Progress Energy

# New Nuclear Baseload Generation Addition

# Evaluation of Florida Sites

October 2007


Progress Energy Florida, Inc.
410 South Wilmington Street
Raleigh, North Carolina 27601



*REDACTED VERSION APRIL 2009. WITHHELD PROPRIETARY INFORMATION INDICATED BY BRACKETS { }.*

# Table of Contents

**Table of Contents** ..... **2**
**Executive Summary & Recommendation** ..... **3**
**Key Assumptions and Evaluation Criteria** ..... **7**
**Evaluation Methodology** ..... **9**
**Review Team** ..... 9
**Detailed Evaluation Process** ..... 9
**Summary Evaluation Results** ..... **12**
**Technical Evaluation** ..... 12
**Strategic Considerations** ..... 12
**Transmission Study** ..... 13
**Composite Rating Comparison:** ..... 14
**Attachment I - Technical Evaluation** ..... **15**
**Attachment II – Strategic Considerations** ..... **32**
**Attachment III – Transmission Study** ..... **45**
**Attachment IV – McCallum-Turner Siting Study** ..... **46**
**Attachment V – Navigant Transmission Impact Study** ..... **228**

**Appendix A – Aerial Photographs of 20 Potential Sites (Proprietary and Confidential)**

**Appendix B – Land Maps of the 5 Alternative Sites (Proprietary and Confidential)**

# Executive Summary & Recommendation

**Based on detailed review/analysis of data collected and evaluated in accordance with EPRI Siting Guide, the review team recommends that the Levy 2 site in Levy County be selected as the location for a Combined Operation License (COL) application for the advanced reactor technology planned for deployment in Florida in 2015.**

The graphical depiction provided later in this section shows how the Florida alternative sites ranked against the evaluation criteria, and the attachments in the following sections of this document provide detailed scoring and analysis that yielded the graphical summary results.

This recommendation is based on the bounding key assumptions described in the next section of this document, and takes into account the relative scoring results across criteria and considerations relevant to a new nuclear plant siting. Industry experts with knowledge of site suitability issues, experience with the NRC licensing processes, experience with NuStart's site selection process, and involvement with the development of the EPRI siting guidance, were contracted to complete the detailed analysis for site selection of a "region of interest" (the Florida service territory) provided by Progress Energy. This report provides the method of evaluation employed, key assumptions applied, and results achieved.

The EPRI Siting Guide as adopted for the Progress Energy siting study provides four steps in the site selection process whereby the "**regions of interest**" are initially subjected to exclusionary considerations. The resulting "**potential sites**" are further analyzed against avoidance considerations reducing to a small number of "**candidate sites**". A suitability evaluation of specific criteria then determines the highest ranked "**alternative sites**" best suited for a nuclear plant. These sites are finally subjected to business strategy considerations to determine the "**preferred site**".

Potential site locations under consideration included green field sites and an existing nuclear plant site. They were subjected to exclusionary and avoidance criteria such as identification of inadequate water supply, adverse environmental impacts, insufficient land area, or unavailable transmission lines. The potential site locations were thereby reduced to five "alternative sites" subjected to a detailed suitability evaluation. These locations included one site with an existing operating nuclear plant (Crystal River Nuclear Plant).

The **Levy 2 site is identified as the "preferred site"** with the highest composite scoring from the following evaluation areas: Technical Evaluation, Progress Energy Strategic Considerations, and Transmission System Compatibility.

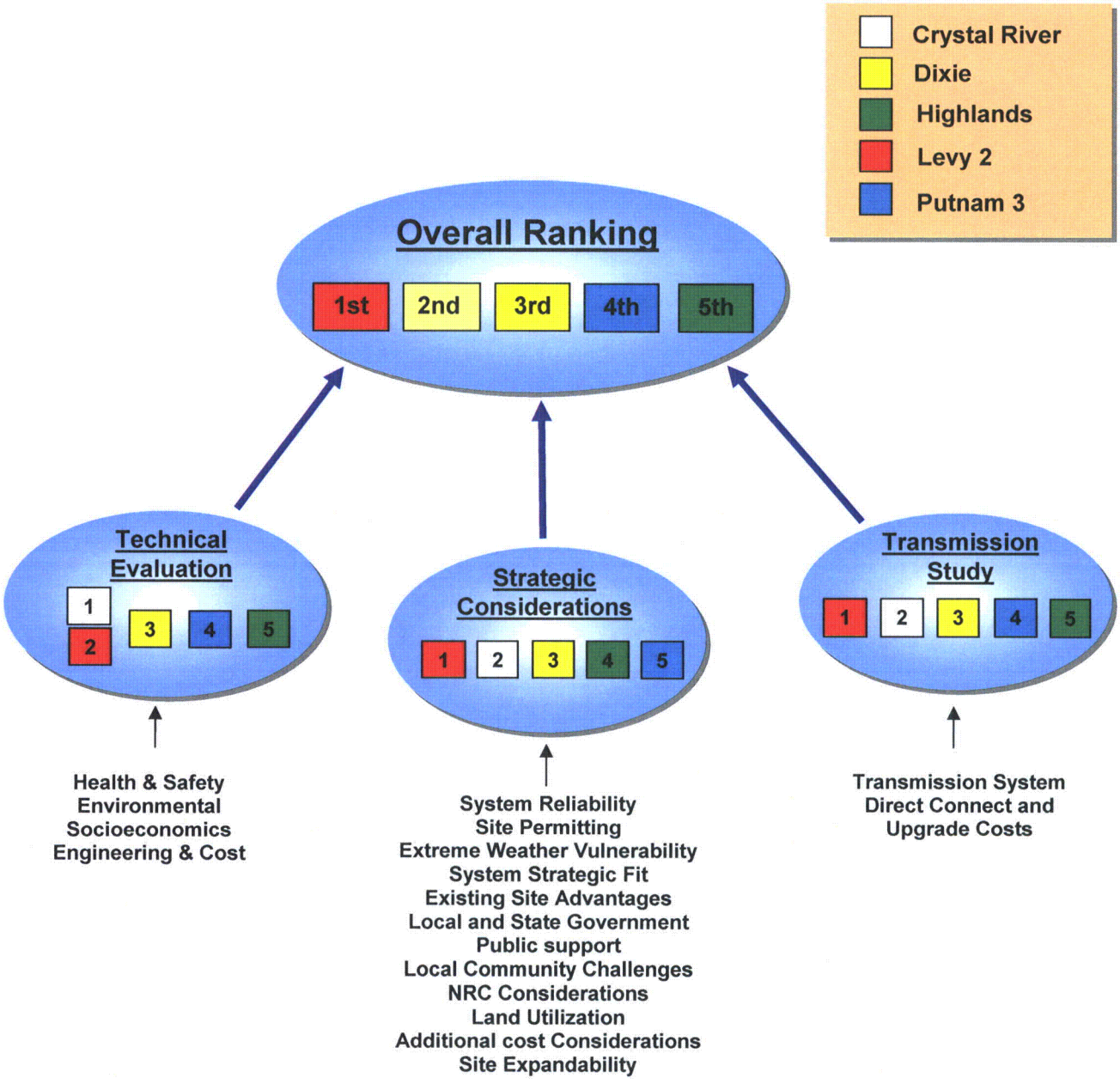
**The Crystal River site and Levy 2 site scored the highest and were considered statistically comparable in regard to technical evaluation criteria which address licensing and design requirements to construct and operate a new nuclear plant.** Crystal River scored only slightly higher than Levy 2 due to location adjacent to an existing nuclear plant with the associated advantages of existing site characterization suitable for a nuclear plant and the infrastructure offered by the operating nuclear plant. Dixie was found to be less favorable than Levy 2 because of numerous sinkholes and depressions observed during field reconnaissance and many voids and cavities encountered during rock coring. Highlands and Putnam demonstrated the least desirable conditions associated with deep soft sand, and Highlands was further less suitable due to local intensive dairy farming. Putnam has potential for tidal run-up from the Atlantic Ocean on the St Johns River, and Dixie is susceptible to hurricane surge flooding. Levy 2 being located farther from the coast than Crystal River and of greater elevation provides additional protection from hurricane surge and probable maximum flooding. A major disadvantage for Crystal River is the resulting concentration of generation capacity subject to a single weather event with associated tornados and storm surge flooding. Additionally, the Crystal River Energy Complex is currently challenged due to thermal discharge limitations into the Gulf of Mexico requiring the use of helper cooling towers. Therefore, Levy 2 demonstrated significant reliability advantages over Crystal River, with respect to storm surge flooding, the potential for single weather event outages, and thermal discharge impact.

**In regards to Progress Energy strategic considerations, the Levy 2 site ranked the highest.** Although the NRC indicates preference to existing nuclear plant sites based on licensing reviews and detailed site characterization already completed to support the existing nuclear plant, Levy 2 scored better than Crystal River based on the location being a reasonable distance off the coast line and a higher elevation allowing additional protection from wind and flood damage. Adding new nuclear generating capacity to the Crystal River Energy Complex results in a significant concentration of Progress Energy Florida generating assets in one geographical location. This increases the likelihood of a significant generation loss from a single event and a resulting large scale impact on the Progress Energy system. Dixie, { } is within the department of Community Affairs Division of Emergency Management GIS Section surge zone for a Category 5 hurricane. The remote locations at Highlands and Putnam offered no opportunity for shared Progress Energy facilities or resources.

**Transmission deliverability analysis has further concluded the Levy 2 site ranked the highest (along with Crystal River) with the transmission system requirements.** Levy 2 and Crystal River scored the best due to lower estimated direct connect and upgrade costs. Levy 2 offers a significant advantage by not co-locating transmission lines in the same corridor with the Crystal River Energy Complex and thereby avoiding loss from a single event and a resulting large scale impact on the Progress Energy system. Dixie was slightly higher in estimated cost than Levy 2. Highlands and Putnam resulted in significantly higher costs.

Considering the collective results of all these reviews and analysis, the **Levy 2 Site is recommended as the preferred location** for new reactor technology deployment in Florida. The next page graphically depicts the overall ranking of the five alternative sites and recommendation.

# Summary Results



# Key Assumptions and Evaluation Criteria

This document includes the results of the evaluation for locating an optimal site for building and operating an advanced reactor type for new nuclear baseload generation. During the evaluation process certain key assumptions and/or criteria were used as "bounding conditions" to aid in the evaluation process. By invoking these key assumptions and/or criteria, the relative scores for a particular attribute of the various siting locations, such as cooling water supply, were determined.

**The following key assumptions and/or criteria were established for this evaluation:**

- **The new nuclear baseload generation must reach commercial in-service status by mid 2015.**
- **The new nuclear plant siting location must be suitable to envelope the range of specific design parameters contemplated for deployment of a standard plant design as certified by the NRC.**
- **The location must be compatible with Progress Energy's System Operation and Transmission Delivery capabilities.**
- **The recommended site's expected licensing path and regulatory outlook must reduce Progress Energy's schedule and financial risk for establishing new nuclear baseload generation.**
- **The cost of the new nuclear generation as impacted by the location must be reasonable and fair, and methods to ensure greater certainty of the cost/schedule during the licensing, design engineering, and construction phases of the project must be included.**
- **Evaluation criteria and methodology established as part of the EPRI Early Site Permit Demonstration Program will be employed in the nuclear plant site selection process. Specifically, the EPRI Siting Guide: Site Selection and Evaluation Criteria for an Early Site Permit Application dated March 2002 will be utilized.**
- **The evaluation and selection process will include "greenfield" (e.g., locations with no current generation facilities), existing nuclear generation plant locations, and other sites previously characterized by Progress Energy.**
- **Compliance with current NRC regulations and NRC guidance (as of November 2005), including 10 CFR Part 50 – "Domestic Licensing of Production and Utilization Facilities", 10 CFR Part 52- "Early Site Permits, Standard Design**

**Certifications, and Combined Licenses for Nuclear Power Plants", SECY-05-0139, "Semi-annual Update of the Status of New Reactors Licensing Activities and Future Planning for New Reactors", dated August 4, 2005.**

- **Compliance with NEPA – National Environmental Policy Act of 1969 requirements.**

# Evaluation Methodology

## Review Team

The siting technical evaluation, Progress Energy strategic considerations, transmission study, and population analysis were reviewed by a comprehensive team representing several disciplines as follows:

**Executive Team Lead** - Joe Donahue, VP- Nuclear Engineering & Services Department (NESD)

**Management Lead** - Garry Miller, Manager – License Renewal

**Reviewers/ Disciplines** - Cristina Ionescu (licensing)
James Nevill (engineering and construction)
Paul Snead (environmental)
McCallum-Turner Inc. (siting consultants)
Navigant Consulting (transmission consultants)

**Progress Florida Team** – Vinny Dolan (Executive Lead)
Gail Simpson (community relations)
Tom Trochek (real estate)
Brantley Tillis (transmission
Buddy Ellis (communications)
Mike Joyner (public affairs)
Gene Upchurch (public affairs & economic development)
Paul Lewis (regulatory affairs)
Alex Glenn (legal)
Rodney Carson (public affairs & economic development)
Jamie Hunter (environmental)

## Detailed Evaluation Process

In accordance with the EPRI Siting Guide, the site selection process involved sequential application of exclusionary, avoidance, and suitability criteria evaluation (includes site reconnaissance, topographic data collection), and technical screening by application of scoring and associated weighting factors applied to the suitability criteria. The exclusionary, avoidance, and suitability criteria address a full range of considerations important in nuclear power facility siting, including health and safety, environmental, socioeconomic and land use, and engineering and cost aspects.

The evaluation and selection process involves a series of activities starting with identification of a "**region of interest**" or a geographic area within which a site must be located. For Florida, the region of interest became the Progress Energy service territory. This geographic area was derived from Progress Energy fundamental business decisions on the economic viability of a nuclear facility, the market for the facility's output, and the general geographic area where the facility should be deployed to serve the market.

The region of interest is screened using exclusionary criteria to identify the "**potential sites**" by eliminating areas in which it is not feasible to site a nuclear facility due to regulatory, institutional, facility design impediments, or environmental constraints. Further screening is performed using avoidance criteria to eliminate feasible but less favorable areas, thus reducing the areas remaining under consideration to an adequate and reasonable number of "**candidate sites**" for continued screening.

The candidate site list is further screened using refined exclusionary and avoidance criteria to identify optimum areas for a facility. Protected lands, population features, ecologically protected resources (e.g., wetlands), and resources set aside for cultural or historical reasons, result in reducing the potential site list to a fewer number of "**alternative sites**". The alternative sites for Florida are Crystal River, Dixie, Highlands, Levy 2, and Putnam 3.

From the application of these exclusionary and avoidance features, alternative sites are identified as discrete parcels of land approximately the size of an actual nuclear site, thus eliminating large tracts of land that do not exhibit conditions suitable to a nuclear facility site. The process then becomes one of comparing the small number of alternative sites, and identifying a site that possesses the most favorable set of conditions for siting a nuclear power facility. The evaluation technique to this point ensures the remaining alternative sites have no fatal flaws which could result in extended licensing delays and increased costs.

Thus, the remaining alternative sites are evaluated against suitability criteria, resulting in a transition from the elimination approach to an evaluation approach of the suitable sites. The objective of evaluation against suitability criteria is to rank the small number of alternative sites for determination of the **preferred site**.

The suitability criteria are grouped into four categories listed below with features in each category relevant to the specific aspects of facility development that are weighted and scored to provide a relative comparison of the candidate sites. The multiple features of the suitability criteria are combined into one composite value for each of the alternative sites.

- Health and Safety
- Environmental
- Land Use and Socioeconomics
- Engineering and Cost-related

At the conclusion of the above **Technical Evaluation** process, the technically acceptable and ranked sites then undergo a final evaluation and verification to ensure compliance and

compatibility with Progress Energy transmission and generation business strategy. This analysis allows the decision of site selection to consider tradeoffs in business requirements and identification of basis for differentiation among sites, thereby ensuring the optimal site is chosen.

The two components of this final step include a list of strategic considerations and transmission deliverability. **Strategic Considerations** address existing nuclear site advantages, proximity to load, NRC considerations, local and state government support, business planning, and public support. The **Transmission Study** provides input for each site regarding direct connection costs and system upgrade costs.

# Summary Evaluation Results

Results of the Technical Evaluation, Strategic Considerations, and Transmission Study for the alternative sites in Florida are summarized below.

**Technical Evaluation**

The **Technical Evaluation** concluded that each of the five sites are technically suitable for a new nuclear power plant. Crystal River and Levy 2 were the highest ranked sites due primarily to geological conditions and water source. Crystal River and Levy 2 sites provide higher elevation of competent rock from the limestone formation approximately 30 to 75 feet below grade at these two sites. {

} Crystal River and Levy 2 will utilize the Gulf of Mexico for cooling water makeup whereas the other sites would rely on river water. Each of the river water sources of the Suwannee, St Johns, and the Kissimmee Rivers had water management and environmental issues with potentially undesirable consequences associated with minimum flows, endangered species, and competing water usage demands. Due to limitation of thermal discharge into the Gulf of Mexico at the existing Crystal River Energy Complex. Levy 2 provided an advantage in avoidance of further impact to current discharge that required the use of helper cooling towers. Levy 2 at an elevation of 44 feet above sea level provided an advantage over Crystal River at 9 feet elevation due to higher ground elevation resulting in improved hurricane surge and flooding protection.

Refer to **Attachment I** for the Technical Evaluation screening and ranking results, and **Attachment IV** for the McCallum-Turner consultants siting study report.

**Strategic Considerations**

The evaluation of **Strategic Considerations** determined that the Levy 2 site demonstrates an advantage due to a location that yields a reduced vulnerability to the likelihood of a significant generation loss from a single event in a geographical location. Like Crystal River, Levy 2 make-up water is from the Gulf of Mexico and therefore provides a reliable source for long term consumption. Levy 2 is within the PEF Transmission footprint, with no significant impact to other grids, and no significant exposure to other critical assets.

Refer to **Attachment II** for Strategic Considerations evaluation criteria ranking.

**Transmission Study**

The preliminary **Transmission Study** results concluded that the Levy 2 site would experience slightly higher transmission upgrade related costs than Crystal River which has the lowest cost. Levy 2, Crystal River, and Dixie were closely comparable in transmission cost with highlands and Putnam demonstrating significantly higher cost.

Refer to **Attachment III** for the Transmission Evaluation criteria ranking, and **Attachment V** for the Navigant Consultants Transmission System Impact Study report.

Based on these results, the **Levy 2 site would be the "preferred site"** for preparation of the Progress Energy Combined Operating License Application in Florida.

Results of the Technical Evaluation, Strategic Considerations, and Transmission Study composite ratings against the evaluation criteria summarized above are displayed in the following comparison tables.

# Composite Rating Comparison:

| Siting Evaluation Criteria: | | Alternative Site Compliance | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Crystal River | | Dixie | | Highlands | | Levy 2 | | Putnam 3 | |
| | Weight | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score |
| **Site Comparison of Technical Evaluation** | | | | | | | | | | | |
| Composite Score for Technical Evaluation of Suitability Criteria | 40 | 100% | 40 | 95.9% | 38.4 | 91.0% | 36.4 | 98.0% | 39.2 | 96.1% | 38.4 |
| **Normalized Scores** | | | 40 | | 38.4 | | 36.4 | | 39.2 | | 38.4 |

| Siting Evaluation Criteria: | | Alternative Site Compliance | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Crystal River | | Dixie | | Highlands | | Levy 2 | | Putnam 3 | |
| | Weight | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score |
| **Site Comparison with Progress Energy Strategic Considerations** | | | | | | | | | | | |
| Composite Score for Evaluation of Business Strategy | 20 | 89.1% | 17.8 | 80.5% | 16.1 | 79.8% | 16 | 100% | 20 | 77.5% | 15.5 |
| **Normalized Scores** | | | 17.8 | | 16.1 | | 16 | | 20 | | 15.5 |

| Siting Evaluation Criteria: | | Alternative Site Compliance | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Crystal River | | Dixie | | Highlands | | Levy 2 | | Putnam 3 | |
| | Weight | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score |
| **Site Comparison of Transmission System Impacts** | | | | | | | | | | | |
| Composite Score for Evaluation of Transmission System Impact | 40 | 100% | 40 | 95% | 38 | 30% | 12 | 100% | 40 | 40% | 16 |
| **Normalized Scores** | | | 40 | | 38 | | 12 | | 40 | | 16 |

| **Total Composite Scores** | **97.8** | **92.5** | **64.4** | **99.2** | **69.9** |
|---|---|---|---|---|---|

# Attachment I - Technical Evaluation

The EPRI Siting Guide as adopted for the Progress Energy siting study provides guidance in the site selection process whereby the "**regions of interest**" are initially subjected to exclusionary considerations. The resulting "**potential sites**" are further analyzed against avoidance considerations reducing to a small number of "**candidate sites**". A suitability evaluation of specific criteria then determines the highest ranked "**alternative sites**" best suited for a nuclear plant. These sites are finally subjected to business strategy considerations to determine the "**preferred site**". Selection parameters in the evaluation and selection process are summarized below.

Exclusionary considerations for the preliminary screening of potential sites in the Region of Interest to down-select candidate sites:

- Lack of water
- Population Restrictions
- Federal or State Parks
- Geologic Features

Avoidance considerations for the screening of candidate sites to identify alternative sites:

- Water Use Moratoriums
- Cultural or Historical Limitations
- State or Local Governmental Restrictions
- Presence of Wetlands

Application of Suitability Criteria to score and rank alternative sites:

- Health and Safety Criteria
- Environmental Criteria
- Socioeconomic Criteria
- Engineering and Cost Related Criteria

Verification and confirmation whereby site differentiation draws conclusion to the preferred site for Progress Energy:

- Business Strategic Considerations
- Transmission Modeling and Analysis

Progress Energy identified the "region of interest" to include counties in the state of Florida that are adjacent to or within Progress Energy service territory. Locations subjected to review and evaluation included nineteen greenfield sites and one location with an operating nuclear plant as illustrated in Attachment I Figure 1. Google Earth® was used to scan the "region of interest" to locate sites that would be potentially suitable for a nuclear plant. Due to an acceptable number of potential sites identified, there was no need to search beyond the "region of interest" described above. The 20 sites were selected based on distance from transmission load centers, distance from populated areas, distance from

industrial areas, existing cooling water source, topography, endangered species habitat, and transportation access. Each of the 20 potential sites covered an area approximately three miles in diameter (6000 acres) to ensure sufficient size to develop a nuclear plant along with support structures and facilities. Refer to Appendix A for aerial photos of the potential sites.

A technical evaluation of the "region of interest" potential sites was completed to develop the list of candidate sites with a subsequent increased level of detail for technical evaluation of the candidate sites resulting in selection of alternative sites. This evaluation phase applying exclusionary considerations is the primary basis for reduction in the number of potential sites to eight candidate sites. The sites eliminated displayed characteristics that indicated unsuitability for a nuclear plant. Specifically, Liberty 1, Gulf, Liberty 2, and Calhoun were excessively far from Progress energy load centers; Gilchrist, Manatee, Liberty 2, Seminole, Volusia, and Calhoun would require cooling water source from Florida Protected Waters; Hillsborough, Manatee, and Volusia were close to heavily populated areas; Taylor and Levy 3 would be located near sensitive estuaries.

In addition to following the EPRI Siting Guide, input was provided by a management committee within Progress Energy for local knowledge of five key parameters including transmission, environmental, community support, economic development, and legislative considerations.

Table 1 displays a summary of technical screening ranked order for the twenty potential sites based on the Progress Energy Florida Siting Management Team input to influence the down-select from twenty potential sites to eight candidate sites. From that input, two of the eight candidate sites (Gilchrist and Hillsborough) identified by the technical evaluation were replaced with two closely scored sites (Putnam 3 and Highlands) to balance the location of candidate sites and ensure that no obviously superior site would be overlooked. The substitutions as based on input by the Progress Energy Florida Siting Management Team allowed at least one site to be considered for each of the potential sources of cooling water in the state of Florida. The St Johns River (Putnam 3) and Kissimmee River (Highlands) locations were rated only slightly below the down-select technical evaluation criteria threshold, and other water sources had two or more sites already selected. Therefore, one upper Suwannee River and one Gulf of Mexico location were replaced with one site to the East on the St Johns River and one to the south on the Kissimmee River. Gilchrist offers no advantage over the other two Suwannee River sites (Lafayette and Dixie), and multiple sites in the down-select on the same water source could result in eliminating multiple sites with one water source issue. Hillsborough is in close proximity to the Tampa-St Petersburg area with uncertain water supply plus concerns with providing effective transmission connections and public support.

Table 2 and Graph 1 provide the composite technical evaluation parameters and ranking to support the down-selection to eight candidate sites from the twenty potential sites. This information was utilized in combination with the Project Energy Florida Siting Management Team discussed above for determining the candidate sites for continued evaluation discussed below.

During this continued screening evaluation process, data and information obtained by The Duncan Companies, Inc. under contract with Progress Energy Florida provided insight into land acquisition potential, local topography, future development plans, and parcel ownership. The Duncan Company, Inc. input to each of the potential and candidate sites was factored into technical evaluation process.

Knowledge gained by The Duncan Company, Inc. data resulted in a substitution of the Putnam 3 location for the Putnam 2 location. Putnam Sites 1, 2, and 3 ranked nearly identical with Putnam 2 being initially selected as a Candidate Site simply due to apparent higher ground elevation and slightly greater distance from populated areas. Input from The Duncan Company, Inc. resulted in a land parcel on the eastern edge of Putnam 3 that provided improved elevation and distance from population, industrial zoning, and improved potential for land acquisition. Therefore, Putnam 3 replaced Putnam 2 on the Alternate Site list.

The continued evaluation of the eight candidate sites utilized an additional set of criteria that included 40 parameters to refine suitability with an increased level of detail associated with water management, population profiles, reconnaissance level information, etc. to culminate in a small number of alternative sites considered suitable for a nuclear plant. This phase included literature research and specific weighted scoring for each candidate site against the 40 criteria. A few examples of the heaviest weighted parameters were geology/seismology, transmission access, accident effect related, and land use. Levy 2, Putnam 3, and Crystal River were three of the highest ranked sites.

Table 3 and Graph 2 provide a summary of the candidate sites general technical evaluation for selection of the alternative sites considered acceptable as a location for a nuclear plant.

The decision to continue further evaluation of Dixie and Highlands over Taylor and Levy 3 was to allow continued consideration of the Suwannee River and the Kissimmee River in lieu of having four alternative sites utilizing water resource from the Gulf of Mexico. Taylor and Levy 3 were only slightly better or equal to Dixie and Highlands, and both are located near the Gulf of Mexico coastline which would require lengthy traverse of estuarine areas and shallow seabed for water intake and discharge conveyances. Extended pipelines in estuarine areas are a major consideration in permitting reviews and would produce considerable additional regulatory scrutiny. Combined with the vulnerability of these coastal sites to storm surge flooding and vacation home development on the shoreline, both sites were deferred from further consideration. Lafayette site indicated considerable recreational/residential development along both shores of the Suwannee River and a real estate analysis indicated a relatively high number of individual land owners.

From the exclusionary and avoidance criteria screening and evaluation reviews described above, the following five alternative sites were identified:

- Crystal River site located in Citrus County on the Gulf of Mexico

- Dixie site located in Dixie County on the Suwannee River
- Highlands site in Highlands County on the Kissimmee River
- Levy 2 site located in Levy County on the Florida Barge Canal
- Putnam 3 site located in Putnam County on the St Johns River

Refer to Appendix B for plat maps of the alternative sites.

These five remaining alternative sites were subjected to a further evaluation of the 40 general criteria with additional research and "on the ground" surveillance by a senior environmental consultant and a senior geologist. Core borings were collected and reviewed by the senior geologist for foundation design suitability. Data from the existing nuclear plant at the Progress Energy Crystal River Complex was used for the Crystal River site. Table 4 contains the weighting and scoring results for the screening of alternative sites for the Technical Evaluation of the alternative sites.

From a combination of siting research data and in-field observations, Levy 2 and Crystal River were the two highest ranked sites. Crystal River utilized available site characterization data previously determined from the existing Crystal River Nuclear Plant. Levy 2 in close proximity of an approximate 8 miles separation from Crystal River provides strategic advantage due to increased distance from the Gulf coast for increased wind and flood protection allowing independence in generation and transmission from a single storm event.

Dixie is susceptibility to karst and solution activity with numerous surface depressions observed. Core boring indicated very soft soil to a depth of approximately 80 feet. Use of cooling water from the Suwannee River would be excessively restricted due to Protected Waters of Florida designation. In addition, Manatee Springs, one of the largest surface discharges in Florida, is located directly across the Suwannee River for the Dixie Site.

Putnam consisted of loose, deep soil with no rock located down to approximately 185 feet. The St Johns River provided opportunity for adequate cooling water supply; however, there is potential for tidal run-up from the Atlantic Ocean.

Highlands was challenged for cooling water due to efforts by Florida water management districts to convert the canal flow back to original stream beds. Water supply is highly regulated by the South Florida Water Management District.

The complete technical evaluation against suitability criterion for potential and candidate site evaluations are included in **Attachment IV,** the McCallum-Turner consultants siting study report.

**{Figure 1: Redacted}**

## Table 1 - Potential Site Screening Evaluation Summary

| Potential Sites | Composite Technical Screening Order | Final Ranking | | Water Source | Progress Energy Florida Preliminary Input | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Technical Screening Top 8 | PEF Down-Select Decision | | Transmission | Community Support | Economic Development | Environment | Legislative |
| Taylor | 1 | **Taylor** | **Taylor** | Gulf of Mexico | | | | | |
| Levy 2 | 2 | **Levy 2** | **Levy 2** | Florida Barge Canal | | | | | |
| Levy 3 | 3 | **Levy 3** | **Levy 3** | Gulf of Mexico | | | | | |
| Lafayette | 4 | **Lafayette** | **Lafayette** | Suwanee River | | | | | |
| Crystal River | 5 | **Crystal River** | **Crystal River** | Gulf of Mexico | | | | | |
| Gilchrist | 6 | **Gilchrist** | (Not Selected) | Suwannee/ Santa Fe | | | | | |
| Dixie | 7 | **Dixie** | **Dixie** | Suwanee River | | | | | |
| Hillsborough | 8 | **Hillsborough** | (Not Selected) | Tampa Bay | | | | | |
| Putnam 2 | 9 | (Not in Top 8) | (Not Selected) | St. Johns River | | | | | |
| Putnam 1 | 10 | (Not in Top 8) | (Not Selected) | St. Johns River | | | | | |
| Putnam 3 | 11 | (Not in Top 8) | **Putnam 3** | St. Johns River | | | | | |
| Manatee | 12 | (Not in Top 8) | (Not Selected) | Manatee River | | | | | |
| Levy 1 | 13 | (Not in Top 8) | (Not Selected) | Suwanee River | | | | | |
| Highlands | 14 | (Not in Top 8) | **Highlands** | Kissimmee River | | | | | |
| Seminole | 15 | (Not in Top 8) | (Not Selected) | St. Johns River | | | | | |

| Potential Sites | Composite Technical Screening Order | Final Ranking | | Water Source | Progress Energy Florida Preliminary Input | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Technical Screening Top 8 | PEF Down-Select Decision | | Transmission | Community Support | Economic Development | Environment | Legislative |
| Volusia | 16 | (Not in Top 8) | (Not Selected) | St. Johns River | | | | | |
| Liberty 1 | 17 | (Not in Top 8) | (Not Selected) | Apalachicola River | | | | | |
| Gulf | 18 | (Not in Top 8) | (Not Selected) | Gulf of Mexico | | | | | |
| Liberty 2 | 19 | (Not in Top 8) | (Not Selected) | Ochlockonee River | | | | | |
| Calhoun | 20 | (Not in Top 8) | (Not Selected) | Chipola River | | | | | |

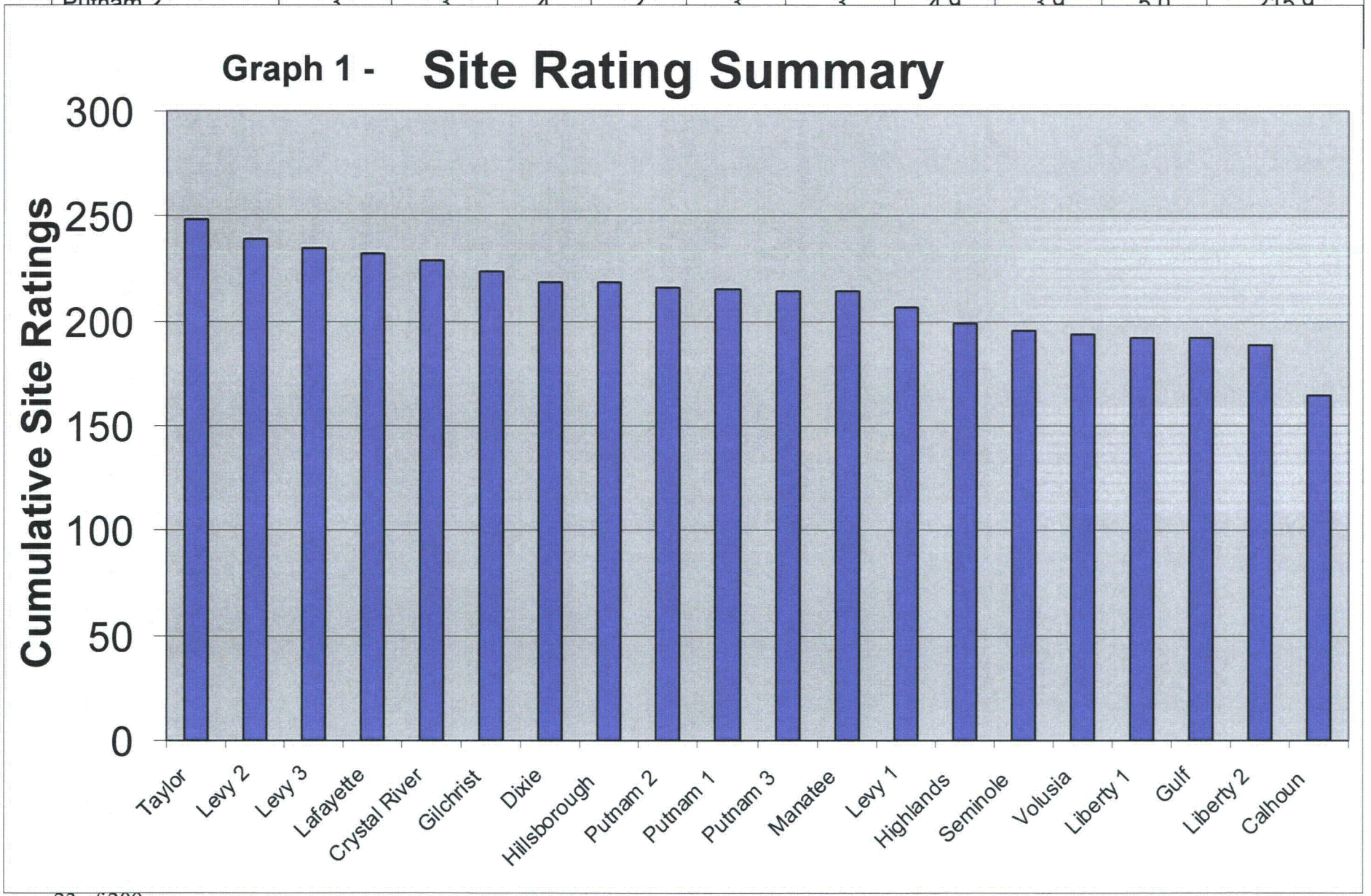
**BLUE** indicates the down-selected eight candidate sites based on technical evaluation and as amended by PEF input

