed Phasing Plan for citrus removal including restoration and development areas.

Phase No.	Approximate Citrus Area (ac.)	Approximate Development Area (ac.)	Approximate Restoration Area (ac.)
1	304	137	167
2	230	103	127
3	600	270	330
<b>Total Acres</b>	<b>1,134</b>	<b>510*</b>	<b>624</b>

\*Note: Of the estimated 510 acres of development, approximately 203 acres are proposed to be irrigated as subdivision. This represents an approximate 82 percent reduction from existing conditions.

In order to more fully understand the magnitude of the phased restoration of the property, the acres of citrus provided in **Table 2** have been assigned their respective irrigation quantities allocated by the South Florida Water Management District (SFWMD) through Water Use Permit No. No. 36-00327-W. As shown in **Table 3**, highly significant reductions in the existing Water Table withdrawals are proposed. The values presented in **Table 3** are in units of gallons per day (gpd). As shown, considerable permitted annual Water Table Aquifer quantities are proposed to be retired (843,150 gpd or 32%) in Phase 1 alone. This large decrease is accompanied by a reduction of 1,678,941 gpd in maximum month or dry season quantities and up to 5,633,938 gpd in permitted cold protection water use.

**Table 3.** Proposed Reduction in Permitted Citrus Quantities for Each Phase Portrayed on Figure 1.

Phase No.	Total Permitted Annual Quantities (gpd)	Total Permitted Max. Month Quantities (gpd)	Total Permitted Cold Protection Quantities (gpd)	Percentage of Permitted Annual Surficial Aquifer Quantities	Percentage of Total Permitted Annual Sandstone Aquifer Quantities
1	843,150	1,678,941	5,633,938	32%	0%
2	637,939	1,270,310	4,262,718	19%	28%
3	1,669,158	3,323,749	11,153,344	49%	72%
<b>Total Quantities (gpd)</b>	<b>3,150,247</b>	<b>6,273,000</b>	<b>21,050,000</b>	<b>100%</b>	<b>100%</b>

Preliminary discussions with SFWMD staff indicate that each phase would result in a formal permit modification, with the final citrus permit cancellation achieved in Phase 3 thereby retiring all Water Table Aquifer quantities and permanently eliminating citrus operations' annual, maximum month, and cold protection quantities. Please note that the proposed subdivision will utilize an integrated stormwater and groundwater irrigation system with quantities roughly equal to the existing permitted sandstone aquifer withdrawals. However, the dispersed

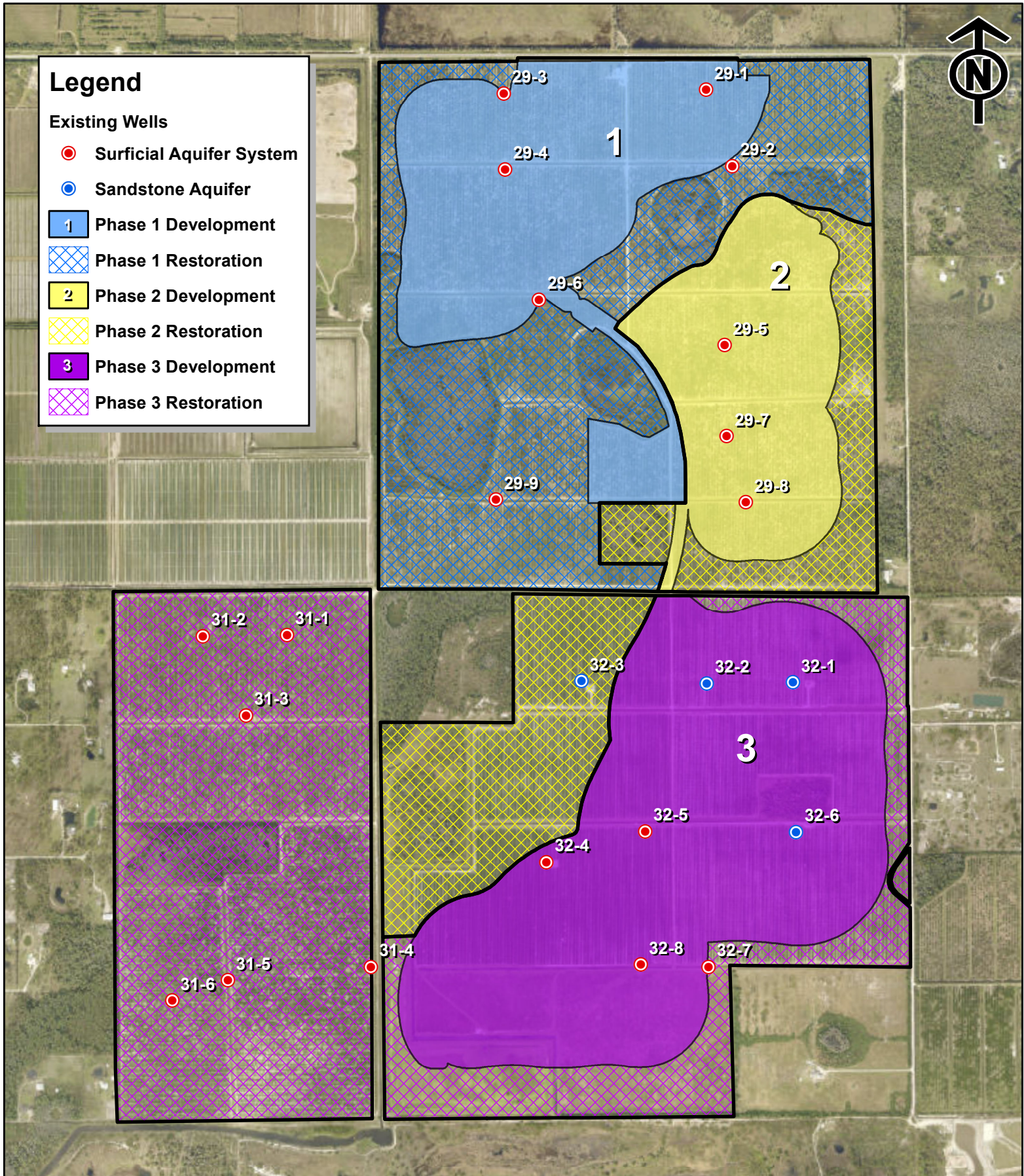
nature of the Sandstone Aquifer wells and the proposed conjunctive use of both surface and groundwater supplies greatly reduces overall demands on each source and further enhances the water resources above current conditions.

## **5.0 CONCLUSIONS**

Lee County staff has expressed concerns regarding the proposed restoration phasing, including the timing of the historical flow-way creation. Staff's desire that the north-south trending flow-way be completed concurrent with Phase 1 of the proposed development is understandable, but the potential for adverse consequences associated with such an approach greatly outweigh the need to quickly restore historic surface water flows. As provided herein, and evidenced in aerial photographs and the site visit attended by County staff, the potential for catastrophic environmental impacts due to uncontrolled erosion, even when employing the best erosion and sedimentation control techniques, is too great to risk. The topographic gradient and soil characteristics will undoubtedly result in severe turbidity and sedimentation of downstream-receiving environmental systems during a large storm event. Recent hydrologic conditions experienced in the area provide an excellent example where a prolonged drought was followed by an abnormally strong onset to the rainy season. These recently experienced hydrologic extremes provide a striking example of conditions that can result in disastrous impacts. Possible tropical storm or hurricane conditions would create even greater potential for highly adverse impacts.

It is apparent to the Applicant that County staff does not desire such an event to occur, nor does staff want to be held accountable for mandating such an approach. We are confident that staff agrees with the Applicant that all necessary protective measures should be incorporated both into the design and implementation of phased restoration activities in order to avoid adverse conditions. Therefore, the Applicant respectfully requests that County staff reconsider their position and approve the Phasing Plan offered that not only meets the intent of the Lee Plan, but also strategically restores the site and provides significant improvements to the water resources. If County staff has questions or comments regarding the proposed Phasing Plan offered in this Technical Memorandum, PWR welcomes the opportunity to discuss the matter in more detail.





**Figure 1**  
**Proposed Phasing Plan**  
**Verdana MPD**  
**Lee County, FL**

Progressive Water Resources has provided the images or data presented in this map for informational purposes only. This data is not intended to be used in lieu of official survey data provided by a Professional Surveyor licensed by the State of Florida

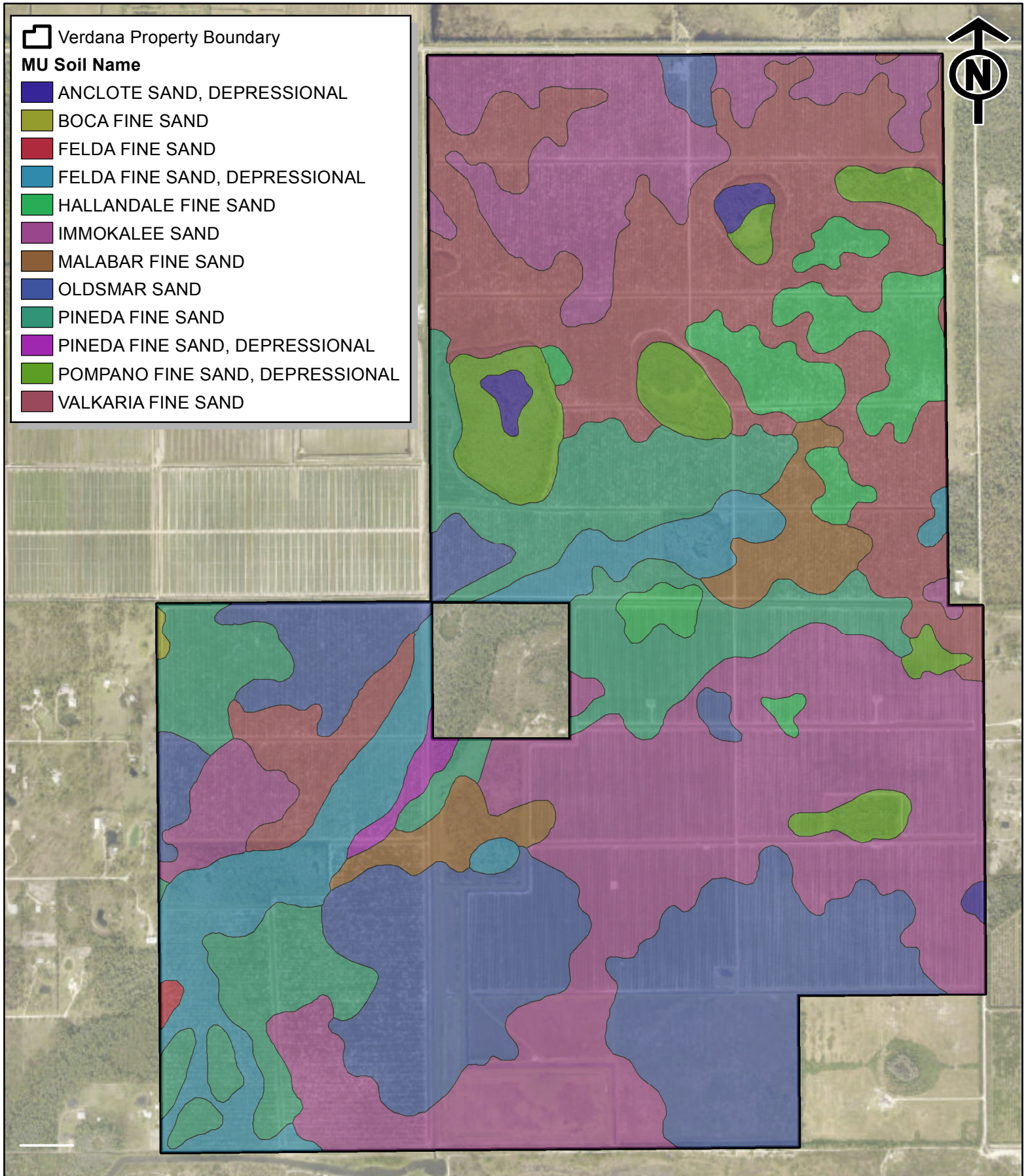




Verdana Property Boundary

#### MU Soil Name

- ANCLOTE SAND, DEPRESSIONAL
- BOCA FINE SAND
- FELDA FINE SAND
- FELDA FINE SAND, DEPRESSIONAL
- HALLANDALE FINE SAND
- IMMOKALEE SAND
- MALABAR FINE SAND
- OLDSMAR SAND
- PINEDA FINE SAND
- PINEDA FINE SAND, DEPRESSIONAL
- POMPANO FINE SAND, DEPRESSIONAL
- VALKARIA FINE SAND