**RED** = significant concerns with site **YELLOW** = proceed with caution
**GREEN** = not aware of any significant concerns **WHITE** = Neutral

## Table 2 - Potential Site Preliminary Technical Evaluation Screening

| Potential Site Name | Criterion | | | | | | | | | Composite Site Rating |
|---|---|---|---|---|---|---|---|---|---|---|
| | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 | |
| | Cooling Water Supply | Flooding | Popula-tion | Hazard-ous Land Uses | Ecology | Wetlands | Railroad Access | Trans-mission Access | Land Acquisi-tion | |
| | Weight Factor | | | | | | | | | |
| | 9.8 | 4.4 | 8.6 | 5.9 | 5.6 | 5.6 | 6.7 | 7.4 | 6.3 | |
| | Site Ratings | | | | | | | | | |
| Liberty 1 | 4 | 5 | 4 | 2 | 1 | 1 | 4.9 | 1.3 | 5.0 | 192.3 |
| Gulf | 5 | 1 | 5 | 2 | 1 | 1 | 5.0 | 1.0 | 5.0 | 191.6 |
| Calhoun | 2 | 1 | 4 | 2 | 2 | 2 | 4.8 | 1.1 | 5.0 | 164.8 |
| Liberty 2 | 1 | 5 | 4 | 4 | 1 | 3 | 4.9 | 1.6 | 5.0 | 188.3 |
| Taylor | 5 | 4 | 5 | 3 | 2 | 5 | 4.4 | 2.9 | 5.0 | 248.8 |
| Gilchrist | 3 | 5 | 4 | 2 | 4 | 3 | 4.9 | 3.1 | 5.0 | 224.0 |
| Levy 1 | 3 | 4 | 3 | 2 | 2 | 4 | 4.9 | 3.3 | 5.0 | 206.6 |
| Levy 2 | 5 | 4 | 4 | 2 | 2 | 4 | 4.9 | 3.9 | 5.0 | 239.2 |
| Crystal River | 5 | 3 | 4 | 1 | 2 | 4 | 4.9 | 3.9 | 5.0 | 229.1 |
| Lafayette | 3 | 5 | 5 | 2 | 3 | 4 | 4.8 | 3.1 | 5.0 | 232.2 |
| Dixie | 3 | 4 | 4 | 2 | 2 | 5 | 4.7 | 3.1 | 5.0 | 218.8 |
| Levy 3 | 5 | 2 | 5 | 2 | 2 | 4 | 4.7 | 3.5 | 5.0 | 234.7 |
| Hillsborough | 5 | 4 | 1 | 2 | 2 | 5 | 5.0 | 3.7 | 5.0 | 218.4 |
| Highlands | 2 | 4 | 3 | 2 | 1 | 5 | 4.9 | 3.6 | 5.0 | 199.1 |
| Manatee | 2 | 5 | 2 | 3 | 2 | 5 | 4.9 | 4.6 | 5.0 | 214.0 |
| Seminole | 2 | 4 | 1 | 2 | 3 | 4 | 4.9 | 4.7 | 5.0 | 195.6 |
| Volusia | 2 | 3 | 2 | 3 | 1 | 4 | 4.8 | 4.6 | 5.0 | 193.4 |
| Putnam 1 | 3 | 2 | 3 | 3 | 3 | 4 | 5.0 | 4.0 | 5.0 | 215.1 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Putnam 2 | 3 | 3 | 4 | 2 | 3 | 3 | 4.9 | 3.9 | 5.0 | 215.9 |



## Table 3 - Candidate Site General Technical Evaluation

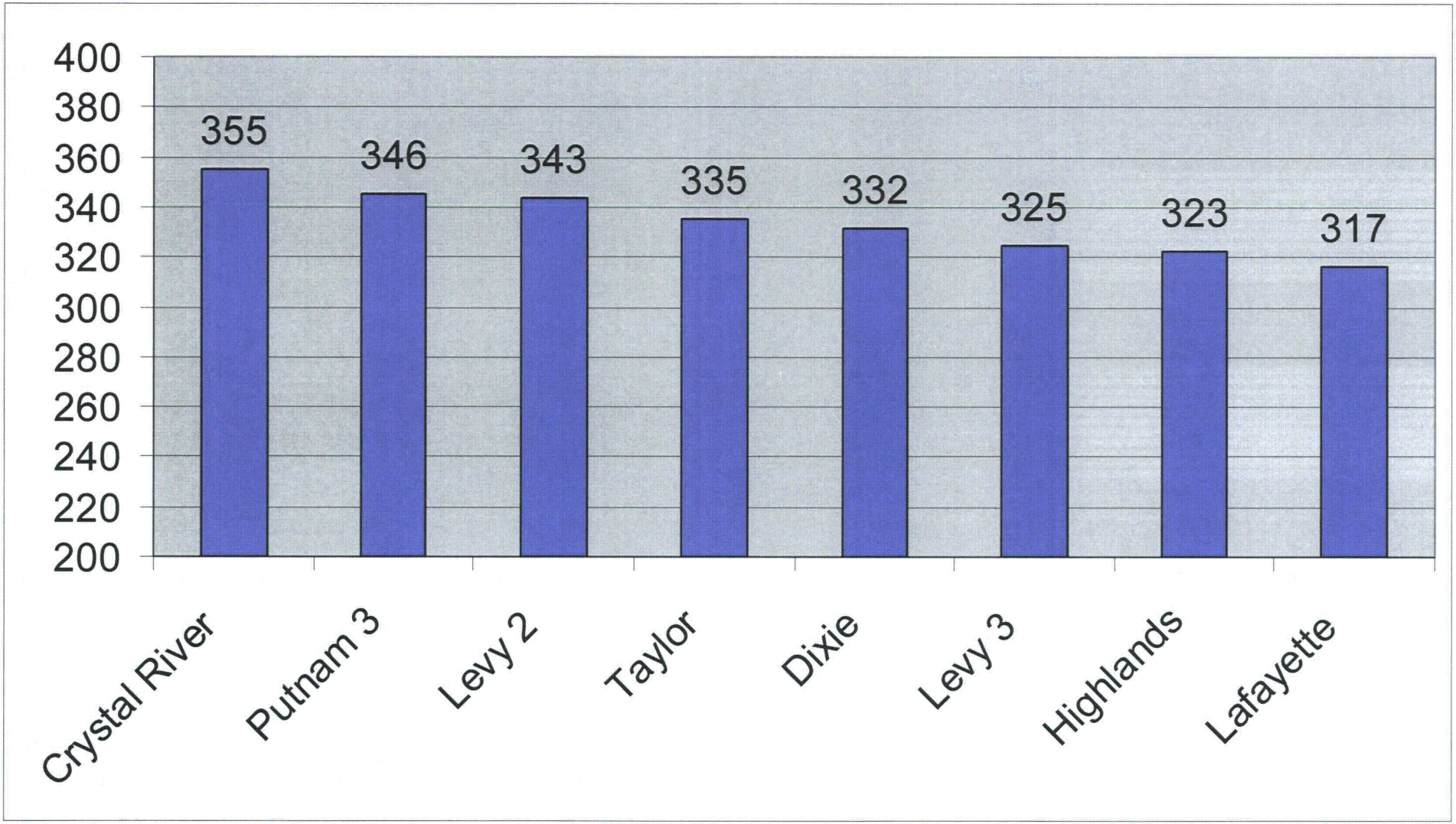
| Criteria | | Weight Factor | Crystal River | | Dixie | | Highlands | | Lafayette | | Levy 2 | | Levy 3 | | Putnam 3 | | Taylor | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score |
| A.1.1 | Geology / Seismology | **3.77** | 5 | 18.85 | 5 | 18.85 | 5 | 18.85 | 5 | 18.85 | 5 | 18.85 | 5 | 18.85 | 5 | 18.85 | 5 | 18.85 |
| A.1.2 | Cooling System Requirements | **3.27** | 4 | 13.08 | 3 | 9.81 | 2 | 6.54 | 3 | 9.81 | 3 | 9.81 | 4 | 13.08 | 3 | 9.81 | 4 | 13.08 |
| A.1.3 | Flooding | **2.4** | 2 | 4.8 | 3 | 7.2 | 1 | 2.4 | 2 | 4.8 | 5 | 12 | 3 | 7.2 | 5 | 12 | 3 | 7.2 |
| A.1.4 | Nearby Hazardous Land Uses | **3.35** | 1 | 3.35 | 3 | 10.05 | 3 | 10.05 | 3 | 10.05 | 2 | 6.7 | 3 | 10.05 | 2 | 6.7 | 3 | 10.05 |
| A.1.5 | Extreme Weather Conditions | **2.36** | 2 | 4.72 | 3 | 7.08 | 3 | 7.08 | 3 | 7.08 | 3 | 7.08 | 1 | 2.36 | 3 | 7.08 | 2 | 4.72 |
| A.2 | Accident Effect Related | **4.09** | 4 | 16.36 | 4 | 16.36 | 4 | 16.36 | 4 | 16.36 | 3 | 12.27 | 4 | 16.36 | 4 | 16.36 | 4 | 16.36 |
| A.3.1 | Surface Water – Radionuclide Pathway | **2.5** | 5 | 12.5 | 4 | 10 | 4 | 10 | 4 | 10 | 5 | 12.5 | 5 | 12.5 | 4 | 10 | 5 | 12.5 |
| A.3.2 | Groundwater Radionuclide Pathway | **2.55** | 2 | 5.10 | 2 | 5.10 | 3 | 7.65 | 2 | 5.10 | 2 | 5.10 | 2 | 5.10 | 2 | 5.10 | 1 | 2.55 |
| A.3.3 | Air Radionuclide Pathway B2+B2 | **2.5** | 5 | 12.5 | 4 | 10 | 4 | 10 | 4 | 10 | 4 | 10 | 5 | 12.5 | 4 | 10 | 5 | 12.5 |
| A.3.4 | Air-Food Ingestion Pathway | **2.5** | 4 | 10 | 4 | 10 | 1 | 2.5 | 3 | 7.5 | 3 | 7.5 | 3 | 7.5 | 3 | 7.5 | 5 | 12.5 |
| A.3.5 | Surface Water-Food Radionuclide | **2.41** | 5 | 12.05 | 4 | 9.64 | 3 | 7.23 | 4 | 9.64 | 5 | 12.05 | 5 | 12.05 | 4 | 9.64 | 5 | 12.05 |

| Criteria | | Weight Factor | Crystal River | | Dixie | | Highlands | | Lafayette | | Levy 2 | | Levy 3 | | Putnam 3 | | Taylor | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pathway | | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score |
| A.3.6 | Transportation Safety | **2.14** | 3 | 6.42 | 3 | 6.42 | 3 | 6.42 | 3 | 6.42 | 3 | 6.42 | 3 | 6.42 | 3 | 6.42 | 3 | 6.42 |
| B.1.1 | Disruption of Important Species/Habitats | **2.64** | 2 | 5.28 | 2 | 5.28 | 5 | 13.2 | 3 | 7.92 | 2 | 5.28 | 1 | 2.64 | 3 | 7.92 | 1 | 2.64 |
| B.1.2 | Bottom Sediment Disruption Effects | **2.14** | 3 | 6.42 | 2 | 4.28 | 2 | 4.28 | 2 | 4.28 | 2 | 4.28 | 3 | 6.42 | 2 | 4.28 | 3 | 6.42 |
| B.2.1 | Disruption of Important Species/Habitats and Wetlands | **3.18** | 3 | 9.54 | 4 | 12.72 | 3 | 9.54 | 3 | 9.54 | 3 | 9.54 | 2 | 6.36 | 3 | 9.54 | 3 | 9.54 |
| B.2.2 | Dewatering Effects on Adjacent Wetlands | **2.77** | 3 | 8.31 | 4 | 11.08 | 4 | 11.08 | 3 | 8.31 | 4 | 11.08 | 2 | 5.54 | 3 | 8.31 | 4 | 11.08 |
| B.3.1 | Thermal Discharge Effects ** | **3.64** | 3 | 10.92 | 2 | 7.28 | 3 | 10.92 | 3 | 10.92 | 3 | 10.92 | 3 | 10.92 | 3 | 10.92 | 3 | 10.92 |
| B.3.2 | Entrainment/Impingement Effects | **3.23** | 3 | 9.69 | 3 | 9.69 | 4 | 12.92 | 3 | 9.69 | 3 | 9.69 | 3 | 9.69 | 3 | 9.69 | 3 | 9.69 |
| B.3.3 | Dredging/Disposal Effects | **2.36** | 3 | 7.08 | 2 | 4.72 | 2 | 4.72 | 2 | 4.72 | 2 | 4.72 | 3 | 7.08 | 2 | 4.72 | 3 | 7.08 |
| B.4.1 | Drift Effects on Surrounding Areas | **2.36** | 2 | 4.72 | 3 | 7.08 | 3 | 7.08 | 3 | 7.08 | 2 | 4.72 | 2 | 4.72 | 3 | 7.08 | 2 | 4.72 |
| C.1.1 | Socioeconomics – Construction – Related Effects | **2** | 4 | 8.0 | 3 | 6.0 | 5 | 10.0 | 3 | 6.0 | 4 | 8.0 | 4 | 8.0 | 5 | 10.0 | 3 | 6.0 |

| Criteria | | Weight Factor | Crystal River | | Dixie | | Highlands | | Lafayette | | Levy 2 | | Levy 3 | | Putnam 3 | | Taylor | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score |
| C.3.1 | Environmental Justice | **1.95** | 5 | 9.75 | 5 | 9.75 | 5 | 9.75 | 5 | 9.75 | 5 | 9.75 | 5 | 9.75 | 5 | 9.75 | 5 | 9.75 |
| C.4.1 | Land Use | **3.8** | 2 | 7.6 | 2 | 7.6 | 3 | 11.4 | 2 | 7.6 | 2 | 7.6 | 2 | 7.6 | 4 | 15.2 | 2 | 7.6 |
| D.1.1 | Water Supply | **3.7** | 5 | 18.5 | 3 | 11.1 | 2 | 7.4 | 3 | 11.1 | 4 | 14.8 | 5 | 18.5 | 4 | 14.8 | 5 | 18.5 |
| D.1.2 | Pumping Distance | **3.05** | 5 | 15.25 | 4 | 12.2 | 3 | 9.15 | 5 | 15.25 | 3 | 9.15 | 1 | 3.05 | 3 | 9.15 | 1 | 3.05 |
| D.1.3 | Flooding | **2.9** | 2 | 5.8 | 3 | 8.7 | 2 | 5.8 | 2 | 5.8 | 5 | 14.5 | 3 | 8.7 | 5 | 14.5 | 3 | 8.7 |
| D.1.5 | Civil Works | **3.4** | 3 | 10.2 | 3 | 10.2 | 3 | 10.2 | 4 | 13.6 | 3 | 10.2 | 3 | 10.2 | 3 | 10.2 | 3 | 10.2 |
| D.2.1 | Railroad Access | **2.6** | 5 | 13.0 | 3 | 7.8 | 4 | 10.4 | 3 | 7.8 | 4 | 10.4 | 3 | 7.8 | 5 | 13.0 | 3 | 7.8 |
| D.2.2 | Highway Access | **2.8** | 5 | 14.0 | 5 | 14.0 | 5 | 14.0 | 5 | 14.0 | 5 | 14.0 | 5 | 14.0 | 5 | 14.0 | 5 | 14.0 |
| D.2.3 | Barge Access | **2.85** | 5 | 14.25 | 2 | 5.7 | 2 | 5.7 | 2 | 5.7 | 2 | 5.7 | 3 | 8.55 | 4 | 11.4 | 3 | 8.55 |
| D.2.4 | Transmission Access | **4.8** | 3 | 14.4 | 4 | 19.2 | 4 | 19.2 | 4 | 19.2 | 5 | 24 | 4 | 19.2 | 4 | 19.2 | 4 | 19.2 |
| D.3.1 | Topography | **2.55** | 5 | 12.75 | 5 | 12.75 | 5 | 12.75 | 4 | 10.2 | 5 | 12.75 | 5 | 12.75 | 3 | 7.65 | 4 | 10.2 |
| D.3.2 | Land Rights | **2.75** | 5 | 13.75 | 4 | 11 | 3 | 8.25 | 1 | 2.75 | 2 | 5.5 | 1 | 2.75 | 3 | 8.25 | 4 | 11 |

| Criteria | | Weight Factor | Crystal River | | Dixie | | Highlands | | Lafayette | | Levy 2 | | Levy 3 | | Putnam 3 | | Taylor | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score |
| D.3.3 | Labor Rates | **3.3** | 5 | 16.5 | 4 | 13.2 | 3 | 9.9 | 3 | 9.9 | 5 | 16.5 | 5 | 16.5 | 2 | 6.6 | 3 | 9.9 |
| **Composite Site Rating** | | | 355 | | 332 | | 323 | | 317 | | 343 | | 325 | | 346 | | 335 | |

**Graph 2 - Candidate Site General Technical Evaluation**



# Table 4 - Screening Results for Technical Evaluation of Suitability Criterion:

| Progress Energy Florida General Site Criteria Ratings | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EPRI Guide Section | Criteria | Weight Factor | Crystal River | | Dixie | | Highlands | | Levy 2 | | Putnam 3 | |
| | | | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score |
| A.1.1 | Geology / Seismology | **3.77** | 5 | 18.85 | 5 | 18.85 | 5 | 18.85 | 5 | 18.85 | 5 | 18.85 |
| A.1.2 | Cooling System Requirements | **3.27** | 4 | 13.08 | 3 | 9.81 | 2 | 6.54 | 3 | 9.81 | 3 | 9.81 |
| A.1.3 | Flooding | **2.4** | 2 | 4.8 | 3 | 7.2 | 1 | 2.4 | 5 | 12 | 5 | 12 |
| A.1.4 | Nearby Hazardous Land Uses | **3.35** | 1 | 3.35 | 3 | 10.05 | 3 | 10.05 | 2 | 6.7 | 2 | 6.7 |
| A.1.5 | Extreme Weather Conditions | **2.36** | 2 | 4.72 | 3 | 7.08 | 3 | 7.08 | 3 | 7.08 | 3 | 7.08 |
| A.2 | Accident Effect Related | **4.09** | 4 | 16.36 | 4 | 16.36 | 4 | 16.36 | 3 | 12.27 | 4 | 16.36 |
| A.3.1 | Surface Water Radionuclide Pathway | **2.5** | 5 | 12.5 | 4 | 10 | 4 | 10 | 5 | 12.5 | 4 | 10 |
| A.3.2 | Groundwater Radionuclide Pathway | **2.55** | 2 | 5.10 | 2 | 5.10 | 3 | 7.65 | 2 | 5.10 | 2 | 5.10 |
| A.3.3 | Air Radionuclide Pathway | **2.5** | 5 | 12.5 | 4 | 10 | 4 | 10 | 4 | 10 | 4 | 10 |
| A.3.4 | Air-Food Ingestion Pathway | **2.5** | 4 | 10 | 4 | 10 | 1 | 2.5 | 3 | 7.5 | 3 | 7.5 |
| A.3.5 | Surface Water-Food Radionuclide Pathway | **2.41** | 5 | 12.05 | 4 | 9.64 | 3 | 7.23 | 5 | 12.05 | 4 | 9.64 |
| A.3.6 | Transportatio n Safety | **2.14** | 3 | 6.42 | 3 | 6.42 | 3 | 6.42 | 3 | 6.42 | 3 | 6.42 |
| B.1.1 | Disruption of Important Species / Habitats | **2.64** | 2 | 5.28 | 2 | 5.28 | 5 | 13.2 | 3 | 7.92 | 3 | 7.92 |
| B.1.2 | Bottom Sediment Disruption Effects | **2.14** | 3 | 6.42 | 2 | 4.28 | 2 | 4.28 | 2 | 4.28 | 2 | 4.28 |

| Progress Energy Florida General Site Criteria Ratings | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EPRI Guide Section | Criteria | Weight Factor | Crystal River | | Dixie | | Highlands | | Levy 2 | | Putnam 3 | |
| | | | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score |
| B.2.1 | Disruption of Important Species/Habitats and Wetlands | **3.18** | 3 | 9.54 | 4 | 12.72 | 3 | 9.54 | 3 | 9.54 | 3 | 9.54 |
| B.2.2 | Dewatering Effects on Adjacent Wetlands | **2.77** | 3 | 8.31 | 4 | 11.08 | 4 | 11.08 | 4 | 11.08 | 3 | 8.31 |
| B.3.1 | Thermal Discharge Effects ** | **3.64** | 3 | 10.92 | 3 | 10.92 | 3 | 10.92 | 3 | 10.92 | 3 | 10.92 |
| B.3.2 | Entrainment/Impingement Effects | **3.23** | 3 | 9.69 | 3 | 9.69 | 4 | 12.92 | 3 | 9.69 | 3 | 9.69 |
| B.3.3 | Dredging/Disposal Effects | **2.36** | 3 | 7.08 | 2 | 4.72 | 2 | 4.72 | 2 | 4.72 | 2 | 4.72 |
| B.4.1 | Drift Effects on Surrounding Areas | **2.36** | 2 | 4.72 | 3 | 7.08 | 3 | 7.08 | 3 | 7.08 | 3 | 7.08 |
| C.1.1 | Socio-economics Construction Related Effects | **2** | 4 | 8.0 | 3 | 6.0 | 5 | 10.0 | 4 | 8.0 | 5 | 10.0 |
| C.3.1 | Environmental Justice | **1.95** | 5 | 9.75 | 5 | 9.75 | 5 | 9.75 | 5 | 9.75 | 5 | 9.75 |
| C.4.1 | Land Use | **3.8** | 2 | 7.6 | 2 | 7.6 | 3 | 11.4 | 2 | 7.6 | 4 | 15.2 |
| D.1.1 | Water Supply | **3.7** | 5 | 18.5 | 4 | 14.8 | 2 | 7.4 | 4 | 14.8 | 4 | 14.8 |
| D.1.2 | Pumping Distance | **3.05** | 5 | 15.25 | 4 | 12.2 | 3 | 9.15 | 3 | 9.15 | 3 | 9.15 |
| D.1.3 | Flooding | **2.9** | 2 | 5.8 | 3 | 8.7 | 2 | 5.8 | 5 | 14.5 | 5 | 14.5 |
| D.1.5 | Civil Works | **3.4** | 3 | 10.2 | 3 | 10.2 | 3 | 10.2 | 3 | 10.2 | 3 | 10.2 |
| D.2.1 | Railroad Access | **2.6** | 5 | 13.0 | 3 | 7.8 | 4 | 10.4 | 4 | 10.4 | 5 | 13.0 |
| D.2.2 | Highway Access | **2.8** | 5 | 14.0 | 5 | 14.0 | 5 | 14.0 | 5 | 14.0 | 5 | 14.0 |
| D.2.3 | Barge Access | **2.85** | 5 | 14.25 | 2 | 5.7 | 2 | 5.7 | 2 | 5.7 | 4 | 11.4 |
| D.2.4 | Transmission Access | **4.8** | 3 | 14.4 | 4 | 19.2 | 4 | 19.2 | 5 | 24 | 3 | 14.4 |

| Progress Energy Florida General Site Criteria Ratings | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EPRI Guide Section | Criteria | Weight Factor | Crystal River | | Dixie | | Highlands | | Levy 2 | | Putnam 3 | |
| | | | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score |
| D.3.1 | Topography | **2.55** | 5 | 12.75 | 5 | 12.75 | 5 | 12.75 | 5 | 12.75 | 3 | 7.65 |
| D.3.2 | Land Rights | **2.75** | 5 | 13.75 | 4 | 11 | 3 | 8.25 | 2 | 5.5 | 3 | 8.25 |
| D.3.3 | Labor Rates | **3.3** | 5 | 16.5 | 4 | 13.2 | 3 | 9.9 | 5 | 16.5 | 2 | 6.6 |
| **Composite Site Rating** | | | | 355 | | 339 | | 323 | | 348 | | 341 |
| **Normalized Score** | | | 100% | | 95.9% | | 91.0% | | 98.0% | | 96.1% | |

**NOTE:** Site ratings for each criterion are assigned in the range 1=least suitable to 5=most suitable

# Attachment II – Strategic Considerations

The following table provides alternative site compliance rating toward Progress Energy business strategy criteria.

## Progress Energy Business Strategic Evaluation

| Siting Evaluation Criteria: Compliance with Progress Energy Business Strategic Considerations | | Crystal River | | Dixie | | Highlands | | Levy 2 | | Putnam 3 | | Basis of Evaluation Finding |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Weight | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | |
| **System Reliability Consideration -** Evaluation of the generating station and transmission system vulnerability due to the concentration of generating stations at one location and/or the concentration of major transmission corridors in one location. | 20 | 1 | 20 | 10 | 200 | 7 | 140 | 8 | 160 | 7 | 140 | Adding new nuclear generating capacity to the Crystal River Energy Complex results in a significant concentration of Progress Energy Florida generating assets in one geographical location. This increases the likelihood of a significant generation loss from a single event and a resulting large scale impact on the Progress Energy system. Generating capacity at the Crystal River Energy Complex is currently ~ 3067 Net MWe and would increase by 73% with the addition of two 1125 MWe AP1000 Units, resulting in ~ 5317 MWe.<br><br>The Levy 2 site is located ~10 miles northeast of the Crystal River Energy Complex and is ~ 8 miles from the Gulf coast. This yields a reduced vulnerability to the likelihood of a significant generation loss from a single event in a geographical location.<br><br>The Dixie site { } and further reduces the vulnerability to the likelihood of a significant generation loss |

| Siting Evaluation Criteria: Compliance with Progress Energy Business Strategic Considerations | Weight | Crystal River | | Dixie | | Highlands | | Levy 2 | | Putnam 3 | | Basis of Evaluation Finding |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | |
| | | | | | | | | | | | | from a single event.<br><br>Putnam 3 and Highlands sites are of a sufficient distance from other PEF generating assets such that concentration of generating stations is less of a concern. However, these sites are much more dependent on the health of other utility/cooperative generating and transmission system reliability beyond the control of Progress Energy. |

| Siting Evaluation Criteria: Compliance with Progress Energy Business Strategic Considerations | | Crystal River | | Dixie | | Highlands | | Levy 2 | | Putnam 3 | | Basis of Evaluation Finding |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Weight | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | |
| **Site permitting & Approval Challenges -** Evaluation of the relative risk in developing a selected site based on known environmental permitting challenges (including groundwater and karst features), water resource issues, ability to acquire necessary state/local permits, difficulty in designing and constructing cooling water make-up and blowdown systems (and acquiring easements), and re-establishing rail access. | 20 | 7 | 140 | 7 | 140 | 7 | 140 | 9 | 180 | 10 | 200 | Levy 2 make-up water is from the Gulf of Mexico and therefore provides a reliable source for long term consumption. One challenge for this site is the distance required for cooling tower blowdown (which requires piping along the barge canal with minimal slope, and must pass under a four lane highway). The Withlacoochee River is fresh water at the headwaters of the lake by-pass canal, and there is some residential development along the river. Environmental considerations for this site relate to protecting threatened and endangered species, avoiding intrusion of salt water from the canal into fresh groundwater tables (if the level was significantly changed), and avoiding impact on shell fish harvesting at the coast.<br><br>The Dixie site on the Suwannee River will have minimal impact on the river minimum flow levels. There are environmental considerations associated with wetlands and aquatic life, and the location may require an assessment for Environmental Justice. Ecotourism is an important consideration for the Suwannee River Dixie site, and site development would require detailed planning/implementation to make the nuclear site transparent to the river environment.<br><br>Putnam 3 on the St Johns River will have minimal impact on minimum flow levels, but due to the low flow velocity in the St Johns, impact |

| Siting Evaluation Criteria: Compliance with Progress Energy Business Strategic Considerations | Weight | Crystal River | | Dixie | | Highlands | | Levy 2 | | Putnam 3 | | Basis of Evaluation Finding |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | |
| | | | | | | | | | | | | on water quality is a consideration. {<br><br>} The St Johns River is also undergoing a broad restoration and clean-up program that could result in additional permitting challenges.<br><br>The Crystal River site water source from the Gulf of Mexico provides a reliable source for long term consumption. How, the site currently is challenged with return temperatures on the discharge canal to the Gulf that has resulted in de-rating fossil Units 1 and 2 during summer months. This would be further be aggravated by the addition of ~ 16 million gallons/day warm water blowdown from two new natural draft cooling towers. In the Crystal River site case, existing operational challenges with existing DEP limits would be significantly complicated by the addition of new generating units.<br><br>Highlands site is considerably complicated based on existing plans by the pertinent water management district to convert the C-38 Kissimmee canal back to a meandering river, and concurrently construct large reservoirs (> 10,000 acres) for flood control. These reservoirs would likely be used by power plants when river flows are low, and then get refilled by diverting water from the Kissimmee when river flows are excessive. |

| Siting Evaluation Criteria: Compliance with Progress Energy Business Strategic Considerations | | Crystal River | | Dixie | | Highlands | | Levy 2 | | Putnam 3 | | Basis of Evaluation Finding |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Weight | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | |
| **Hurricanes and other Extreme Weather Events Consideration –** Evaluation of generating station vulnerability as it relates to extreme weather events, such as hurricanes, based on geographical siting location. | 10 | 2 | 20 | 4 | 40 | 6 | 60 | 8 | 80 | 10 | 100 | The Crystal River site is already most vulnerable to the direct impacts (wind and flooding) from a Gulf coast hurricane, based on its coastal siting. Therefore the addition of new nuclear units at this site would results in a significant PEF system vulnerability due to weather events. The addition of generating capacity at Crystal River also results in additional transmission system vulnerabilities from tornadoes impacting the north& south transmission corridors that emanate eastward from the site.<br><br>Dixie, {<br>} is within the Department of Community Affairs Division of Emergency Management GIS Section surge zone for a Category 5 hurricane.<br><br>Putnam 3{<br>} therefore less vulnerable to direct hurricane wind impacts than Levy 2 at ~ 10 miles from the coast line.<br><br>The Dixie, Levy 2 and Putnam 3 sites have less concentrated transmission system corridors than the Crystal River site, and are therefore less vulnerable to tornado impacts.<br><br>Highlands is comparable to Putnam with regard to hurricane wind effects based on siting distance from the coast, but is more susceptible to inland flooding from major hurricanes. Dikes |

| Siting Evaluation Criteria: Compliance with Progress Energy Business Strategic Considerations | Weight | Crystal River | | Dixie | | Highlands | | Levy 2 | | Putnam 3 | | Basis of Evaluation Finding |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | |
| | | | | | | | | | | | | have previously been built around Lake Okeechobee to avoid major inland flooding from hurricane driven lake surges. |
| **System Strategic Fit -** Evaluation of how the plant siting impacts and/or supports strategic transmission and generation planning. Considered attributes include: (1) Relative location to PEF transmission grid, (2) Any impact to other electric grids, (3) Exposure to other PGN critical assets, and (4) Joint venture opportunities. | 20 | 9 | 180 | 10 | 200 | 8 | 160 | 10 | 200 | 6 | 120 | Crystal River is within the PEF Transmission footprint, with No significant impact to other grids, and some exposure to other critical assets (Crystal River Units 1 – 5).<br><br>Dixie is within the PEF Transmission footprint, with No significant impact to other grids, and No significant exposure to other critical assets.<br><br>Levy 2 is within the PEF Transmission footprint, with No significant impact to other grids, and No significant exposure to other critical assets.<br><br>Putnam 3 is not within the PEF Transmission footprint, has significant impact to other grids (~ $ 400+ M to FPL), has No significant exposure to other critical assets.<br><br>Highlands is on the edge the PEF Transmission footprint, with significant impact to other grids (~ $ 400 M to FPL), and has No significant exposure to other critical assets. Highlands site has the potential to structure a co-location with FPL. |

| **Siting Evaluation Criteria:** Compliance with Progress Energy Business Strategic Considerations | | Crystal River | | Dixie | | Highlands | | Levy 2 | | Putnam 3 | | Basis of Evaluation Finding |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Weight | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | |
| **Existing Site Advantages -** Sharing of existing resources and facilities associated with security, maintenance, training, warehousing, and emergency planning. | 10 | 10 | 100 | 7 | 70 | 1 | 10 | 8 | 80 | 1 | 10 | An existing nuclear site would generally have an advantage for sharing facilities and certain support organizations. However in the case of the Crystal River Energy Complex, the site is already very complicated by the existence of a nuclear unit and four fossil units (and the associated coal storage and transport systems), the synergistic relationship to the adjacent mining company (mining ore on conveyer belts pass through the site to a barge loading facility). This site is therefore much more difficult from an engineering viewpoint, to integrate two additional nuclear units into the existing site layout. Further, this site is scheduled for significant fossil emission system upgrades in the same timeframe that would further complicate construction of new nuclear units.<br><br>Dixie, Levy 2, Highlands, and Putnam 3 are all greenfield sites with no existing facilities or developed resources. Levy 2 and Dixie are close enough to the Crystal River site to have the potential to more routinely leverage workforce and materials (spare parts).<br><br>Putnam 3 and Highlands are sufficiently far from the existing Crystal River nuclear site than no significant routine work leveraging would be practical. |

| Siting Evaluation Criteria: Compliance with Progress Energy Business Strategic Considerations | | Crystal River | | Dixie | | Highlands | | Levy 2 | | Putnam 3 | | Basis of Evaluation Finding |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Weight | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | |
| **Local and State Government Support** Incentives and support associated with infrastructure improvements, rate base impact, emergency planning, employment training, etc. | 15 | 10 | 150 | 4 | 60 | 7 | 105 | 9 | 135 | 4 | 60 | There is no significant differentiation between sites for state incentives or support.<br><br>Support has been publicly expressed by both Citrus County and Highlands County which would likely bring financial support to the Crystal River and Highlands sites.<br><br>Current infrastructure is in place in Crystal River which due to proximity would also be available to the Levy 2 site.<br><br>Generally there is more infrastructure available to the sites closer to urban areas (CR, Highlands, Levy). This is not the case for Dixie and Putnam.<br><br>It is probable that we would have less support for an off system county (Putnam) where we do not have relationships or customer base. |
| **Public Support** General public desire for safe and efficient nuclear power generation and avoidance of nonproductive intervention... | 10 | 10 | 100 | 5 | 50 | 6 | 60 | 8 | 80 | 4 | 40 | Without research on the local sites, this is difficult to gauge.<br><br>Based on our experience in North Carolina and on public reaction to date, utilization of an existing site would draw far less opposition than a greenfield site. CR site ranked highest on this basis.<br><br>It is also probable that we could expect less support for an off system community where we |

| Siting Evaluation Criteria: Compliance with Progress Energy Business Strategic Considerations | Weight | Crystal River Score | Crystal River Wgt'd Score | Dixie Score | Dixie Wgt'd Score | Highlands Score | Highlands Wgt'd Score | Levy 2 Score | Levy 2 Wgt'd Score | Putnam 3 Score | Putnam 3 Wgt'd Score | Basis of Evaluation Finding |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | have few relationships, no customer base, and no visibility. Putnam was ranked low on this basis.<br><br>Also due to expected reaction by environmental groups to utilization of pristine/protected waterways, Putnam, Highlands and Dixie were ranked lower. |
| **Local Community Challenges** – Relative evaluation of challenges from the local community. | 15 | 10 | 150 | 7 | 105 | 7 | 105 | 6 | 90 | 4 | 60 | We anticipate few local challenges for Crystal River. We have received strong expressed support from county leadership and little reaction publicly to that. This is also true for Highlands.<br><br>We anticipate likely intervention by local environmental groups for the Dixie, Putnam and Highlands locations. Highlands may draw state and national attention from these groups; however, water level management through the implementation of reservoirs may be seen as a positive outcome for an ongoing flood control problem.<br><br>It is anticipated that the impact in Dixie will be seen as positive due to increase in tax base, job opportunities and increased land values. There is some concern that the current site is a hunting preserve as well as the perception of impact to the Suwannee River.<br><br>{ } |

| **Siting Evaluation Criteria:** **Compliance with Progress Energy Business Strategic Considerations** | | **Crystal River** | | **Dixie** | | **Highlands** | | **Levy 2** | | **Putnam 3** | | **Basis of Evaluation Finding** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Weight** | Score | **Wgt'd Score** | Score | **Wgt'd Score** | Score | **Wgt'd Score** | Score | **Wgt'd Score** | Score | **Wgt'd Score** | |
| | | | | | | | | | | | | { } Transmission impact will need to be known and evaluated on the basis of specific impact to the site communities. There is estimated to be no additional transmission added to the Crystal River and Levy 2 site communities. |
| **NRC Considerations -** Preference of existing nuclear facility sites facilitating the COLA review process. | 10 | 10 | 100 | 8 | 80 | 8 | 80 | 8 | 80 | 8 | 80 | Crystal River, while providing advantage with prior licensing site geotechnical and meteorological characterization, is however complicated by the complexity of the existing site layout. Therefore this site does not benefit as much as other existing nuclear only sites (like Harris) for this strategic consideration.<br><br>There was no preference or advantage between the various greenfield sites. |
| **Land Utilization -** Leverage of Progress Energy land for potential applications of public benefit. | 5 | 6 | 30 | 10 | 50 | 9 | 45 | 10 | 50 | 7 | 35 | The Crystal River site, based on the site configuration/complexity and public access, has fewer opportunities for increased public benefit with land utilization.<br><br>{ } { } |

| Siting Evaluation Criteria: Compliance with Progress Energy Business Strategic Considerations | Weight | Crystal River Score | Crystal River Wgt'd Score | Dixie Score | Dixie Wgt'd Score | Highlands Score | Highlands Wgt'd Score | Levy 2 Score | Levy 2 Wgt'd Score | Putnam 3 Score | Putnam 3 Wgt'd Score | Basis of Evaluation Finding |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | { }and has less favorable conditions for land utilization planning for public benefit.<br><br>The Highlands site could be used synergistically with the Water Management district to help with flood control by using the proposed reservoirs. |
| **Additional Cost considerations** – Consideration of additional costs unique to particular sites. Note that site transmission costs are specifically covered in the Transmission deliverability analysis evaluation rankings. | 10 | 10 | 100 | 5 | 50 | 10 | 100 | 10 | 100 | 1 | 10 | The Dixie site has the most significant rail expansion needed to access the site during the construction period, and later on a much more infrequent basis for on-going maintenance/spent fuel shipping. { } Levy 2 also requires rail expansion to reach the site from Dunnellon, but the distance is ~ 10 miles. Crystal River { }<br><br>Levy 2 has the longest cooling tower blowdown path requirement, and this will involve a higher cost to achieve (in the $ 10 of millions)<br><br>Based on borings at the Putnam 3 site, the soil was determined to be soft down to at least ~ 220 feet, which would require significant |

| **Siting Evaluation Criteria:** **Compliance with Progress Energy Business Strategic Considerations** | | **Crystal River** | | **Dixie** | | **Highlands** | | **Levy 2** | | **Putnam 3** | | **Basis of Evaluation Finding** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Weight** | Score | **Wgt'd Score** | Score | **Wgt'd Score** | Score | **Wgt'd Score** | Score | **Wgt'd Score** | Score | **Wgt'd Score** | |
| | | | | | | | | | | | | excavation and repacking of the soil below the foundation of the plant. It is not clear how deep this soil exchange/re-packing would require, but it would be well below the water table, and therefore ground water intrusion (during excavation) would make this very difficult and costly. Pilings are not an option to reach the bedrock. This makes the Putnam 3 site significantly more expensive to construct. (greater than $ 100 million range). |
| **Site Expandability –** Considers the capability of a given site location to be able to expand beyond two reactors, adding additional reactors and/or a co-located fossil station. | 10 | 10 | 100 | 3 | 30 | 6 | 60 | 10 | 100 | 3 | 30 | In general, the various sites are most limited by water resources as the sites are expanded beyond the original two reactor concept. In all cases there is sufficient undeveloped adjacent land to allow physical siting of additional reactors.<br><br>In regards to water, the Crystal River and Levy 2 sites would be not limited by water, noting the endless supply of water from the Gulf of Mexico.<br><br>{<br><br>}<br><br>{<br><br>} This is based on there lower volumetric |

| Siting Evaluation Criteria: Compliance with Progress Energy Business Strategic Considerations | Weight | Crystal River | | Dixie | | Highlands | | Levy 2 | | Putnam 3 | | Basis of Evaluation Finding |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | Score | Wgt'd Score | |
| | | | | | | | | | | | | flow rates and anticipated increase in water management control. |
| **Total Weighted Scores** | | | 1190 | | 1075 | | 1065 | | 1335 | | 1035 | |
| **Normalized Scores** | | | 89.1 % | | 80.5 % | | 79.8 % | | 100 % | | 77.5 % | |

# Attachment III – Transmission Study

The evaluation of transmission impact was based on analysis completed by Navigant Consulting to provide basis for differentiating each of the alternative sites in relation to transmission upgrade and tie-in costs, and other criteria to ensure best site was selected for the new nuclear plant location. Criteria included in the following matrix were weighted based on importance to Progress Energy generation and service territory requirements, and scored for each alternative site.

| **Siting Evaluation Criteria:** | | **Alternative Site Compliance** | | | | | | | | | | **Basis of Evaluation Finding** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Comparison of Transmission System Impacts** | | **Crystal River** | | **Dixie** | | **Highlands** | | **Levy 2** | | **Putnam 3** | | |
| | **Weight** | Score | **Wgt'd Score** | Score | **Wgt'd Score** | Score | **Wgt'd Score** | Score | **Wgt'd Score** | Score | **Wgt'd Score** | |
| **Transmission system Direct Connect and Upgrade Costs** Miles of transmission line to be constructed based on overloads and voltage violations. Interconnection availability, need for breaker bays and substations. | 10 | 10 | 100 | 9 | 90 | 3 | 30 | 10 | 100 | 4 | 40 | Transmission connection cost would be in range of $560-725 million at the northwestern sites (Crystal River, Levy 2, Dixie) and would be greater than $1 billion at Putnam 3 ($1,013 M) and Highlands ($1,370 M). Much of the cost at Putnam and Highlands results from need to upgrade the transmission grid outside Progress service territory to address contingencies that could occur when power from two-unit nuclear plant is injected into the system. |
| **Total Weighted Scores** | | | 100 | | 90 | | 30 | | 100 | | 40 | |
| **Normalized Scores** | | | 100 % | | 90% | | 30% | | 100 % | | 40% | |

Refer to **Attachment VI** for details of the Navigant Consulting transmission system impact study.

# Attachment IV – McCallum-Turner Siting Study

**Progress Energy**
**Florida Nuclear Power Plant**
**Siting Report**

**November 2006**

**Table of Contents**

1.0 Background & Introduction
2.0 Siting Process Overview
3.0 Regional Screening
4.0 Identification of Potential Sites
5.0 Evaluation of Potential Sites and Identification of Candidate Sites
6.0 Evaluation of Candidate Sites and Identification of Alternative Sites
7.0 Selection of Preferred Site

Appendix A – Results of ROI Screening
Appendix B – Weight Factor Development
Appendix C – Screening Criteria Evaluations
Appendix D – General Site Criteria Evaluations

## 1.0 Background & Introduction

Progress Energy (Progress) plans to prepare a Combined Operating License (COL) application for a new nuclear power plant in Florida. An early step in this process is selection of a site that will provide the geographic setting for the COL application. This *Siting Plan* provides a description of the bases, assumptions, and processes applied in selecting the Progress Florida COL site.

The overall objective of the siting process is to identify a nuclear power plant site that 1) meets Progress's business objectives for the COL project, 2) satisfies applicable Nuclear Regulatory Commission (NRC) site suitability requirements, and 3) is compliant with National Environmental Policy Act (NEPA) requirements regarding the consideration of alternative sites.

Definition of the Region of Interest (ROI) for the siting study began with the Progress (Florida) service territory, as depicted in Figure 1-1. In order to identify viable sites within reasonable distance of the service territory and to allow additional flexibility in consideration of siting trade-offs, the ROI was expanded one additional county around the periphery of the service territory in Florida. Counties added to the ROI in Florida include all or parts of Bay, Calhoun, Jackson, Suwannee, Columbia, Union, Bradford, Alachua, Clay, Putnam, Flagler, Volusia, Seminole,

Brevard, Indian River, Okeechobee, St. Lucie, Glades, Highlands, DeSoto, Hardee, Manatee, Pasco, Polk and Hillsborough; the resulting ROI is shown in Figure 1-2.

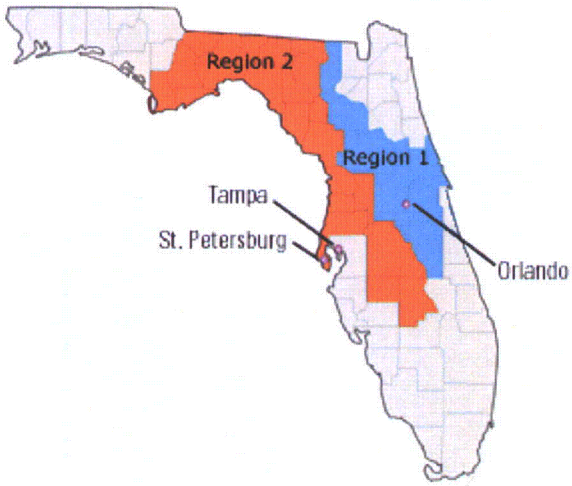



Figure 1-1 Progress Service Area - Florida

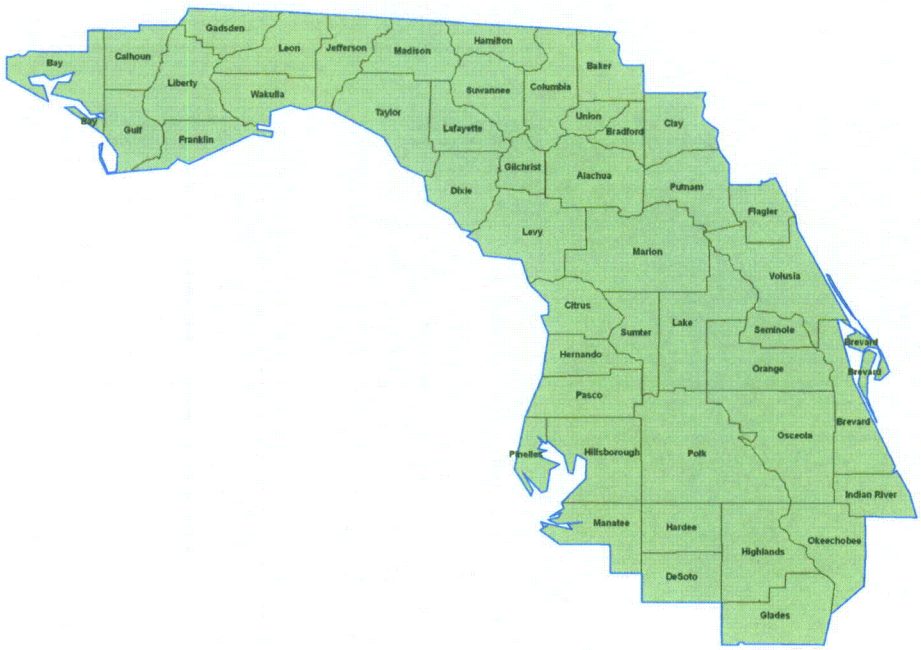



Figure 1-2 Florida Region of Interest

Prospective sites were evaluated based on the assumption that a twin-unit plant, AP1000 design will be built and operated; characteristics of the plant as they relate to site characteristics are documented in *AP1000 Siting Guide: Site Information for an Early Site Permit*, April 2003.

An overall description of the siting process appears in Section 2.0; additional detail on component steps in the site selection process and results of executing these steps is provided in succeeding sections. Additional technical detail on the site selection analysis appears in the Appendices.

## 2.0 Siting Process Overview

Site selection was conducted in accordance with the overall process outlined in the EPRI *Siting Guide: Site Selection and Evaluation Criteria for an Early Site Permit Application* (Siting Guide), March 2002. This process, as adapted for the Progress Florida site selection study, is depicted in Figure 2-1.

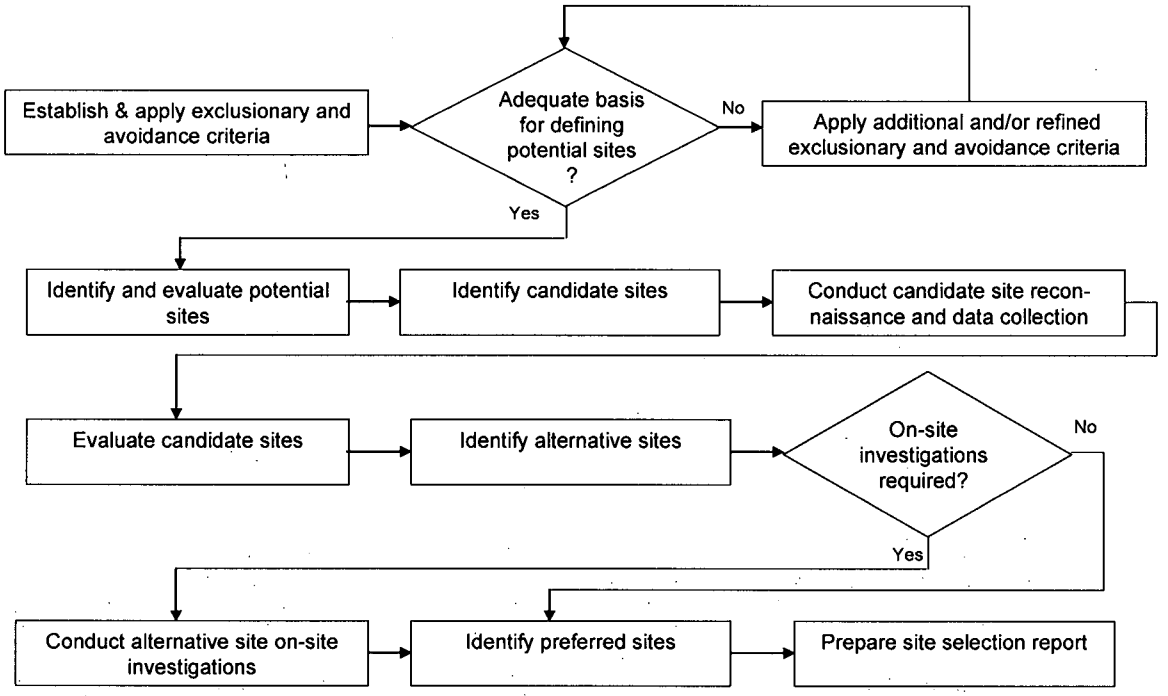



Figure 2-1 Site Selection Process Overview

The process begins with screening the ROI and then reducing the area under consideration in successive steps to potential sites (target number 18-20), candidate sites (6-8), alternative sites (3-4), and selection of the proposed site. Site suitability criteria listed in Chapter 3 of the Siting Guide were used as the overall framework for these evaluations. The proposed site was selected based on results of applying this process and consideration of how well the alternative sites satisfy Progress' business objectives for the Florida COL.

## 3.0 Regional Screening

Section 3.1 outlines the regional screening process. Section 3.2 describes the results of applying the process to the ROI and the identification of siting areas for identification of potential sites (Section 4.0).

### 3.1 Regional Screening Process

The first step in the site selection process was to screen the ROI to eliminate those areas that are either unsuitable or are significantly less suitable than other potential siting areas. Exclusionary and avoidance criteria identified in the Siting Guide were reviewed to identify those criteria and related physical features that provide insights into site suitability on an areal basis within the ROI.

Criteria applied to initial screening of the ROI are listed in Table 3-1. Additional information provided in Table 3-1 includes:

- Identification of data mapped
- Mapping criteria that define how suitability was determined based on mapped data (e.g., buffer zones)
- Suitability impact (i.e., identification of areas excluded from further study)
- Sources for identification and location of data to be mapped
- Comments and rationale for the application of mapped data in determining site suitability

Table 3-1 Process for ROI Screening

| Data Category | Mapped Data | Screening Criteria | Suitability Impact | Data Source(s) | Comments/Rationale |
|---|---|---|---|---|---|
| Geology/ Seismic | None (see Comments) | Areas within 25 miles of capable faults | Excluded | USGS Records Crystal River SARs | No surface faults appear on the Fla. State Geologic Map, and no capable structures are identified in the USGS database for Florida. There are no Class A or B features in Fla. Accordingly, no mapping criteria for geologic/seismic issues were applied in regional screening. |
| | | Areas within 5 miles of surface faults | Excluded | | |
| Population | Population Density | Counties where population density > 300 persons/$mi^2$ | Excluded | 2000 Census | Counties with > 300 persons/$mi^2$ likely have multiple imbedded areas >500 persons/$mi^2$. Siting within these areas would place the plant within an unacceptable distance of high population density areas. |
| Water Availability | Water sources (large rivers, coastal areas) | River reaches for which the average flow >10 times the plant makeup water requirement. | Excluded areas greater than 5 miles from water bodies that meet the mapping criteria | USGS Records | Rivers for which more than 10% of the average flow will be required for makeup water may present permitting or operational water supply problems. Pumping makeup water more than 5 miles imposes significant construction and operational costs and can result in operational risks. |
| Dedicated Land Use | Federal & State parks, monuments, wildlife areas, wilderness areas, wild and scenic rivers | Five mile buffer around each mapped feature. | Excluded | Federal and State Land Use Maps | A 5 mile buffer is expected to provide mitigation for potential visual impacts of a plant located near dedicated land uses. |
| Regional Ecological Features | Known, mapped wetlands, estuaries, designated T&E species habitat | Map areal extent of identified features | Excluded | | Development of a plant at the location of significant known areas of ecological importance could result in unacceptable environmental impacts and/or challenge as to whether obviously superior alternatives are available.<br>Permitting may be significantly more difficult in marsh or estuarine areas of ecological sensitivity. |
| Transmission | None (see Comments) | N/A | N/A | N/A | Load conditions on the existing transmission grid are such that a new plant would be connected directly to load centers rather than being tied into the existing system. Accordingly, transmission was not evaluated directly in regional screening, but was taken into account in later stages of the site selection process as a site-specific cost issue in terms of distance to the load centers in the Orlando and Tampa-St. Petersburg areas. |

Information defined for each of the Data Categories listed in Table 3-1 was displayed on separate maps of the ROI. These maps were combined using a simple overlaying technique to produce a composite screening map; Figure 3-1 provides a conceptual depiction of this process.

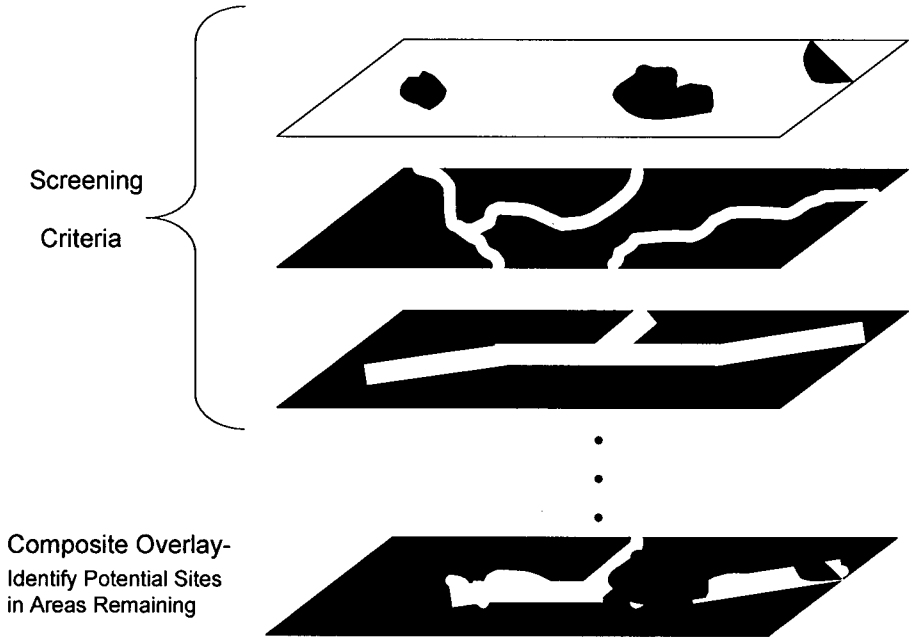



Figure 3-1 Conceptual Depiction of ROI Screening Process

Areas that remained eligible on the composite map (i.e., those not affected by any of the screening criteria) were reviewed to verify that the area remaining provided:

- Adequate land area for a reasonable number of potential sites
- Reasonable diversity in potential sites, in terms of alternative settings within the ROI
- Potential sites that are capable of satisfying Progress' business objectives for the Florida COL

Once this process was completed, the siting areas identified in the final composite screening result formed the basis for identification of potential sites.

## 3.2 Regional Screening Results

The regional screening process involved evaluation of the ROI against the criteria identified in Table 3-1. Results of this process are depicted in Figure 3-2; a series of maps depicting the geographic mapping of data applicable to individual criteria are provided in Appendix A.

Results yielded nine siting areas that were subsequently examined for potential site locations (Section 4.0). These siting areas generally took the form of land lying along

linear segments of the water bodies that are candidate cooling water sources, interrupted by areas excluded due to high population density, dedicated land use areas, or known locations of threatened or endangered species habitat (other than that for the Gulf sturgeon).

Identified siting areas (see Figure 3-2) were as follows:

- Western Panhandle along the Gulf Coast/St. Joseph Bay (Bay and Gulf Counties)
- Apalachicola and Chipola River basin areas (Calhoun, Gulf and Liberty Counties)
- Ochlockonee River basin along borders of Liberty, Franklin, Leon and Wakulla Counties
- Gulf Coast along Taylor and Dixie, Levy, Citrus and Hernando Counties
- Tampa Bay area/Manatee River south of Tampa/St. Petersburg area (Hillsborough and Manatee Counties)
- Suwannee River Basin (Dixie, Levy, Gilchrist, and Lafayette Counties)
- Kissimmee River near Lake Okeechobee (Highlands, Okeechobee and Glades Counties)
- St. Johns River Basin (Seminole, Volusia and Putnam Counties)
- Atlantic Coastal areas (numerous locations between Flagler County to the north and Indian River County to the south)

NOTE: Gulf sturgeon habitat extends to virtually all of the rivers feeding the Gulf of Mexico, as well as the Gulf itself. Although both the Suwanee and Apalachicola rivers are designated as sturgeon habitat (see Figure A-4), no significant impacts on this species are anticipated as a result of siting a nuclear plant on these rivers, because:

- Impacts would be limited to a very small fraction of the overall habitat
- Power plant development would not involve damming or otherwise impeding free range of the sturgeon on these rivers; these actions have been shown to be a significant primary cause of declines in sturgeon populations.
- Mitigative measure to ensure minimal impact on sturgeon habitat in the immediate vicinity of a power plant can be implemented.

For these reasons, and because eliminating all of Gulf sturgeon habitat would unnecessarily and severely limit the alternatives for power plant siting in the state of Florida (see Figure A-5), sites on water bodies other that the Apalachicola and Suwannee rivers would not be obviously superior to sites on these rivers, and these areas were included in the siting areas resulting from regional screening.

{Figure 3-2 Regional Screening Results Redacted}

Figure 3-2 Regional Screening Results

## 4.0 Identification of Potential Sites

Section 4.1 outlines the process used in identifying potential sites; Section 4.2 describes the results of applying of the process and the potential sites identified.

### 4.1 Potential Site Identification Process

Based on the composite ROI screening results, identification of potential sites was conducted in a two-phased process.

In the first phase, starting with the areas remaining after ROI screening, general siting areas were identified that allowed evaluation of siting trade-offs within the ROI. These siting areas were subdivisions of the areas identified in ROI screening and generally took the form of linear segments of land lying along water bodies that are candidate cooling water sources.

Considerations applied in selecting these areas were:

- At least one siting area for each major water source
- Proximity to transmission/load centers
- Avoidance of high population areas
- Consideration of ecologically sensitive and special designation areas, both along the coast and river corridors (e.g., Outstanding Florida waters, critical habitat of Federally protected gulf sturgeon).
- Proximity to transportation (e.g., rail lines, barge terminals)
- Diversity of siting areas within the large Florida ROI (e.g., coastal and inland waterways)
- Areas that are particularly compatible with the Progress business objectives

Siting areas having the above characteristics defined the geographic basis for identification of potential sites. Aerial photographs and other available geographic information were compiled for the siting areas and potential sites were identified. Potential sites were defined to be approximately 6000 acres in size, although favorable sites as small as 2000 acres were considered. Because the major siting trade-offs in the ROI were reflected in the siting areas selected (see paragraph above), the objective of this phase was to optimize potential sites within each area with respect to cost and environmental considerations. Additional factors taken into account in this process, as feasible, included:

- Flexibility to optimize site layout and design for cost minimization
- Flexibility to optimize site layout and design for avoidance or mitigation of environmental impacts
- Minimization of the number of land parcels contained within the site
- Optimization of site engineering factors, e.g., topography, foundation conditions, grading requirements

The output of this task was a list of potential sites to be evaluated with respect to the EPRI site suitability criteria, along with general boundaries of each site marked on aerial photos and/or maps of suitable scale.

## 4.2 Potential Site Identification Results

Functionally, potential site identification was conducted by a team comprised of Progress, McCallum-Turner, and Enercon personnel, who collaboratively identified potential sites within the siting areas

Geographic siting areas identified in the ROI screening were examined to identify sites that would be feasible for a new nuclear power plant, taking into account the considerations identified in Section 4.1. The following process was used:

1. 1:100,000-scale topographic maps (USGS) were examined to identify possible areas for potential sites within the previously screened siting areas; information on identified areas was supplemented using AAA Florida state map, 1998, and Florida County highway maps showing roads, towns, wetlands, dedicated lands, etc.
2. Low resolution aerial photographs of the areas were scanned using Google Earth® (http://earth.google.com/). Potential sites of approximately 6000 acres were identified by visually applying the criteria described below.
3. The latitude and longitude of the approximate center point of the potential site was noted.
4. Higher resolution USGS aerial photographs were inspected to confirm the location of nearby communities and the amount of development in the vicinity of the potential site as well as topography. (http://www.terraserver-usa.com). If a potential conflict was determined from information found on the USGS aerial photograph, the potential site was relocated, using the same resources and process.

The following criteria were applied, as feasible, in locating potential sites.

- Distance to existing transmission load centers in the Orlando and Tampa-St. Petersburg areas was minimized to the extent possible. (Load conditions on the existing grid are such that a new plant would likely be connected directly to load centers rather than being tied into the existing system.)
- Distance from towns, villages, and developed areas was maximized. Developed areas were identified from aerial photographs, county and topographic maps.
- Distance from industrial areas identifiable from the aerial photographs and topographic maps (e.g. airports, industrial complexes) was maximized.
- Whenever possible, land near existing water supply sources (rivers, lakes and coastal areas) was identified.
- The optimal topography was assumed to be a relatively flat area and above the 100-year floodplain for construction of the plant, adjacent to streams with surrounding topography showing some relief. Topographic maps and aerial photographs were qualitatively examined to find areas as close to this ideal as possible.
- Vehicle transportation access to the potential sites was qualitatively evaluated. Land areas around major highways were avoided; those within a reasonable distance of state highways were considered.

This process resulted in identification of 20 potential sites, identified on Figure 4-1.

{Figure 4-1 Potential Site Locations Redacted}

Figure 4-1 Potential Site Locations

## 5.0 Evaluation of Potential Sites and Identification of Candidate Sites

### 5.1 Potential Site Evaluation

The 20 potential sites were evaluated in more detail to identify a smaller set of candidate sites (nominally 6 – 8) for more detailed evaluation. Criteria used in this evaluation are listed in Table 5-1, along with the methodology applied to developing site ratings for each criterion. Criteria presented in Table 5-1 are derived from the larger set of more detailed criteria listed in Chapter 3 of the Siting Guide. These criteria provided insights into the overall site suitability trade-offs inherent in the available sites within the Progress Florida ROI and were designed to take advantage of data available at this stage of the site selection process.

The overall process for potential site evaluation was comprised of the following elements, each of which is described in the following paragraphs; results from applying the process are described in Section 5.2.

- Develop criterion ratings for each site
- Develop weight factors reflecting the relative importance of each criterion
- Develop composite site suitability ratings

Criterion Ratings – Each site was assigned a rating of 1 to 5 (1 = least suitable, 5 = most suitable) for each of the potential site evaluation criteria, using the rationale listed in Table 5-1. Information sources for these evaluations included publicly available data, information available from Progress files and personnel, and large scale satellite photographs.

Weight Factors - Weight factors reflecting the relative importance of these criteria were synthesized from those developed for previous nuclear power plant siting studies. The weight factors were originally derived using methodology consistent with the modified Delphi process specified in the Siting Guide. The process used in weight factor development is described in Appendix B; weight factor results (1 = least important, 10 = most important) are listed in the table below.

| Criterion Number | Criterion | Weight Factor |
|---|---|---|
| P1 | Cooling Water Supply | 9.8 |
| P2 | Flooding | 4.4 |
| P3 | Population | 8.6 |
| P4 | Hazardous Land Uses | 5.9 |
| P5 | Ecology | 5.6 |
| P6 | Wetlands | 5.6 |
| P7 | Railroad Access | 6.7 |
| P8 | Transmission Access | 7.4 |
| P9 | Land Acquisition | 6.3 |

Composite Suitability Ratings – Ratings reflecting the overall suitability of each site were developed by multiplying criterion ratings by the criterion weight factors and summing over all criteria for each site.

Table 5-1 Screening Criteria for Evaluation of Potential Sites

| Criterion Number | Criterion | Measure of Suitability | |
|---|---|---|---|
| | | Metric | Rating Rationale |
| P1 | Water Supply | Low flow for period of record. | 5 = no practical restriction<br>4 = > ~10 X requirement<br>3 = 2-10 X requirement<br>2 = 2 X requirement<br>1 = requirement near or below low flow |
| P2 | Flooding | Difference between mean site elevation and mean water elevation from USGS topographic maps, USGS gaging station measurements. | 5 = >20 feet<br>4 = <20 feet<br>3 = <10 feet<br>2 = <6 feet (or near swamp lands)<br>1 = <3 feet (or in swamp lands) |
| P3 | Population | Composite ratings were based on an average of following two features:<br>(1) Distance to nearest population center (high density based on screening map); and (2) population density of host county. In addition, a rating point was deducted or added, respectively, if the site is in a particularly densely populated area or not. | 5 = no population centers within 20 miles<br>4 = population centers within 20miles<br>3 = population centers within 15 miles<br>2 = population centers within 10 miles<br>1= population centers within 5 miles<br>County Population Density Ratings:<br>5 = < 50 persons per square mile<br>4 = < 100 psm<br>3 = < 250 psm<br>2 = < 500 psm<br>1 = > 500 psm<br>Point added if no densely populated area is found within 40 miles of the site; point deducted if a densely populated area is found within 15 miles of the site or if a large grouping of densely populated areas are located within 15-40 miles of the site. |
| P4 | Hazardous Land Uses | Number of airports, pipelines, and other known hazardous industrial facilities (including Air Force Bases and Kennedy Space Center/Cape | 5 = No hazardous land uses within 10 miles<br>4 = No major or multiple hazardous land uses within 5 miles; minor hazardous land uses between 5 and 10 miles (e.g., small airport or pipeline).<br>3 = No hazardous land uses within 5 miles; major or multiple (minor) hazardous land uses between 5 and 10 miles. |

| Criterion Number | Criterion | Measure of Suitability | |
|---|---|---|---|
| | | Metric | Rating Rationale |
| | | Canaveral), as determined from publicly available data. | 2 = Minor hazardous facilities within 5 miles.<br>1 = Major hazardous facilities within 5 miles. |
| P5 | Ecology | Number of Federal Threatened, Endangered and Rare Species in County (aquatic and terrestrial) | 5 = 0 species<br>4 = 1-5 species<br>3 = 6-10 species<br>2 = 11-15 species<br>1 = 16 or more species |
| P6 | Wetlands | Number of acres or percentage of wetlands within site area (acreages based on nominal 6000 acres). | 5 = < 60 acres (1 %)<br>4 = < 300 acres (5 %)<br>3 = < 600 acres (10%)<br>2 = < 1200 acres (15%)<br>1 = > 1200 acres |
| P7 | Railroad Access | Estimated cost of constructing rail spur to the site, based on distance in miles to the nearest in-service rail line. | Ratings computed by scaling costs from lowest (rating = 5) to highest (rating = 1).<br>Costs were estimated by applying an assumed unit cost of $ 2 million per mile to the distance measured to the nearest in-service rail line. |
| P8 | Transmission Access | Load conditions on the existing grid are such that a new plant would be connected directly to load centers rather than being tied into the existing system. Transmission access is evaluated in terms of distance to the load centers in the Orlando and Tampa – St. Petersburg areas. Measurements taken from | Ratings computed by scaling costs from lowest (rating = 5) to highest (rating = 1). Costs were estimated by applying an assumed unit cost of $ 4 million per mile ($2 million per mile x 2 to reflect double-circuit connections) to the measured distance. |

| Criterion Number | Criterion | Measure of Suitability | |
|---|---|---|---|
| | | Metric | Rating Rationale |
| | | each potentials site to each area, as well as a point midway between the two. Shortest distance of the three was used in ratings determination. | |
| P9 | Land Acquisition | Estimated cost of acquiring land (nominally 2000 acres) at the site, based on the following assumed cost/acre:<br>- very remote areas - $1500<br>- farm areas - $1500 - $3000 per acre [based on 2002 average cost of farmland per acre by county, US Census of Agriculture]<br>- land near population centers - $3,000 - $6,000 per acre | Ratings computed by scaling costs from lowest (rating = 5) to highest (rating = 1) |
| Note: Ratings for Criteria P7, P8, and P9 were developed by normalizing ratings for individual cost criteria across the total cost differentials across all sites, so that differences in ratings are proportional to relative differences in cost across all three criteria. | | | |

## 5.2 Identification of Candidate Sites

Results of applying the evaluation process described in Section 5.1 to the 20 potential sites are summarized in Table 5-2 and Figure 5-1; the technical basis for the individual criterion ratings is detailed in Appendix C.

Based on these results, the top 8 ranked sites were as follows:

| | |
|---|---|
| Taylor | Crystal River |
| Levy 2 | Gilchrist |
| Levy 3 | Dixie |
| Lafayette | Hillsborough |

The next four highest rated sites (Putnam 1, 2, & 3 and Manatee) were all rated about the same and very close to the eighth site (Hillsborough). Finally, Levy 1 and Highlands followed closely behind Manatee. Given the small difference in site suitability ratings between the top eight sites and the next four to six sites, additional issues were considered in the down-select process to ensure that important site suitability trade-offs could be evaluated in more detail. Additional considerations included in the final selection of candidate sites were:

- The value of further evaluating sites on additional water sources, (e.g., Putnam sites on the St. Johns River and the Highlands site on the Kissimmee River). Addition of sites using alternative water sources provides additional diversity in the decision process, especially given the large concentration of preliminary top-eight sites in the Suwannee River Basin (three).
- The possible advantages of sites with locations (e.g., Putnam and Highlands sites) that provide different transmission/system reliability trade-offs. Each of these sites provides a different direction of approach to the Progress load centers, as well as allowing connection routes that are remote from existing transmission corridors.