Scale: 1:14,500

7/20/2017

Image: ESRI World Imagery

0 500 1,000 2,000 3,000 Feet

Progressive Water Resources has provided the images or data presented in this map for informational purposes only. This data is not intended to be used in lieu of official survey data provided by a Professional Surveyor licensed by the State of Florida

**Figure 2**  
**NRCS Soils Map**  
**Verdana MPD**  
**Lee County, FL**



**Progressive Water Resources**  
Integrated Water Resource Consultants

**VERDANA  
INDIGENOUS PRESERVATION, RESTORATION, AND  
MANAGEMENT PLAN**

**Revised July 2017**

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## **1.0 INTRODUCTION**

The following outlines the Lee County Indigenous Preservation, Restoration, and Management Plan for Verdana (Project) located in Sections 29, 31, and 32; Township 46 South; Range 27 East; Lee County. The Project site totals 1,460.78± acres. According to Lee County's open space requirements outlined in Policy 33.3.4 of The Lee Plan, the minimum open space requirement for the Project is 60 percent of the site, or approximately 873 acres. As part of the required open space, the Project proposes to establish on-site conservation areas totaling 805± acres. The proposed conservation areas will contain the following elements:

- Preservation of 68± acres of indigenous wetlands and uplands (existing forested and herbaceous habitats with less than 75 percent exotics);
- Restoration of 34± acres of indigenous wetlands and uplands vegetation through the removal of exotic vegetation (existing forested and herbaceous habitats with greater than 75 percent exotics) and supplemental planting;
- Restoration of 703± acres of indigenous wetlands and uplands from citrus groves; and
- Establishment of buffer lakes to serve as wildlife buffers between conservation areas and development areas.

The preservation and enhancement of existing indigenous vegetation and the restoration of the significant areas of citrus groves back to indigenous habitats will serve to provide as a regional flow-way and wildlife corridor. The proposed flow-way/corridor will link Corkscrew Regional Mitigation Bank and the Imperial Marsh Preserve to the north with Panther Island Mitigation Bank and Audubon's overall Corkscrew Swamp Sanctuary lands to the south. The proposed flow-way will also serve to re-establish a northeast to southwest flow-way that historically existed through the Project site.

## **2.0 EXISTING INDIGENOUS VEGETATION HABITATS**

Pursuant to Land Development Code (LDC) Section 10-1, indigenous native vegetation means those plant species that are characteristic of the major plant communities of the County. Native habitats where invasive exotic vegetation has exceeded 75 percent coverage are not considered to be indigenous vegetation.

The Project site includes 74± acres (combined pre-development wetland and upland acres) of indigenous native vegetation. The indigenous areas occur on-site as scattered pockets of primarily remnant wetland and upland forested habitats with less than 75 percent coverage by exotics. These indigenous areas are surrounded by citrus groves and associated drainage system components. The existing indigenous wetland and upland vegetation communities are identified in Appendix A.

The indigenous wetland habitats total 48± acres and consist mostly of remnant cypress, hydric pine, and mixed wetland hardwood habitats. Freshwater marsh habitats occur to a lesser extent. The indigenous uplands total 26± acres and consist mostly of pine flatwoods habitat around the remnant cypress areas on-site. Listed below are the Florida Land Use, Cover and Forms



Classification System (FLUCFCS) (Florida Department of Transportation 1999) descriptions of the indigenous wetland and upland habitats proposed for preservation and enhancement. An aerial with FLUCFCS is attached as Appendix B.

## **2.1 Indigenous Wetland Habitats**

### Cypress, Disturbed (0-24% Exotics) (FLUCFCS Code 6219 E1)

The canopy of this wetland habitat contains bald cypress (*Taxodium distichum*) and cabbage palm (*Sabal palmetto*). The sub-canopy consists of Brazilian pepper (*Schinus terebinthifolius*), cabbage palm, and southern bayberry (*Myrica cerifera*). The ground cover includes caesarweed (*Urena lobata*), pennywort (*Hydrocotyle umbellata*), and swamp fern (*Blechnum serrulatum*). The canopy and sub-canopy contains 0 to 24 percent Brazilian pepper and/or melaleuca (*Melaleuca quinquenervia*).

### Cypress, Disturbed (25-49% Exotics) (FLUCFCS Code 6219 E2)

The vegetation composition of this wetland community is similar to FLUCFCS Code 6219 E1, but contains 25 to 49 percent Brazilian pepper and/or melaleuca in the canopy and sub-canopy.

### Cypress, Disturbed (50-75% Exotics) (FLUCFCS Code 6219 E3)

The vegetation composition of this wetland community is similar to FLUCFCS Code 6219 E2, but contains 50 to 75 percent Brazilian pepper and/or melaleuca in the canopy and sub-canopy.

### Cypress/Pine/Cabbage Palm, Disturbed (0-24% Exotics) (FLUCFCS Code 6249 E1)

The canopy of this wetland habitat consists of slash pine (*Pinus elliottii*), bald cypress, laurel oak (*Quercus laurifolia*), and scattered cabbage palm. The sub-canopy consists of bald cypress, cabbage palm, and Brazilian pepper. This area contains up to 24 percent Brazilian pepper in the canopy and sub-canopy.

### Cypress/Pine/Cabbage Palm, Disturbed (25-49% Exotics) (FLUCFCS Code 6249 E2)

The vegetation composition of this wetland community is similar to FLUCFCS Code 6249 E1 with 25 to 49 percent Brazilian pepper in the canopy and sub-canopy.

### Cypress/Pine/Cabbage Palm, Disturbed (50-75% Exotics) (FLUCFCS Code 6249 E3)

The vegetation composition of this wetland community is similar to FLUCFCS Code 6249 E2 with 50 to 75 percent Brazilian pepper in the canopy and sub-canopy.

### Freshwater Marsh, Disturbed (0-24% Exotics) (FLUCFCS Code 6419 E1)

The canopy and sub-canopy of this wetland habitat is typically open, with scattered Carolina willow (*Salix caroliniana*). The ground cover includes fireflag (*Thalia geniculata*). This area contains 0 to 24 percent coverage by melaleuca, torpedograss (*Panicum repens*), and/or cattail (*Typha* sp.).

Freshwater Marsh, Disturbed (25-49% Exotics) (FLUCFCS Code 6419 E2)

The vegetation composition of this wetland community is similar to FLUCFCS Code 6419 E1 with 25 to 49 percent coverage by melaleuca, torpedograss, and/or cattail.

## **2.2 Indigenous Upland Habitats**

Upland Coniferous Forests, Disturbed (50-75% Exotics) (FLUCFCS Code 4109 E3)

The vegetation of this upland community consists of primarily slash pine, with 50 to 75 percent melaleuca, earleaf acacia (*Acacia auriculiformis*), and/or Brazilian pepper in the canopy and sub-canopy.

Pine Flatwoods, Disturbed (25-49% Exotics) (FLUCFCS Code 4119 E2)

The canopy of this upland habitat contains slash pine, laurel oak, earleaf acacia, cabbage palm, ficus (*Ficus* sp.), and melaleuca. The sub-canopy contains Brazilian pepper, southern bayberry, earleaf acacia, and slash pine. The ground cover includes muscadine (*Vitis rotundifolia*), laurel oak, cabbage palm, Virginia creeper (*Parthenocissus quinquefolia*), earleaf greenbrier (*Smilax auriculata*), saw palmetto (*Serenoa repens*), caesarweed, and cocoplum (*Chrysobalanus icaco*).

Pine Flatwoods, Disturbed (50-75% Exotics) (FLUCFCS Code 4119 E3)

The vegetation composition of this upland community is similar to FLUCFCS Code 4119 E2, but contains 50 to 75 percent melaleuca, earleaf acacia, and/or Brazilian pepper in the canopy and sub-canopy.

Tropical Hardwoods (FLUCFCS Code 426)

The canopy of this forest type is dominated by eucalyptus (*Eucalyptus* sp.). The sub-canopy consists of scattered slash pine and cabbage palm. The ground cover is dog fennel (*Eupatorium capillifolium*), caesarweed, Virginia creeper, balsam apple (*Momordica charantia*), marsh brittle grass (*Setaria parviflora*), pennywort, zarzabacoa-comun (*Desmodium incanum*), sensitive fern (*Mimosa pudica*), pinewoods finger grass (*Eustachys petraea*), bushy bluestem (*Andropogon glomeratus*), bahiagrass (*Paspalum notatum*), and beggarticks (*Bidens alba*).

Hardwood/Conifer Mixed, Disturbed (25-49% Exotics) (FLUCFCS Code 4349 E2)

The canopy of this area is such that neither upland conifers nor hardwoods achieve a 66 percent crown canopy dominance, and contains 25 to 49 percent melaleuca, earleaf acacia, and/or Brazilian pepper in the canopy and sub-canopy.

Cypress/Pine/Cabbage Palm, Disturbed and Drained (50-75% Exotics) (FLUCFCS Code 6245 E3)

The canopy of this habitat consists of slash pine, bald cypress, laurel oak, and scattered cabbage palm. The sub-canopy consists of bald cypress, cabbage palm, Brazilian pepper, and pond-apple (*Annona glabra*). The ground cover consists primarily of swamp fern. This community contains 50 to 75 percent melaleuca and/or Brazilian pepper in the canopy and sub-canopy, and is void of its natural hydrological features.