In addition, local knowledge of site issues was brought to bear to provide further insights into likely issues involved in plant development. This was accomplished by polling Progress personnel familiar with the public acceptance, environmental, transmission, economic development, and legislative issues in Florida. This group, through their ongoing involvement in dealing with these issues for current Progress operations, was able to provide characterizations of the difficulties such issues could raise at new power plant sites. Their characterizations were reported in the form of color "ratings" based on the potential for significant concerns in each of the five areas; these ratings were assigned based on the group's knowledge, experience, and best professional insights. Results of this analysis are shown in Table 5-3 (GREEN represents no known significant concerns, YELLOW represents potential concerns warranting caution, and RED represents potentially significant concerns with site development or approval).

As noted in Table 5-2, the potential sites were grouped in order of suitability, based on the composite suitability ratings and the overall level of concern identified for each; this grouping produced the following results:

| | |
|---|---|
| Group 1 – Minimal Concerns | Crystal River, Highlands, Levy-2, Levy-3 and Taylor |
| Group 2 – Intermediate Concerns | Putnam-1, -2, and -3 |
| Group 3 – One potential significant concern; favorable transmission | Dixie, Lafayette, Levy-1 and Gilchrist |
| Group 4 – One or more potential significant concerns; no favorable transmission | Calhoun, Gulf, Hillsborough, Liberty -1 & -2, Manatee, Seminole, Volusia |

Based on the composite site suitability ratings and the additional considerations noted above, the following eight sites were selected as candidate sites for more detailed evaluation. The full rationale for modification from the list of top eight sites above is provided below.

| | |
|---|---|
| Taylor | Crystal River |
| Levy 2 | Dixie |
| Levy 3 | Putnam 3 |
| Lafayette | Highlands |

**Putnam 3** – The Putnam site was added to the candidate list based on the fact that it allowed evaluation of an additional alternative water source (St. Johns River) and because its location provides for connecting with the Progress load centers from a different direction (from the northeast versus the northwest) than the sites in western Florida. Also, transmission lines from this location would be less likely to be subject to single-event failures because they would be more distant from existing transmission corridors. Also, the Putnam site composite ratings were only slightly lower than those for the seventh and eighth ranked sites (Dixie and Hillsborough). Putnam 3 was selected from the three sites in the county, based on subsequently identified advantages in rail and transmission access, as well as real estate considerations.

**Highlands** – The Highlands site was added to the candidate list for similar reasons, i.e., it allows evaluation of an additional water source (Kissimmee River) and another transmission scenario (connection from the southeast, with similar advantages in distance from existing major corridors).

**Gilchrist** – The Gilchrist site is located on the Santa Fe river, near its confluence with the Suwannee; either river could provide the water source for a nuclear power plant at the site, though flows in the Santa Fe are low enough such that a supplemental reservoir would be required. Because of this constraint in using the Santa Fe, because use of the Suwannee River at the site would require long water supply lines, and because the site does not offer significant advantages over the other two Suwannee sites (Lafayette and Dixie), the Gilchrist site was deferred from further consideration.

**Hillsborough** – The Hillsborough site was deferred from further consideration because of its proximity to the Tampa-St. Petersburg area, uncertainties about how water supply would be developed, and concerns about public support and the ability to provide effective transmission connections.

Table 5-2 Screening Criterion Ratings

| Potential Site Name | Criterion | | | | | | | | | Composite Site Rating |
|---|---|---|---|---|---|---|---|---|---|---|
| | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | P9 | |
| | Cooling Water Supply | Flooding | Popula-tion | Hazard-ous Land Uses | Ecology | Wetlands | Railroad Access | Trans-mission Access | Land Acquisi-tion | |
| | Weight Factor | | | | | | | | | |
| | 9.8 | 4.4 | 8.6 | 5.9 | 5.6 | 5.6 | 6.7 | 7.4 | 6.3 | |
| | Site Ratings | | | | | | | | | |
| Liberty 1 | 4 | 5 | 4 | 2 | 1 | 1 | 4.9 | 1.3 | 5.0 | 192.3 |
| Gulf | 5 | 1 | 5 | 2 | 1 | 1 | 5.0 | 1.0 | 5.0 | 191.6 |
| Calhoun | 2 | 1 | 4 | 2 | 2 | 2 | 4.8 | 1.1 | 5.0 | 164.8 |
| Liberty 2 | 1 | 5 | 4 | 4 | 1 | 3 | 4.9 | 1.6 | 5.0 | 188.3 |
| Taylor | 5 | 4 | 5 | 3 | 2 | 5 | 4.4 | 2.9 | 5.0 | 248.8 |
| Gilchrist | 3 | 5 | 4 | 2 | 4 | 3 | 4.9 | 3.1 | 5.0 | 224.0 |
| Levy 1 | 3 | 4 | 3 | 2 | 2 | 4 | 4.9 | 3.3 | 5.0 | 206.6 |
| Levy 2 | 5 | 4 | 4 | 2 | 2 | 4 | 4.9 | 3.9 | 5.0 | 239.2 |
| Crystal River | 5 | 3 | 4 | 1 | 2 | 4 | 4.9 | 3.9 | 5.0 | 229.1 |
| Lafayette | 3 | 5 | 5 | 2 | 3 | 4 | 4.8 | 3.1 | 5.0 | 232.2 |
| Dixie | 3 | 4 | 4 | 2 | 2 | 5 | 4.7 | 3.1 | 5.0 | 218.8 |
| Levy 3 | 5 | 2 | 5 | 2 | 2 | 4 | 4.7 | 3.5 | 5.0 | 234.7 |
| Hillsborough | 5 | 4 | 1 | 2 | 2 | 5 | 5.0 | 3.7 | 5.0 | 218.4 |
| Highlands | 2 | 4 | 3 | 2 | 1 | 5 | 4.9 | 3.6 | 5.0 | 199.1 |
| Manatee | 2 | 5 | 2 | 3 | 2 | 5 | 4.9 | 4.6 | 5.0 | 214.0 |
| Seminole | 2 | 4 | 1 | 2 | 3 | 4 | 4.9 | 4.7 | 5.0 | 195.6 |
| Volusia | 2 | 3 | 2 | 3 | 1 | 4 | 4.8 | 4.6 | 5.0 | 193.4 |
| Putnam 1 | 3 | 2 | 3 | 3 | 3 | 4 | 5.0 | 4.0 | 5.0 | 215.1 |
| Putnam 2 | 3 | 3 | 4 | 2 | 3 | 3 | 4.9 | 3.9 | 5.0 | 215.9 |
| Putnam 3 | 3 | 2 | 3 | 3 | 3 | 4 | 5.0 | 3.9 | 5.0 | 214.5 |

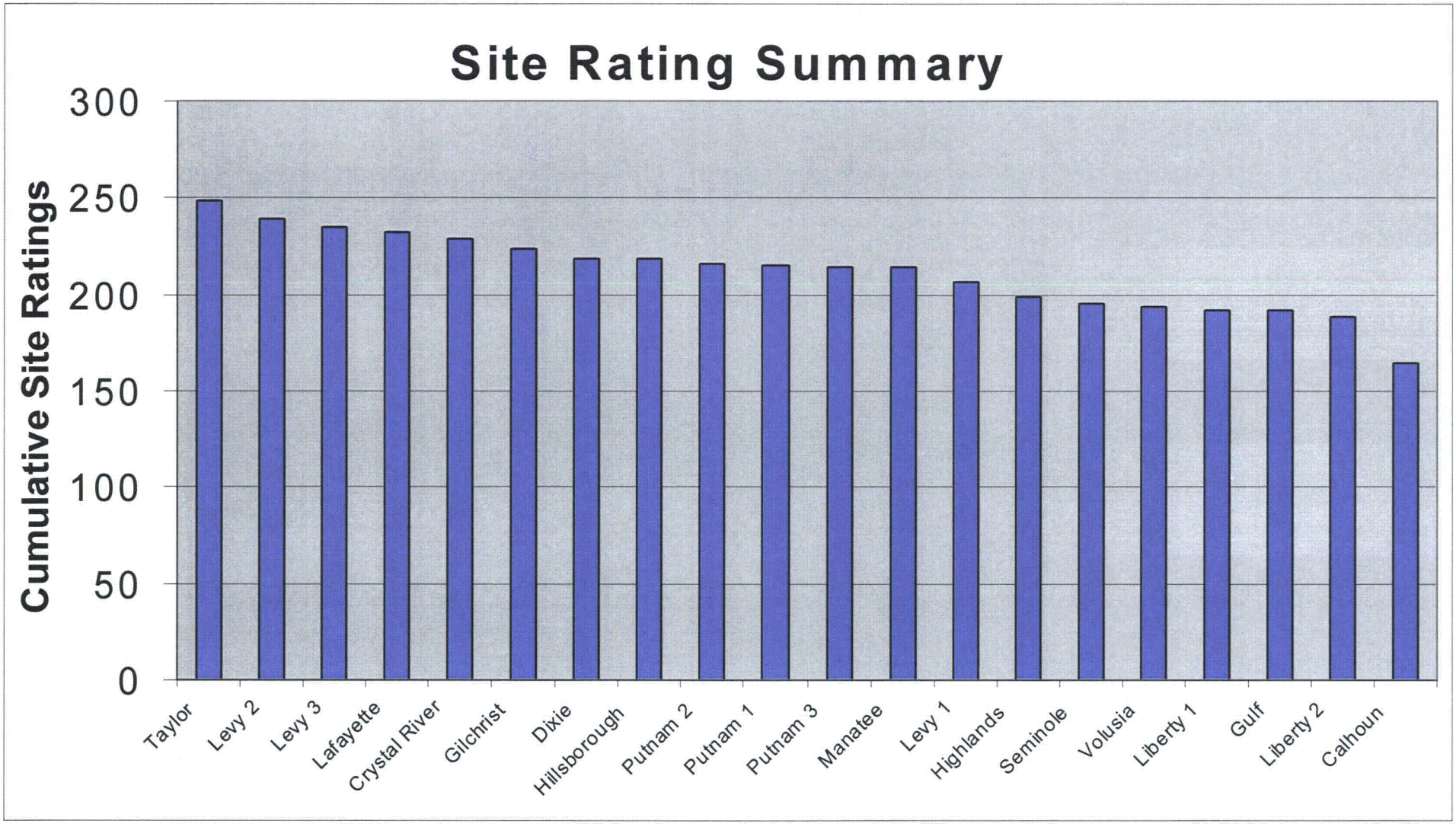



Figure 5-1 Summary of Potential Site Composite Ratings

Table 5-3 Potential Site Screening Evaluation Summary

| Potential Site | Water Source | Composite Rating (Rank) | Transmission | Community Support | Economic Development | Environment | Legislative |
|---|---|---|---|---|---|---|---|
| Calhoun | Chipola River | | | | | | |
| Crystal River | Gulf of Mexico | | | | | | |
| Dixie | Suwanee River | | | | | | |
| Gilchrist | Suwannee/Santa Fe | | | | | | |
| Gulf | Gulf of Mexico | | | | | | |
| Highlands | Kissimmee River | | | | | | |
| Hillsborough | Tampa Bay | | | | | | |
| Lafayette | Suwanee River | | | | | | |
| Levy 1 | Suwanee River | | | | | | |
| Levy 2 | Florida Barge Canal | | | | | | |
| Levy 3 | Gulf of Mexico | | | | | | |
| Liberty 1 | Apalachicola River | | | | | | |
| Liberty 2 | Ochlockonee River | | | | | | |
| Manatee | Manatee River | | | | | | |
| Putnam 1 | St. Johns River | | | | | | |
| Putnam 2 | St. Johns River | | | | | | |
| Putnam 3 | St. Johns River | | | | | | |
| Seminole | St. Johns River | | | | | | |
| Taylor | Gulf of Mexico | | | | | | |
| Volusia | St. Johns River | | | | | | |
| | | Green = top 8<br>Yellow = middle 6<br>Red = bottom 6 | **GREEN** = not aware of any significant concerns YELLOW = some or potential concerns; proceed with caution RED = significant concerns with site | | | | |

Summary

1. No reds, several greens – Crystal River, Highlands, Levy 2, Levy 3, Taylor (4 on Gulf of Mexico; 1 on Florida Barge Canal)
2. No reds, all yellow – Putnam 1, Putnam 2, Putnam 3 (3, all on St Johns River)
3. One Red with transmission green – Dixie, Gilchrist, Lafayette, Levy 1 (all on Suwannee River [Gilchrist also on Santa Fe])
4. One or more significant concerns; no favorable transmission – Calhoun, Gulf, Hillsborough, Liberty -1 & -2, Manatee, Seminole, Volusia

## 6.0 Evaluation of Candidate Sites and Identification of Alternative Sites

The objective of this component of the site selection process was to further evaluate the eight candidate sites and select a smaller set of alternative sites for detailed evaluation and ultimate selection of the preferred site for the Progress Florida COL. Section 6.1 outlines the process for evaluating candidate sites, while Section 6.2 describes process results and the selection of alternate sites.

### 6.1 Process for Evaluating Candidate Sites

General siting criteria used to evaluate the eight candidate sites were derived from those presented in Chapter 3.0 of the *Siting Guide: Site Selection and Evaluation Criteria for an Early Site Permit Application*, EPRI, Palo Alto, CA: 2002 (Siting Guide); criteria from the siting guide were tailored to reflect issues applicable to, and data available for, the Progress Florida candidate sites; a list of the criteria appears Table 6-1.

The overall process for applying the general site criteria was analogous to that described in Section 5.1 and was comprised of the following elements; results from applying the process are described in Section 6.2. Appendix D provides the detailed technical basis for the general site criteria ratings.

Criterion Ratings – Each site was assigned a rating of 1 to 5 (1 = least suitable, 5 = most suitable) for each of the potential site evaluation criteria, using the rationale described in Appendix D. Information sources for these evaluations included publicly available data, information available from Progress files and personnel, USGS topographic maps, information derived from site flyovers and from additional analyses conducted by Progress consultants/contractors.

Weight Factors - Weight factors reflecting the relative importance of these criteria were synthesized from those developed for previous nuclear power plant siting studies. The weight factors were originally derived using methodology consistent with the modified Delphi process specified in the Siting Guide and summarized in Appendix B. Weight factors used (1 = least important, 5 = most important) are listed Table 6-2.

Composite Suitability Ratings – Ratings reflecting the overall suitability of each site were developed by multiplying criterion ratings by the criterion weight factors and summing over all criteria for each site, as summarized in Table 6-2.

### 6.2 Candidate Sites Evaluation and Results

Results of applying the evaluation process described in Section 6.1 to the 8 candidate sites are summarized in Table 6-2 and Figure 6-1. Detailed discussions of the basis for site ratings for each of the criteria are provided in Appendix D.

Based on these results and on other considerations described below, a total of five alternative sites (Crystal River, Dixie, Levy 2, Putnam 3, and Highlands) were identified for further, more detailed evaluation and consideration. In addition to inclusion of several of the top-rated sites, this set of alternatives represents a good cross-section of siting trade-offs available within the ROI, including a variety of water sources, locations, and transmission connection strategies. In

addition to the composite ratings (Figure 6-1), the alternative site selection decision was also informed by site inspections conducted via helicopter over-flights.

Bases for deferral of the three sites not included as alternatives (Taylor, Levy 3 and Lafayette) were as follows.

**Taylor, Levy 3** – {

}

**Lafayette** – {

}

Table 6-1 General Site Criteria

| Siting Criteria | Siting Criteria |
|---|---|
| **Health and Safety Criteria: Accident Cause-Related Criteria** | **Environmental Criteria: Operational-Related Effects on Aquatic Ecology, cont'd.** |
| Geology and Seismology | Entrainment/Impingement effects |
| Cooling System Requirements: Cooling Water Supply | Dredging/Disposal Effects |
| Cooling Water System: Ambient Temperature Requirements | **Environmental Criteria: Operational-Related Effects on Terrestrial Ecology** |
| Flooding | Drift Effects on Surrounding Areas |
| Nearby Hazardous Land Uses | **Socioeconomic Criteria** |
| **Health and Safety Criteria: Accident Effects-Related** | Socioeconomic – Construction Related Effects |
| Extreme Weather Conditions | Socioeconomics – Operation |
| Population | Environmental Justice |
| Emergency Planning | Land Use |
| Atmospheric Dispersion | **Engineering and Cost Related Criteria: Health and Safety Related Criteria** |
| **Health and Safety Criteria: Operational Effects-Related** | Water Supply |
| Surface Water- Radionuclide Pathway | Pumping Distance |
| Groundwater Radionuclide Pathway | Flooding |
| Air Radionuclide Pathway | Civil Works |
| Air-Food ingestion pathway | Brownfield Site Remediation (if applicable) |
| Surface Water – food radionuclide pathway | Water Supply |
| Transportation Safety | **Engineering and Cost: Transportation or Transmission Related Criteria** |
| **Environmental Criteria: Construction-Related Effects on Aquatic Ecology** | Railroad Access |
| Disruption of Important Species/Habitats | Highway Access |
| Bottom Sediment Disruption Effects | Barge Access |
| **Environmental Criteria: Construction-Related Effects on Terrestrial** | Transmission Cost and Market Price Differentials |
| Disruption of Important Species/Habitats and Wetlands | **Engineering and Cost- Related Criteria: Related to Socioeconomic & Land Use** |
| Dewatering Effects on Adjacent Wetlands | Topography |
| **Environmental Criteria: Operational-Related Effects on Aquatic Ecology** | Land Rights |
| Thermal Discharge Effects | Labor Rates |

Table 6-2 General Site Criteria Ratings for Candidate Sites

| Criteria | | | Crystal River | | Dixie | | Highlands | | Lafayette | | Levy 2 | | Levy 3 | | Putnam 3 | | Taylor | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Weight | | | | | | | | | | | | | | | | |
| | | Factor | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score |
| 1.1.1 | Geology/Seismology | **3.77** | 5 | 18.85 | 5 | 18.85 | 5 | 18.85 | 5 | 18.85 | 5 | 18.85 | 5 | 18.85 | 5 | 18.85 | 5 | 18.85 |
| 1.1.2 | Cooling System Requirements | **3.27** | 4 | 13.08 | 3 | 9.81 | 2 | 6.54 | 3 | 9.81 | 3 | 9.81 | 4 | 13.08 | 3 | 9.81 | 4 | 13.08 |
| 1.1.3 | Flooding | **2.4** | 2 | 4.8 | 3 | 7.2 | 1 | 2.4 | 2 | 4.8 | 5 | 12 | 3 | 7.2 | 5 | 12 | 3 | 7.2 |
| 1.1.4 | Nearby Hazardous Land Uses | **3.35** | 1 | 3.35 | 3 | 10.05 | 3 | 10.05 | 3 | 10.05 | 2 | 6.7 | 3 | 10.05 | 2 | 6.7 | 3 | 10.05 |
| 1.1.5 | Extreme Weather Conditions | **2.36** | 2 | 4.72 | 3 | 7.08 | 3 | 7.08 | 3 | 7.08 | 3 | 7.08 | 1 | 2.36 | 3 | 7.08 | 2 | 4.72 |
| 1.2 | Accident Effect Related | **4.09** | 4 | 16.36 | 4 | 16.36 | 4 | 16.36 | 4 | 16.36 | 3 | 12.27 | 4 | 16.36 | 4 | 16.36 | 4 | 16.36 |
| 1.3.1 | Surface Water – Radionuclide Pathway | **2.5** | 5 | 12.5 | 4 | 10 | 4 | 10 | 4 | 10 | 5 | 12.5 | 5 | 12.5 | 4 | 10 | 5 | 12.5 |
| 1.3.2 | Groundwater Radionuclide Pathway | **2.55** | 2 | 5.10 | 2 | 5.10 | 3 | 7.65 | 2 | 5.10 | 2 | 5.10 | 2 | 5.10 | 2 | 5.10 | 1 | 2.55 |
| 1.3.3 | Air Radionuclide Pathway | **2.5** | 5 | 12.5 | 4 | 10 | 4 | 10 | 4 | 10 | 4 | 10 | 5 | 12.5 | 4 | 10 | 5 | 12.5 |
| 1.3.4 | Air-Food Ingestion Pathway | **2.5** | 4 | 10 | 4 | 10 | 1 | 2.5 | 3 | 7.5 | 3 | 7.5 | 3 | 7.5 | 3 | 7.5 | 5 | 12.5 |
| 1.3.5 | Surface Water-Food Radionuclide Pathway | **2.41** | 5 | 12.05 | 4 | 9.64 | 3 | 7.23 | 4 | 9.64 | 5 | 12.05 | 5 | 12.05 | 4 | 9.64 | 5 | 12.05 |

| Criteria | | | Crystal River | | Dixie | | Highlands | | Lafayette | | Levy 2 | | Levy 3 | | Putnam 3 | | Taylor | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Weight | | | | | | | | | | | | | | | | |
| | | Factor | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score |
| 1.3.6 | Transportation Safety | **2.14** | 3 | 6.42 | 3 | 6.42 | 3 | 6.42 | 3 | 6.42 | 3 | 6.42 | 3 | 6.42 | 3 | 6.42 | 3 | 6.42 |
| 2.1.1 | Disruption of Important Species/Habitats | **2.64** | 2 | 5.28 | 2 | 5.28 | 5 | 13.2 | 3 | 7.92 | 2 | 5.28 | 1 | 2.64 | 3 | 7.92 | 1 | 2.64 |
| 2.1.2 | Bottom Sediment Disruption Effects | **2.14** | 3 | 6.42 | 2 | 4.28 | 2 | 4.28 | 2 | 4.28 | 2 | 4.28 | 3 | 6.42 | 2 | 4.28 | 3 | 6.42 |
| 2.2.1 | Disruption of Important Species/Habitats and Wetlands | **3.18** | 3 | 9.54 | 4 | 12.72 | 3 | 9.54 | 3 | 9.54 | 3 | 9.54 | 2 | 6.36 | 3 | 9.54 | 3 | 9.54 |
| 2.2.2 | Dewatering Effects on Adjacent Wetlands | **2.77** | 3 | 8.31 | 4 | 11.08 | 4 | 11.08 | 3 | 8.31 | 4 | 11.08 | 2 | 5.54 | 3 | 8.31 | 4 | 11.08 |
| 2.3.1 | Thermal Discharge Effects | **3.64** | 3 | 10.92 | 2 | 7.28 | 3 | 10.92 | 3 | 10.92 | 3 | 10.92 | 3 | 10.92 | 3 | 10.92 | 3 | 10.92 |
| 2.3.2 | Entrainment/Impingement Effects | **3.23** | 3 | 9.69 | 3 | 9.69 | 4 | 12.92 | 3 | 9.69 | 3 | 9.69 | 3 | 9.69 | 3 | 9.69 | 3 | 9.69 |
| 2.3.3 | Dredging/Disposal Effects | **2.36** | 3 | 7.08 | 2 | 4.72 | 2 | 4.72 | 2 | 4.72 | 2 | 4.72 | 3 | 7.08 | 2 | 4.72 | 3 | 7.08 |
| 2.4.1 | Drift Effects on Surrounding Areas | **2.36** | 2 | 4.72 | 3 | 7.08 | 3 | 7.08 | 3 | 7.08 | 2 | 4.72 | 2 | 4.72 | 3 | 7.08 | 2 | 4.72 |
| 3.1.1 | Socioeconomics – Construction – Related Effects | **2** | 4 | 8.0 | 3 | 6.0 | 5 | 10.0 | 3 | 6.0 | 4 | 8.0 | 4 | 8.0 | 5 | 10.0 | 3 | 6.0 |
| 3.3.1 | Environmental Justice | **1.95** | 5 | 9.75 | 5 | 9.75 | 5 | 9.75 | 5 | 9.75 | 5 | 9.75 | 5 | 9.75 | 5 | 9.75 | 5 | 9.75 |
| 3.4.1 | Land Use | **3.8** | 2 | 7.6 | 2 | 7.6 | 3 | 11.4 | 2 | 7.6 | 2 | 7.6 | 2 | 7.6 | 4 | 15.2 | 2 | 7.6 |

| Criteria | | | Crystal River | | Dixie | | Highlands | | Lafayette | | Levy 2 | | Levy 3 | | Putnam 3 | | Taylor | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Weight | | | | | | | | | | | | | | | | |
| | | Factor | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score | Rating | Score |
| 4.1.1 | Water Supply | **3.7** | 5 | 18.5 | 3 | 11.1 | 2 | 7.4 | 3 | 11.1 | 4 | 14.8 | 5 | 18.5 | 4 | 14.8 | 5 | 18.5 |
| 4.1.2 | Pumping Distance | **3.05** | 5 | 15.25 | 4 | 12.2 | 3 | 9.15 | 5 | 15.25 | 3 | 9.15 | 1 | 3.05 | 3 | 9.15 | 1 | 3.05 |
| 4.1.3 | Flooding | **2.9** | 2 | 5.8 | 3 | 8.7 | 2 | 5.8 | 2 | 5.8 | 5 | 14.5 | 3 | 8.7 | 5 | 14.5 | 3 | 8.7 |
| 4.1.5 | Civil Works | **3.4** | 3 | 10.2 | 3 | 10.2 | 3 | 10.2 | 4 | 13.6 | 3 | 10.2 | 3 | 10.2 | 3 | 10.2 | 3 | 10.2 |
| 4.2.1 | Railroad Access | **2.6** | 5 | 13.0 | 3 | 7.8 | 4 | 10.4 | 3 | 7.8 | 4 | 10.4 | 3 | 7.8 | 5 | 13.0 | 3 | 7.8 |
| 4.2.2 | Highway Access | **2.8** | 5 | 14.0 | 5 | 14.0 | 5 | 14.0 | 5 | 14.0 | 5 | 14.0 | 5 | 14.0 | 5 | 14.0 | 5 | 14.0 |
| 4.2.3 | Barge Access | **2.85** | 5 | 14.25 | 2 | 5.7 | 2 | 5.7 | 2 | 5.7 | 2 | 5.7 | 3 | 8.55 | 4 | 11.4 | 3 | 8.55 |
| 4.2.4 | Transmission Access | **4.8** | 3 | 14.4 | 4 | 19.2 | 4 | 19.2 | 4 | 19.2 | 5 | 24 | 4 | 19.2 | 4 | 19.2 | 4 | 19.2 |
| 4.3..1 | Topography | **2.55** | 5 | 12.75 | 5 | 12.75 | 5 | 12.75 | 4 | 10.2 | 5 | 12.75 | 5 | 12.75 | 3 | 7.65 | 4 | 10.2 |
| 4.3.2 | Land Rights | **2.75** | 5 | 13.75 | 4 | 11 | 3 | 8.25 | 1 | 2.75 | 2 | 5.5 | 1 | 2.75 | 3 | 8.25 | 4 | 11 |
| 4.3.3 | Labor Rates | **3.3** | 5 | 16.5 | 4 | 13.2 | 3 | 9.9 | 3 | 9.9 | 5 | 16.5 | 5 | 16.5 | 2 | 6.6 | 3 | 9.9 |
| | Composite Site Rating | | 355 | | 332 | | 323 | | 317 | | 343 | | 325 | | 346 | | 335 | |

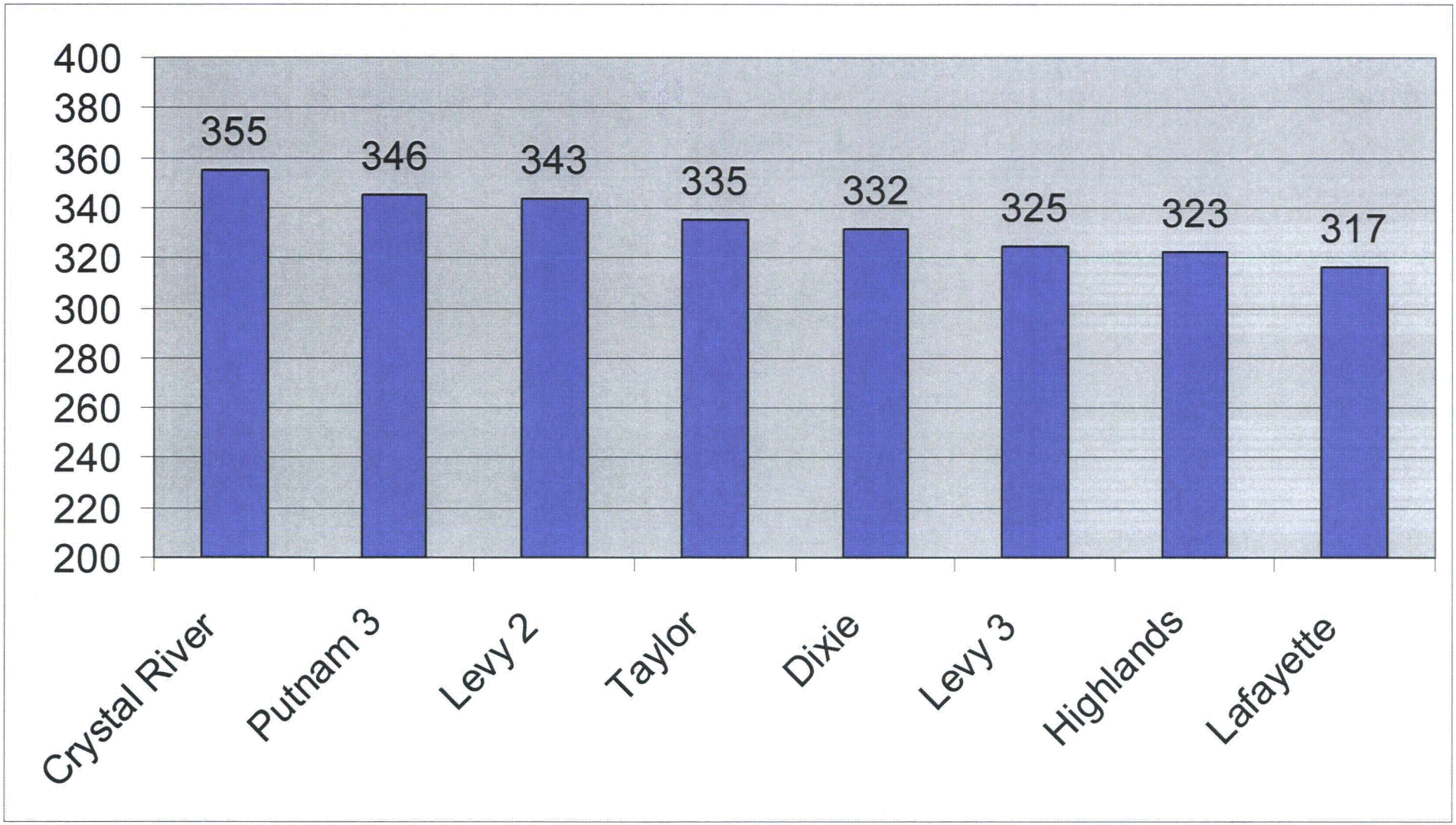



Figure 6-1 Composite General Site Suitability Ratings for Candidate Sites

## 7.0 Selection of Preferred Site

As discussed in Section 6.2, the Crystal River, Dixie, Highlands, Levy and Putnam sites were selected as alternative sites for the Progress COL. (Note: The numerical designator for Levy 2 and Putnam 3 is dropped for purposes of this discussion, so they become "Levy" and "Putnam," respectively.) Based on the evaluations leading to this selection, all of these sites appear to be feasible locations for a new nuclear power plant.

To support selection of a proposed site for the COL from this set of alternatives, additional and more detailed studies of the alternative sites were conducted. Scope and results of these studies are described in Section 7.1. The rationale for selecting a proposed site from the alternatives considered is provided in Section 7.2.

### 7.1 Detailed Study of Alternative Sites

The objective of the more detailed studies for the five alternative sites studies was to provide additional insights into site conditions and/or to provide further confidence on specific issues that were viewed important to the COL site decision. Results of the detailed alternative site studies are summarized in Table 7-1 and are discussed in the paragraphs below.

Transmission Evaluations – Transmission analysis (*Transmission Impact Study in Support of Site Selection for a Florida Nuclear Power Plant*, Navigant Consulting, Inc., June 30, 2006) of the alternative sites involved the following:

- Establishing tentative interconnection points for each site on the existing Progress grid,
- Defining the new transmission lines required to carry power from a new two-unit nuclear plant to the connection points,
- Conducting load flow studies to identify contingencies that could occur with the new plant connected to the grid,
- Identifying system upgrades necessary to handle the additional new plant capacity on the grid, and
- Developing cost estimates for the new transmission lines and upgrades.

Results of these studies (summarized in Table 7-1) indicated that transmission connection cost would be in the range of $560–725 million(M) at the northwestern sites (Crystal River, Dixie, Levy) and would be greater than $1 billion at Putnam ($1,013 M) and Highlands ($1,370 M). Much of the additional cost at the latter two sites results from the need to upgrade the transmission grid outside the Progress service territory to address contingencies that could occur when power from a new two-unit nuclear plant is injected into the system.

Geotechnical Studies – Overall, the geotechnical studies conducted to further evaluate the alternative sites involved a review of existing geotechnical information (e.g., available near-site boring and geological information) and on-site borings at Dixie, Highlands, Levy and Putnam. Geophysical studies were also conducted at Levy. Scope and results of these studies are reported in *Technical Memorandum: Geological and Geotechnical Evaluations and Recommendations for Siting of a Nuclear Power Plant in Florida*, CH2MHill, Inc., September 26, 2006.

Geotechnical characteristics at Crystal River were assumed to be acceptable for new nuclear units, because the site is located near the area investigated for the existing unit, and subsurface conditions are expected to be similar to those underlying the existing plant.

Based on the preliminary subsurface on-site investigations, the most suitable site among the five greenfield sites appears to be Levy. {

}

Environmental – On-site reconnaissance of the greenfield alternative sites (Dixie, Highlands, Levy, Putnam) was conducted to determine whether there were any ecological resources or conditions that would present significant impacts or that would indicate significant differences in the ecological suitability between the alternative sites. Going beyond the aerial reconnaissance conducted in support of the evaluation of candidate sites (Section 6.0), these surveys were conducted via vehicle drive-over and examination on foot.

All of the sites examined have been previously disturbed via farming or mining activity and/or are in the process of being logged. All sites appeared to contain some wetland areas (less than 5% of total site area), although very little standing water was actually observed during the site visits. The wetland areas were mostly characterized by depressed areas which tend to be wet (usually due to surface aquifer inflow) except during drought conditions and typically exhibit vegetation that is characteristic of wetlands. Except for {
} all of the greenfield sites exhibit land cover typical of open forested pineland. {

}

Crystal River is characterized by industrial development with both nuclear and fossil power plants and associated support facilities present, although areas that would be newly disturbed in adding to new units at Crystal River are ecologically similar to the greenfield sites.

All sites are located near special ecologically protected areas (1-5 miles) and all lie in the range of threatened or endangered species which could occur onsite (e.g., eastern indigo snake), although none were observed during the site visits

Overall, from an ecological perspective, Crystal River is judged to be slightly superior to the other sites as a result of existing land use and the Highlands site less suitable because of the local intensive dairy and beef farming. The other three sites are considered to be similar and there is no compelling basis for differentiating among them from an ecological perspective.

Reliability – Adding two nuclear units (nominal total power output of 2200 MW) to the existing units at Crystal River would result in the concentration of a large fraction of Progress' total generation capacity at one site subject to disruption by a single weather event (e.g., hurricane, tornado, storm surge flooding). Vulnerability of the site to such events extends to the transmission lines, because connections for the new units would be co-located with existing transmission lines. Because the loss of total generation at Crystal River would create a major electrical disaster for the Progress service territory, a qualitative reliability analysis of the alternative sites was conducted to determine their relative suitability – as compared to Crystal River – in mitigating this concern.