### **3.0 EXISTING NON-INDIGENOUS VEGETATION**

Approximately 1,387 acres (95 percent) of the Project site consists of vegetation communities that do not meet the LDC's definition of indigenous vegetation. The non-indigenous areas are predominantly citrus grove with associated ditching and drainage systems, and agricultural operations areas. Existing non-indigenous wetlands on the site total 22± acres and consist of melaleuca areas, disturbed lands and remnant cypress areas, and wetland habitats with greater than 75 percent coverage by exotics, primarily Brazilian pepper. Non-indigenous uplands on the Project site total 1,289± acres and consist primarily of the citrus grove and associated agricultural operations. Non-indigenous areas also include 76± acres of agricultural ditching and man-made surface waters (water detention and conveyance). The non-indigenous wetland and upland vegetation communities and surface waters are identified in Appendix A. Listed below are the FLUCFCS descriptions of the non-indigenous areas on the Project site.

#### **3.1 Non-Indigenous Wetland Habitats**

##### Melaleuca, Hydric (FLUCFCS Code 4241)

The canopy of this wetland area is dominated by melaleuca with scattered slash pine. The sub-canopy contains melaleuca with scattered Brazilian pepper. The ground cover contains swamp fern, sensitive fern, caesarweed, and muscadine.

##### Cypress, Disturbed (76-100% Exotics) (FLUCFCS Code 6219 E4)

The vegetation composition of this wetland community is similar to FLUCFCS Code 6219 E3, but contains 76 to 100 percent Brazilian pepper and/or melaleuca in the canopy and sub-canopy.

##### Disturbed Land, Hydric (FLUCFCS Code 7401)

The vegetation of this area is similar to FLUCFCS Code 7401, except with a canopy of scattered melaleuca, with scattered Carolina willow in the sub-canopy.

#### **3.2 Non-Indigenous Upland Habitats**

##### Agricultural Support Operations (FLUCFCS Code 205)

This upland area is cleared of vegetation and is used as a staging and preparation area for the surrounding agriculture operations.

##### Citrus Grove (FLUCFCS Code 221)

The canopy contains citrus trees. The sub-canopy is open. The ground cover is dominated by bahiagrass with crowfoot grass (*Dactyloctenium aegyptium*), natalgrass (*Rhynchelytrum repens*), and Southern sandspur (*Cenchrus echinatus*).

##### Pine Flatwoods, Disturbed (76-100% Exotics) (FLUCFCS Code 4119 E4)

The vegetation composition of this upland community is similar to FLUCFCS Code 4119 E3, but contains 76 to 100 percent melaleuca, earleaf acacia, and/or Brazilian pepper in the canopy and sub-canopy.

#### Melaleuca (FLUCFCS Code 424)

The canopy and sub-canopy of this upland area are dominated by melaleuca. The ground cover contains smutgrass (*Sporobolus indicus*), rusty flat sedge (*Cyperus odoratus*), and caesarweed.

#### Disturbed Land (FLUCFCS Code 740)

The canopy and sub-canopy of this upland area are open. The ground cover includes smutgrass and Peruvian primrose-willow (*Ludwigia peruviana*).

#### Berm (FLUCFCS Code 747)

The canopy of this upland area is open. The sub-canopy consists of Brazilian pepper, slash pine, and earleaf acacia. The ground cover contains caesarweed, Brazilian pepper, Virginia creeper, saw palmetto, crowfoot grass, beggarticks, Southern sandspur, maidencane (*Panicum hemitomon*), ragweed (*Ambrosia artemisiifolia*), panicum (*Panicum* sp.), and smutgrass.

### **3.3 Non-Indigenous Surface Waters**

#### Ditch (FLUCFCS Code 514)

Ditches that support the agricultural operations have a ground cover that includes cattail, Mexican primrose-willow (*Ludwigia octovalvis*), marsh pennywort (*Hydrocotyle vulgaris*), Asiatic pennywort (*Centella asiatica*), dayflower (*Commelina diffusa*), torpedograss, and West Indian marsh grass (*Hymenache amplexicaulis*).

#### Disturbed Land, Other Surface Waters (FLUCFCS Code 7401)

These disturbed areas are periodically flooded due to farming and drainage operations on the property and are classified as “other surface waters.” The ground cover includes Mexican primrose-willow, caesarweed, willow, sawgrass, cattail, mangrove flat sedge (*Cyperus ligularis*), cogongrass (*Imperata cylindrica*), water lettuce (*Pistia stratiotes*), and para liverseed grass (*Urochloa mutica*), southern beak sedge (*Rhynchospora microcarpa*), yellow-eyed grass (*Xyris* sp.), torpedograss, smut grass, marsh bristle grass (*Setaria parviflora*), marsh pennywort, rosy camphorweed (*Pluchea rosea*), dayflower, and buttonweed (*Diodia virginiana*).

## **4.0 INDIGENOUS VEGETATION PRESERVATION AND ENHANCEMENT**

A total of 68± acres (47± acres of wetlands and 21± acres of uplands) with less than 75 percent existing exotic vegetation will be preserved and enhanced by the hand removal/treatment of exotic and nuisance vegetation. The locations of the indigenous preservation areas are shown on Appendix C.

### **4.1 Methods to Remove and Control Exotic and Nuisance Plants**

Exotics to be eradicated include, but are not limited to, the 21 species of prohibited invasive exotic species listed in Section 10-420(h) of the LDC (Table 1).



**Table 1. Prohibited Invasive Exotics**

Common Name	Scientific Name
Air potato	<i>Dioscorea alata</i>
Australian pines	All <i>Casuarina</i> species
Bishopwood	<i>Bischofia javanica</i>
Brazilian pepper	<i>Schinus terebinthifolius</i>
Carrotwood	<i>Cupaniopsis anacardioides</i>
Chinese tallow	<i>Sapium sebiferum</i>
Cork tree	<i>Thespesia populnea</i>
Cuban laurel fig	<i>Ficus microcarpa</i>
Downy rose-myrtle	<i>Rhodomyrtus tomentosus</i>
Earleaf acacia	<i>Acacia auriculiformis</i>
Japanese climbing fern	<i>Lygodium japonicum</i>
Java plum	<i>Syzygium cumini</i>
Melaleuca	<i>Melaleuca quinquenervia</i>
Murray red gum	<i>Eucalyptus camaldulensis</i>
Old World climbing fern	<i>Lygodium microphyllum</i>
Rose apple	<i>Syzygium jambos</i>
Rosewood	<i>Dalbergia sissoo</i>
Tropical soda apple	<i>Solanum viarum</i>
Wedelia	<i>Wedelia trilobata</i>
Weeping fig	<i>Ficus benjamina</i>
Woman's tongue	<i>Albizia lebbek</i>

Exotic and nuisance vegetation removal will be conducted primarily by hand methods. Hand treatment will be either felling of exotic trees, hand removal, and herbicide treatment of the stumps; or by hand pulling and removal. The treatment of exotic and nuisance vegetation will include one or more of the following methods: (1) cut exotics within 12 inches of ground elevation, hand remove cut vegetation, and treat remaining stump with approved herbicide; (2) foliar application of approved herbicide or hand pulling of exotic seedlings; and (3) foliar application of approved herbicide to nuisance grasses.

#### **4.2 Debris Removal**

Exotic vegetative debris that is cut will be removed from the indigenous preserve areas. Exotic debris may be stacked in the adjacent former grove areas and burned. The preserve areas will be inspected annually for trash/garbage. Any trash/garbage located within the preserve areas will be removed and disposed of by hand.

### **4.3 Method and Frequency of Pruning and Trimming**

Exotic removal within the existing indigenous habitats is scheduled to begin after development order approval. After the completion of the initial exotic removal, semi-annual inspections of the preserves will occur for the first two years. During these inspections, the conservation areas will be traversed by a qualified ecologist. Locations of nuisance and/or exotic species will be identified for immediate treatment with an appropriate herbicide. Any additional potential problems will also be noted and corrective actions taken. Once exotic/nuisance species levels have been reduced to acceptable limits, inspections of the conservation areas will be conducted a minimum of once every two years.

Maintenance will be conducted in perpetuity to ensure that the conservation areas are free of exotic vegetation, including the prohibited invasive exotic species listed in Section 10-420(h) of the LDC (Table 1).

## **5.0 INDIGENOUS VEGETATION RESTORATION**

Restoration and re-establishment of indigenous vegetation communities will be conducted in areas with greater than 75 percent coverage by exotic vegetation and in the existing citrus grove within the conservation areas. Restoration activities will include 34± acres of exotic removal and supplemental plantings in existing forested habitats with greater than 75 percent exotics and 703± acres of wetland and upland restoration from existing citrus groves. The locations of the various types of restoration areas are shown on Appendix C.

### **5.1 Removal of Exotics and Supplemental Plantings**

Approximately 34 acres (22± acres of wetlands and 12± acres of uplands) with greater than 75 percent exotics will be enhanced by the removal of exotic species and supplemental plantings of native vegetation. Mechanical equipment may be utilized to assist in the removal of exotic species in these areas. Cut vegetative debris will be removed from these areas in order to allow for successful supplemental plantings. All efforts will be made to preserve native trees when conducting the exotic removal with mechanized equipment. To minimize adverse impacts to the ground surface, machinery that exerts a relatively low impact on the ground surface (i.e., tracked skid steer, feller-buncher) will be utilized within the mechanical removal areas.

Following the removal of exotics, supplemental wetland plantings will be installed in the 22± acres of wetland habitats. Wetland plantings will be selected based on the type of native vegetation that occurs in the adjacent or nearby wetland habitats. Tree and ground cover species will be planted according to the specifications in Table 2. A minimum of three tree species and five ground cover species will be planted. The species selected for planting will depend on market availability at the time the plantings are to occur.

**Table 2. Supplemental Wetland Plantings<sup>1</sup>**

Common Name	Scientific Name	Minimum Height	Container Size	Planting Instruction (On Center)
<b>Trees</b>				
Bald cypress	<i>Taxodium distichum</i>	2 to 5 ft.	BR to 3 gal.	30 to 50 ft.
Red maple	<i>Acer rubrum</i>	2 to 5 ft.	BR to 3 gal.	30 to 50 ft.
Slash pine	<i>Pinus elliottii</i>	2 to 5 ft.	BR to 3 gal.	30 to 50 ft.
Laurel oak	<i>Quercus laurifolia</i>	2 to 5 ft.	BR to 3 gal.	30 to 50 ft.
Dahoon holly	<i>Ilex cassine</i>	2 to 5 ft.	BR to 3 gal.	30 to 50 ft.
Pop ash	<i>Fraxinus caroliniana</i>	2 to 5 ft.	BR to 3 gal.	30 to 50 ft.
<b>Ground Cover</b>				
Cordgrass	<i>Spartina bakeri</i>	12 in.	2 in.	5 to 8 ft.
Wiregrass	<i>Aristida stricta</i>	12 in.	2 in.	5 to 8 ft.
Gulfdune paspalum	<i>Paspalum monostachyum</i>	12 in.	2 in.	5 to 8 ft.
Muhly grass	<i>Muhlenbergia capillaris</i>	12 in.	2 in.	5 to 8 ft.
Sawgrass	<i>Cladium jamaicense</i>	12 in.	2 in.	5 to 8 ft.
Blue maidencane	<i>Amphicarpum muhlenbergianum</i>	12 in.	2 in.	5 to 8 ft.
Swamp lily	<i>Crinum americanum</i>	12 in.	2 in.	5 to 8 ft.
Golden canna	<i>Canna flaccida</i>	12 in.	2 in.	5 to 8 ft.
Maidencane	<i>Panicum hemitomon</i>	12 in.	2 in.	5 to 8 ft.
Spikerush	<i>Eleocharis interstincta</i>	12 in.	2 in.	5 to 8 ft.
Arrowhead	<i>Sagittaria lancifolia</i>	12 in.	2 in.	5 to 8 ft.
Pickernelweed	<i>Pontederia cordata</i>	12 in.	2 in.	5 to 8 ft.
Alligator flag	<i>Thalia geniculata</i>	12 in.	2 in.	5 to 8 ft.
Soft-stem bulrush	<i>Scirpus validus</i>	12 in.	2 in.	5 to 8 ft.

<sup>1</sup>Additional tree and ground cover species may be included in the planting table prior to Development Order approval.

BR - Bare root

Following the removal of exotic vegetation, supplemental upland planting will be installed in 12± acres of upland habitats. Upland plantings will be selected to replace the type of native vegetation that occurs in the adjacent or nearby upland habitats. Tree plantings will include primarily slash pine, although other tree species listed in Table 3 may be utilized. Upland tree and ground cover plantings will be installed according to the specifications listed in Table 3. A minimum of three tree species and five ground cover species will be planted. The species selected for planting will depend on market availability at the time the plantings are to occur.

**Table 3. Supplemental Upland Plantings<sup>1</sup>**

Common Name	Scientific Name	Minimum Height	Minimum Container Size	Planting Instruction (On Center)
<b>Trees</b>				
Slash pine	<i>Pinus elliottii</i>	2 to 5 ft.	BR to 3 gal.	30 to 50 ft.
Cabbage palm	<i>Sabal palmetto</i>	2 to 5 ft.	BR to 3 gal.	30 to 50 ft.
Live oak	<i>Quercus virginiana</i>	2 to 5 ft.	BR to 3 gal.	30 to 50 ft.
Laurel oak	<i>Quercus laurifolia</i>	2 to 5 ft.	BR to 3 gal.	30 to 50 ft.
Dahoon holly	<i>Ilex cassine</i>	2 to 5 ft.	BR to 3 gal.	30 to 50 ft.
<b>Ground Cover</b>				
Saw palmetto	<i>Serenoa repens</i>	12 in.	1 gal.	30 to 50 ft.
Gulfdune paspalum	<i>Paspalum monostachyum</i>	12 in.	2 in.	5 to 8 ft.
Blue maidencane	<i>Amphicarpum muhlenbergianum</i>	12 in.	2 in.	5 to 8 ft.
Wiregrass	<i>Aristida stricta</i>	12 in.	2 in.	5 to 8 ft.
Muhly grass	<i>Muhlenbergia capillaris</i>	12 in.	2 in.	5 to 8 ft.
Cordgrass	<i>Spartina bakeri</i>	12 in.	2 in.	5 to 8 ft.
Broomgrass	<i>Andropogon virginicus</i>	12 in.	2 in.	5 to 8 ft.
Fakahatchee grass	<i>Tripsacum dactyloides</i>	12 in.	2 in.	5 to 8 ft.
Purple lovegrass	<i>Eragrostis spectabilis</i>	12 in.	2 in.	5 to 8 ft.

<sup>1</sup>Additional tree and ground cover species may be included in the planting table prior to Development Order approval.

BR - Bare root

## 5.2 Wetland and Upland Restoration from Citrus Grove

Approximately 703 acres of existing citrus groves, including agricultural ditches, water detention areas, and berms will be restored to native wetland and upland habitats. Wetland and upland restoration activities will include removal of citrus trees, backfilling of agricultural ditches and detention systems, regrading to contours necessary for restoration historic habitat communities, replanting of vegetation to achieve target habitat types, and ongoing maintenance and management.

### 5.2.1 Wetland Grading and Planting

Stormwater from development areas of the Project will be treated for water quality in stormwater lakes within the stormwater management system for each development area. Following water quality treatment, stormwater will be discharge from treatment lakes into the restoration area at various locations. A flow-way will be established within the wetland restoration area to allow this water to hydrate the restoration area and to accommodate positive flow of water from the north to the south. The open water component of the flow-way will vary in width from 15 to 45 feet with several large “pond areas” to increase wading bird foraging opportunities. The average wet season water depth within the open water portion of the flow-way will be 4 feet in order to reduce the potential for



cattail overgrowth. The side slopes of the flow-way will be 1:8 or less and will be vegetated with appropriate wetland vegetation. Water elevations within the flow-way will be stepped down from north to south to mimic historic patterns and to allow hydration of the indigenous replanting areas.

Following the removal of the citrus trees, drainage ditches and other components of the agricultural drainage/water management system will be backfilled using material from the existing berms and disturbed areas. Proposed wetland areas will be graded and planted with wetland plantings in Table 4. The species selected for planting will depend on market availability at the time the plantings are to occur. Specifications for plantings size and density (on-center spacing) are also provided in Table 4.

**Table 4. Wetland Restoration Plantings<sup>1</sup>**

Common Name	Scientific Name	Minimum Height	Container Size	Planting Instruction (On Center)
<b>Trees<sup>2</sup></b>				
Bald cypress	<i>Taxodium distichum</i>	2 to 5 ft.	BR to 3 gal.	30 to 50 ft.
Slash pine	<i>Pinus elliottii</i>	2 to 5 ft.	BR to 3 gal.	30 to 50 ft.
<b>Ground Cover Plantings</b>				
<b>Zone 1</b>				
Gulfdune paspalum	<i>Paspalum monostachyum</i>	12 in.	2 in.	5 to 8 ft.
Muhly grass	<i>Muhlenbergia capillaris</i>	12 in.	2 in.	5 to 8 ft.
Cordgrass	<i>Spartina bakeri</i>	12 in.	2 in.	5 to 8 ft.
Blue maidencane	<i>Amphicarpum muhlenbergianum</i>	12 in.	2 in.	3 to 5 ft.
Sawgrass	<i>Cladium jamaicense</i>	12 in.	2 in.	3 to 5 ft.
Maidencane	<i>Panicum hemitomon</i>	12 in.	2 in.	3 to 5 ft.
<b>Zone 2</b>				
Sawgrass	<i>Cladium jamaicense</i>	12 in.	2 in.	3 to 5 ft.
Maidencane	<i>Panicum hemitomon</i>	12 in.	2 in.	3 to 5 ft.
Spikerush	<i>Eleocharis interstincta</i>	12 in.	2 in.	3 to 5 ft.
Golden canna	<i>Canna flaccida</i>	12 in.	2 in.	3 to 5 ft.
Arrowhead	<i>Sagittaria lancifolia</i>	12 in.	2 in.	3 to 5 ft.
Pickerelweed	<i>Pontederia cordata</i>	12 in.	2 in.	3 to 5 ft.
Alligator flag	<i>Thalia geniculata</i>	12 in.	2 in.	3 to 5 ft.
Soft-stem bulrush	<i>Scirpus validus</i>	12 in.	2 in.	3 to 5 ft.
<b>Zone 3</b>				
Spikerush	<i>Eleocharis interstincta</i>	12 in.	2 in.	3 to 5 ft.
Golden canna	<i>Canna flaccida</i>	12 in.	2 in.	3 to 5 ft.
Arrowhead	<i>Sagittaria lancifolia</i>	12 in.	2 in.	3 to 5 ft.
Pickerelweed	<i>Pontederia cordata</i>	12 in.	2 in.	3 to 5 ft.

**Table 4. (Continued)**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Minimum Height</b>	<b>Container Size</b>	<b>Planting Instruction (On Center)</b>
<b>Zone 3 (Continued)</b>				
Soft-stem bulrush	<i>Scirpus validus</i>	12 in.	2 in.	3 to 5 ft
Alligator flag	<i>Thalia geniculata</i>	12 in.	2 in.	3 to 5 ft
Spatterdock	<i>Nuphar luteum</i>	24 in.	1 gal.	15 ft.
Waterlily	<i>Nymphaea odorata</i>	24 in.	1 gal.	15 ft.

<sup>1</sup>Additional tree and ground cover species may be included in the planting table prior to Development Order approval.

<sup>2</sup>Wetland tree plantings will be clustered along the edge of the flow-way restoration area as to not preclude open foraging habitat for listed wading bird species.

BR - Bare root

Slash pines and ground cover species from Zone 1 in Table 4 will be installed on the higher slope of the restored wetlands where the target habitat is hydric pine flatwoods. Zone 2 plantings will be installed on the mid to lower elevations where the target habitat is freshwater marsh. Zone 3 plantings will be installed in the lowest portions of the graded area and on the side slopes of the flow-way. The Zone 3 target habitat type is freshwater marsh, but may contain intermittent areas of open water. A minimum of six ground cover species will be planted.

### **5.2.2 Upland Grading and Planting**

The locations of the upland restoration areas are shown on Appendix A. Upland restoration will consist of the removal of citrus trees and removal of berms, and the backfilling of ditches and detention areas. Re-grading will occur to provide appropriate ground elevations for targeted upland plant communities.

Following final grading, tree species and ground cover from Table 5 will be installed. The species selected for planting will depend on the market availability at the time plantings are to occur. Trees may be planted in clusters to provide distinct areas that can be defended from prescribed fire by the installation of disked fire breaks around the perimeter of the clusters. The locations of the tree clusters will be identified based on an analysis of historic aerials and proposed site topography. Trees will be planted in accordance with the specifications listed in Table 5. The goal is to create clusters of primarily open canopy native forest areas, with adequate sunlight for an abundance of ground cover species. Clusters of trees may be pine, hardwoods, or a mix of pine and hardwoods. A variety of tree sizes may be utilized to create a more heterogeneous plant community.

In areas where tree plantings are not clustered, widely scattered trees will be planted randomly in the upland restoration areas. The widely scattered trees will be slash pine and bare root plantings.

Native ground cover plantings will be installed in the upland restoration areas and will include a minimum of four of the species listed in Table 5. No one species will constitute more than 50 percent of the total ground cover plantings. Direct seeding to establish upland ground cover may be used in conjunction with ground cover plantings within the upland restoration areas. The seed source will be obtained from and applied by a professional experienced with direct seeding as a method of upland restoration. The seed source will be harvested from a local area and will include a mixture of regionally-appropriate native graminoid species. The seed source mixture will include a variety of species to optimize ground cover diversity to the maximum extent possible.