Two initiating weather events were considered in this analysis: storm surge flooding and hurricane or tornado wind damage. The potential for flooding was considered greatest at near-coastal and lower elevation sites, with sites farther inland and with higher elevations ranked higher. For outages initiated by a single weather event, the greater the distance from Crystal River, the less likely a single-event outage would be. Any separation from Crystal River would provide significant decrease in risk that all units could be taken off line by a single event, but additional distance provides additional risk mitigation.

Both Highlands and Putnam are located relatively far from the coast and are therefore expected to provide significant redundancy relative to the storm surge risk if the two new units are located at Crystal River. Of the two sites, Highlands is considered more favorable due to its higher elevation and because of the potential for tidal run-up from the Atlantic Ocean on the St. Johns River at Putnam. Both Dixie and Levy are located farther from the coast than Crystal River; site elevation at Levy is greater than that at Dixie, and therefore would be expected to provide additional protection from storm surge flooding.

Both Dixie and Levy, because of their physical separation from Crystal River, have reduced risk of disturbance from other weather events; Dixie rates slightly higher from this perspective because of its increased distance from the existing plant site. Both Putnam and Highlands are located far from Crystal River; siting the new units at either of these locations would minimize risk of outages from a single initiating weather event.

Land Acquisition – Because of the aggressive schedule for plant development mandated by the Progress business objectives for the new units, there is no potential for accommodating significant delays (e.g., condemnation process under eminent domain) in obtaining access to land for a new site. Accordingly, a land availability analysis was conducted through a third-party real estate agent to identify parcels of adequate size at each of the sites and to make initial contact with landowners to arrange for site access for the on-site geotechnical investigation and to assess availability of the property for sale.

Results of this analysis are summarized in Table 7-1. {

}

Table 7-2 Summary Results of Alternative Site Studies

| | Site Suitability Issue | | | | |
|---|---|---|---|---|---|
| | **Transmission** | **Geotechnical** | **Environmental** | **Reliability** | **Land Acquisition** |
| **Basis for Evaluation →** **Site ↓** | Detailed transmission impact study (Navigant 2006) | On-site geotechnical investigations, including borings and geophysical studies (CH2MHill 2006) [Relative suitability scale of 1 to 5, with 5 representing most suitable and 1 the least suitable.] | On-site reconnaissance survey of greenfield sites, visual evaluation of plant communities; Crystal River characterization based on other existing data | Qualitative analysis of risk factors for reliable power production and supply (e.g., vulnerability to single-event failures) | { } |
| Crystal River | Upgrade costs conservatively estimated to be similar to those for Levy 2 – $563 M[1] | Geotechnical characteristics assumed to be acceptable; similar to those underlying existing plant. | Site is characterized by industrial development with both nuclear and fossil power plants and associated support facilities. | Site is subject to coastal storm surge flooding and concentration of additional units at the site would subject the entire service territory to a single weather event failure. Co-location of new units at the site does not allow for any physical separation of transmission lines from new units from existing corridors and would subject them to single weather event failures over several miles of co-located lines. | { } |
| Dixie | Estimated total direct connect plus upgrade costs: $726M[1] | Recommended Suitability Index = 2. This site exhibits numerous sinkholes and depressions. The rock quality at this site is mostly very poor to poor with many voids and cavities. | Site is characterized primarily by open forested pineland with some evidence of timbering. Some wetlands indicator species apparent on relatively small fraction of site area. | Site would not be subject to storm surge flooding and would significantly reduce the possibility that new units would be affected by a single weather event with Crystal River. Location allows additional separation of transmission lines over that provided by Levy. | { } |

| | Site Suitability Issue | | | | |
|---|---|---|---|---|---|
| | **Transmission** | **Geotechnical** | **Environmental** | **Reliability** | **Land Acquisition** |
| Highlands | Estimated total direct connect plus upgrade costs: $1,370M. Includes significant ($592M) upgrades due to contingencies in FPL service area required[2]. | Recommended Suitability Index = 1. This site is assigned the lowest suitability index because of the thickness and variable consistency of soil deposits underneath it. | Mostly agricultural cleared land; significant sod farming on site and significant cattle and dairy farming near the site. | Site would not be subject to storm surge flooding and would almost eliminate the possibility that new units would be affected by a single weather event with Crystal River.<br>Location provides for a different directional approach to load centers for transmission lines as compared to Crystal River, Dixie and Levy. | { } |
| Levy | Estimated total direct connect plus upgrade costs: $653M. | Location 1 (Rayonier property): Recommended Suitability Index = 3. This site has a small variation in the top of limestone bedrock elevation, although rock quality is not good, i.e., very poor to fair rock.<br>Location 2 (Lybass property): Recommended Suitability Index = 3. This site seems to have slightly better rock quality than Levy Location 1. However, the top of limestone bedrock elevation is erratic across this site, with a boring advanced to a depth of 100 feet without encountering bedrock. | Site is characterized primarily by forested pineland but has been heavily timbered with associated disturbance to site ecology. Some wetlands indicator species apparent on relatively small fraction of site area. | Site would not be subject to storm surge flooding and would reduce the possibility that new units would be affected by a single weather event with Crystal River. Location allows some separation of transmission lines as compared to Crystal River. | { } |

| | Site Suitability Issue | | | | |
|---|---|---|---|---|---|
| | **Transmission** | **Geotechnical** | **Environmental** | **Reliability** | **Land Acquisition** |
| Putnam | Estimated total direct connect plus upgrade costs: $1,013M. Includes significant ($590M) upgrades due to contingencies in FPL service area required[2]. | Recommended Suitability Index = 1. This site is assigned the lowest suitability index because of the thickness and variable consistency of soil deposits underneath it. | The majority of the site area has been disturbed from previous mining activities and much of the land reclaimed. Currently characterized by mostly open canopied forest. Some wetland areas noted on relatively small fraction of site area. | Site would be less subject to storm surge flooding (tidal effects in St. Johns river from Atlantic storms) and would significantly reduce the possibility that new units would be affected by a single weather event with Crystal River.<br>Location provides for a different directional approach to load centers for transmission lines as compared to Crystal River, Dixie and Levy 2. | { } |

1 – Connection to Crystal River East substation with 800MW assumed to be installed at the proposed Taylor Energy Complex.
2 – Upgrades in service areas other than the Progress service area are subject to additional schedule uncertainty because of the need to negotiate upgrade strategies with other transmission operator(s)

7.2 Selection of Proposed Site

Results of the detailed evaluations, as described in Section 7.1, indicate that:

- All five alternative sites may be viable locations for a nuclear power plant,
- There are significant differences in their suitability with regard to some siting issues, and
- Additional study would be required to confirm site suitability at several of the sites.

Specifically, additional study would be required to confirm whether geotechnical conditions at Dixie, Highlands and Putnam are suitable, { } The level of effort and schedule required to complete the necessary confirmation studies are not compatible with schedule requirements for the Progress COL, especially since final resolution could result in additional licensing requirements (e.g., modified design certification to address deep foundations).

Accordingly, Crystal River and Levy were identified as the primary alternatives locations for the Progress COL. Given this result, selection of a preferred site for the Progress COL was based on:

1. Satisfying Progress's overall business objectives for the COL, and
2. Enhancing the ability of future nuclear units that would be built and operated at the site to provide Progress customers with reliable, cost-effective electric service.

Based on these considerations, Levy was selected as the proposed site for the Progress COL. Levy is characterized by:

- Transmission costs as low as any of the sites under consideration,
- Significant reliability advantages over Crystal River, both with respect to storm surge flooding and the potential for single weather event outages,
- Geotechnical conditions that allow design of plant foundations that will support deployment of a certified design without a requirement for deep foundations,
- Ecological conditions similar to those at other alternative sites, and
- Adequate water supply (from the Gulf of Mexico through the Florida Barge Canal), without impacting riverine surface water resources.

Although many of these characteristics also apply to Crystal River, the severe potential impact of single-event weather-related outages if all units were placed at that site drives the decision to select the Levy site. The significant additional reliability inherent in developing a new nuclear plant at Levy – versus Crystal River – is the primary reason for selecting Levy over the existing plant site for the Progress Florida COL.

## Appendix A

## Results of ROI Screening

Figures provided in this Appendix provide results of areal screening of the Progress Florida Region of Interest (ROI) in accordance with the screening criteria described in Section 3.0. The following information related to identification of candidate areas is contained in this appendix:

- Figure A-1, Dedicated Land Use (Land Use and Land Cover) – Includes lands designated by the Department of Defense (Navy, Air Force, and Army Corps of Engineers, National Seashores, Wilderness Areas, National Park Service, and National Forest Service, National Wildlife Refuges, and State Parks and Recreation Areas.
- Figure A-2, Hydrology – Includes the Gulf and Atlantic coasts and rivers whose annual average daily flow exceeds 1,300 cubic feet per second; a five mile buffer along these features was considered available for plant siting.
- Figure A-3, Population Density – Includes areas of population density less than 300 persons per square mile, measured on a census block basis.
- Figure A-4, Endangered Species – Mapped habitat for Gulf sturgeon, manatee, piping plovers, and snail kite.
- Figure A-6, Composite Map – Depicts the spatial relationship of the selected areas to the features (criteria) considered, with gulf sturgeon habitat eliminated.
- Figure A-7, Composite Map – Depicts the spatial relationship of the selected areas to the features (criteria) considered.

{Figure A-1 Redacted}

{Figure A-2: Redacted}

{Figure A-3: Redacted}

{Figure A-4: Redacted}

{Figure A-5: Redacted}

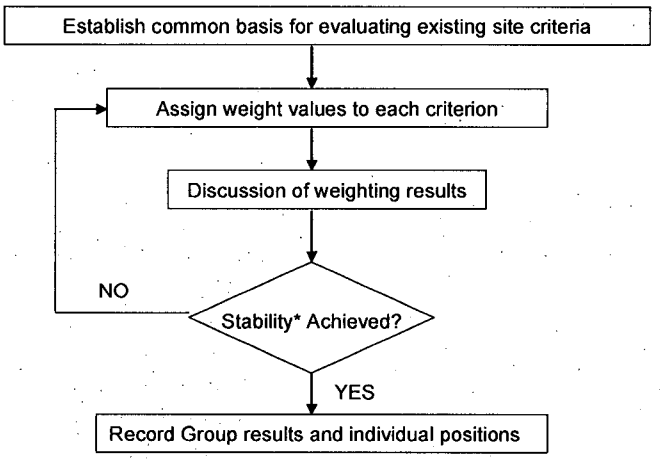
{Figure A-6: Redacted}

## Appendix B
## Weight Factor Development

For the potential and candidate site evaluation phases of the site selection process (Sections 5.0 and 6.0, respectively, weight factors were developed that reflect the relative importance of individual criteria in judging the overall suitability of nuclear power plant sites. As described in these sections, weight factors were used in developing overall composite suitability ratings for sites under consideration.

Methods used to develop weight factors for criteria applied at these phases of the site selection process are described below.

Weight factors reflecting the relative importance of both the screening and general site criteria used to evaluate potential sites were developed consistent with the modified Delphi method suggested in the EPRI Siting Guide. The process used for weight factor development is summarized in the diagram below.




An industry committee of multi-disciplinary experts in the areas of nuclear power plant site suitability issues met to execute this process; the committee was comprised of subject matter experts in water use and availability, real estate, ecology, transmission, land use, health & safety, socioeconomics and public relations.

A brief description of the screening site criteria, data inputs, and rating methodologies was provided. Weights were assigned on a 1 to 10 scale (or 1 to 5), with the highest numerical values being most important and the lowest being least. Individual weight scores were averaged to arrive at group composite criterion weighting factors.

After the first round of voting, a group discussion was held in which each committee member provided the rationale for their weight factor assignments. Following this discussion, another polling of the group was conducted and committee members modified their weights, as they

deemed appropriate, based on the discussions and arguments presented after the first round. Additional discussions were held after each succeeding round of voting. When no member of the committee indicated that they had been persuaded to change their weight assignments from one round to the next, the Delphi session was terminated.

Weight factors resulting from this process are listed in Tables 5-2 and 6-2 for the screening criteria and general site criteria, respectively.

## APPENDIX C

### Technical Basis for Screening Criterion Ratings

| Criterion P1 – Cooling Water Supply | | | | |
|---|---|---|---|---|
| Site | Water Source | Low Flow[1] | Rating[3] | Comments and Notes |
| Liberty 1 | Apalachicola River | 5000 cfs | 4 | { } |
| Calhoun | Chipola River | 300 cfs | 2 | { } |
| Gulf | Gulf of Mexico | OK | 5 | { } |
| Liberty 2 | Ochlockonee River | 150 cfs | 1 | { .} |
| Taylor | Gulf of Mexico | OK | 5 | { } |
| Gilchrist | Suwannee River<br>Santa Fe River | 1050 cfs<br>450 cfs | 3[4] | { } |
| Levy 1 | Suwannee River | 1100 cfs | 3 | { } |
| Levy 2 | Florida Barge Canal | OK | 5 | { } |
| Crystal River | Gulf of Mexico | OK | 5 | { } |
| Lafayette | Suwannee River | 1100 cfs | 3 | { } |
| Dixie | Suwannee River | 1100 cfs | 3 | { } |
| Levy 3 | Gulf of Mexico | OK | 5 | { } |
| Hillsborough | Tampa Bay | OK | 5 | { } |
| Highlands | Kissimmee River | TBD | 2* | { } |
| Seminole | St. Johns River | 217[2] | 2* | { } |
| Volusia | St. Johns River | 217[2] | 2* | { } |
| Putnam 1 | St. Johns River | TBD[2] | 3* | { } |
| Putnam 2 | St. Johns River | TBD[2] | 3* | { } |
| Putnam 3 | St. Johns River | TBD[2] | 3* | { } |
| Manatee | Manatee River | 1 cfs | 2* | { } |

**Criterion P1 – Cooling Water Supply**

| Site | Water Source | Low Flow[1] | Rating[3] | Comments and Notes |
|---|---|---|---|---|

1. USGS Daily Streamflow Data. Low Flow of record except as noted.
2. Flow in the St. Johns River System is complex and requires additional evaluation. {

}

3. Ratings are indicative of publicly available flow data only. Florida water policy dictates that consumptive water use be approved by the appropriate water management district. Relative difficulty of obtaining approvals has not been evaluated at this time.
4. Gilchrist rating based on utilizing either Suwanee or Santa Fe Rivers, not both.

* indicates a preliminary rating, based on available data; additional information from water management districts will be required to fully characterize water source feasibility.

| Criterion P2 – Flooding | | |
|---|---|---|
| Site | Rating | Comments and Discussion |
| Liberty 1 | 5 | { .} |
| Calhoun | 1 | { } |
| Gulf | 1 | { } |
| Liberty 2 | 5 | { } |
| Taylor | 4 | { } |
| Gilchrist | 5 | { } |

| Criterion P2 – Flooding | | |
|---|---|---|
| Site | Rating | Comments and Discussion |
| Levy 1 | 4 | { } |
| Levy 2 | 4 | { } |
| Crystal river | 3 | { } |
| Lafayette | 5 | { } |
| Dixie | 4 | { } |
| Levy 3 | 2 | { } |
| Hillsborough | 4 | { } |

| Criterion P2 – Flooding | | |
|---|---|---|
| Site | Rating | Comments and Discussion |
| Highlands | 4 | { } |
| Seminole | 4 | { } |
| Volusia | 3 | { } |
| Putnam 1 | 2 | { } |
| Putnam 2 | 3 | { } |
| Putnam 3 | 2 | { } |
| Manatee | 5 | { } |

| Criterion P2 – Flooding | | |
|---|---|---|
| Site | Rating | Comments and Discussion |
| References: Google Earth, http://earth.google.com; NOAA Stream and Flood Data, http://www.weather.gov/ahps/.<br>USGS Topographic Maps (1 x 100,000 metric); U.S. Flood Hazard Areas, http://www.esri.com/hazards/makemap.html. | | |

| Criterion P3 – Population | | | | | |
|---|---|---|---|---|---|
| Site | Rating | | | | Comments and Discussion |
| | County Density | Closest Pop Center | Average Rating* | Adjusted Rating** | |
| Liberty 1<br>7021(county Pop);<br>8.4 (persons per square mile, psm) | 5 | 1 | 4 | 4 | { } |
| Calhoun<br>13,017; 22.9 psm | 5 | 2 | 4 | 4 | { } |
| Gulf<br>13,332; 24 psm | 5 | 2 | 4 | 5 | { } |
| Liberty 2<br>7021; 8.4 psm | 5 | 4 | 4 | 4 | { } |

| Criterion P3 – Population | | | | | |
|---|---|---|---|---|---|
| Site | Rating | | | | Comments and Discussion |
| | County Density | Closest Pop Center | Average Rating* | Adjusted Rating** | |
| Taylor 19,256; 18.5 psm | 5 | 4 | 5 | 5 | { } |
| Gilchrist 14,437; 41.4 psm | 5 | 3 | 4 | 4 | { } |
| Levy 1 34,450; 30.8 psm | 5 | 1 | 3 | 3 | { } |
| Levy 2 34,450; 30.8 psm | 5 | 2 | 4 | 4 | { } |
| Crystal River 118,085; 202.3 psm | 3 | 4 | 4 | 4 | { } |
| Lafayette 7022; 12.9 psm | 5 | 5 | 5 | 5 | { } |
| Dixie 13,827; 19.6 psm | 5 | 2 | 4 | 4 | { } |
| Levy 3 34,450; 30.8 psm | 5 | 4 | 5 | 5 | { } |

| Criterion P3 – Population | | | | | |
|---|---|---|---|---|---|
| Site | Rating | | | | Comments and Discussion |
| | County Density | Closest Pop Center | Average Rating* | Adjusted Rating** | |
| Hillsborough 998,948; 950.6 psm | 1 | 2 | 2 | 1 | { } |
| Highlands 87,366; 85 psm | 4 | 2 | 3 | 3 | { } |
| Seminole 365,196; 1184.9 psm | 1 | 3 | 2 | 1 | { } |
| Volusia 443,343; 401.9 psm | 2 | 3 | 3 | 2 | { } |
| Putnam 1 70.423; 97.6 psm | 4 | 1 | 3 | 3 | { } |
| Putnam 2 70,423; 97.6 psm | 4 | 3 | 4 | 4 | { } |

| Criterion P3 – Population | | | | | |
|---|---|---|---|---|---|
| Site | Rating | | | | Comments and Discussion |
| | County Density | Closest Pop Center | Average Rating* | Adjusted Rating** | |
| Putnam 3<br>70,423; 97.6 psm | 4 | 2 | 3 | 3 | { } |
| Manatee<br>264,002; 356.3 psm | 2 | 3 | 3 | 2 | { } |

* Average rating of rating based on host county population density and rating based on distance to nearest population center (identified using screening map and USGS 100,000 scale topographic map).

References: US Census Bureau (2000 Census data); Enercon Screening Map; USGS 100,000 scale topographic maps; AAA Flordia State Map

| Criterion P4 – Hazardous Land Uses | | |
|---|---|---|
| Site | Rating | Comments and Discussion |
| Liberty 1 | 2 | { } |
| Calhoun | 2 | { } |
| Gulf | 2 | { } |
| Liberty 2 | 4 | { } |
| Taylor | 3 | { } |

| Criterion P4 – Hazardous Land Uses | | |
|---|---|---|
| Site | Rating | Comments and Discussion |
| Gilchrist | 2 | { } |
| Levy 1 | 2 | { } |
| Levy 2 | 2 | { } |
| Crystal River | 1 | { } |

| Criterion P4 – Hazardous Land Uses | | |
|---|---|---|
| Site | Rating | Comments and Discussion |
| Lafayette | 2 | { } |
| Dixie | 2 | { } |
| Levy 3 | 2 | { } |
| Hillsborough | 2 | { } |

| Criterion P4 – Hazardous Land Uses | | |
|---|---|---|
| Site | Rating | Comments and Discussion |
| Highlands | 2 | { } |
| Seminole | 2 | { } |
| Volusia | 3 | { } |
| Putnam 1 | 3 | { } |

| Criterion P4 – Hazardous Land Uses | | |
|---|---|---|
| Site | Rating | Comments and Discussion |
| Putnam 2 | 2 | {<br><br>} |
| Putnam 3 | 3 | {<br><br>} |
| Manatee | 3 | {<br><br>} |
| References:<br>Google Earth, http://earth.google.com.<br>USGS Topographic Maps (1 x 100,000 metric) | | |

| Criterion P5 – Ecology/Federal RTE Species (by County) | | |
|---|---|---|
| Site | Rating | Comments and Discussion |

| Criterion P5 – Ecology/Federal RTE Species (by County) | | |
|---|---|---|
| Site | Rating | Comments and Discussion |
| Liberty 1 | 1 | { } |
| Calhoun | 2 | { } |
| Gulf | 1 | { } |
| Liberty 2 | 1 | { } |
| Taylor | 2 | { } |
| Gilchrist | 4 | { } |
| Levy 1 | 2 | { } |

| Criterion P5 – Ecology/Federal RTE Species (by County) | | |
|---|---|---|
| Site | Rating | Comments and Discussion |
| Levy 2 | 2 | { } |
| Crystal River | 2 | { } |
| Lafayette | 3* | { } |
| Dixie | 2 | { } |
| Levy 3 | 2 | { } |
| Hillsborough | 2 | { } |
| Highlands | 1 | { } |
| Seminole | 3 | { } |

| Criterion P5 – Ecology/Federal RTE Species (by County) | | |
|---|---|---|
| Site | Rating | Comments and Discussion |
| Volusia | 1 | { } |
| Putnam 1 | 3 | { } |
| Putnam 2 | 3 | { } |
| Putnam 3 | 3 | { } |
| Manatee | 2 | { } |

* Based on rating scale, site should receive a 4 rating; however, it is reduced an addition point because the site is within Gulf Sturgeon critical habitat.

Note: All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. NOAA Fisheries and the U.S. Fish and Wildlife Service (USFWS) share jurisdiction for sea turtles, with NOAA Fisheries having lead responsibility for the conservation and recovery of sea turtles in the marine environment and USFWS on turtles on nesting beaches.

References:

US Fish and Wildlife Service, North Florida Field Office [www.fws.gov/northflorida/CountyList – data provided by county; supposed to be current through September or December 2005, depending on county, but no mention of critical habitat for Gulf Sturgeon even though it is found within this office's jurisdiction]. [Includes all counties in study area except as noted below.

US Fish and Wildlife Service, Panama City [www.fws.gov/panamacity/resources/specieslist.html] – for Calhoun, Gulf and Liberty Counties [pdf files; no date]

US Fish and Wildlife Service, Vero Beach/South Florida [www.fws.gov/verobeach/species_lists/countyfr.html] – for Highlands County; June 2000]

| Criterion P6 – Wetlands | | | |
|---|---|---|---|
| Site | Wetland Acres (within 6000-acre site area) | Rating | Comments and Discussion |
| Liberty 1 | 3842 | 1 | |
| Calhoun | 927 | 2 | |
| Gulf | 4500 | 1 | Could not search wetland polygon data. Estimated from local map. |
| Liberty 2 | 302 | 3 | |
| Taylor | 48 | 5 | |
| Gilchrist | 766 | 3 | |
| Levy 1 | 83 | 4 | |
| Levy 2 | 61 | 4 | |
| Crystal River | 123 | 4 | |
| Lafayette | 140 | 4 | |
| Dixie | 50 | 5 | |
| Levy 3 | 242 | 4 | |
| Hillsborough | 45 | 5 | |
| Highlands | 58 | 5 | Could not compile local map. Wetland polygon data from radius search only. |
| Seminole | 64 | 4 | Could not compile local map. Wetland polygon data from radius search only. |
| Volusia | 84 | 4 | Could not compile local map. Wetland polygon data from radius search only. |
| Putnam 1 | 65 | 4 | |
| Putnam 2 | 584 | 3 | |
| Putnam 3 | 105 | 4 | |
| Manatee | 56 | 5 | Could not compile local map. Wetland polygon data from radius search only. |
| Reference: From NWI Wetlands Mapper. Does not include riverine wetlands. | | | |

| Criterion P7 – Railroad Access | | |
|---|---|---|
| Site | Rating | Comments and Discussion |
| Liberty 1 | See Table 2. | { } |
| Calhoun | See Table 2. | { } |
| Gulf | See Table 2. | { } |
| Liberty 2 | See Table 2. | { } |
| Taylor* | See Table 2. | { } |
| Gilchrist | See Table 2. | { } |
| Levy 1 | See Table 2. | { } |
| Levy 2 | See Table 2. | { } |
| Crystal River | See Table 2. | { } |
| Lafayette | See Table 2. | { } |
| Dixie | See Table 2. | { } |
| Levy 3* | See Table 2. | { } |

| Criterion P7 – Railroad Access | | |
|---|---|---|
| Site | Rating | Comments and Discussion |
| Hillsborough | See Table 2. | { } |
| Highlands | See Table 2. | { } |
| Seminole | See Table 2. | { } |
| Volusia | See Table 2. | { } |
| Putnam 1 | See Table 2. | { } |
| Putnam 2 | See Table 2. | { } |
| Putnam 3 | See Table 2. | { } |
| Manatee | See Table 2. | { } |
| References:<br>North American Railroad Map, version 2.14, http://www.RailroadMap.com.<br>Tiger Map Server, http://tiger.census.gov/cgi-bin/mapbrowse-tbl.<br>USGS Topographic Maps (1 x 100,000 metric) | | |

| Criterion P8 – Transmission Access | | |
|---|---|---|
| Load conditions on the existing grid are such that a new plant would be connected directly to load centers rather than being tied into the existing system. Transmission access is evaluated in terms of distance to the load centers in the Orlando and Tampa / St. Petersburg areas and to a center point between the two. Final rating was based on the shortest distance of the three. | | |
| Site | Rating | Comments and Discussion |
| Liberty 1 | See Table 2. | } |
| Calhoun | See Table 2. | { } |
| Gulf | See Table 2. | { } |
| Liberty 2 | See Table 2. | { } |
| Taylor | See Table 2. | { } |
| Gilchrist | See Table 2. | { } |
| Levy 1 | See Table 2. | { } |
| Levy 2 | See Table 2. | { } |
| Crystal River | See Table 2. | { } |
| Lafayette | See Table 2. | { } |

| **Criterion P8 – Transmission Access** | | |
|---|---|---|
| Load conditions on the existing grid are such that a new plant would be connected directly to load centers rather than being tied into the existing system. Transmission access is evaluated in terms of distance to the load centers in the Orlando and Tampa / St. Petersburg areas and to a center point between the two. Final rating was based on the shortest distance of the three. | | |
| Site | Rating | Comments and Discussion |
| Dixie | See Table 2. | { } |
| Levy 3 | See Table 2. | { } |
| Hillsborough | See Table 2. | { } |
| Highlands | See Table 2. | { } |
| Seminole | See Table 2. | { } |
| Volusia | See Table 2. | { } |
| Putnam 1 | See Table 2. | { } |
| Putnam 2 | See Table 2. | { } |
| Putnam 3 | See Table 2. | { } |
| Manatee | See Table 2. | { } |
| References:<br>Google Earth, http://earth.google.com | | |

| Criterion P9 – Land Acquisition | | |
|---|---|---|
| Site | Rating | Comments and Discussion |
| Liberty 1 | See Table 2. | { } |
| Calhoun | See Table 2. | { } |
| Gulf | See Table 2. | { } |
| Liberty 2 | See Table 2. | { } |
| Taylor | See Table 2. | { } |
| Gilchrist | See Table 2. | { } |
| Levy 1 | See Table 2. | { } |
| Levy 2 | See Table 2. | { } |
| Crystal River | See Table 2. | { } |
| Lafayette | See Table 2. | { } |
| Dixie | See Table 2. | { } |
| Levy 3 | See Table 2. | { } |
| Hillsborough | See Table 2. | { } |
| Highlands | See Table 2. | { } |
| Seminole | See Table 2. | { } |
| Volusia | See Table 2. | { } |
| Putnam 1 | See Table 2. | { } |
| Putnam 2 | See Table 2. | { } |
| Putnam 3 | See Table 2. | { } |
| Manatee | See Table 2. | { } |
| Reference: U.S. Census of Agriculture – 2002 average farm value by county | | |

# APPENDIX D

## Technical Basis for General Site Criteria Evaluations

General siting criteria used in the Progress nuclear power plant siting study were derived from those presented in Chapter 3.0 of the *Siting Guide: Site Selection and Evaluation Criteria for an Early Site Permit Application*, EPRI, Palo Alto, CA: 2002 (Siting Guide).

The following information is provided in this appendix for each criterion:

- Objective – what aspect of site suitability is being measured
- Evaluation approach – technical basis/methodology used to develop site ratings from available data
- Discussion – Data and information available for the eight sites under consideration
- Results – Ratings results and rationale

The following candidate nuclear plant (NP) sites were evaluated for the Progress Combined Operating License (COL) application in Florida: Crystal River (Citrus County), Dixie, Highlands, Lafayette, Levy 2, Levy 3, Putnam 3, and Taylor.

Note that the sites were evaluated with respect to the following siting criteria during the initial screening phase: cooling water supply, flooding, population, hazardous land uses, ecology, wetlands, railroad access, transmission access, and land acquisition; the evaluation and results of this phase are presented in the screening criteria report. For several of these criteria (e.g., transmission access), the screening criteria evaluations are used in the general site criteria evaluations reported in this appendix. For these criteria, a brief summary and the final ratings are presented in this appendix for completeness. For other screening criteria (e.g., flooding, population and ecology), additional data were evaluated or additional detail are provided in this appendix, as appropriate, to provide a more comprehensive analysis of the full suite of EPRI siting general site criteria and sub-criteria.

Technical bases for site ratings developed for each of the general site criteria are provided in the following sections. Criterion/section numbering is designed to reflect section numbers in Chapter 3 of the EPRI Siting Guide where the criteria is discussed, e.g., Criterion 1.1.1 - Geology/ Seismology appears in Section 3.1.1.1 of the Siting Guide.

# 1. HEALTH AND SAFETY CRITERIA

## 1.1 ACCIDENT CAUSE-RELATED

### 1.1.1 Geology/Seismology

Objective - The objective of this criterion is to rank the suitability of the eight candidate sites with respect to the geologic and seismic setting, using to the extent possible the same or similar criteria previously utilized to rank other potential sites.

Evaluation approach - A numerical system of weights and ratings based upon suitability criteria were assigned to each geologic/seismic category, including vibratory ground motion, capable tectonic sources, surface faulting and deformation, geologic hazards, and soil stability (Sections 1.1.1.1 through 1.1.1.8) and used to compute (i.e., rate times weight) an index number for each category. (To enable the comparative evaluation of sites, the weights and rating schemes adopted herein are the same for all eight sites. The index numbers for each site were summed to compute a GEOL Index (Tables 1.1-1 through 1.1-8). The range of GEOL indexes was then used to develop a rating system for candidate sites (Section 1.1.1.6). The sites were rated on a scale of 1 to 5, based on the GEOL scale, with the most suitable sites receiving an overall rating of 5. Weights and the basis for deriving correlating site ratings from the GEOL scale are discussed with respect to each of the sub-criteria in the sections below. NOTE: Within the GOEL index sub-criteria an inverse rating basis is used, with lower numbers indicating most suitable and 5 the least suitable; for the composite GEOL index, higher numbers indicate less suitable sites.

#### 1.1.1.1 Vibratory Ground Motion

Objective – The purpose of this sub-criterion is to rate sites according to the expected magnitude of ground motion that may be expected. As long as expected peak ground accelerations do not exceed that for the certified designs under consideration there are no exclusionary or avoidance components to this sub-criterion.

Evaluation approach – Peak ground acceleration (PGA) is a measure of the maximum force experienced by a small mass located at the surface of the ground during an earthquake and it is an index of hazard for some structures. The units for PGA are in percent of gravity (%g); i.e. an acceleration of 0.30g is expressed as 30%g. PGA provided herein, as for other sites, is for a probability of exceedance (PE) of 2% in 50 years (once in 2500 years). PGA data for eight Progress Florida sites were obtained from the USGS National Seismic Hazards Mapping Project, 2002 (http://eqint.cr.usgs.gov/eq/html/lookup-2002-interp.html).

Discussion/Results – The locations evaluated for each of the eight candidate sites have PGA values as shown in the table below.

**Probabilistic ground motion values in %g**

| Site | PGA (%g) with 2% PE in 50 years |
|---|---|
| Crystal River | 3.87 |
| Dixie | 4.20 |
| Highlands | 3.58 |
| Lafayette | 4.68 |
| Levy 2 | 4.02 |
| Levy 3 | 3.89 |
| Putnam 3 | 5.29 |
| Taylor | 4.08 |

The following table shows the assigned weight and rating scheme for vibratory ground motion.

| Weight | Range | Rating | Index Range |
|---|---|---|---|
| | PGA (%g) | | |
| 5 | 0 – 3 | 1 | 0 - 50 |
| | 3 – 6 | 2 | |
| | 6 – 9 | 3 | |
| | 9 – 12 | 4 | |
| | 12 – 15 | 5 | |
| | 15 – 18 | 6 | |
| | 18 – 21 | 7 | |
| | 21 – 24 | 8 | |
| | 24 – 27 | 9 | |
| | 27 – 30 | 10 | |

Based upon the information provided in Tables 1.1-1 through 1.1-8 each candidate site receives the following ratings based on the computed index numbers for vibratory ground motion.

| Site | Rating | Index No. |
|---|---|---|
| Crystal River | 2 | 10 |
| Dixie | 2 | 10 |
| Highlands | 2 | 10 |
| Lafayette | 2 | 10 |
| Levy 2 | 2 | 10 |
| Levy 3 | 2 | 10 |
| Putnam 3 | 2 | 10 |
| Taylor | 2 | 10 |

1.1.1.2 Capable Tectonic Structure or Source

Objective – No absolute exclusionary criteria have been identified. Capable tectonic structures are addressed as avoidance criteria, therefore, the objective of this sub-criterion is to identify the existence of capable or potentially capable tectonic structures within 200 miles of each site. Candidate sites that are furthest from capable or potentially capable tectonic structures are considered more suitable.

Evaluation Approach – A database compiled by USGS (Quaternary Fault and Fold Database, 2003; http://qfaults.cr.usgs.gov/) and Crone and Wheeler (2000) were utilized to identify capable and potentially capable tectonic sources within 200 miles of each of the four candidate sites. It was assumed that capable and potential capable tectonic sources, which are Quaternary features that may generate strong ground motion, fall into two categories as defined by Crone and Wheeler (2000, p5):

> Class A features have good geologic evidence of tectonic origin and are potentially seismogenic; and
>
> Class B features have geologic evidence that supports the existence of a seismogenic fault or suggests Quaternary deformation, but the currently available geologic evidence for Quaternary tectonic activity is less compelling than for a Class A feature.

Discussion/Results – There are no Class A, B, or C features within 200 miles of the candidate sites. {

} The following table shows the assigned weight and the rating scheme for capable tectonic sources.

| Weight | Range (miles) | Rating | Index Range |
|---|---|---|---|
| Class A | None within 200 mi radius | 0 | 0 – 10 |
| 2 | greater than 100 to 200 mi | 2 | |
| | greater than 50 to 100 mi | 3 | |
| | greater than 25 to 50 mi | 4 | |
| | 0 to 25 mi | 5 | |
| Class B | None within 200 mi radius | 0 | 0 – 5 |
| 1 | greater than 100 to 200 mi | 2 | |
| | greater than 50 to 100 mi | 3 | |
| | greater than 25 to 50 mi | 4 | |
| | 0 to 25 mi | 5 | |

Based on the information provided in Tables 1.1-1 through 1.1-8, each candidate site receives the following ratings and computed index numbers.