**Table 5. Upland Restoration Plantings<sup>1</sup>**

Common Name	Scientific Name	Minimum Height	Container Size	Planting Instruction (On Center)
<b>Trees</b>				
Slash pine	<i>Pinus elliottii</i>	2 to 5 ft.	BR to 3 gal.	30 to 50 ft.
Live oak	<i>Quercus virginiana</i>	2 to 5 ft.	BR to 3 gal.	30 to 50 ft.
Laurel oak	<i>Quercus laurifolia</i>	2 to 5 ft.	BR to 3 gal.	30 to 50 ft.
Dahoon holly	<i>Ilex cassine</i>	2 to 5 ft.	BR to 3 gal.	30 to 50 ft.
<b>Ground Cover</b>				
Saw palmetto	<i>Serenoa repens</i>	12 in.	1 gal.	30 to 50 ft.
Gulfdune paspalum	<i>Paspalum monostachyum</i>	12 in.	2 in.	5 to 8 ft.
Wiregrass	<i>Aristida stricta</i>	12 in.	2 in.	5 to 8 ft.
Muhlygrass	<i>Muhlenbergia capillaris</i>	12 in.	2 in.	5 to 8 ft.
Cordgrass	<i>Spartina bakeri</i>	12 in.	2 in.	5 to 8 ft.
Fakahatchee grass	<i>Tripsacum dactyloides</i>	12 in.	2 in.	5 to 8 ft.
Purple lovegrass	<i>Eragrostis spectabilis</i>	12 in.	2 in.	5 to 8 ft.

<sup>1</sup>Additional tree and ground cover species may be included in the planting table prior to Development Order approval.

BR - Bare root

## 6.0 RESTORATION ACTIVITY SCHEDULE

Restoration activities will be completed in phases. Each phase will take approximately 4 years to complete due to seasonal time constraints for the prescribed burns, herbicide treatments, and plantings. In addition, sufficient time for re-sprouting of the remaining exotic species is needed between the initial burning, the first herbicide treatment, and successive exotic treatments. Restoration activities in all phases will be completed within 16 years or sooner from the date of commencement of the first development phase.

## **6.1 Restoration Phases**

Sections 6.1.1 through 6.1.4 below summarize the restoration activities by phase.

### **6.1.1 Phase 1 (230± acres)**

Phase 1 will include the initial hand treatment of exotic and nuisance vegetation within 46± acres of existing indigenous habitat; 117± acres of indigenous wetland restoration; and 67± acres of indigenous upland restoration (Appendix D). Enhancement and restoration activities will commence upon initiation of the first development phase. The activities, including installation of restoration plantings, will be completed four years after the first development order has been issued.

### **6.1.2 Phase 2 (169± acres)**

Phase 2 will include the initial hand treatment of exotic and nuisance vegetation within 21± acres of existing indigenous habitat; 90± acres of indigenous wetland restoration; and 58± acres of indigenous upland restoration (Appendix D). Enhancement and restoration activities will be completed within six years after the first development order. This includes installation of restoration plantings.

### **6.1.3 Phase 3 (406± acres)**

Phase 3 will include the initial hand treatment of exotic and nuisance vegetation within 1± acre of existing indigenous habitat; 187± acres of indigenous wetland restoration; and 218± acres of indigenous upland restoration (Appendix D). Restoration activities will be completed within eight years after the first development order. This includes installation of restoration plantings.

## **6.2 Irrigation**

The planting activities will occur from June to December, and irrigation is assumed to be necessary for a maximum of six months or until the vegetation has established appropriately. In the event that plantings cannot be installed within this timeframe, then irrigation will be utilized until the onset of the wet season (i.e., June) or until the vegetation has established appropriately. In either case, irrigation will be utilized on a temporary, as-needed basis, and will not be a required long-term activity.

Depending on the location of the planted areas, irrigation sources may include, but are not limited to, on-site lakes and existing agricultural wells. The irrigation method will typically consist of an overhead sprinkler with temporary piping installed to the water source. A water truck may also be utilized for the transportation and distribution of irrigation water resources.

## **7.0 SUCCESS CRITERIA**

### **7.1 Indigenous Wetland and Upland Preservation and Enhancement**

The following are the success criteria for the indigenous preserve areas:

- 1) Initial eradication of exotic and nuisance vegetation will be completed; and
- 2) The preserve areas will be maintained free from exotic vegetation. Exotic vegetation species include, but are not limited to, the 21 species of prohibited invasive exotic species listed in Section 10-420(h) of the LDC (Table 1).

### **7.2 Indigenous Wetland and Upland Restoration**

The following are the success criteria for the indigenous wetland and upland restoration areas:

- 1) Initial eradication of exotic and nuisance vegetation will be completed;
- 2) Supplemental plantings will be completed in the indigenous restoration areas;
- 3) A minimum 80 percent survival of tree and ground cover plantings after five years; and
- 4) The preserve areas will be maintained free from exotic vegetation. Exotic vegetation species include, but are not limited to, the 21 species of prohibited invasive exotic species listed in Section 10-420(h) of the LDC (Table 1).

### **7.3 Wetland and Upland Restoration from Citrus Grove**

The following are the success criteria for the wetland and upland restoration from citrus grove areas:

- 1) Initial eradication of exotic and nuisance vegetation will be completed;
- 2) Removal of citrus trees, removal of berms and spoil areas, backfilling of ditches, and borrow areas, and re-grading of wetland and upland restoration areas will be completed;
- 3) Plantings within wetland and upland restoration areas will be completed;
- 4) A minimum of 80 percent survival of tree and ground cover species after five years;
- 5) The goal will be an average of approximately 100 trees per acre in the upland restoration areas. There may be areas of clustered trees which amount to greater than 100 trees per acre and areas of herbaceous prairie with less than 100 trees per acre; and
- 6) The preserve areas will be maintained free from exotic vegetation. Exotic vegetation species include, but are not limited to, the 21 species of prohibited invasive exotic species listed in Section 10-420(h) of the LDC (Table 1).



## **8.0 MAINTENANCE**

After the completion of the initial exotic removal, semi-annual inspections of the conservation areas will occur for the first two years. During these inspections, the conservation areas will be traversed by a qualified ecologist. Locations of nuisance and/or exotic species will be identified for immediate treatment with an appropriate herbicide. Any additional potential problems will also be noted and corrective actions taken. Once exotic/nuisance species levels have been reduced to acceptable limits, inspections of the conservation areas will be conducted annually. Maintenance will be conducted in perpetuity to ensure that the conservation areas are free of exotic vegetation, including the prohibited invasive exotic species listed in Section 10-420(h) of the LDC (Table 1).

### **8.1 Prescribed Fire**

Prescribed burning will be used as a management tool in the conservation areas to maintain the native vegetation communities. Prescribed burns help maintain vegetative communities in their natural state, reduce fuel loads and the danger of wildfire, aid with the eradication and control of exotic and nuisance vegetation species, and improve wildlife habitat. The objectives of prescribed burning maintenance events will be to aid in the control of exotic vegetation and woody shrubs (i.e., wax myrtle and saltbush), and to stimulate the growth and diversity of herbaceous vegetation.

The burning frequency for the conservation areas will be two to four years, which is consistent with the natural fire regime for mesic flatwoods, wet flatwoods, and wet prairies described by Florida Natural Areas Inventory (FNAI) in the *Guide to the Natural Communities of Florida* (FNAI 2010). The edges of the Project's freshwater marshes will be burned when the fire moves through the adjacent pine and prairie habitats. The fire will be allowed to extinguish naturally within the wetter marsh habitats.

Prescribed burning is typically conducted during the winter or early spring when temperatures are reduced and wind direction is more constant. The initial burn is anticipated to occur during the late winter. Winter burns are preferred to reduce high fuel loads. Growing season burns also may be conducted as conditions allow. Changes in annual weather cycles determine when burn permits will be available and burns may be conducted only on the day(s) of Florida Forest Service permission.

Fire breaks will be installed in strategic locations in order to safely ignite and control prescribed fires. Fire breaks will be co-located with maintenance trails, access roads, easements, fence lines, property boundaries, and natural habitat boundaries. A 12-foot wide fire break will be established directly adjacent to and inside (i.e., the restoration side) of the 8-foot tall wildlife control fence, or other structural wildlife deterrent. Fires will be excluded from the planted tree clusters until such time that the plantings are mature enough to survive fires. Fires will be allowed to extinguish naturally within the wetter preserve areas, such as the marsh habitats.

Controlled burns will be conducted only when authorized with a permit by the Florida Forest Service. In addition, notice will be given to the Estero Fire District. Coordination with the Lee County Port Authority and the South Florida Water Management District will occur before burning. Burning will not be conducted if smoke is anticipated to encroach upon Corkscrew Road, Corkscrew Farms residential lots, or the Burgundy Farms subdivision.

## **9.0 MONITORING REPORTS**

Monitoring will be conducted annually for the conservation areas. Annual reports documenting the achievement of the success criteria outlined in Section 6.0 will be submitted to Lee County's Division of Environmental Sciences (DES). Annual monitoring reports will be provided for a period of five years after the Certificate of Compliance has been issued by Development Services or until the 80 percent survivability is reached. Monitoring will typically be conducted during the height of the growing season (August to October) with annual reports submitted by December 31.

Annual monitoring reports will be provided for each conservation area phase as described above. The monitoring reports will include documented exotic and nuisance species, mortality of vegetation, estimated causes of mortality, growth of the vegetation, wildlife observed and other factors that demonstrate the functional health of the conservations areas, and photographs. Four to five photograph stations will be established per monitoring transect. A brief description of anticipated maintenance work to be conducted over the next year will also be included. Monitoring reports may include information regarding additional material planted to achieve the percentage of coverage to re-establish the restoration areas due to mortality. Periodic inspections will be conducted by DES staff to ensure the accuracy of the monitoring reports.

## **10.0 LONG-TERM MANAGEMENT AND MONITORING**

The conservation areas will be placed in a conservation easement granted to Lee County. The conservation easement will prevent the encroachment of future development as well as activities that are incompatible with the goal of sustaining the preserved and restored conservation areas in good ecological health. These areas will be physically managed in accordance with the approved long-term management plan prepared by the Project ecologist and implemented by a Community Development District (CDD) or Homeowners' Association (HOA) with the assistance of an appropriately skilled environmental professional.

Responsibility for management of the conservation areas will shift to the CDD or HOA following the completion of enhancement and restoration activities on-site. Prior to completion of the five-year annual monitoring program, a long-term management and monitoring plan will be drafted for DES review and approval. The plan will then be implemented after completion of the five-year annual monitoring program and achievement of success criteria has been verified by DES. Long-term management activities within the conservation areas will include periodic

surveys of vegetation and wildlife, control of exotic and nuisance plant species, regulating water levels, maintenance of the water control structures and access, and prescribed fires.

Long-term monitoring reports will be provided to DES bi-annually (every other year). The long-term monitoring reports will provide ecological data such as water levels, vegetative cover, degree and location of exotic vegetation cover, and wildlife utilization. This information will guide the active management of the site.

## **11.0 PRESERVE SIGNAGE AND COMMUNITY EDUCATION PLAN**

Signs identifying the preserve as a “nature preserve area” will be installed along the boundary of the conservation areas. The signage will include language stating, “No dumping allowed.” The signs will be spaced a maximum of 200 feet apart. The signs will be no closer than ten feet from residential property lines, and be limited to a maximum height of four feet and a maximum size of two square feet. A typical preserve sign is attached as Appendix D.