**Class A**

| Site | Rating | Index No. |
|---|---|---|
| Crystal River | 0 | 0 |
| Dixie | 0 | 0 |
| Highlands | 0 | 0 |
| Lafayette | 0 | 0 |
| Levy 2 | 0 | 0 |
| Levy 3 | 0 | 0 |
| Putnam 3 | 0 | 0 |
| Taylor | 0 | 0 |

**Class B**

| Site | Rating | Index No. |
|---|---|---|
| Crystal River | 0 | 0 |
| Dixie | 0 | 0 |
| Highlands | 0 | 0 |
| Lafayette | 0 | 0 |
| Levy 2 | 0 | 0 |
| Levy 3 | 0 | 0 |
| Putnam 3 | 0 | 0 |
| Taylor | 0 | 0 |

Class A Features

No Class A features are identified within 200 miles of the Crystal River, Dixie, Highlands, Lafayette, Levy 2, Levy 3, Putnam 3 and Taylor sites.

Class B Features

No Class B features are identified within 200 miles of the Crystal River, Dixie, Highlands, Lafayette, Levy 2, Levy 3, Putnam 3, and Taylor sites.

Crone and Wheeler (2000) and the USGS Fault Database (2003) also identify Class C and D features. Class C features are defined by Crone and Wheeler (2000) as features where:

> Geologic evidence is insufficient to demonstrate (1) the existence of a tectonic fault, or (2) Quaternary slip or deformation associated with the feature.

No Class C features are known to occur within 200 miles of the Crystal River, Dixie, Highlands, Lafayette, Levy 2, Levy 3, Putnam 3, and Taylor sites.

Class D features are defined by Crone and Wheeler (2000) as features where:

> Geologic evidence demonstrates that the feature is not a tectonic fault or feature; this category includes features such as demonstrated joints or joint zones, landslides, erosional or fluvial scarps, or landforms resembling fault scarps, but of demonstrable non-tectonic origin.

No Class D features are known to occur within 200 miles of the Crystal River, Dixie, Lafayette, Levy 2, Levy 3, Putnam 3, and Taylor sites. One Class D feature occurs within 200 miles of the Highlands site.

{

}

{

}

1.1.1.3 Surface Faulting and Deformation

Objective – Develop site ratings for site suitability relative to surface faulting and deformation in the site vicinity.

Evaluation approach – No absolute exclusionary criteria have been identified with regard to surface faulting and deformation. Suitability criteria have been established based on the occurrence of surface faulting and tectonic and non-tectonic structures within a 25-mi and 5-mi radius of the candidate sites, as follows (EPRI 2000, p.3-7):

Within 25 miles
- No such structures altogether (Most Suitable)
- Potential non-capable structures
- Potential capable structures (Least Suitable)

Within 5 miles
- No such structures altogether (Most Suitable)
- Potential non-capable structures
- Potential capable structures
- Fault exceeding 1,000 feet in length (Least Suitable)

The potential for surface faulting or deformation primarily concerns plant design, therefore features identified within 5 miles of a candidate site receive a higher weight. Following are the assigned weights and ratings for surface faulting and deformation.

| Weight | Range | Rating | GEOL Index Range |
|---|---|---|---|
| Five miles to within 25 mi–1 | No structures<br>Potential non-capable structures<br>Potential capable structures | 0<br>1<br>5 | 0–5 |
| within 5 mi–2 | No structures<br>Potential non-capable structures<br>Potential capable structures<br>Fault exceeding 1,000 feet in length<br>Capable fault exceeding 1,000 feet in length | 0<br>2<br>3<br>4<br>5 | 0–10 |

Discussion/Results

Over several decades, various faults have been proposed across Florida. Communications with the Florida Geologic Survey confirm that many of these have since been discounted, and conclusive proof is lacking for others. The current Geologic Map of Florida does not show faulting, and various structural maps of the State show deep-seated basins, platforms, and other structures, but no faulting. Therefore, it is not apparent that significant faulting occurs within 25 miles of any of the Progress sites. Based upon this information, the Crystal River, Dixie, Highlands, Lafayette, Levy 2, Levy 3, Putnam 3, and Taylor sites receive the following ratings and computed index numbers for surface faulting and deformation.

**Within 25 miles**

| Site | Rating | Index No. |
|---|---|---|
| Crystal River | 0 | 0 |
| Dixie | 0 | 0 |
| Highlands | 0 | 0 |
| Lafayette | 0 | 0 |
| Levy 2 | 0 | 0 |
| Levy 3 | 0 | 0 |
| Putnam 3 | 0 | 0 |
| Taylor | 0 | 0 |

**Within 5 miles**

| Site | Rating | Index No. |
|---|---|---|
| Crystal River | 0 | 0 |
| Dixie | 0 | 0 |
| Highlands | 0 | 0 |
| Lafayette | 0 | 0 |
| Levy 2 | 0 | 0 |
| Levy 3 | 0 | 0 |
| Putnam 3 | 0 | 0 |
| Taylor | 0 | 0 |

1.1.1.4 Geologic Hazards

Objective – Based on EPRI guidance (2000, p. 3-7) sites having the following geologic and man-made conditions should be avoided:

- Areas of active (and dormant) volcanic activity,
- Subsidence areas caused by withdrawal of subsurface fluids such as oil or groundwater, including areas which may be affected by future withdrawals,
- Potential unstable slope areas, including areas demonstrating paleolandslide characteristics,
- Areas of potential collapse (e.g. karst areas, salt, or other soluble formations),
- Mined areas, such as near-surface coal mined-out areas, as well as areas where resources are present and may be exploited in the future,
- Areas subject to seismic and other induced water waves and floods.

Evaluation approach – Sites furthest away from these features would be considered the most suitable sites; sites were rated in accordance with the presence of and distance from these features. Following are the assigned weight and rating used for geologic hazards:

| Weight | Range | Rating | GEOL Index Range |
|---|---|---|---|
| 1 | Geologic hazard(s) present | 1 | 0–1 |

Discussion/Results

The following Geologic Hazards apply to the Crystal River site:

1. The site is underlain by the Ocala Limestone and the Avon Park Limestone, both of which are subject to solution activity and the formation of surface and subsurface sinkholes (karst areas). Maps of the site vicinity exhibit surface depressions indicative sinkhole formation.
2. The site is located adjacent to the Gulf of Mexico, and is subject to seismic and other induced water waves and floods.

{

}

{

}

Design specifications for a new nuclear facility must address the possibility of limestone solutioning and sinkhole formation, and large water waves and floods. The eight candidate sites receive the following computed rating and index number for geologic hazards.

| Site | Rating | Index No. |
|---|---|---|
| Crystal River | 1 | 1 |
| Dixie | 1 | 1 |
| Highlands | 1 | 1 |
| Lafayette | 1 | 1 |
| Levy 2 | 1 | 1 |
| Levy 3 | 1 | 1 |
| Putnam 3 | 1 | 1 |
| Taylor | 1 | 1 |

1.1.1.5 Soil Stability

Objective – Evaluate the sites with respect to the difficulty of soil conditions expected at each site.

Evaluation approach – No absolute exclusionary criteria have been identified with respect to soil stability. Soil stability is addressed as an avoidance criterion. Certain soil properties have unfavorable characteristics in association with vibratory ground motion. These soil properties include poor mineralogy, low density soil (lack of compaction), and high water content (or high water table). Sites with the highest values of PGA in combination with deleterious site soils

would receive a relatively lower rating. Sites having rock foundations or more suitable soil conditions are considered to be better sites.

Following are the assigned weights and ratings for soil stability:

| Weight | Range | Rating | Index Range |
|---|---|---|---|
| 2 | Rock site | 0 | 0 – 4 |
| | Deep soil site, no known deleterious soil conditions | 1 | |
| | Deep soil site with potential stability issues, or insufficient information available to assign a rating of 1 | 2 | |

Discussion/Results –

The Geologic Map of Florida indicates that the Crystal River, Dixie, Lafayette, Levy 2, Levy 3, and Taylor site areas are underlain by less than 20 feet of unconsolidated sediments (sand, silt, clay) followed by the Ocala Limestone. Therefore, these sites are considered to be rock sites. However, the limestone rock is of variable quality and some is poorly indurated, and is subject to solutioning and sinkhole formation. These six sites will require extensive investigation and study for these reasons.

According to the Geologic Map of Florida, the Highlands and Putnam 3 sites are underlain by hundreds of feet of predominately unconsolidated sediments (sands and clays) with some possible limestone or dolostone. The Highlands and Putnam 3 sites are deep soil sites. Deep soil sites will require specific site investigations to determine if deleterious soil conditions occur.

Based upon this information the eight sites receive the following rating and computed index number for soil stability.

| Site | Rating | Index No. |
|---|---|---|
| Crystal River | 0 | 0 |
| Dixie | 0 | 0 |
| Highlands | 1 | 2 |
| Lafayette | 0 | 0 |
| Levy 2 | 0 | 0 |
| Levy 3 | 0 | 0 |
| Putnam 3 | 1 | 2 |
| Taylor | 0 | 0 |

1.1.1.6 Overall Rating for Geology/Seismology

The index numbers for this ranking scheme range from 5 to 85. This range of indexes was used to develop a ranking system to compare the suitability of sites as follows.

| Index Range | Rating |
|---|---|
| 5 – 21 | 5 |
| 22 – 37 | 4 |
| 38 – 53 | 3 |
| 54 – 69 | 2 |
| 70 – 85 | 1 |

The index numbers for each site were summed. The resulting index was compared to the index ranges in the above table to determine the overall rating for each site. Based upon this evaluation, the candidate sites are ranked as follows.

| Site | Index Number | Rating |
|---|---|---|
| Crystal River | 11 | **5** |
| Dixie | 11 | **5** |
| Highlands | 13 | **5** |
| Lafayette | 11 | **5** |
| Levy 2 | 11 | **5** |
| Levy 3 | 11 | **5** |
| Putnam 3 | 13 | **5** |
| Taylor | 11 | **5** |

**Table 1.1-1 Ratings for Progress Crystal River Site**

| Feature | Source | Weight | Rating | Index No. |
|---|---|---|---|---|
| Vibratory Ground Motion | PGA 3.87 %g with 2% PE in 50 years (USGS National Seismic Hazards Mapping Project, 2002). | 5 | 2 | 10 |
| Capable Tectonic Source (Class A) | No Class A features occur within 200 miles of the Crystal River site (USGS Fault and Fold Database, 2003. Crone & Wheeler, 2000). | 2 | 0 | 0 |
| Capable Tectonic Source (Class B) | No Class B features occur within 200 miles of the Crystal River site (USGS Fault and Fold Database, 2003. Crone & Wheeler, 2000). | 1 | 0 | 0 |
| Surface Faulting & Deformation within 25 miles | No surface faulting or deformation is known to occur near the site. | 1 | 0 | 0 |
| Surface Faulting & Deformation within 5 miles | No surface faulting or deformation is known to occur at the site. | 2 | 0 | 0 |
| Geologic Hazards | The site is located in an area of potential karst activity. The site is subject to seismic and other induced water waves and floods. | 1 | 1 | 1 |
| Soil Stability | The Crystal River site is presumed to be a rock site. | 2 | 0 | 0 |
| | | | **Total Index** | **11** |

**Table 1.1-1 Ratings for Progress Dixie Site**

| Feature | Source | Weight | Rating | Index No. |
|---|---|---|---|---|
| Vibratory Ground Motion | PGA 4.20 %g with 2% PE in 50 years (USGS National Seismic Hazards Mapping Project, 2002). | 5 | 2 | 10 |
| Capable Tectonic Source (Class A) | No Class A features occur within 200 miles of the Dixie 1 site (USGS Fault and Fold Database, 2003. Crone & Wheeler, 2000). | 2 | 0 | 0 |
| Capable Tectonic Source (Class B) | No Class B features occur within 200 miles of the Dixie 1 site (USGS Fault and Fold Database, 2003. Crone & Wheeler, 2000). | 1 | 0 | 0 |
| Surface Faulting & Deformation within 25 miles | No surface faulting or deformation is known to occur near the site. | 1 | 0 | 0 |
| Surface Faulting & Deformation within 5 miles | No surface faulting or deformation is known to occur near the site. | 2 | 0 | 0 |
| Geologic Hazards | The site is located in an area of potential karst activity. | 1 | 1 | 1 |
| Soil Stability | The Dixie 1 site is presumed to be a rock site. | 2 | 0 | 0 |
| | | | **Total Index** | **11** |

**Table 1.1-1 Ratings for Progress Highlands**

| Feature | Source | Weight | Rating | Index No. |
|---|---|---|---|---|
| Vibratory Ground Motion | PGA 3.58 %g with 2% PE in 50 years (USGS National Seismic Hazards Mapping Project, 2002). | 5 | 2 | 10 |
| Capable Tectonic Source (Class A) | No Class A features occur within 200 miles of the Highlands site (USGS Fault and Fold Database, 2003. Crone & Wheeler, 2000). | 2 | 0 | 0 |
| Capable Tectonic Source (Class B) | No Class B features occur within 200 miles of the Highlands site (USGS Fault and Fold Database, 2003. Crone & Wheeler, 2000). | 1 | 0 | 0 |
| Surface Faulting & Deformation within 25 miles | No surface faulting or deformation is known to occur near the site. | 1 | 0 | 0 |
| Surface Faulting & Deformation within 5 miles | No surface faulting or deformation is known to occur at the site. | 2 | 0 | 0 |
| Geologic Hazards | The site is located in an area of potential solutioning and sinkhole formation. | 1 | 1 | 1 |
| Soil Stability | The Highlands site is presumed to be a deep soil site. | 2 | 1 | 2 |
| | | | **Total Index** | **13** |

**Table 1.1-1 Ratings for Progress Lafayette Site**

| Feature | Source | Weight | Rating | Index No. |
|---|---|---|---|---|
| Vibratory Ground Motion | PGA 4.68 %g with 2% PE in 50 years (USGS National Seismic Hazards Mapping Project, 2002). | 5 | 2 | 10 |
| Capable Tectonic Source (Class A) | No Class A features occur within 200 miles of the Lafayette site (USGS Fault and Fold Database, 2003. Crone & Wheeler, 2000). | 2 | 0 | 0 |
| Capable Tectonic Source (Class B) | No Class B features occur within 200 miles of the Lafayette site (USGS Fault and Fold Database, 2003. Crone & Wheeler, 2000). | 1 | 0 | 0 |
| Surface Faulting & Deformation within 25 miles | No surface faulting or deformation is known to occur near the site. | 1 | 0 | 0 |
| Surface Faulting & Deformation within 5 miles | No surface faulting or deformation is known to occur at the site. | 2 | 0 | 0 |
| Geologic Hazards | The site is located in an area of potential karst activity. | 1 | 1 | 1 |
| Soil Stability | The Lafayette site is presumed to be a rock site. | 2 | 0 | 0 |
| | | | **Total Index** | **11** |

**Table 1.1-1 Ratings for Progress Levy 2 Site**

| Feature | Source | Weight | Rating | Index No. |
|---|---|---|---|---|
| Vibratory Ground Motion | PGA 4.02 %g with 2% PE in 50 years (USGS National Seismic Hazards Mapping Project, 2002). | 5 | 2 | 10 |
| Capable Tectonic Source (Class A) | No Class A features occur within 200 miles of the Levy 2 site (USGS Fault and Fold Database, 2003. Crone & Wheeler, 2000). | 2 | 0 | 0 |
| Capable Tectonic Source (Class B) | No Class B features occur within 200 miles of the Levy 2 site (USGS Fault and Fold Database, 2003. Crone & Wheeler, 2000). | 1 | 0 | 0 |
| Surface Faulting & Deformation within 25 miles | No surface faulting or deformation is known to occur near the site. | 1 | 0 | 0 |
| Surface Faulting & Deformation within 5 miles | No surface faulting or deformation is known to occur at the site. | 2 | 0 | 0 |
| Geologic Hazards | The site is located in an area of potential karst activity. | 1 | 1 | 1 |
| Soil Stability | The Levy 2 site is presumed to be a rock site. | 2 | 0 | 0 |
| | | | **Total Index** | **11** |

**Table 1.1-1 Ratings for Progress Levy 3 Site**

| Feature | Source | Weight | Rating | Index No. |
|---|---|---|---|---|
| Vibratory Ground Motion | PGA 3.89 %g with 2% PE in 50 years (USGS National Seismic Hazards Mapping Project, 2002). | 5 | 2 | 10 |
| Capable Tectonic Source (Class A) | No Class A features occur within 200 miles of the Levy 3 site (USGS Fault and Fold Database, 2003. Crone & Wheeler, 2000). | 2 | 0 | 0 |
| Capable Tectonic Source (Class B) | No Class B features occur within 200 miles of the Levy 3 site (USGS Fault and Fold Database, 2003. Crone & Wheeler, 2000). | 1 | 0 | 0 |
| Surface Faulting & Deformation within 25 miles | No surface faulting or deformation is known to occur near the site. | 1 | 0 | 0 |
| Surface Faulting & Deformation within 5 miles | No surface faulting or deformation is known to occur at the site. | 2 | 0 | 0 |
| Geologic Hazards | The site is located in an area of potential karst activity. | 1 | 1 | 1 |
| Soil Stability | The Levy 3 site is presumed to be a rock site. | 2 | 0 | 0 |
| | | | **Total Index** | **11** |

**Table 1.1-1 Ratings for Progress Putnam 3 Site**

| Feature | Source | Weight | Rating | Index No. |
|---|---|---|---|---|
| Vibratory Ground Motion | PGA 5.29 %g with 2% PE in 50 years (USGS National Seismic Hazards Mapping Project, 2002). | 5 | 2 | 10 |
| Capable Tectonic Source (Class A) | No Class A features occur within 200 miles of the Putnam 3 site (USGS Fault and Fold Database, 2003. Crone & Wheeler, 2000). | 2 | 0 | 0 |
| Capable Tectonic Source (Class B) | No Class B features occur within 200 miles of the Putnam 3 site (USGS Fault and Fold Database, 2003. Crone & Wheeler, 2000). | 1 | 0 | 0 |
| Surface Faulting & Deformation within 25 miles | No surface faulting or deformation is known to occur near the site. | 1 | 0 | 0 |
| Surface Faulting & Deformation within 5 miles | No surface faulting or deformation is known to occur at the site. | 2 | 0 | 0 |
| Geologic Hazards | The site is located in an area of potential limestone solutioning and sinkhole formation (karst activity). | 1 | 1 | 1 |
| Soil Stability | The Putnam 3 site is presumed to be a deep soil site. | 2 | 1 | 2 |
| | | | **Total Index** | **13** |

**Table 1.1-1 Ratings for Progress Taylor Site**

| Feature | Source | Weight | Rating | Index No. |
|---|---|---|---|---|
| Vibratory Ground Motion | PGA 4.08 %g with 2% PE in 50 years (USGS National Seismic Hazards Mapping Project, 2002). | 5 | 2 | 10 |
| Capable Tectonic Source (Class A) | No Class A features occur within 200 miles of the Taylor 1 site (USGS Fault and Fold Database, 2003. Crone & Wheeler, 2000). | 2 | 0 | 0 |
| Capable Tectonic Source (Class B) | No Class B features occur within 200 miles of the Taylor 1 site (USGS Fault and Fold Database, 2003. Crone & Wheeler, 2000). | 1 | 0 | 0 |
| Surface Faulting & Deformation within 25 miles | No surface faulting or deformation is known to occur near the site. | 1 | 0 | 0 |
| Surface Faulting & Deformation within 5 miles | No surface faulting or deformation is known to occur at the site. | 2 | 0 | 0 |
| Geologic Hazards | The site is located in an area of potential karst activity. | 1 | 1 | 1 |
| Soil Stability | The Taylor 1 site is presumed to be a rock site. | 2 | 0 | 0 |
| | | | **Total Index** | **11** |

**References**

Crone, A.J. and Wheeler, R.L. 2000. Data for Quaternary faults, liquefaction features, and possible tectonic features in the Central and Eastern United States, east of the Rocky Mountain front. USGS Open File Report 00-260.

EPRI. 2001. Siting Guide: Site Selection and Evaluation Criteria for an Early Site Permit Application. Electric Power Research Institute, August 2001.

Florida Environment Online, Southeastern Geological Society, Hydrogeological Units of Florida.

Florida Geological Survey, Data and Maps, County Geologic Maps.

Florida Geological Survey, Earthquake and Seismic History of Florida, Information Circular 85.

Florida Geological Survey, Geologic Framework of the Lower Floridan Aquifer System, Brevard

County, Florida, Bulletin No. 64, 1994.

Florida Geological Survey, Geologic Map of Florida, 2001.

Florida Geological Survey, Florida's Geological History and Geological Resources, Special Publication No. 35, 1994.

Florida Geological Survey, Text to Accompany the Geologic Map of Florida, open-file report 80, 2001.

Florida Power, A Progress Energy Company. Final Safety Analysis Report. Revision 29.

Frankel, A. et. al. 1996. National Seismic Hazard Maps, Documentation. USGS Open File Report 96-532. June 1996.

NRC. 1997. Identification and Characterization of Seismic Sources and Determination of Safe Shutdown Earthquake Ground Motion Regulatory Guide 1.165.

USGS Earthquakes Hazards Program. National Seismic Hazard Mapping Project. Interpolated Probabilistic Ground Motion for the Conterminous 48 States by Latitude Longitude, 2002 data.

USGS Earthquakes Hazards Program. National Seismic Hazard Mapping Project. Quaternary Fault and Fold Database for the United States, 2005.

USGS, 1985. Sinkhole Type, Development, and Distribution in Florida.

USGS. South Florida Information Access. Lithostratigraphic Units.

USGS. Topographic Maps of Florida, various.

### 1.1.2 Cooling System Requirements

Objective - Cooling system requirements are important siting considerations for new power generating facilities. The objective of this criterion is to rate the candidate sites with respect to specific cooling system requirements, using to the extent possible the same or similar criteria previously utilized to evaluate other potential nuclear power plant sites.

Evaluation approach - The principle requirements of interest are the quantity of cooling water available and the ambient air temperature (EPRI, 2001, Section 3.1.1.2.1). Exclusionary and avoidance conditions apply to the evaluation of candidate sites with respect to these cooling system requirements. AP1000 cooling water supply requirements for units with closed-cycle cooling systems are summarized below.

| Cooling System Type | AP1000 Two-Unit Requirement |
|---|---|
| Closed-cycle | Make up flow rate (gpm) – 42,000 |
| Closed-cycle | Maximum Water Consumption (gpm) – 60,000 |
| Closed-cycle | Monthly Average Water Consumption (gpm) – 42,000 |

Ambient air temperature characteristics of a potential site affect the design of heat removal systems. The candidate sites were compared to determine which site has the most suitable ambient air characteristics with respect to the PPE values outlined in EPRI 2001, Section 3.1.1.2.2. With the exception of extreme low temperature values, sites with the lowest temperatures are considered to be the most suitable.

Discussion/Results – Site data and results are presented for each of the sub-criteria in Sections 1.1.2.1 and 1.1.2.2, below. Overall ratings for the Cooling System Requirements criterion are provided in Section 1.1.2.3.

#### 1.1.2.1 Cooling Water

The eight sites were evaluated with respect to the cooling water criterion during the initial screening phase (P1 criterion) and all were found to have an adequate flow or reservoir volume to support the requirements of a closed cycle cooling water system. The rating approach used in this evaluation, as well as the site data and screening results, were described previously in the screening criteria report (Criterion P1). To summarize:

| Criterion P1 – Cooling Water Supply | | | | |
|---|---|---|---|---|
| Site | Water Source | Low Flow[1] | Rating[3] | Comments and Notes |
| Crystal River | Gulf of Mexico | OK | 5 | By inspection. |
| Dixie | Suwannee River | 1100 cfs | 3 | { } |
| Highlands | Kissimmee River | TBD | 2* | Flow data not conclusive. |
| Lafayette | Suwannee River | 1100 cfs | 3 | { } |
| Levy 2 | Florida Barge Canal | OK | 3 | Gulf of Mexico/Barge canal/Withlacoochee River; access potentially problematic (so given rating of 3). |
| Levy 3 | Gulf of Mexico | OK | 5 | By inspection |
| Putnam 3 | St. Johns River | 1360 cfs[2] | 3* | Flow data not conclusive in lower basin |
| Taylor | Gulf of Mexico | OK | 5 | By inspection. { } |

5. USGS Daily Streamflow Data. Low Flow of record except as noted.
6. Flow in the St. Johns River System is complex and requires additional evaluation. { }
7. Ratings are indicative of publicly available flow data only. Florida water policy dictates that consumptive water use be approved by the appropriate water management district. Relative difficulty of obtaining approvals has not been evaluated at this time.
8. Gilchrist located on smaller Santa Fe River, however, rating based on utilizing nearby higher flow Suwannee River.

* indicates a preliminary rating, based on available data; additional information from water management districts will be required to fully characterize water source feasibility.

This evaluation has been performed in the absence of agency contact using publicly available flow data (e.g., USGS Daily Streamflow Data and low flow of record data were used when appropriate data were available). Flow in some of the source water systems is complex and requires further investigation, notably at the Highlands and Levy 2 sites (although Levy 2 is given a slightly higher rating than Highlands given its potential access to two water sources: the expansive Gulf of Mexico via the cross Florida barge canal and possibly the Withlacoochee River, depending on final site location). Water access difficulties are anticipated at Highlands due to a planned restoration project for the Kissimmee River that includes conversion of the channelized C-38 canal back to a good portion of the original Kissimmee River bed and creation of approximately 27,000 acres of wetlands. Dixie and Lafayette are also given a rating of "3" to account for regulatory complexities on the Suwannee River; and Putnam 3 receives a conservative rating of "3" to be consistent with the other sites and in light of the regulatory unknowns associated with the St. Johns River. For these source waters, indicative flows were obtained from available data and preliminary ratings were assigned as follows:

| Cooling Water | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| Rating | 5 | 3 | 2 | 3 | 3 | 5 | 3 | 5 |

Note that sites using the Gulf of Mexico as the source water were each given a rating of 5 because of the Gulf's expansive water supply. Site attributes associated with pipeline routing or pumping are reflected in section 4.1.

Water usage in all source waters is governed by individual water management districts in Florida. Approval for proposed water usage by the cognizant water management district will be required. It will be necessary to meet with the appropriate agencies to obtain preliminary confirmation of available water and to define requirements for obtaining final approval of any proposed water use. This criterion will continue to be refined as additional river flow and water availability information becomes available from the relevant water management districts within the State of Florida. However, in the interim, for those sites located on rivers, additional water supply evaluations have been conducted for the Suwannee River (Dixie and Lafayette) and Kissimmee River (Highlands) sites (Hopping Green & Sams, 2006); and a review of environmental concerns also has been conducted for the St. Johns River (Putnam 3) and Barge Canal (Levy 2) sites (CH2MHILL 2006). Findings from both evaluations are summarized below.

Suwannee River

Minimum flow levels (MFLs for the Lower Suwannee River, potentially relevant to the Dixie and Lafayette sites, have been recently completed by the Suwannee River Water Management District (District or SRWMD). Public notice of the proposed rule language was published by SRWMD in the Florida Administrative Law Weekly on Friday, April 21st. Within 21 days from the date of publication, substantially affected parties may file a petition to challenge the rule. Rule challenges can last several months to more than a year and are often appealed which often adds another year delay to the rule becoming effective. If no challenges are filed, the rulemaking process is complete within approximately 90 days barring procedural delays.

Specifically, the governing board of the SRWMD approved rule language to amend the District's Rule 40B-8, Fla. Admin. Code, to adopt minimum flows and levels (MFLs) for Manatee Spring, Fanning and Little Fanning Spring and the Lower Suwannee River (Wilcox gauge to Gulf). The flow numbers include a flow duration frequency of 50%. According to SRWMD staff, the flow duration frequency means that, over the long term, and considering only withdrawal effects, the seasonal median flow statistics cannot drop below the specified values. In this case, continued monitoring should demonstrate that, over the long term, 50% of the mean daily flows at the Wilcox Gauge must be 6,600 cfs or greater from May 1 through October 31, and that 50% of the mean daily flow at the Wilcox Gauge must be 7,600 cfs, or greater, from November 1 through April 30.

Looking at gross numbers comparing MFL flows to historical flows, it appears that sufficient water is potentially available from the Lower Suwannee to accommodate two nuclear units (i.e., an estimated 1000 cfs (646 mgd) could be taken from the Suwannee River without causing an

MFL violation). While these figures do not reflect existing withdrawals or available capacity, they do show that on a gross scale the proposed plant could potentially be accommodated. The actual post-MFL yield available for consumption will be determined by the District.

At this stage, while the effect, if any, the MFLs adopted with a flow duration frequency will have on post-MFL yield, it would seem that yield would increase since the MFL flow values must be met only 50% of the time rather than continuously.

Kissimmee River

{

} The restoration project will convert the channelized C-38 canal back to a good portion of the original Kissimmee River river bed and create approximately 27,000 acres of wetlands.

The South Florida Water Management District (SFWMD or District) published a Kissimmee Basin Water Supply Plan in April of 2000 (KBWSP). The District is currently updating the KBWSP and a draft of that update was provided by the District, available online, in 2005. Based upon these documents, related documents describing the Kissimmee River Restoration Plan, and various maps and supporting information available from the District and the Army Corps of Engineers (COE), the following matters are relevant to the Highland County site and the potential use of the Lower Kissimmee River for water supply and discharge.

1. *The Lower Kissimmee River Is Regulated By the SFWMD and COE.* While not necessarily an obstacle to drawing water from the lower Kissimmee, any such water use would have to be coordinated with the COE and District and be consistent with each agency's efforts in implementing the Comprehensive Everglades Restoration Plan (CERP) as well as the Kissimmee River Restoration Plan. Additionally, the District is a party to an intergovernmental agreement with the Seminole Tribe to assure water entitlements to the Brighton Reservation south of the Highlands County site in Glades County.

2. *Water Supply Is Highly Regulated In The Vicinity of the Proposed Site.* The District's 2000 Water Supply Plan identifies a large area northwest of Lake Okeechobee as a "Water Resource Caution Area" and "Restricted Allocation Area." In a Water Resource Caution Area, reclaimed water must be used unless shown not to be economically, environmentally or technologically feasible. The area to the northwest of Lake Okeechobee, and southeast of Lake Istokpoga, has been declared a Restricted Allocation Area due to water shortages limiting the availability of surface water from Lake Istokpoga for use within the Indian Prairie Agricultural Area. By definition, Restricted Allocation Areas are linked to water availability from a specific water body. See Rule 40E-23.021(4), Florida Administrative Code (F.A.C.). The Restricted Allocation Area status means that water is not available from the canals connecting Lake

Istokpoga to the Kissimmee River and Lake Okeechobee but does not appear linked to the availability of water from the Lower Kissimmee River (C-38). Additionally, under Rule 40E-23.021(2), F.A.C., the District defines "Critical Water Supply Problem Areas" as those which have experienced water supply problems or are expected to have water supply problems in the next 20 years. The definition incorporates the area northwest of Lake Okeechobee, and encompassing the general vicinity of the proposed Highlands County site, as part of the Critical Water Supply Problem Area.

While the site does fall in an area where water supply is an issue, the District seems to take the position that power plants—which fall into the District's water use category of "Thermoelectric Self-Supplied" in the plan—are not problematic from a water supply perspective. Additionally, as noted above, water supply issues in this area are related to local sources and not the Kissimmee River itself.

3. *Minimum Flows And Levels Are Pending.* A minimum flow is that flow at which further withdrawals would cause significant harm to the water resources or ecology of the area. MFLs for the Kissimmee River have not been adopted to date but are anticipated for 2008, and the 2005 draft KBWSP update notes that a pending "Long Term Management Plan" for the lakes in the upper Kissimmee chain must be completed to determine the volume and timing of water availability in the Kissimmee River.

In summary, while there is nothing absolutely precluding the Lower Kissimmee River as a source of water, and point of discharge, the regulatory intricacies and potential costs need to be weighed. At this point it is still unknown what effect, if any, the Kissimmee Restoration River Project might have on water availability and whether the project would limit water supply or provide an opportunity for collaboration with the District and COE.

This criterion will continue to be refined as additional river flow and water availability information becomes available from the relevant water management districts within the State of Florida.

St. Johns River

The St. Johns River Alliance in coordination with the District and the Florida Department of Environmental Protection is developing a 4.6 billion dollar restoration plan for the entire river. Some of this money is to go to the purchasing of thousands of acres of land along the river for conservation purposes.

Gulf, Barge Canal, Withlacoochee River

Withlacoochee Creek is dammed where the canal begins, and flows into the Gulf of Mexico after going through a series of locks along the canal (see attached Figure B). The lower reaches of the river are tidally influenced (Gulf of Mexico) and therefore assumed to be brackish. However, the saline extent is unknown at this time.

Direct and indirect affects associated with water withdrawal and discharge would require extensive hydrological modeling.

**References**

U.S. Nuclear Regulatory Commission Office of Nuclear Reactor Regulation. NUREG-1038 Supplement No. 4. October

CH2MHill 2006. Memoranda dated April 4, 2006 (Levy 2 site), April 13, 2006 (Dixie and Putnam 3 sites.

Hopping Green & Sams 2006. Memoranda dated March 28, 2006 and April 20, 2006.

US Geological Survey

1.1.2.2 Ambient Temperature Requirements

Temperature data were obtained from local weather stations as compiled by the Southeast Regional Climate Center – historical climate summaries and normals – which is part of the National Oceanic and Atmospheric Administration's National Climate Data Center (NOAA NCDC). Closest daily weather stations with a reasonable period of record (e.g., more than 20 years) were selected for each site. Data indicate that each site meets the ambient temperature exclusionary and avoidance criteria addressed in EPRI 2001 (Section 3.1.1.2.2). Maximum and minimum annual temperature values (dry bulb), as well as the highest and lowest average monthly temperatures values, and the annual average monthly mean values, were compared between sites. Actual meteorological conditions at the eight sites, however, may vary from the data collected and evaluated for the closest reporting (representative) weather stations: Inverness for Crystal River; Cross City for Dixie; Okeechobee for Highlands; Mayo for Lafayette; Ocala for Levy 2; Cedar Keys for Levy 3; Palatka for Putnam 3; and Perry for Taylor. The period of record for all sites is 1948 to 2005.

| Ambient Temperatures (degrees F) | Highest temp. of record | Highest monthly average | Lowest temp. of record | Lowest monthly average | Annual Monthly Average Mean | Rating |
|---|---|---|---|---|---|---|
| **Crystal River** | 105 (9/7/55) Inverness | 91.6 (July) | 15 (1/21/85) | 44.8 (January) | 70.7 | **3** |
| **Dixie** | 103 (6/26/50) Cross City | 90.6 (July/ August) | 10 (1/13/81) | 40.4 (January) | 68 | **3** |
| **Highlands** | 99 (8/7/72) Okee-chobee | 93 (August) | 31 12/28/72 | 47.7 (Feb) | 72.7 | **3** |
| **Lafayette** | 104 (6/5/85) Mayo | 91.6 (July) | 7 1/21/85 | 40.1 (January) | 68.2 | **3** |

| Ambient Temperatures (degrees F) | Highest temp. of record | Highest monthly average | Lowest temp. of record | Lowest monthly average | Annual Monthly Average Mean | Rating |
|---|---|---|---|---|---|---|
| **Levy 2** | 105 (6/4/85) Ocala | 9 91.8 (August) | 11 (1/13/81) | 46 (January) | 71 | **3** |
| **Levy 3** | 100 (6/226/52) Cedar Keys | 89.7 (July and August) | 15 (12/13/62) | 49.1 (January) | 70.8 | **3** |
| **Putnam 3** | Palatka 105, 6/25/50 | 92.4 (July) | 11 1/21/85 | 45.1 Jan | 70.9 | **3** |
| **Taylor** | Perry 104 7/15/80 1948-2005 | 92 (July) | 7 1/21/85 | 41.29 (January) | 68.6 | **3** |

Source: www.sercc.net/climateinfo/historical/historical.html [for Florida]
NOAA National Climatic Data Center, Ashville, NC: 2005 Local Climatological Data, Annual Summary with Comparative Data for the following Florida cities: Inverness, Cross City, Okeechobee, Mayo, Ocala, Cedar Keys, Palatka, and Perry, FL.

Discussion/Results – The candidate sites were compared to one another to assess their relative suitability with respect to selected temperature extremes and frequency values.

With the exception of extreme low temperature values, sites with the lowest dry bulb temperatures are considered to be the most suitable. Based on a comparison of highest and lowest temperature (daily extremes), average high and low temperature records, annual average monthly mean temperatures, and consideration of general climate conditions at the sites, the variation in temperatures between site was very small. This is not surprising given that they are located in the same geographic area of central Florida. The differences were small enough such that identical ratings were assigned to each site. In addition, because the temperatures in Florida are, in general, higher than other parts of the country, and the maximum temperatures exceeded 100 in all cases except Highlands at 99, a conservative rating of 3 was given to all sites.

1.1.2.3 Cooling System Summary Rating

The sites were assigned relative ratings for the suitability of the cooling system based on the average of the ratings for cooling water supply and the ambient air temperature characteristics.

| Cooling Water | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| Cooling Water Supply | 5 | 3 | 2 | 3 | 3 | 5 | 3 | 5 |
| Ambient Temperature | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| **Composite Rating** | **4** | **3** | **2** | **3** | **3** | **4** | **3** | **4** |

### 1.1.3 Flooding

Objective – The objective of this criterion is to evaluate the suitability of the candidate sites with respect to potential flooding. Some potential sites are located within the 100-year floodplain and may not meet the exclusionary and avoidance criteria outlined in EPRI 2001 (Section 3.1.1.3). These criteria exclude potential sites within major wetlands and areas less than one foot above the maximum flood elevation.

Evaluation Approach – The relative suitability of the candidate sites was evaluated with respect to flooding in the Preliminary Screening Evaluation, but was limited to a comparison of existing surface water elevations and anticipated (and approximate) plant elevations. A further comparison was conducted in this detailed evaluation, between site grade elevation and the 100-year flood elevation for the major river on which the plant is located. The 100-year flood elevations were based on Flood Insurance Rate Maps (FIRM) from FEMA for the respective counties in which the sites are located. Primary emphasis was on flood elevations for the main water bodies (rivers and reservoirs) and their major tributaries where flood elevations were identified. Finally, other potential flooding sources (e.g., upstream dam failure concerns) were also considered.

Because of the more accurate floodplain data and consideration of upstream dam failure concerns, the rating scale was modified from that used in the Preliminary Screening Evaluation. The revised scale is as follows:

5 if site is not located within 100-year floodplain, and no potential upstream flooding concerns exist (e.g., dam failure).
4 if site is not located within 100-year floodplain, but potential upstream flooding concerns exist.
3 if site is on border of 100-year floodplain.
2 if site is located within 100-year floodplain, but no potential upstream flooding concerns exist.
1 if site is located within 100-year floodplain, and potential upstream flooding concerns exist.

The relative suitability of the eight sites with respect to flooding was evaluated during the previous screening phase in the screening criteria report (Criterion P2).

Discussion/Results – Additional pertinent flood related information for the candidate sites is shown in the following table, followed by the site ratings.

| Site | Evaluation |
|---|---|
| Crystal River | { } |
| Dixie | { } |
| Highlands | { } |
| Lafayette | { } |
| Levy 2 | { } |
| Levy 3 | { } |
| Putnam 3 | { } |
| Taylor | { } |

| Flooding | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| Rating | 2 | 3 | 1 | 2 | 5 | 3 | 5 | 3 |

**References**

FEMA Digital Flood Insurance Rate Maps, http://www.msc.fema.gov/.

USGS Topographic Maps.

### 1.1.4 Nearby Hazardous Land Uses

1.1.4.1 Existing Facilities
1.1.4.2 Projected Facilities

Objective – The objective of this criterion is to include NRC guidance on considerations regarding the nature and proximity of man-related hazards (dams, airports, transportation routes, and military and chemical manufacturing and storage facilities).

Evaluation approach – For the purpose of this evaluation, it was assumed that all eight sites can be developed to meet the exclusionary criteria outlined in 10 CFR 100. The suitability of the candidate sites was, therefore, evaluated based on the relative number and distance of the following off-site man-made hazards that could be identified on USGS topographic maps, supplemented by information found in existing environmental reports for each site. The evaluation was limited to only existing hazards within a 5- to 10-mile radius of each site, to the extent such information was available. This included primarily airports, pipelines, and rail. Note that information relating to projected man-made hazards was not readily available and could not be evaluated during this phase of the siting process.

The relative suitability of the eight sites with respect to nearby hazardous land uses was evaluated in the screening criteria report (Criterion P4), although the rating approach was revised slightly to better reflect a comparison of the eight candidate sites (as compared to the 20 sites evaluated previously). The following revised scale was used:

5 = No major or minor hazardous land uses within 10 miles
4 = No major hazardous land uses within 10 miles, but minor hazardous land uses within 10 miles (single or multiple, e.g., landing strips or small airports)
3 =No major hazardous land use within 10 miles but minor hazardous land use within 5 miles (single or multiple)
2 = Major hazardous land use within 10 miles or multiple minor hazardous land use within 5 miles (multiple).
1 = Major hazardous land use within 5 miles.

Discussion – To summarize from the screening evaluation, identified hazards at each of the sites are as follows:

*Crystal River*

Airports: JRS landing strip 8.2 miles Northeast, Crystal River Homosassa Airport 9.9 miles Southeast.

Freight Rail: Assumed immediate vicinity due to co-location with Crystal River Energy Complex.

Pipeline: None within 10 miles.

Military Installation: None located near site.

Other Potential Hazards: Crystal River Energy Complex immediate vicinity, assumed power transmission line immediate vicinity, Power Plant 4.2 miles North; Quarry/mining operations immediately north of the site.

*Dixie*

{

}

Freight Rail: { }

Pipeline: { }

Military Installation: { }

Other Potential Hazards: { }

*Highlands*

Airports: {

}

Freight Rail: { }

Pipeline: { }

Military Installation: { }

Other Potential Hazards: { }

*Lafayette*

Airports: {

}

Freight Rail: { }

Pipeline: { }

*Levy 2*
Airports: { }
Freight Rail: { }
Pipeline: { }
Military Installation: { }
Other Potential Hazards: { }
Military Installation: { }
Other Potential Hazards: { }

*Levy 3*
Airports: { }
Freight Rail: { }
Pipeline: { }
Military Installation: { }
Other Potential Hazards: { }

*Putnam 3*
Airports: { }
Freight Rail: { }
Pipeline: { }
Military Installation: { }

*Taylor*
Airports: { }
Pipeline: { }
Military Installation: { }
Other Potential Hazards: { }

Results – All sites included at least one major hazardous land use within 10 miles or a minor hazardous land use (mostly landing strips or small, private airports) within 5 miles and received ratings of 3 or less.

| Nearby Hazardous Land Uses | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putna m 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| Rating | 1 | 3 | 3 | 3 | 2 | 3 | 2 | 3 |

**References**

Google Earth, http://earth.google.com.

USGS Topographic Maps

### 1.1.5 Extreme Weather Conditions

1.1.5.1 Winds

1.1.5.2 Precipitation

Objective – The objective of this criterion is to rate the suitability of the eight candidate sites with respect to extreme weather conditions. Extreme weather conditions of interest are related to specific PPE criteria regarding tornado design, wind and precipitation (EPRI Siting Guide, Section 3.1.1.5).

Evaluation approach – During the review of available meteorological information on the sites, no information was found that indicated the eight sites could not meet the exclusionary and avoidance criteria specified for the PPE values. Extreme weather readily available for the eight sites included fastest mile speed (available for selected cities – although not necessarily the most representative of site conditions); number of tornadoes and violent tornadoes per 10,000 square miles (state average); and maximum 24-hour precipitation values. The number of hurricanes making landfall in Florida was also considered. Available extreme weather data were obtained from government sources (National Climate Data Center and Southeast Regional Climate Center), including NCDC Climatic Wind Data for US [ncdc.noaa.gov/documentlibrary/pdf/wind1996.pdf.].

Discussion/Results – Rating of the sites was performed based on a comparison of fastest mile (wind) speeds, maximum 24-hour precipitation and severe storm records, although greater emphasis was placed on the most distinguishing site feature – site location in relation to the coast – as an indicator of greater probability of hurricane threat – and the number of hurricanes to hit Florida (broken up into four geographic quadrants) as follows:

| Hurricane direct hits on the mainland U.S. coastline and for individual states 1851-2004 by Saffir/Simpson category. | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Area** | **Category Number** | | | | | **All (1-5)** | **Major (3-5)** |
| | **1** | **2** | **3** | **4** | **5** | | |
| **U.S. (Texas to Maine)** | 109 | 72 | 71 | 18 | 3 | 273 | 92 |
| **Florida** | 43 | 32 | 27 | 6 | 2 | 110 | 35 |
| (Northwest)* | 27 | 16 | 12 | 0 | 0 | 55 | 12 |
| (Northeast)* | 13 | 8 | 1 | 0 | 0 | 22 | 1 |
| (Southwest)* | 16 | 8 | 7 | 4 | 1 | 36 | 12 |
| (Southeast)* | 13 | 13 | 11 | 3 | 1 | 41 | 15 |

- Assume Southeast area includes Highlands site; Northeast area includes Putnam 3 site; and remaining 6 sites are all located in the Northwest area of Florida.
- Hurricane that may strike more than one region in Florida would be counted separately for each region (i.e., individual regional totals may exceed state totals)

Source: National Hurricane Center at http://www.nhc.noaa.gov/paststate.shtml

| **Site** | **Fastest Mile (1970-2001)** | **Tornado Frequency/ Strong violent tornadoes Average per 10,000 sq mi/ [state average]** | **Proximity to Coast/ Hurricane Threat** | **Hurricane direct hits on Florida region (1851-2004)** | **Maximum 24-hr précis.** |
|---|---|---|---|---|---|
| Crystal River | 67 (Tampa) | 8.4/1.2 | Coast | 55 (12 major) | 9.54 (Inverness) |
| Dixie | 58 (Tallahassee) | 8.4/1.2 | Inland | 55 (12 major) | 10 (Cross City) |
| Highlands | 86 (West Palm Beach; fastest mile)<br>64 (Orlando) | 8.4/1.2 | Inland | 41 (15 major) | 8.08 Okeechobee |
| Lafayette | 58 Tallahassee | 8.4/1.2 | Inland | 55 (12 major) | 14.62 (Mayo) |
| Levy 2 | 67 Tampa | 8.4/1.2 | Semi -Coast | 55 (12 major) | 11.72 (Ocala) |
| Levy 3 | 67 Tampa | 8.4/1.2 | Coast | 55 (12 major) | 11.72 (Ocala)<br>24 (Cedar Keys) |
| Putnam 3 | 57 Jacksonville | 8.4/1.2 | Inland | 22 (1 major) | 8.56 (Palatka) |
| Taylor | 58 (Tallahassee) | 8.4/1.2 | Coast | 55 (12 major) | 10.26 in (Perry) |

In general, the sites were fairly similar and were assigned equally conservative ratings of 3 (given the narrow width of Florida, even inland sites can be affected by hurricanes), with the exception of the three coastal sites: Crystal River, Levy 3 and Taylor. Given their proximity to the coast and higher potential for extreme storm events (precipitation, winds, and number of hurricanes) compared to the other sites, they were given ratings of 2. Levy 3 was further reduced to a 1 since it is close to the coast on two sides (west and south) and also close to Cedar Keys which had the highest 24-hour maximum rainfall of the sites.

| Extreme Weather Conditions | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Rating** | 2 | 3 | 3 | 3 | 3 | 1 | 3 | 2 |

## 1.2 ACCIDENT EFFECTS-RELATED

Objective – The overall objective of this criterion is to evaluate sites with respect to the evaluation of design-related accident evaluations and potential effects of accidents.

Evaluation approach – Site ratings for this criterion are developed as a composite of three sub-criteria that address site characteristics relevant to consideration of accidents: Population, Emergency Planning Considerations, and Atmospheric Dispersion.

Discussion/Results – A discussion of each of the sub-criteria appears in the following sections 1.2.1, 1.2.2, and 1.2.3. A discussion of the roll-up of the sub-criterion ratings into a single rating for the Accident-Effects-Related criterion appears in Section 1.2.4.

### 1.2.1 Population

Objective - The objective of this criterion is to evaluate the relative suitability of the candidate sites with respect to the population density in the vicinity of the sites. For the purposes of this evaluation, it was assumed the existing licensed units at three of the candidate sites meet the population density conditions codified in 10CFR100.21. These conditions are:

- the sites have exclusion area authority,
- a low population zone exists beyond the exclusion area, and
- sufficient distance exists to high population centers.

Evaluation approach - As outlined in Regulatory Guide 4.7, low population areas are preferred and low population zones should have densities less than 500 people per square mile (EPRI 2001) (equivalent to less than 25,000 persons within 4 miles).

All sites meet population density exclusion criteria since population density was a criterion in the regional screening process. Available census data regarding the nearest population centers and area population densities were reviewed for the candidate sites in the screening criteria report

(Criterion P3), and confirmed that each met the exclusion criteria. On-line data were obtained from the US Census Bureau.

Discussion/Results

Ratings and the population data and distance to population centers that drive the ratings are presented for each site in the following table; additional detail on population data for each site is provided in the succeeding tables.

Florida's seasonal population was also factored in as follows:

- Total population calculated based on Census Bureau year-round population data plus tourist population.
- Assume increase due to seasonal/tourist population is directly related to the percentage of housing units classified for seasonal, recreational or occasional use.

| Nearest Population Center (2000 Population) | Distance (miles) | Population and Population Density (By County) | Notes |
|---|---|---|---|
| **Crystal River (Citrus County)** | | | |
| Donnellon (1898)<br><br>Ocala (45,943) | 16 miles<br><br>38 miles | Population - 118,085<br>Pop. Density - 202.3 persons per square mile (psm)<br><br>Population with tourist population included (8.3% increase to 127,886) | 1 population center within 20 miles<br><br>1 densely populated area within 40 miles<br>Ocala (pop density of 1189.2 psm) |
| **Dixie (Dixie County)** | | | |
| { }<br>{ }<br>{ } | { }<br>{ }<br>{ } | Population – 13,827;<br>Pop Density – 19.6 psm<br><br>Population with tourist population included (18.7% increase to 16,412) | { }<br>{<br>}<br><br> |
| **Highlands (Highlands County)** | | | |
| { }<br>{<br>} | { }<br>{ } | Population – 87,366<br>Pop. Density - 85 psm<br><br>12.6% (98,374)<br>Population with tourist population included (12.6% increase to 98,374 [closer to 3 rating for county population, but would not change overall site | { }<br><br>{<br><br>} |

| Nearest Population Center (2000 Population) | Distance (miles) | Population and Population Density (By County) | Notes |
|---|---|---|---|
| | | rating still of 3] | |
| **Lafayette (Lafayette County)** | | | |
| { } { } | { } { } | Population – 7,022<br>Pop. Density - 12.9 psm<br><br>Population with tourist population included (10% increase to 7724) | { } { } |
| **Levy 2 (Levy County)** | | | |
| { } { } | { } { } | Population – 34,450<br>Pop. Density – 30.8 psm<br><br>Population with tourist population included (6.5% increase to 36,689) | { } { } |
| **Levy 3 (Levy County)** | | | |
| { } { } { } | { } { } { } | Population – 34,450<br>Pop. Density – 30.8 psm<br><br>Population with tourist population included (6.5% increase to 36,689) | { } { } |
| **Putnam 3 (Putnam County)** | | | |
| { } { } { } | { } { } { } | Population – 70,423;<br>Pop Density – 97.6 psm<br><br>Population with tourist population included (8.7% increase to 76,549) | { } { } |
| **Taylor (Taylor County)** | | | |
| { } { } | { } { } | Population – 19,256;<br>Pop Density – 18.5 psm<br><br>Population with tourist population included (13.7% increase to 21,894) | { } { } |

Based on the above information, the following site ratings were assigned:

| Population | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| County population | 3 | 5 | 4 | 5 | 5 | 5 | 4 | 5 |
| Distance to Pop Center | 4 | 2 | 2 | 5 | 2 | 4 | 2 | 5 |
| Number of/proximity to densely populated area | 4 | 4 | 4 | 4 | 3 | 5 | 3 | 5 |
| **Rating** | **4** | **4** | **3** | **5** | **3** | **5** | **3** | **5** |

### 1.2.2 Emergency Planning

Objective – The objective of this criterion is to evaluate the relative suitability of the eight candidate sites with respect to emergency planning characteristics of the general area around each site. (No exclusionary or avoidance criteria apply to this issue.) In particular, this evaluation relied on information pertaining to general population in surrounding area, road conditions near site, access to major traffic networks, terrain features, and climatic conditions.

Evaluation approach – Sites with the least constrained evacuation planning issues (low population, good access from site to major traffic networks and no terrain or climate limitations) were considered the most suitable and were assigned a score of 5. Ratings are based on review of county websites (transportation information), USGS topographic maps, and best professional judgment. Ratings relate to extent of development in the general area, the number of roads providing egress from the site area, and proximity to major US highway systems. In general, the areas with lower population are found in more rural areas with less developed traffic networks, so the two factors balanced one another out.

Discussion/Results – A summary of information for each site is shown in the table below. In general, the sites with lower population were found in the more rural areas with less developed traffic networks, so the two factors balanced one another out. In general, given Florida's flat topography, no limiting terrain features were identified. Limiting climate conditions identified for the coastal sites included the potential for hurricanes. Site ratings follow the table.

| Site | Evaluation |
|---|---|
| Crystal River | Site is located ~ 3 miles west of Red Level, FL and ~ 8 miles northwest of Crystal River, FL. U.S. Highway 19 is located ~ 3 miles east of the site and provides the main access to the area. Interstate 75 is located ~ 35 miles east of the site. Area evacuation is possible in three directions, being limited to the west by the Gulf of Mexico. Florida is prone to impact by hurricanes, and site evacuations coinciding with such climatic conditions would be hampered.<br>The site is adjacent to the Crystal River Energy Complex, and brings the advantage of already having an Emergency Plan that could easily be adapted to include the new site. However, both sites would require evacuation under emergency conditions. |
| Dixie | { } Area evacuation is possible in three directions, being limited to the west by the Gulf of Mexico. Florida is prone to impact by hurricanes, and site evacuations coinciding with such climatic conditions would be hampered. |
| Highlands | { .} Area evacuation is possible in all directions, but { } Florida is prone to impact by hurricanes, and site evacuations coinciding with such climatic conditions would be hampered. { } |
| Lafayette | { } Area evacuation is possible in all directions, but immediate area evacuation { } Florida is prone to impact by hurricanes, and site evacuations coinciding with such climatic conditions would be hampered. { } |
| Levy 2 | { } Area evacuation is possible in three directions, being limited to the west by the Gulf of Mexico. Florida is prone to impact by hurricanes, and site evacuations coinciding with such climatic conditions would be hampered. |
| Levy 3 | { } Immediate area evacuation is limited to one direction (northeast) due to lack of major roads. General area evacuation is possible in three directions, being limited to the west by the Gulf of Mexico. Florida is prone to impact by hurricanes, and site evacuations coinciding with such climatic conditions would be hampered. |

| Site | Evaluation |
|---|---|
| Putnam 3 | { } Immediate area evacuation is possible in all directions, but area evacuation is limited to the east due to the Atlantic Ocean. Florida is prone to impact by hurricanes, and site evacuations coinciding with such climatic conditions would be hampered. |
| Taylor | { } Area evacuation is possible in two directions, being limited to the west by the Gulf of Mexico and to the east by a lack of major roads. { } Florida is prone to impact by hurricanes, and site evacuations coinciding with such climatic conditions would be hampered. |

| Emergency Planning | Crystal River | Dixie | High-lands | Lafayette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Rating** | 3 | 3 | 4 | 4 | 3 | 3 | 4 | 3 |

**References**

Rand McNally Road Atlas.

USGS Topographic Maps.

### 1.2.3 Atmospheric Dispersion

Objective – The objective of this criterion is to evaluate the suitability of the eight candidate sites with respect to short-term atmospheric dispersion characteristics, as a measure of the relative level of concentrations that could occur during accident conditions at the sites.

Evaluation Approach – The efficiency of atmospheric diffusion is primarily dependent on wind speed, wind direction, and the change in air temperature with height which affects atmospheric stability. These factors are used to calculate an atmospheric dispersion function referred to X/Q.

Discussion/Results – The best way to calculate atmospheric dispersion (X/Q) is using on-site meteorological data; however, no such data were readily available for all candidate sites. Sites near the coast would generally experience windier conditions, and were given a rating of 5. Inland locations would generally experience less wind, and were given a rating of 4. Should atmospheric dispersion become a sensitive criterion for site selection, site-specific meteorological data should be obtained to calculate an atmospheric dispersion function (X/Q) for more accurate site comparison.

| Site | Evaluation |
|---|---|
| Crystal River | Site is located in Gulf of Mexico coastal region |
| Dixie | { } |
| Highlands | { } |
| Lafayette | { } |
| Levy 2 | { } |
| Levy 3 | { } |
| Putnam 3 | { } |
| Taylor | { } |

| Atmospheric Dispersion | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Rating** | **5** | **4** | **4** | **4** | **4** | **5** | **4** | **5** |

Finally, composite ratings for this criterion (Accident Effects) are a composite of those for sub-criteria 1.2.1, 1.2.2, and 1.2.3; the ratings for these sub-criteria, along with the summary rating for this criterion, are provided in the following table.

| Sub-criterion | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| Population | 4 | 4 | 3 | 5 | 3 | 5 | 3 | 5 |
| Emergency Planning | 3 | 3 | 4 | 4 | 3 | 3 | 4 | 3 |
| Atmospheric Dispersion | 5 | 4 | 4 | 4 | 4 | 5 | 4 | 5 |
| **Overall Rating** | **4** | **4** | **4** | **4** | **3** | **4** | **4** | **4** |

1.3 OPERATIONAL EFFECTS-RELATED

**1.3.1 Surface Water – Radionuclide Pathway**
1.3.1.1 Dilution Capacity
1.3.1.2 Baseline Loadings
1.3.1.3 Proximity to Consumptive Users

Objective – The purpose of this criterion is to evaluate candidate sites with respect to potential liquid pathway dose consequences. (No site exclusionary or avoidance criteria apply to this issue.) Besides potential source terms, dilution in the receiving surface water body is of primary importance. Three factors considered in evaluating the potential dilution for a receiving water body are dilution capacity, baseline loadings, and proximity to consumptive users.

Evaluation Approach – Site ratings for this criterion are developed as a composite of three sub-criteria that address site characteristics relevant to consideration of operation: Dilution Capacity, Baseline Loadings, and Proximity to consumptive users.

- Dilution Capacity - The purpose of this sub-criterion is to rate sites based on the overall capacity of the receiving water body to dilute effluents from a nuclear power plant. Information on the radioactive source term dilution at a new power plant will be site specific. For siting consideration where such information is not available, however, surrogate parameters, representing the dilution capacity of a stream, can be used. The greater the dilution capacity of the receiving water body, the shorter will be the mixing length downstream defined as the zone within which complete mixing of a discharge contaminant occurs. Sites with higher dilution capacity are rated higher.

- Baseline Loadings – The capacity of a stream to impact health and safety of downstream consumers is related to the existing, or baseline loadings of, radionuclides that are present in the system or can be anticipated in the future. The purpose of this sub-criterion is to characterize sites in accordance with existing levels of radioactive contamination in the receiving water body. Sites are given a rating of 5 for no baseline loadings; proportionally lower ratings are assigned as higher existing levels of radionuclide contamination are identified.

- Proximity to consumptive users - The purpose of this sub-criterion is to rate sites in accordance with the proximity of plant effluent release point to the location(s) public water supply withdrawal(s). More proximal withdrawals present higher potential for dose impacts from the surface water ingestion pathway and can require additional design and licensing efforts. Downstream locations of public water supply withdrawals and recreational contact were identified for each site. Sites with greater pathway lengths to users were more suitable and were assigned a score of 5.

Discussion/Results – An evaluation of each site and a summary of the sub-criterion and overall ratings for the surface water-radionuclide pathway criterion are presented in the following tables.

| Site | Evaluation |
|---|---|
| Crystal River | Dilution Capacity: The Gulf of Mexico is the receiving body of water from the site and is sufficiently large to easily dilute effluents from a nuclear power plant.<br>Baseline Loading: While an existing nuclear power plant is located near the site, the receiving body of water is sufficiently large to render any baseline radionuclide loadings negligible.<br>Proximity to Consumptive Users: No downstream locations of public water supply withdrawals were identified for the site. |

| Site | Evaluation |
|---|---|
| Dixie | Dilution Capacity: The Suwannee River is the receiving body of water from the site. Recent river flow rates have been near 12,000 cubic feet per second. Under these conditions, the receiving body of water is capable of diluting effluents from a nuclear power plant.<br>Baseline Loading: No sources of baseline radionuclide loadings were identified for the site.<br>Proximity to Consumptive Users: No downstream locations of public water supply withdrawals were identified for the site. |
| Highlands | Dilution Capacity: The Kissimmee River is the receiving body of water from the site. The receiving body of water is likely capable of diluting effluents from a nuclear power plant.<br>Baseline Loading: No sources of baseline radionuclide loadings were identified for the site.<br>Proximity to Consumptive Users: {<br>}<br>} |
| Lafayette | Dilution Capacity: The Suwannee River is the receiving body of water from the site. Recent river flow rates have been near 9,000 cubic feet per second. Under these conditions, the receiving body of water is capable of diluting effluents from a nuclear power plant.<br>Baseline Loading: No sources of baseline radionuclide loadings were identified for the site.<br>Proximity to Consumptive Users: No downstream locations of public water supply withdrawals were identified for the site. |
| Levy 2 | Dilution Capacity: Lake Rousseau, the Withlacoochee River, and the Barge Canal are the receiving bodies of water from the site. These receiving bodies enter the Gulf of Mexico within 10 miles. The receiving bodies of water from the site are sufficiently large to easily dilute effluents from a nuclear power plant.<br>Baseline Loading: No sources of baseline radionuclide loadings were identified for the site.<br>Proximity to Consumptive Users: No downstream locations of public water supply withdrawals (either on the Withlacoochee River or on the Barge Canal) were identified for the site – nearby communities use groundwater sources. |
| Levy 3 | Dilution Capacity: The Gulf of Mexico is the receiving body of water from the site and is sufficiently large to easily dilute effluents from a nuclear power plant.<br>Baseline Loading: No sources of baseline radionuclide loadings were identified for the site.<br>Proximity to Consumptive Users: No downstream locations of public water supply withdrawals were identified for the site. |

| Site | Evaluation |
|---|---|
| Putnam 3 | Dilution Capacity: The St. Johns River is the receiving body of water from the site and is sufficiently large to dilute effluents from a nuclear power plant. Recent river flow rates have been near 14,000 cubic feet per second.<br>Baseline Loading: No sources of baseline radionuclide loadings were identified for the site.<br>Proximity to Consumptive Users: {<br>} |
| Taylor | Dilution Capacity: The Gulf of Mexico is the receiving body of water from the site and is sufficiently large to easily dilute effluents from a nuclear power plant.<br>Baseline Loading: No sources of baseline radionuclide loadings were identified for the site.<br>Proximity to Consumptive Users: No downstream locations of public water supply withdrawals were identified for the site. |

| Site | Dilution Capacity | Baseline Loadings | Proximity to Downstream public water supply | Composite Rating |
|---|---|---|---|---|
| Crystal River | 5 | 5 | 5 | **5** |
| Dixie | 3 | 5 | 5 | **4** |
| Highlands | 2 | 5 | 3 | **4** |
| Lafayette | 3 | 5 | 5 | **4** |
| Levy 2 | 4 | 5 | 5 | **5** |
| Levy 3 | 5 | 5 | 5 | **5** |
| Putnam 3 | 3 | 5 | 3 | **4** |
| Taylor | 5 | 5 | 5 | **5** |

Ratings for dilution capacity are directly related to average annual river flow.

**Dilution Capacity**

- The receiving body of water for the Crystal River, Levy 2 and 3, and Taylor sites (Gulf of Mexico) is large enough to efficiently dilute effects from a nuclear power plant; Levy 2 rating is slightly lower since its discharge will enter the Gulf through a short distance along the barge canal or lower reaches of the Withlacoochee River.
- The receiving body of water for the Dixie and Lafayette sites (Suwannee River) and the Highlands site (Kissimmee River) will dilute effects from a nuclear power plant, but are not as large as the receiving bodies of water at other sites. Highlands receives a slightly lower rating since flow is the Kissimmee is variable and flow data are unavailable.

**Baseline Loadings**

- All sites but the Crystal River site are located in an area where no current radiological operations exist. Crystal River would discharge to the Gulf of Mexico, a receiving body large enough to render any baseline loadings as negligible.

**Proximity to Consumptive Users**

- Preliminary information indicated that essentially all drinking water in western Florida comes from groundwater (e.g., this is true for the Suwannee Water Management District) such that there would be no surface water withdrawals (intakes) for public drinking water downstream of the following sites – Crystal River, Dixie, Lafayette, Levy 2 and 3, and Taylor. Also, Crystal River, Levy 3 and Taylor sites are coastal sites and so are unlikely to be located upstream from public drinking water users. {

}

**References**

Estimated Water Use 2002, Southwest Florida Water Management District.

Florida Department of Environmental Protection, Outstanding Florida Waters Fact Sheet [http://www.dep.state.fl.us/water/wqssp/ofwfs.htm]

Florida Department of Environmental Protection, Section 303(d) List [http://www.dep.state.fl.us/water/tmdl/303drule.htm]

Florida Department of Environmental Protection, 2004. Integrated Water Quality Assessment for Florida, 2005 305(b) Report and 303(d) List Update. Division of Water Resource Management, Bureau of Watershed Management, Tallahassee, FL

USGS Topographic Maps

Water Use in the St. Johns River Water Management District, Technical Fact Sheet SJ2004-FS1, 2000.

### 1.3.2 Groundwater Radionuclide Pathway

Objective – The purpose of this section is to evaluate the candidate sites with respect to the relative vulnerability of shallow groundwater resources to potential contamination.

Evaluation Approach – All candidate sites overlie aquifers that have not been designated by EPA's (1986) classification scheme. EPA guidelines were, however, used to assign a designation to candidate site aquifers. In addition, the relative vulnerability of these aquifers to groundwater pollution was evaluated using a standard numerical ranking system called DRASTIC (Aller et al. 1987). Sites considered most suitable are those that are least vulnerable to groundwater contamination within a 2-mile radius of a site.

Discussion/Results – Class I groundwater is addressed as an avoidance criteria (EPRI 2000). This classification includes groundwater resources of unusually high value. They are highly vulnerable to contamination and are irreplaceable sources of drinking water and or ecologically vital. Groundwater underlying the candidate sites are either currently used or are potential sources of drinking water, hence, they would be considered Class II aquifers according to the EPA classification guidelines. There are no sole source aquifers at the six Progress sites. {

} Projects that receive Federal financial assistance and have the potential to contaminate a sole source aquifer are subject to EPA review.

The DRASTIC evaluation was completed using site-specific data, where available, or data from published sources. The most important variables that control the groundwater pollution potential are:

- D–Depth to water,
- R–Recharge (net),
- A–Aquifer media,
- S–Soil media,
- T–Topography (slope),
- I–Impact of the vadose zone,
- C–Conductivity (hydraulic) of the groundwater flow system.