The community will be advised of the benefits of the conservation areas to the surrounding landscape and their residential community. One or more kiosks containing information, maps, wildlife sightings, and community notices will be installed at appropriate locations within the development including the activity center and recreation areas.

Periodic seminars will be held to further educate the community about the conservation areas, wetland benefits, coexistence with and protection of wildlife, and the benefits of prescribed fire. Community informational and educational brochures, such as those describing the benefits of preserve areas, may be created and provided as needed to keep residents in compliance with conservation easements, wildlife regulations, etc. Continued education will ensure that the community is well-informed regarding the preserves and wildlife coexistence.

Please refer to the Protected Species Management and Human-Wildlife Coexistence Plan for details on wildlife crossings, fencing, and measures to be implemented to help prevent human-wildlife conflicts.

## **12.0 REFERENCES**

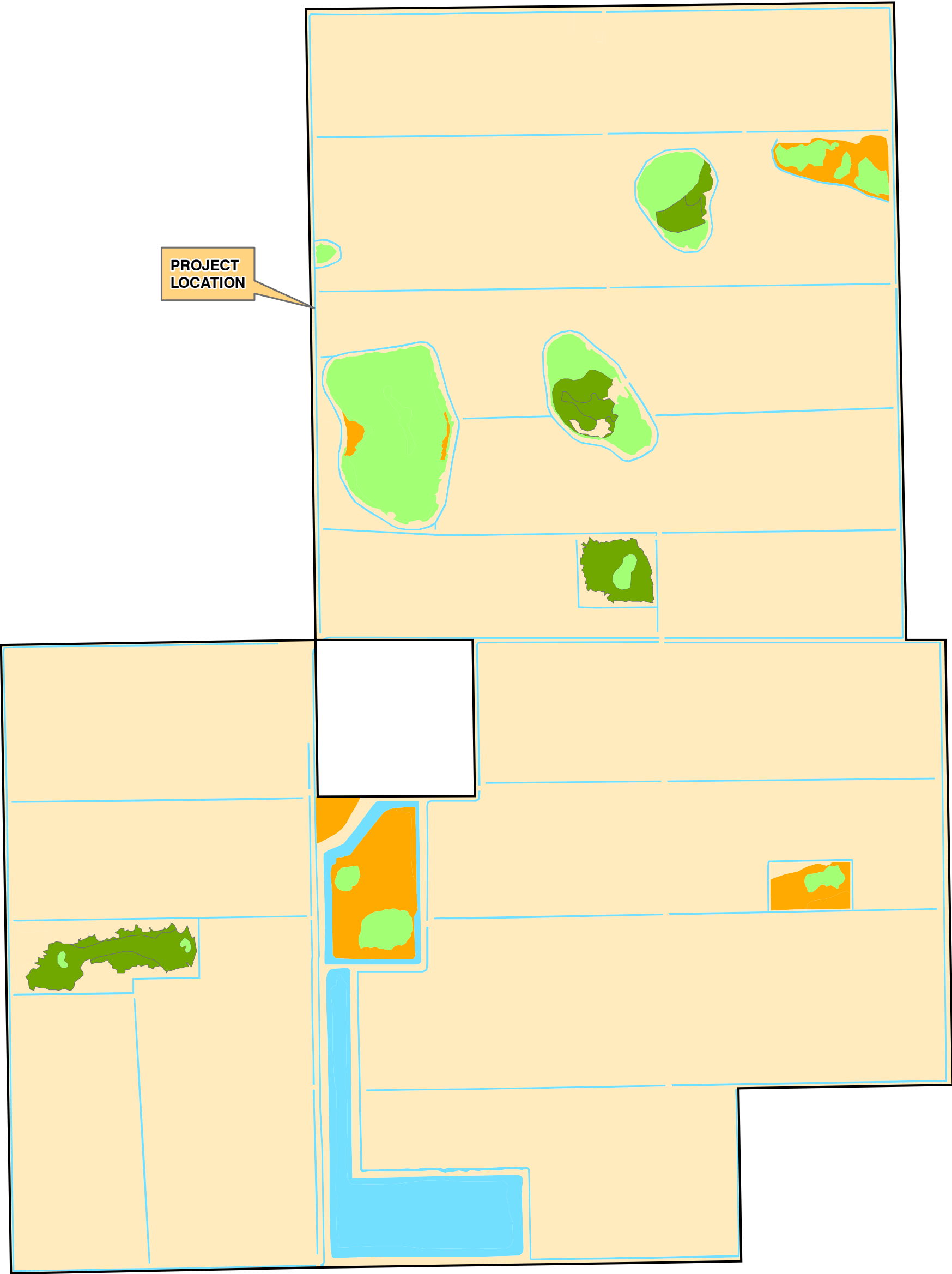
Florida Department of Transportation. 1999. Florida Land Use, Cover and Forms Classification System. Procedure No. 550-010-001-a. Third Edition.

Florida Natural Areas Inventory. 2010. Guide to the Natural Communities of Florida: 2010 Edition. Florida Natural Areas Inventory, Tallahassee, Florida.







**APPENDIX A**

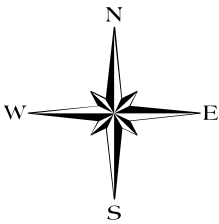
**INDIGENOUS VEGETATION MAP**

J:\2015\15BDG2365\GIS\2016 INDIGENOUS\_PRESERVE\_MANAGEMENT\_PLAN\Figures\APPENDIX\_A\_INDIGENOUS\_VEGETATION\_Map\_021317.mxd - 2/14/2017 @ 10:34:03 AM



**LEGEND**

-  VERDANA
-  INDIGENOUS WETLANDS (47 Ac.±)
-  INDIGENOUS UPLANDS (25 Ac.±)
-  NON-INDIGENOUS WETLANDS (22 Ac.±)
-  NON-INDIGENOUS UPLANDS (1,289 Ac.±)
-  NON-INDIGENOUS "OTHER SURFACE WATERS" (77 Ac.±)



0 500 1,000  
Feet

NOTES:

PROPERTY BOUNDARY PER DELISI FITZGERALD, INC.  
DRAWING No. CSP\_CSG\_03-29-2016.DWG DATED  
MARCH 31, 2016.

FLUCFCS LINES ESTIMATED FROM 1"=200' AERIAL  
PHOTOGRAPHS AND LOCATIONS APPROXIMATED.

FLUCFCS PER FLORIDA LAND USE, COVER AND FORMS  
CLASSIFICATION SYSTEM (FLUCFCS) (FDOT 1999).

DRAWN BY	DATE
D.B.	2/13/17
REVIEWED BY	DATE
T.D.	2/13/17
REVISED	DATE

13620 Metropolis Avenue  
Suite 200  
Fort Myers, Florida 33912  
Phone (239) 274-0067  
Fax (239) 274-0069



PASSARELLA  
& ASSOCIATES INC.

VERDANA  
INDIGENOUS VEGETATION MAP

DRAWING No.
15BDG2365
SHEET No.
APPENDIX A

## **APPENDIX B**

### **AERIAL WITH FLUCFCS AND WETLANDS MAP**





J:\2015\15BDG2365\2016\INDIGENOUS PRESERVE MANAGEMENT PLAN\APPENDIX B AERIAL WITH FLUCFCS AND WETLANDS MAP 8-16-16.DWG TAB: 11X17-C TB FEB 14, 2017 - 11:25AM PLOTTED BY: DONB

FLUCFCS CODES	DESCRIPTIONS	ACREAGE	% OF TOTAL
205	AGRICULTURAL SUPPORT OPERATIONS	0.98 Ac.±	0.1%
221	CITRUS GROVE	1161.44 Ac.±	79.5%
4119 E2	PINE FLATWOODS, DISTURBED (25-49% EXOTICS)	14.94 Ac.±	1.0%
4119 E3	PINE FLATWOODS, DISTURBED (50-75% EXOTICS)	2.50 Ac.±	0.2%
4119 E4	PINE FLATWOODS, DISTURBED (76-100% EXOTICS)	11.15 Ac.±	0.8%
424	MELALEUCA	0.62 Ac.±	0.0%
4241	MELALEUCA, HYDRIC	4.36 Ac.±	0.3%
426	TROPICAL HARDWOODS	0.84 Ac.±	0.0%
4349 E2	HARDWOOD/CONIFER MIXED, DISTURBED (25-49% EXOTICS)	4.43 Ac.±	0.3%
514	DITCH	54.68 Ac.±	3.7%
6219 E1	CYPRESS, DISTURBED (0-24% EXOTICS)	8.29 Ac.±	0.6%
6219 E2	CYPRESS, DISTURBED (25-49% EXOTICS)	23.38 Ac.±	1.6%
6219 E3	CYPRESS, DISTURBED (50-75% EXOTICS)	0.48 Ac.±	0.0%
6219 E4	CYPRESS, DISTURBED (76-100% EXOTICS)	12.14 Ac.±	0.8%
6245 E3	CYPRESS/PINE, DISTURBED AND DRAINED (50-75% EXOTICS)	3.44 Ac.±	0.2%
6249 E1	CYPRESS/PINE/CABBAGE PALM, DISTURBED (0-24% EXOTICS)	1.36 Ac.±	0.1%
6249 E2	CYPRESS/PINE/CABBAGE PALM, DISTURBED (25-49% EXOTICS)	5.62 Ac.±	0.4%
6249 E3	CYPRESS/PINE/CABBAGE PALM, DISTURBED (50-75% EXOTICS)	6.54 Ac.±	0.4%
6249 E4	CYPRESS/PINE/CABBAGE PALM, DISTURBED (76-100% EXOTICS)	2.09 Ac.±	0.1%
6419 E1	FRESHWATER MARSH, DISTURBED (0-24% EXOTICS)	0.34 Ac.±	0.0%
6419 E2	FRESHWATER MARSH, DISTURBED (25-49% EXOTICS)	1.79 Ac.±	0.1%
740	DISTURBED LAND	85.58 Ac.±	5.9%
7401*	DISTURBED LAND, OTHER SURFACE WATERS	22.52 Ac.±	1.5%
7401	DISTURBED LAND, HYDRIC	3.00 Ac.±	0.2%
747	BERM	23.90 Ac.±	1.6%
814	ROAD	4.57 Ac.±	0.3%
TOTAL		1460.78 Ac.±	100.0%

- LEGEND:
- SFWMW WETLANDS (69.39 Ac.±)
  - SFWMW "OTHER SURFACE WATERS" (77.20 Ac.±)
  - SURVEYED WETLAND LINE

NOTES:

AERIAL PHOTOGRAPHS WERE ACQUIRED THROUGH THE LEE COUNTY PROPERTY APPRAISER'S OFFICE WITH A FLIGHT DATE OF JANUARY 2016.

PROPERTY BOUNDARY AND SURVEYED WETLAND LINES PER DELISI FITZGERALD, INC. DRAWING NO. CORKSCREW GROVES.DWG DATED JANUARY 7, 2016.

FLUCFCS LINES ESTIMATED FROM 1"=200' AERIAL PHOTOGRAPHS AND LOCATIONS APPROXIMATED.

FLUCFCS PER FLORIDA LAND USE, COVER AND FORMS CLASSIFICATION SYSTEM (FLUCFCS) (FDOT 1999).

SURVEYED WETLAND LINES WERE APPROVED BY THE SFWMW ON MAY 18, 2016.

DRAWN BY	DATE
D.B./T.S.	2/17/16
REVIEWED BY	DATE
C.G.	2/17/16
REVISED	DATE
D.B.	8/16/16

13620 Metropolis Avenue  
Suite 200  
Fort Myers, Florida 33912  
Phone (239) 274-0067  
Fax (239) 274-0069



VERDANA  
AERIAL WITH FLUCFCS AND WETLANDS MAP

DRAWING No.	15BDG2365
SHEET No.	APPENDIX B



## **APPENDIX C**

### **INDIGENOUS VEGETATION PRESERVATION AND RESTORATION PLAN**



SCALE: 1" = 400'

P/L

-CORKSCREW RD-

-CARTER RD-

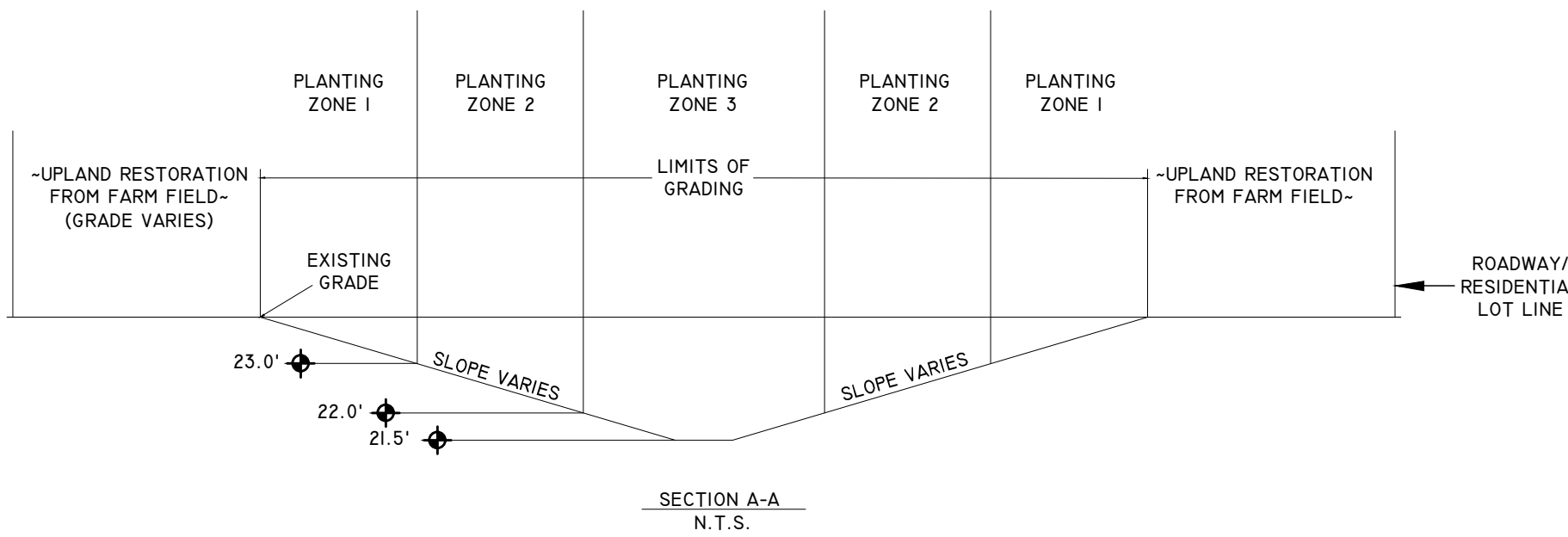
P/L

-ESTERO PINES RD-

LEGEND:

- INDIGENOUS WETLAND PRESERVATION AND ENHANCEMENT (47 Ac.±)
- INDIGENOUS UPLAND PRESERVATION AND ENHANCEMENT (21 Ac.±)
- INDIGENOUS WETLAND RESTORATION (22 Ac.±)
- INDIGENOUS UPLAND RESTORATION (12 Ac.±)
- INDIGENOUS WETLAND FLOW-WAY RESTORATION FROM FARM FIELDS (372 Ac.±)
- INDIGENOUS UPLAND RESTORATION FROM FARM FIELDS (331 Ac.±)

- SURVEYED WETLAND LINE
- PROPOSED WILDLIFE CROSSING



WETLAND FLOW-WAY RESTORATION TYPICAL CROSS-SECTION

NOTES:

SITE PLAN PER DELISI FITZGERALD, INC. DRAWING No. 21375-VERDANA-SITE-PLAN-2017-01-04.DWG DATED JANUARY 17, 2017.

PROPERTY BOUNDARY AND SURVEYED WETLAND LINES PER DELISI FITZGERALD, INC. DRAWING No. CORKSCREW GROVES.DWG DATED JANUARY 7, 2016.

FLUCFCS LINES ESTIMATED FROM 1"=200' AERIAL PHOTOGRAPHS AND LOCATIONS APPROXIMATED.

FLUCFCS PER FLORIDA LAND USE, COVER AND FORMS CLASSIFICATION SYSTEM (FLUCFCS) (FDOT 1999).

SURVEYED WETLAND LINES WERE APPROVED BY THE SFWMD ON MAY 18, 2016.

DRAWN BY	DATE
D.B.	2/13/17
DESIGNED BY	DATE
A.W.	2/13/17
REVISED	DATE

13620 Metropolis Avenue  
Suite 200  
Fort Myers, Florida 33912  
Phone (239) 274-0067  
Fax (239) 274-0069



VERDANA  
PRELIMINARY INDIGENOUS VEGETATION  
PRESERVATION AND RESTORATION PLAN


DRAWING No.
15BDG2365
SHEET No.
APPENDIX C


## **APPENDIX D**


### **PRESERVATION AND RESTORATION PHASE MAP**





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
- 


INDIGENOUS WETLAND PRESERVATION AND ENHANCEMENT (47 Ac.±)
- 


INDIGENOUS UPLAND PRESERVATION AND ENHANCEMENT (21 Ac.±)
- 


INDIGENOUS WETLAND RESTORATION (22 Ac.±)
- 

INDIGENOUS UPLAND RESTORATION (12 Ac.±)
- 

INDIGENOUS WETLAND FLOW-WAY RESTORATION FROM FARM FIELDS (372 Ac.±)
- 

INDIGENOUS UPLAND RESTORATION FROM FARM FIELDS (331 Ac.±)
- 

APPROXIMATE LOCATION OF PHASE 1 LIMITS FOR RESTORATION (230 Ac.±)
- 

APPROXIMATE LOCATION OF PHASE 2 LIMITS FOR RESTORATION (169 Ac.±)
- 

APPROXIMATE LOCATION OF PHASE 3 LIMITS FOR RESTORATION (406 Ac.±)

NOTES:

SITE PLAN PER DELISI FITZGERALD, INC. DRAWING No. 21375-VERDANA-SITE-PLAN-2017-01-04.DWG DATED JANUARY 17, 2017.

PROPERTY BOUNDARY AND SURVEYED WETLAND LINES PER DELISI FITZGERALD, INC. DRAWING No. CORKSCREW GROVES.DWG DATED JANUARY 7, 2016.

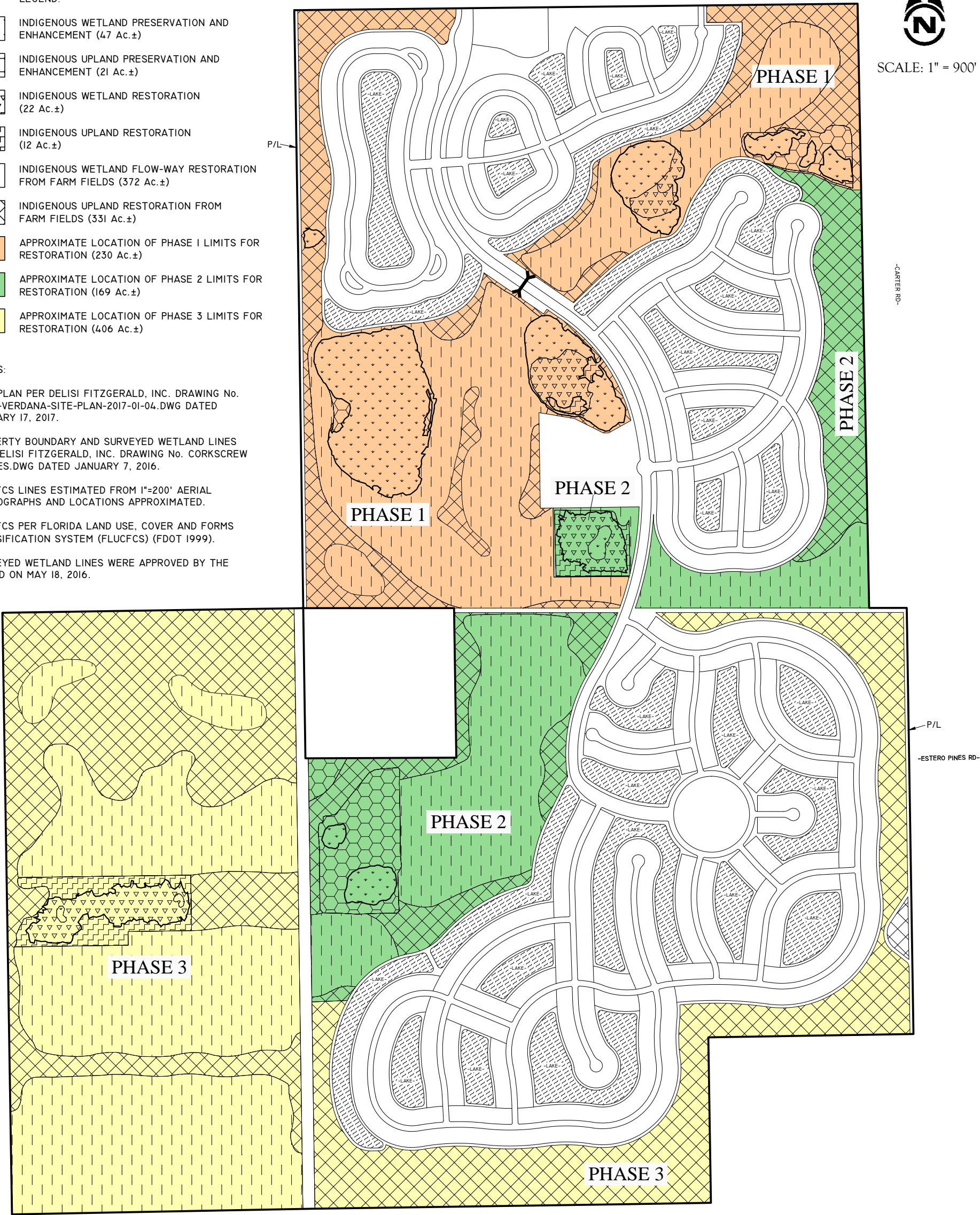
FLUCFCS LINES ESTIMATED FROM 1"=200' AERIAL PHOTOGRAPHS AND LOCATIONS APPROXIMATED.

FLUCFCS PER FLORIDA LAND USE, COVER AND FORMS CLASSIFICATION SYSTEM (FLUCFCS) (FDOT 1999).

SURVEYED WETLAND LINES WERE APPROVED BY THE SFWMD ON MAY 18, 2016.



SCALE: 1" = 900'



ACTIVITY

	PHASE 1	PHASE 2	PHASE 3	TOTAL
INDIGENOUS WETLAND PRESERVATION AND ENHANCEMENT	42 Ac.±	5 Ac.±	<1 Ac.±	47 Ac.±
INDIGENOUS UPLAND PRESERVATION AND ENHANCEMENT	4 Ac.±	16 Ac.±	1 Ac.±	21 Ac.±
INDIGENOUS WETLAND RESTORATION	8 Ac.±	5 Ac.±	9 Ac.±	22 Ac.±
INDIGENOUS UPLAND RESTORATION	1 Ac.±	2 Ac.±	9 Ac.±	12 Ac.±
INDIGENOUS WETLAND FLOW-WAY RESTORATION FROM FARM FIELDS	109 Ac.±	85 Ac.±	178 Ac.±	372 Ac.±
INDIGENOUS UPLAND RESTORATION FROM FARM FIELDS	66 Ac.±	56 Ac.±	209 Ac.±	331 Ac.±
TOTAL	230 Ac.±	169 Ac.±	406 Ac.±	805 Ac.±

DRAWN BY	DATE
D.B.	2/13/17
REVIEWED BY	DATE
T.D.	2/13/17
REVISED	DATE
D.B., W.C.	7/25/17

13620 Metropolis Avenue  
Suite 200  
Fort Myers, Florida 33912  
Phone (239) 274-0067  
Fax (239) 274-0069



PASSARELLA  
& ASSOCIATES INC.

VERDANA  
PRESERVATION AND RESTORATION  
PHASE MAP

DRAWING No.
15BDG2365
SHEET No.
APPENDIX D

**APPENDIX E**

**TYPICAL PRESERVE SIGNAGE**





# VERDANA

## Nurtrient Loading Analysis Results by Phase

Phase	Pre-development		Post-development		Difference			
	Nitrogen (kg TN/yr.)	Phosphorous (kg TN/yr.)	Nitrogen (kg TN/yr.)	Phosphorous (kg TN/yr.)	Nitrogen (kg TN/yr.)	%	Phosphorous (kg TN/yr.)	%
1	671.2	463.6	228.5	28.6	-442.7	-66%	-435.0	-94%
2	494.1	320.4	392.9	26.9	-101.2	-20%	-293.5	-92%
3	962.6	545.1	797.0	54.3	-165.6	-17%	-490.8	-90%
Total	2127.9	1329.1	1418.4	109.8	-709.5	-33%	-1219.3	-92%



	Citrus	Row Crop	Pasture
Clearing and Grading	\$2,900		
Mowing/Discing		\$60	\$60
Decommision, removal, disposal of irrigation system	\$350		
Tree disposal/burning	\$275		
Back-fill Ditches	\$1,750	\$200	\$100
First Herbicide Treatment	\$500	\$500	\$500
Second Herbicide Treatment			\$200
Design Stakeout	\$35	\$35	\$35
Excavation, On-site Haul, Final Grading	\$8,565	\$6,534	\$6,534
As-Built Surveys	\$35	\$35	\$35
Planting	\$6,000	\$6,000	\$6,000
<b>Installation Total</b>	<b>\$20,410</b>	<b>\$13,364</b>	<b>\$13,464</b>
Herbicide Maintenance Years 1-2	\$250	\$250	\$250
Herbicide Maintenance Years 3-5	\$125	\$125	\$125
Monitoring (6 Events)			
Fencing per 100 foot	\$300		

Fencing 5 foot Hog Wire wooden post, \$3 per linear foot (Summerall est. \$2-3) 3

Excavation average 1.5 feet = 65,340 cubic feet per acre = 2,420 cubic yards per acre, \$2.70 per cubic yard (0.5 - 1 mile haul) from EHC 2009 costs 2.7

Metron 2009 as-built estimate \$34 per acre for 350 acre site

Mowing/Discing/Ditch backfill for row crop and pasture estimate \$120 per hour at 2 acres per hour = \$60 per acre

## VERDANA

### Typical Restoration Costs for Citrus Lands Relative to Row Crop and Pasture Lands

Cost components of restoration typically include the following elements:

Activity	Citrus	Row Crop	Pasture
Clearing and grubbing	X		
Mowing/discing			X
Decommission, removal, and disposal of irrigation system	x	x	
Tree disposal/burning	X		
Backfill canals/ditches	X	x	
Herbicide treatment of nonnative species	x	x	x
Design stakeout	x	x	x
Excavation, On-site haul, final grading	X	X	X
As-built surveys	x	x	x
Planting	X	X	X

**Note:** X denotes major cost component; x denotes minor cost component

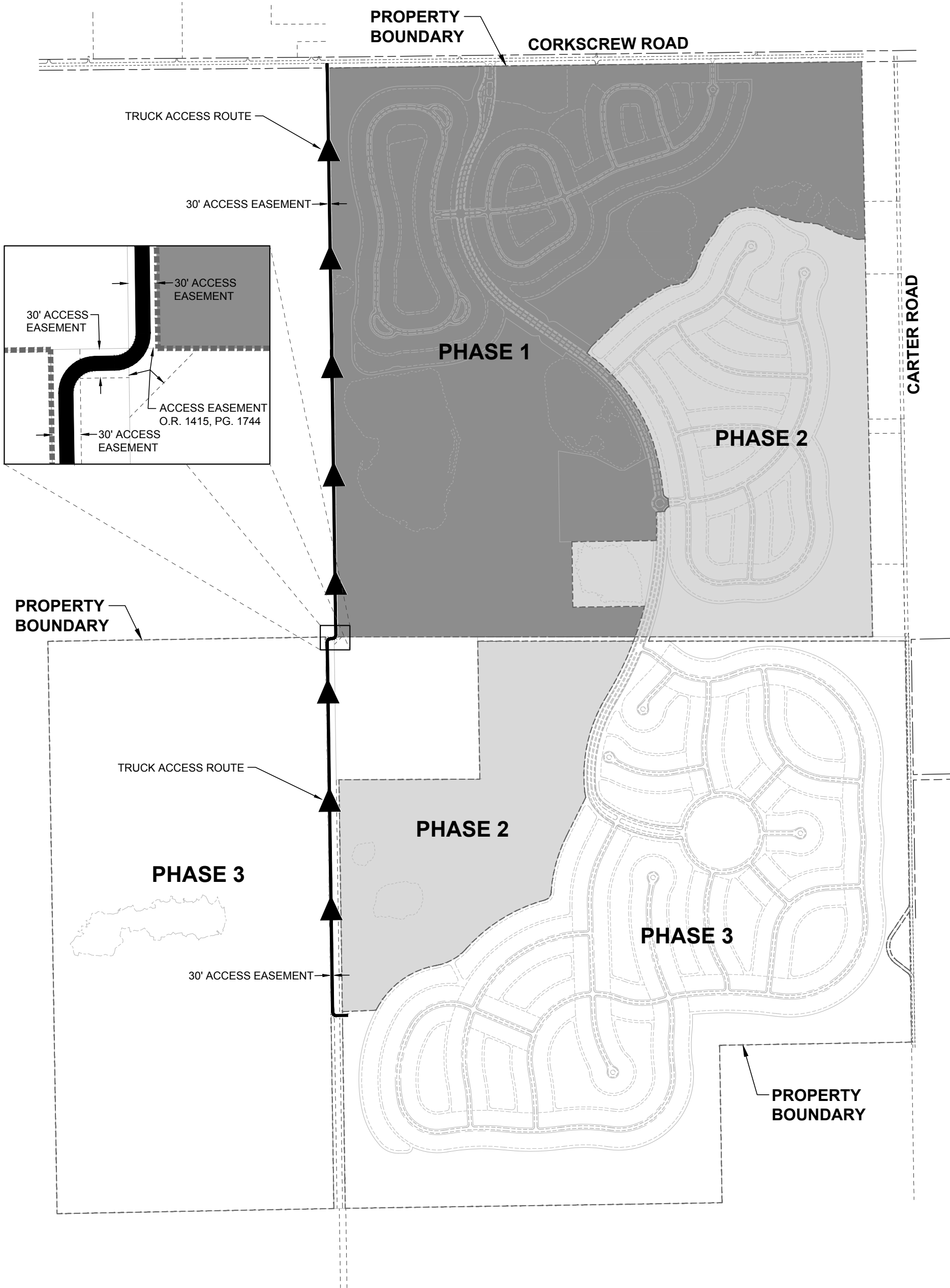
Costs associated with the above activities are generally calculated as:

Citrus- **\$20,410/acre +/-**


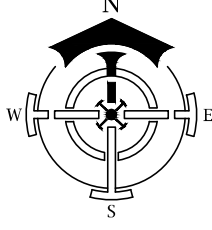
Row Crop- **\$13,360/acre +/-**

Pasture- **\$13,460/acre +/-**

The primary differences in costs are driven by the fact citrus operations require well drained lands and extensive drainage systems to assure citrus tree roots are not exposed to standing water. Backfilling of the large canals and ditches associated with citrus operations requires more extensive earthwork which drives costs up. Other cost factor differences include the elimination of extensive irrigation/fertilizing systems on citrus lands and the disposal and/or burning of mature citrus trees.



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8/4/2017 9:50 AM

VERDANA	
AGRICULTURE ACCESS EXHIBIT	
 <b>DeLISI FITZGERALD, INC.</b> <i>Planning – Engineering – Project Management</i>	
1605 Hendry Street Fort Myers, FL 33901 (239) 418-0691 (239) 418-0692 fax	Florida Certificate of Authorization Engineering LB #26978

**Policy 33.3.4 (1)a.**

Lands located west of Lee County 20/20 Imperial Marsh Preserve (Corkscrew Tract), and within one mile north or south of Corkscrew Road. Properties with frontage on Corkscrew Road designated as Tier 1 Priority Restoration Area may extend the overlay an additional mile south to include contiguous Tier 1 properties, where the extension will result in regional environmental benefits by the connection of protected habitat located north of Corkscrew Road to land in Collier County used for conservation purposes.

**Policy 33.3.4 (2) i.**

Elimination of any agricultural row crop uses at the time of first development order. Active citrus groves may phase out agriculture consistent with a phased restoration plan, but must cease all agricultural operations no later than seven years from the time of first development order.