DRASTIC assigns a weighted numeric value to each characteristic, depending on its relative contribution to risk of groundwater contamination. This results in a numeric ranking for each site, allowing the sites to then be ranked in order of suitability. The higher an area scores on the DRASTIC index, the more susceptible a site is to groundwater contamination. Following is a summary of the DRASTIC evaluations.

| Crystal River | | | | |
|---|---|---|---|---|
| **DRASTIC Variable** | **Range and Source of Information** | **Weight** | **Rating** | **Number** |
| Depth to water | 10 ft bgs (Crystal River FSAR) | 5 | 9 | 45 |
| Net Recharge | $10^{+}$ in/yr (Crystal River FSAR) | 4 | 9 | 36 |
| Aquifer Media | Karst Limestone (Crystal River FSAR) | 3 | 9 | 27 |
| Soil Media | Sandy Loam (Crystal River FSAR) | 2 | 6 | 12 |
| Topography | Less than 1% (USGS site topographic maps) | 1 | 10 | 10 |
| Impact Vadose Zone | Sand with significant silt and clay (Crystal River FSAR) | 5 | 6 | 30 |
| Hydraulic Conductivity | 1000 - 2000 gpd/ft$^2$ (Driscoll, 1986; DRASTIC, 1987) | 3 | 8 | 24 |
| | | | **INDEX** | **184** |

| Dixie | | | | |
|---|---|---|---|---|
| **DRASTIC Variable** | **Range and Source of Information** | **Weight** | **Rating** | **Number** |
| Depth to water | 10 ft bgs (USGS topographic maps) | 5 | 9 | 45 |
| Net Recharge | $10^{+}$ in/yr (Crystal River FSAR) | 4 | 9 | 36 |
| Aquifer Media | Karst Limestone (FL geologic maps, topographic maps) | 3 | 9 | 27 |
| Soil Media | Sandy Loam (FL geologic map and text) | 2 | 6 | 12 |
| Topography | Less than 1% (USGS site topographic maps) | 1 | 10 | 10 |
| Impact Vadose Zone | Sand with significant silt and clay (FL geologic map and text) | 5 | 6 | 30 |
| Hydraulic Conductivity | $2000^{+}$ gpd/ft$^2$ (Driscoll, 1986; DRASTIC, 1987) | 3 | 10 | 30 |
| | | | **INDEX** | **190** |

| Highlands | | | | |
|---|---|---|---|---|
| **DRASTIC Variable** | **Range and Source of Information** | **Weight** | **Rating** | **Number** |
| Depth to water | 10 ft bgs (USGS topographic maps) | 5 | 9 | 45 |
| Net Recharge | $10^{+}$ in/yr (Crystal River FSAR) | 4 | 9 | 36 |
| Aquifer Media | Sands with silt and clay (FL geologic maps and text) | 3 | 6 | 18 |
| Soil Media | Sandy Loam (FL geologic map and text) | 2 | 6 | 12 |
| Topography | Less than 1% (USGS site topographic maps) | 1 | 10 | 10 |
| Impact Vadose Zone | Sand with significant silt and clay (FL geologic map and text) | 5 | 6 | 30 |
| Hydraulic Conductivity | 300 - 700 gpd/ft$^2$ (Driscoll, 1986; DRASTIC, 1987) | 3 | 4 | 12 |
| | | | **INDEX** | **163** |

| Lafayette | | | | |
|---|---|---|---|---|
| **DRASTIC Variable** | **Range and Source of Information** | **Weight** | **Rating** | **Number** |
| Depth to water | 10 - 15 ft bgs (USGS topographic maps) | 5 | 9 | 45 |
| Net Recharge | $10^{+}$ in/yr (Crystal River FSAR) | 4 | 9 | 36 |
| Aquifer Media | Karst Limestone (FL geologic maps, topographic maps) | 3 | 9 | 27 |
| Soil Media | Sandy Loam (FL geologic map and text) | 2 | 6 | 12 |
| Topography | Less than 1% (USGS site topographic maps) | 1 | 10 | 10 |
| Impact Vadose Zone | Sand with significant silt and clay (FL geologic map and text) | 5 | 6 | 30 |
| Hydraulic Conductivity | $2000^{+}$ gpd/ft$^2$ (Driscoll, 1986; DRASTIC, 1987) | 3 | 10 | 30 |
| | | | **INDEX** | **190** |

| Levy 2 | | | | |
|---|---|---|---|---|
| **DRASTIC Variable** | **Range and Source of Information** | **Weight** | **Rating** | **Number** |
| Depth to water | 10 ft bgs (USGS topographic maps) | 5 | 9 | 45 |
| Net Recharge | $10^{+}$ in/yr (Crystal River FSAR) | 4 | 9 | 36 |
| Aquifer Media | Karst Limestone (Crystal River FSAR) | 3 | 9 | 27 |
| Soil Media | Sandy Loam (Crystal River FSAR) | 2 | 6 | 12 |
| Topography | Less than 1% (USGS topographic maps) | 1 | 10 | 10 |
| Impact Vadose Zone | Sand with significant silt and clay (Crystal River FSAR) | 5 | 6 | 30 |
| Hydraulic Conductivity | 1000 - 2000 gpd/ft$^2$ (Driscoll, 1986; DRASTIC, 1987) | 3 | 8 | 24 |
| | | | **INDEX** | **184** |

| Levy 3 | | | | |
|---|---|---|---|---|
| **DRASTIC Variable** | **Range and Source of Information** | **Weight** | **Rating** | **Number** |
| Depth to water | 5 - 10 ft bgs (USGS topographic maps) | 5 | 9 | 45 |
| Net Recharge | $10^{+}$ in/yr (Crystal River FSAR) | 4 | 9 | 36 |
| Aquifer Media | Karst Limestone (FL geologic maps, topographic maps) | 3 | 9 | 27 |
| Soil Media | Sandy Loam (FL geologic map and text) | 2 | 6 | 12 |
| Topography | Less than 1% (USGS topographic maps) | 1 | 10 | 10 |
| Impact Vadose Zone | Sand with significant silt and clay (FL geologic map and text) | 5 | 6 | 30 |
| Hydraulic Conductivity | 1000 - 2000 gpd/ft$^2$ (Driscoll, 1986; DRASTIC, 1987) | 3 | 8 | 24 |
| | | | **INDEX** | **184** |

| Putnam 3 | | | | |
|---|---|---|---|---|
| **DRASTIC Variable** | **Range and Source of Information** | **Weight** | **Rating** | **Number** |
| Depth to water | 10-20 ft bgs (USGS topographic maps) | 5 | 8 | 40 |
| Net Recharge | $10^{+}$in/yr (Crystal River FSAR) c | 4 | 9 | 36 |
| Aquifer Media | Sands with minor clay (FL geologic maps and text) | 3 | 8 | 24 |
| Soil Media | Sand (FL geologic map and text) | 2 | 8 | 16 |
| Topography | 1% (USGS site topographic maps) | 1 | 10 | 10 |
| Impact Vadose Zone | Sand with minor clay (FL geologic map and text) | 5 | 8 | 40 |
| Hydraulic Conductivity | 700 – 1000 gpd/ft$^2$ (Driscoll, 1986; DRASTIC, 1987) | 3 | 6 | 18 |
| | | | **INDEX** | **184** |

| Taylor | | | | |
|---|---|---|---|---|
| **DRASTIC Variable** | **Range and Source of Information** | **Weight** | **Rating** | **Number** |
| Depth to water | 5 - 10 ft bgs (USGS topographic maps) | 5 | 9 | 45 |
| Net Recharge | $10^{+}$ in/yr (Crystal River FSAR) | 4 | 9 | 36 |
| Aquifer Media | Karst Limestone (FL geologic maps, topographic maps) | 3 | 9 | 27 |
| Soil Media | Sand (FL geologic map and text) | 2 | 9 | 18 |
| Topography | Less than 1% avg. (USGS topographic maps) | 1 | 10 | 10 |
| Impact Vadose Zone | Sand (FL geologic map and text) | 5 | 8 | 40 |
| Hydraulic Conductivity | 1000 - 2000 gpd/ft$^2$ (Driscoll, 1986; DRASTIC, 1987) | 3 | 8 | 24 |
| | | | **INDEX** | **200** |

DRASTIC indexes for all typical hydrogeologic settings range from 65 to 223 (Aller et al. 1987, p. 82). This range of indexes was used to develop a ranking system to compare vulnerability of candidate sites, as follows:

| DRASTIC Index Range | Relative Vulnerability | Rating |
|---|---|---|
| 65–98 | Low | 5 |
| 98–132 | Low to Moderate | 4 |
| 132–166 | Moderate | 3 |
| 166–199 | High | 2 |
| 199–233 | Very High | 1 |

Based on these DRASTIC Index Ranges for qualitative vulnerability, candidate sites were ranked as follows:

| Candidate Site | DRASTIC Index | Rating |
|---|---|---|
| Crystal River | 184 | **2** |
| Dixie | 190 | **2** |
| Highlands | 163 | **3** |
| Lafayette | 190 | **2** |
| Levy 2 | 184 | **2** |
| Levy 3 | 184 | **2** |
| Putnam 3 | 184 | **2** |
| Taylor | 200 | **1** |

**References:**

Aller, L., Bennett, T., Lehr, J., Petty, R. and G. Hackett. 1987. DRASTIC: A Standardized System for Evaluating Ground Water Pollution Potential Using Hydrogeologic Settings. EPA/600/2-87/035, June 1987.

DRASTIC: A Standardized System for Evaluating Ground Water Pollution Potential Using Hydrogeologic Settings; EPA Manual, 1987.

Driscoll, Fletcher G., Groundwater and Wells, 1986.

EPA, 1986. Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy, Office of Groundwater Protection.

EPA, 2005. Source Water Protection. Sole Source Aquifer Program.

Florida Environment Online, Southeastern Geological Society, Hydrogeological Units of Florida.

Florida Geological Survey, Data and Maps, County Geologic Maps.

Florida Geological Survey, Florida's Geological History and Geological Resources, Special Publication No. 35, 1994.

Florida Geological Survey, Geologic Framework of the Lower Floridan Aquifer System, Brevard County, Florida, Bulletin No. 64, 1994.

Florida Geological Survey, Geologic Map of Florida, 2001.

Florida Geological Survey, Text to Accompany the Geologic Map of Florida, open-file report 80, 2001.

Florida Power, A Progress Energy Company. FSAR – Crystal River, Revision 29.

USGS, 1985. Sinkhole Type, Development, and Distribution in Florida.

USGS. South Florida Information Access. Lithostratigraphic Units.

USGS. Topographic Maps of Florida, various.

### 1.3.3 Air Radionuclide Pathway

1.3.3.1 Topographic Effects
1.3.3.2 Atmospheric Dispersion

Objective – The purpose of this criterion is to address the relative suitability of sites with respect to the potential for exposure to the public from routine airborne releases from a nuclear power plant.

Evaluation approach – The criterion is comprised of two suitability characteristics:

Topographic Effects – Site ratings are based on whether there are any significant topographic features that would materially affect dispersion of the plume from plant releases (e.g., channeling of releases from a site located low in a high-banked river valley).

Atmospheric Dispersion – Measured in terms of long term (e.g., annual average X/Q) dispersion characteristics. Sites with lower X/Q values are rated higher than those with less favorable dispersion conditions.

Discussion/Results – None of the sites are believed to have significant potential for negative topographic effects on long-term dispersion; however, final site locations have not been identified for several of the sites. Annual average X/Q values were unavailable for candidate sites. Sites near the coast would generally experience windier conditions, and were given a rating of 5. Inland locations would generally experience less wind, and were given a rating of 4. Should atmospheric dispersion become a sensitive criterion for site selection, site-specific meteorological data should be obtained to calculate an atmospheric dispersion function (X/Q) for more accurate site comparison.

| Site | Evaluation | Ranking |
|---|---|---|
| Crystal River | Site is located in Gulf of Mexico coastal region | 5 |
| Dixie | { } | 4 |
| Highlands | { } | 4 |

| Site | Evaluation | Ranking |
|---|---|---|
| Lafayette | { } | 4 |
| Levy 2 | { } | 4 |
| Levy 3 | { } | 5 |
| Putnam 3 | { } | 4 |
| Taylor | { } | 5 |

The proposed site ratings with respect to radionuclide exposure via airborne releases are as follows:

| Air Radionuclide Pathway | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Rating** | **5** | **4** | **4** | **4** | **4** | **5** | **4** | **5** |

**References**

USGS Topographic Maps.

### 1.3.4 Air-Food Ingestion Pathway

Objective – The objective of this criterion is to rate candidate sites in terms of the relative potential for exposure of humans to radioactive emissions through deposition of radioactive materials on food crops with subsequent consumption of foodstuffs by exposed individuals.

Evaluation approach – A potential exposure pathway for nuclear power plants is the emission of radionuclides into the food chain on local crops and pastures. Radiological doses and dose commitments resulting from a nuclear plant are well and known and documented. While the operational impacts on the public through food pathway exposures are negligible, sites with lower amounts of crop and pasture land uses are considered to be more suitable. No exclusionary or avoidance criteria apply to this issue. Sites with less crop production nearby are rated higher than those with larger agricultural industries.

Discussion/Results - General information regarding crop lands and pastures near the sites is summarized in the table below.

| Site | Evaluation | Ranking |
|---|---|---|
| Florida (entire state) | Agriculture (farmland) represents 10,414,877 acres out of 34,513,280 acres in Florida (30%). Out of total farmland, **3,715,257** acres are planted in crop (36%). | N/A |
| Crystal River | Agriculture (farmland) represents 47,209 acres out of 373,760 acres in Citrus County (13%). Out of total farmland, **12,331** acres are planted in crop (26%). Other farmland is used for cattle (6,882 head), hogs and pigs (210 head), and poultry (1,094 layers). | 4 |

| Site | Evaluation | Ranking |
|---|---|---|
| Dixie | Agriculture (farmland) represents 31,249 acres out of 450,560 acres in Dixie County (7%). Out of total farmland, **8,488** acres are planted in crop (27%). Other farmland is used for cattle (5,218 head), hogs and pigs (380 head), and poultry (78,334 layers). | 4 |
| Highlands | Agriculture (farmland) represents 576,900 acres out of 657,920 acres in Highlands County (88%). Out of total farmland, **168,996** acres are planted in crop (29%). Other farmland is used for cattle (100,806 head), hogs and pigs (1,904 head), sheep and lambs (78 head), and poultry (1,166 layers and 300 sold in 2002). | 1 |
| Lafayette | Agriculture (farmland) represents 91,988 acres out of 347,520 acres in Lafayette County (26%). Out of total farmland, **17,114** acres are planted in crop (19%). Other farmland is used for cattle (20,173 head) and poultry (10.7 million sold in 2002). | 3 |
| Levy 2 | Agriculture (farmland) represents 180,314 acres out of 715,520 acres in Levy County (25%). Out of total farmland, **69,859** acres are planted in crop (39%). Other farmland is used for cattle (48,691 head), hogs and pigs (1,078 head), sheep (105 head), and poultry (430 layers). | 3 |
| Levy 3 | Agriculture (farmland) represents 180,314 acres out of 715,520 acres in Levy County (25%). Out of total farmland, **69,859** acres are planted in crop (39%). Other farmland is used for cattle (48,691 head), hogs and pigs (1,078 head), sheep (105 head), and poultry (430 layers). | 3 |
| Putnam 3 | Agriculture (farmland) represents 92,619 acres out of 462,080 acres in Putnam County (20%). Out of total farmland, **16,743** acres are planted in crop (18%). Other farmland is used for cattle (12,066 head), hogs and pigs (575 head), sheep and lambs (21 head), and poultry (268 sold in 2002). | 3 |
| Taylor | Agriculture (farmland) represents 53,720 acres out of 666,880 acres in Taylor County (8%). Out of total farmland, **3,052** acres are planted in crop (6%). Other farmland is used for cattle (4,376 head), hogs and pigs (95 head), and poultry (2.5 million sold in 2002). | 5 |

| Air-Food Ingestion Radionuclide Pathway | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Rating** | **4** | **4** | **1** | **3** | **3** | **3** | **3** | **5** |

**References**

Florida MapStats, http://www.fedstats.gov/qf/states/12000.html.

National Agricultures Statistics Service (2002 Census of Agriculture) for Florida, http://151.121.3.33:8080/Census/Create_Census_US_CNTY.jsp.

### 1.3.5 Surface Water – Food Radionuclide Pathway

Objective – The purpose of this criterion is to evaluate the relative suitability of sites in terms of the specific use of irrigation water by downstream locations as a potential pathway for potential exposure.

Evaluation approach – Sites with the fewest number of downstream irrigation uses are more suitable and are rated higher than sites with a large number of downstream irrigation withdrawals. No exclusionary or avoidance criteria apply to this issue (EPRI 2001).

Discussion/Results – General information regarding irrigated lands near the sites is summarized in the table below.

| Site | Evaluation | Ranking |
|---|---|---|
| Florida (entire state) | Total irrigated land represents 1,815,174 acres out of 10,414,877 acres of farmland in Florida (17%). | N/A |
| Crystal River | Total irrigated land represents 867 acres out of 47,209 acres of farmland in Citrus County (2%). Withdrawals of water for irrigation downstream of the site are not expected as the site is located very near the Gulf of Mexico. | 5 |
| Dixie | Total irrigated land represents 1,751 acres out of 31,249 acres of farmland in Dixie County (6%). Withdrawals of water for irrigation downstream of the site are possible. | 4 |
| Highlands | Total irrigated land represents 99,269 acres out of 576,900 acres of farmland in Highlands County (17%). Withdrawals of water for irrigation downstream of the site are probable. | 3 |
| Lafayette | Total irrigated land represents 4,147 acres out of 91,988 acres of farmland in Lafayette County (5%). Withdrawals of water for irrigation downstream of the site are probable. | 4 |
| Levy 2 | Total irrigated land represents 19,501 acres out of 180,314 acres of farmland in Levy County (11%). Withdrawals of water for irrigation downstream of the site are not expected as the site is located very near the Gulf of Mexico. | 5 |
| Levy 3 | Total irrigated land represents 19,501 acres out of 180,314 acres of farmland in Levy County (11%). Withdrawals of water for irrigation downstream of the site are not expected as the site is located very near the Gulf of Mexico. | 5 |
| Putnam 3 | Total irrigated land represents 5,738 acres out of 92,619 acres of farmland in Putnam County (6%). Withdrawals of water for irrigation downstream of the site are probable. | 4 |

| Site | Evaluation | Ranking |
|---|---|---|
| Taylor | Total irrigated land represents 196 acres out of 53,720 acres of farmland in Taylor County (0.4%). Withdrawals of water for irrigation downstream of the site are not expected as the site is located very near the Gulf of Mexico. | 5 |

| Surface Water-Food Radionuclide Pathway | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Rating** | **5** | **4** | **3** | **4** | **5** | **5** | **4** | **5** |

**References**

National Agricultures Statistics Service (2002 Census of Agriculture) for Florida, http://151.121.3.33:8080/Census/Create_Census_US_CNTY.jsp.

### 1.3.6 Transportation Safety

Objective - The objective of this criterion is to evaluate the suitability of the eight candidate sites with respect to potential to create fog and ice hazards to local transportation. No exclusionary or avoidance criteria apply to this issue.

Evaluation approach – Potential impacts from plant operations on transportation safety could occur as a result of increased hazards from cooling towers. Both natural draft and mechanical cooling towers can increase area fogging conditions ice formation on local roads and highways. Sites with high frequencies of naturally-occurring fog and ice events will likely be more adversely affected by cooling tower operations.

Discussion/Results - Relative information regarding existing fog and ice conditions was not readily available for candidate sites; however, cooling tower fogging or icing is not expected to be a major issue at any of the sites, given their general weather patterns, nor is it expected to be a major site discriminator. Accordingly, and in the absence of site specific data, all sites are given a conservative rating of 3 with respect to this criterion.

| Transportation Safety | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Rating** | **3** | **3** | **3** | **3** | **3** | **3** | **3** | **3** |

Of additional concern is the construction of tall facilities in the vicinity of airports. The Florida Department of Transportation (FDOT) is responsible for governing construction of tall structures within a 10 nautical-mile radius of military or public-use aviation facilities. Structures that would require approval include those more than 200 feet above ground level and those exceeding a 100:1 slope within 20,000 feet (3.8 miles) of such facilities. While application for Airspace Obstruction Permits would be required, agency approvals are expected to be easily granted.

**References**

Airspace Obstructions, http://www.dot.state.fl.us/aviation/pdfs/Airspace_Obstructions.pdf

Airport Obstructions Standards Committee Decision Document #02b, September 2004.
http://www.aosc.faa.gov/documents/DRAFT_AOSC_DecisionDocument_02b_Sep13_2004.pdf

## 2. ENVIRONMENTAL CRITERIA

## 2.1 CONSTRUCTION-RELATED EFFECTS ON AQUATIC ECOLOGY

### 2.1.1 Disruption of Important Species/Habitats

Objective – The objective of this criterion is to evaluate the candidate sites with respect to potential construction related impacts on aquatic or marine ecology. Regulatory Guide 4.7 defines important plant and animal species if one or more of the following conditions apply.

- the species is commercially or recreationally valuable,
- the species is officially listed as endangered (E) or threatened (T),
- the species effects the well being of another species within (1) or (2) above,
- the species is a critical component of the structure and function of a valuable ecosystem, or
- the species is a biological indicator of radionuclides in the environment.

Of particular concern are potential impacts to habitat areas used by important species. These areas include those used for:

- breeding and nursery,
- nesting and spawning,
- wintering, and
- feeding.

Evaluation approach – The following siting criteria were used to evaluate the eight candidate sites.

- Exclusionary – Designated critical habitat of endangered species
- Avoidance – Areas where threatened and endangered species are known to occur.
- Suitability – Areas where limited potential impact is expected

No information was obtained which would indicate that any of the sites under consideration would exceed the exclusionary or avoidance criteria relative to ecology. Therefore, the evaluation focused on the relative suitability of the site based on the number of areas where limited potential impact is expected. The number of potential impact areas was directly correlated to the number of rare, threatened and endangered (RTE) aquatic species that may occur in the host county, their habitat (based on existing reports and professional judgment of the amount and quality of habitat available for species), and flexibility (professional judgment of the amount of space within the site circle to avoid known locations of protected species during construction of the facility). Note that the evaluation was limited to the plant site and not existing or potential (future) transmission corridors.

The suitability of the candidate sites with respect to ecology (rare, threatened and endangered aquatic and terrestrial species, and critical habitat) was initially evaluated in the screening criteria report (Criterion P5, which included Federally protected aquatic and terrestrial species combined). Additional site ecological information specific to aquatic resources at each site is included in the full discussion below. In the context of this discussion, vicinity refers to the county in which the candidate site is located.

Discussion

*Crystal River*

Six Federally listed protected aquatic species are found in Citrus County and have the potential to occur in the vicinity of the Crystal River Nuclear Plant 2 site (Citrus County): one mammal species, four reptile (turtle) species, and one fish species. They are identified in the table below.

| Scientific Name | Common Name | Federal Status |
|---|---|---|
| *Trichechus manatus latirostris* | West Indian (Florida) Manatee | E<br>Critical habitat |
| *Chelonia mydas* | Green Sea Turtle | E |
| *Dermochelys coriacea* | Leatherback Sea Turtle | E |
| *Caretta caretta* | Loggerhead Sea Turtle | T |
| *Lepidochelys kempii* | Kemp's ridley Sea Turtle | E |
| *Acipenser oxyrhynchus desotoi* | Gulf Sturgeon | T |

Citrus County is one of four counties called the Nature Coast, the most accessible part of the Gulf Coast in Central Florida. The floodplain forests and feeder lakes of the Withlacoochee River define the interior of the region, while vast estuaries along the coast fringe its western border. According to the Citrus County profile, Citrus County is home to the largest herd of wintering manatees in the nation – 380 as of January 10, 2006, and record numbers were recorded in 2005. A permanent population resides in rehab at the Homosassa Springs State Wildlife Park to the south of the site. Thirty springs protected by the Crystal River National Wildlife Refuge (NWR) in Crystal River serve as critical wintering grounds for nearly 20 percent of the nation's manatee population. In addition, 14 endangered whopping cranes were recently flown down from Wisconsin to make Citrus County their winter home – at the Chassahowitzka National Wildlife Refuge, also south of the site.

Crystal River and Kings Bay, just south of the Crystal River site, form a unique hydrologic system. The tidally influenced Kings Bay is the headwater of Crystal River which forms at the northwest corner of the bay. Six miles west of the Kings Bay, the river ends at the Gulf of Mexico. Crystal River and Kings Bay are classified as Class III waters (Chapter 62-302 of the Florida Administrative Code). Mounting public concern about the environmental sensitivity of the Crystal River/Kings Bay system prompted the Florida Department of Environmental Protection to make Crystal River an Outstanding Florida Water (OFW). The intent of this designation is not to change the designated uses, to prevent further degradation of ambient water quality using certain regulatory restrictions. Changes in water chemistry, particularly water clarity, and nuisance aquatic vegetation are the major management issues for the Crystal River/Kings Bay system with the primary concern being a reduction in water clarity. (Crystal River SWIM (Surface Water Improvement and Management Act) Plan, 2000).

All waters of the state fall into one of five surface water classifications, with specific criteria applicable to each class of water. In addition to its surface water classification, a water may be

designated as an Outstanding Florida Water (62-302.700 F.A.C.). An Outstanding Florida Water, (OFW), is a water body designated worthy of special protection because of its natural attributes. This special designation is applied to certain waters, and is intended to protect existing good water quality. Most OFWs are areas managed by the state or federal government as parks, including wildlife refuges, preserves, marine sanctuaries, estuarine research reserves, certain waters within state or national forests, scenic and wild rivers, or aquatic preserves. Generally, the waters within these managed areas are OFWs because the managing agency has requested this special protection.

*Dixie*

Six Federally listed protected aquatic species are found in Dixie County, although given the site's distance from the coast, only the Gulf sturgeon has the potential to occur in the vicinity of the site. The six species (one mammal, four turtle and one fish species) are identified in the table below.

| Scientific Name | Common Name | Federal Status |
|---|---|---|
| *Trichechus manatus latirostris* | West Indian (Florida) Manatee | E Critical habitat |
| *Chelonia mydas* | Green Sea Turtle | E |
| *Dermochelys coriacea* | Leatherback Sea Turtle | E |
| *Caretta caretta* | Loggerhead Sea Turtle | T |
| *Lepidochelys kempii* | Kemp's ridley Sea Turtle | E |
| *Acipenser oxyrhynchus desotoi* | Gulf Sturgeon | T |

The Lower Suwannee River runs through Dixie and Levy Counties. The region, sometimes referred to as "Pure Water Wilderness" is known for its rivers, springs, and estuaries. The Lower Suwannee basin originates at the confluence of the Santa Fe River and ends at the mouth of the Suwannee River in the Gulf of Mexico. After receiving the discharge from the Santa Fe River, the Suwannee River widens considerably and the floodplain becomes lower and broader.

The states of Georgia, Florida, and the Federal Government have identified the entire Suwannee River as "an ecosystem in need of protection." The Florida Department of Environmental Protection has classified the waterway as an "Outstanding Florida Water". The Suwannee is considered one of the largest and most ecologically unique blackwater river systems in the Southeastern United States.

*Highlands*

There are no aquatic species in the site vicinity that are included on the Federal list of endangered or threatened species.

*Lafayette*

There is one Federally listed aquatic species in the site vicinity: the Gulf sturgeon, a threatened species.

The Florida Department of Environmental Protection has classified the Suwannee waterway as an "Outstanding Florida Water". The Suwannee is considered one of the largest and most ecologically unique blackwater river systems in the Southeastern United States.

*Levy 2 and Levy 3*

Six Federally listed protected aquatic species are found in Levy County and have the potential to occur in the vicinity of the sites, particularly the Levy 3 site which is near the coast: one mammal species, four reptile (turtle) species, and one fish species. They are identified in the table below.

| Scientific Name | Common Name | Federal Status |
|---|---|---|
| *Trichechus manatus latirostris* | West Indian (Florida) Manatee | E<br>Critical habitat |
| *Chelonia mydas* | Green Sea Turtle | E |
| *Dermochelys coriacea* | Leatherback Sea Turtle | E |
| *Caretta caretta* | Loggerhead Sea Turtle | T |
| *Lepidochelys kempii* | Kemp's ridley Sea Turtle | E |
| *Acipenser oxyrhynchus desotoi* | Gulf Sturgeon | T |

The area is commonly known as Florida's "Nature Coast"; the Marjorie Harris Carr Cross Florida Greenway, previously known as the Cross Florida Barge Canal, is a protected green belt corridor surrounded by a public park system. At the mouth of the waterway (Withlacoochee River near Levy 2 site), the Florida Bureau of Watershed Management has designated the waters as a shellfish harvesting/propagation area, and is also considered "Outstanding Florida Waters".

*Putnam 3*

Two Federally listed protected species are found in Putnam County and have the potential to occur in the vicinity of the site: the endangered West Indian (Florida) Manatee (*Trichechus manatus latirostris*) and the endangered shortnose sturgeon (*Acipenser brevirostrum*).

Shortnose sturgeon occur in most major river systems along the eastern seaboard of the United States. They inhabit the main stems of natal rivers, migrating between freshwater and mesohaline river reaches. Spawning occurs in upper, freshwater areas, while feeding and overwintering activities may occur in both fresh and saline habitats (NMFS 1998). Their habitat includes the St. Johns River in Putnam County.

Also of note for Putnam 3 is the importance of commercial fishing in Putnam County. According to the Putnam County Chamber of commerce, Putnam County is the bass capital of the world. The St. Johns river water abounds with largemouth bass, speckled perch, striped bass, catfish, and bream. Also blue crabs and shrimp are caught in the river in season. Some 40 or more fish camps and resorts are found along the banks of the river.

While the St. Johns River is not considered an Outstanding Florida Water, the St. Johns River Alliance in coordination with the District and the Florida Department of Environmental Protection is developing a 4.6 billion dollar restoration plan for the entire river. Some of this money is to go to the purchasing of thousands of acres of land along the river for conservation purposes.

*Taylor*

Six Federally listed protected aquatic species (table below) are found in Taylor County and have the potential to occur in the vicinity of the site: one mammal species, four reptile (turtle) species, and one fish species. They are identified in the table below.

| Scientific Name | Common Name | Federal Status |
|---|---|---|
| *Trichechus manatus latirostris* | West Indian (Florida) Manatee | E<br>Critical habitat |
| *Chelonia mydas* | Green Sea Turtle | E |
| *Dermochelys coriacea* | Leatherback Sea Turtle | E |
| *Caretta caretta* | Loggerhead Sea Turtle | T |
| *Lepidochelys kempii* | Kemp's ridley Sea Turtle | E |
| *Acipenser oxyrhynchus desotoi* | Gulf Sturgeon | T |

Results

The threatened gulf sturgeon is potential concern at several of the sites. The National Marine Fisheries Service and US Fish and Wildlife Service listed the Gulf sturgeon as a threatened species in 1991. They share jurisdiction for this species under the Endangered Species Act. Also known as the Gulf of Mexico sturgeon, it is a subspecies of the Atlantic sturgeon. It is a large fish with an extended snout, vertical mouth, chin barbells, and adults are 71-95 inches in length. Adult fish are bottom feeders, eating primarily invertebrates, including brachiopods, insect larvae, mollusks, worms and crustaceans. Gulf sturgeon are anadromous, with reproduction occurring in fresh water. Most adult feeding takes place in the Gulf of Mexico and its estuaries. The fish return to breed in the river system in which they hatched. Spawning occurs in areas of deeper water with clean (rock and rubble) bottoms.

Historically, the Gulf sturgeon occurred from the Mississippi River to Charlotte Harbor, Florida. It still occurs, at least occasionally, throughout this range, but in greatly reduced numbers. The

fish is essentially confined to the Gulf of Mexico. River systems where the Gulf sturgeon is known to be viable today at or near the candidate sites include the Suwannee River

Dams have been a big factor in their decline as they prevent Gulf sturgeon from reaching many spawning areas. In addition, dredging, desnagging and spoil deposition carried out in connection with channel improvement and maintenance represent a threat to the Gulf Sturgeon.

A Recovery and Management Plan for the Gulf Sturgeon was completed in 1995. In June 2002, NMFS and FWS published a proposed critical habitat designation for Gulf sturgeon, which was finalized in March 2003. Critical habitat includes the Suwannee River (Dixie and Lafayette sites), as well as coastal areas along the Gulf in the vicinity of the Taylor, Levy 2 and Levy 3 sites.

The significance of the coastal areas along the Gulf to the manatee, particularly at Crystal River, is another potential issue with the Gulf coast candidate sites. Site ratings below are based on the number of aquatic species in a given site area (i.e., county), as well as whether or not the potentially affected species include the Gulf sturgeon, manatee and their critical habitat.

| Site | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **T&E Species (aquatic)** | 2 | 2 | 5 | 4 | 2 | 2 | 3 | 2 |
| **Habitat** | 2 | 2 | 5 | 2 | 2 | 1 | 3 | 1 |
| **Flexibility** | 2 | 2 | 5 | 2 | 3 | 1 | 3 | 1 |
| **Overall rating** | **2** | **2** | **5** | **3** | **2** | **1** | **3** | **1** |

### 2.1.2 Bottom Sediment Disruption Effects

2.1.2.1 Contamination
2.1.2.2 Grain Size

Objective – The objective of the criterion is to evaluate the potential short-term impacts to aquatic/marine resources resulting from construction related dredging activities at the candidate sites.

Evaluation approach – The evaluation sought available data on the amount of contaminated sediments near the candidate sites and the grain size of sediments in the area. In general, sites with the lowest concentration of heavy metals and toxic organic compounds and the highest sediment grain size are considered to be the most suitable.

Little information exists regarding the site specific level of sediment contamination that exists in water bodies near the candidate sites. The majority of the available information was obtained from the EPA's National Sediment Quality Survey (2001 and 2004). Information in the EPA report addresses sediment contamination levels as Tier I (adverse impacts to aquatic life are probable) and Tier II (adverse impacts to aquatic life are possible but infrequent). Using best professional judgment, the following evaluation considered the results of the EPA's Tier I/Tier II study results to determine the relative contamination potential for the candidate sites.

No information regarding sediment grain size was obtained for this evaluation. Because sediment grain size is highly variable, even within a small area of coastline or river reach, the following evaluation of potential bottom sediment disruption effects was limited to available information regarding sediment contamination levels in principle water bodies at the eight sites.

Discussion/Results

An updated EPA study (EPA 2004) evaluated 2,874 sampling stations in the Southeast, and identified 12 water bodies as having the most significant sediment contamination in EPA Region 4. No water bodies on which the Progress candidate sites are located were identified in the EPA study, although the Lower St. Johns River was identified in the first report (to Congress) as a watershed containing 32 areas of probable concern, but has fewer than 10 stations (9) classified as Tier 1 in the current report [Tier 1 is defined by EPA as category where associated adverse effects on aquatic life and human health are probable.] A review of water quality data from the Department of Environmental Protection and the various water management districts within the state, including Section 303(d) listings (impaired waterbodies) and monitoring of benthic activity, indicated that one of the biggest water quality impacts in the Progress service area is from increasing nutrients (i.e., nitrate-nitrogen), or nutrient loading, found in the Suwannee (Dixie and Lafayette sites), Kissimmee (Highlands), St. Johns Rivers (Putnam 3), and even the Withlacoochee River at Lake Rousseau (Levy 2) . In addition, individual discharges into the Lower St. Johns River have introduced potentially toxic contaminants into the river sediments (e.g., river is impaired for lead, copper, and silver as well as nutrients) and, in combination with urban development, have reduced water quality in this river to sufficiently low levels to make river restoration and protection a high priority today.

Because dredging is not one of the parameters considered for this particular evaluation, and information on grain size was not readily available for most of the sites, the estimated potential for contaminated sediments to affect the cost and schedule of any construction related dredging operations was based on the limited information available and professional judgment. Based on the EPA study and information provided by the Water Management Districts in Florida, and because the presence of contaminated sediments in the immediate vicinity of the candidate sites including any onsite streams cannot be confirmed, the following conservative ratings are given to the candidate sites. The coastal sites are given a slightly higher rating because their receiving body of water is so expansive (Gulf of Mexico).

| Bottom Sediment Disruption Effects | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Rating** | **3** | **2** | **2** | **2** | **2** | **3** | **2** | **3** |

References

The Incidence and Severity of Sediment Contamination in Surface Waters of the United States. National Sediment Quality Survey. Office of Science and Technology. EPA 823-R-04-007. November.

Florida Department of Environmental Protection, Section 303(d) List [http://www.dep.state.fl.us/water/tmdl/303drule.htm]

Florida Department of Environmental Protection, 2004. Integrated Water Quality Assessment for Florida, 2005 305(b) Report and 303(d) List Update. Division of Water Resource Management, Bureau of Watershed Management, Tallahassee, FL

## 2.2 CONSTRUCTION-RELATED EFFECTS ON TERRESTRIAL ECOLOGY

### 2.2.1 Disruption of Important Species/Habitats and Wetlands

2.2.1.1 Important Species/Habitats
2.2.1.2 Groundcover/Habitat
2.2.1.3 Wetlands

Objective – The objective of this criterion is to evaluate the candidate sites with respect to potential construction related impacts on important species and terrestrial ecology. Regulatory Guide 4.7 defines important plant and animal species if one or more of the following conditions apply.

- the species is commercially or recreationally valuable,
- the species is officially listed as endangered or threatened,
- the species effects the well being of another species within (1) or (2) above,
- the species is a critical component of the structure and function of a valuable ecosystem, or
- the species is a biological indicator of radionuclides in the environment.

Of particular concern are potential impacts to habitat areas used by important species. These areas include those used for:

- breeding and nursery,
- nesting and spawning,
- wintering, and
- feeding.

Evaluation approach – The following siting criteria were used to evaluate the eight candidate sites.

- Exclusionary – Designated critical habitat of endangered species
- Avoidance – Areas where threatened and endangered species are known to occur.
- Suitability – Areas where limited potential impact is expected

No information was obtained which would indicate that any of the sites under consideration would exceed the exclusionary or avoidance criteria relative to ecology. Therefore, the evaluation focused on the relative suitability of the site based on the number of areas where limited potential impact is expected. The number of potential impact areas was directly correlated to the number of rare, threatened, and endangered terrestrial species that may occur in the host county, their habitat (based on existing reports and professional judgment of the amount and quality of habitat available for species), and flexibility (professional judgment of the amount of space within the site circle to avoid known locations of protected species during construction of the facility). Note that the evaluation was limited to the plant site and not existing or potential (future) transmission corridors.

Another sub-criteria evaluated was the total acreage of wetland within the 6000 acres, not including the lake or reservoir that would be the primary source of cooling water. This was also broken out into three components: total wetlands (acres), total acreage of higher quality wetlands, and flexibility, or the ability to avoid wetlands during construction.

The relative suitability of the candidate sites with respect to ecology (rare, threatened and endangered aquatic and terrestrial species, and critical habitat) and wetlands was evaluated in the screening criteria report (Criterion P5, aquatic and terrestrial species combined; and P6). Additional site ecological information specific to terrestrial resources at each site is included in the full discussion below.

Discussion/Results

*Crystal River*

Seven Federally listed terrestrial species, including five bird, one reptile and one plant species, have the potential to occur in Citrus County and therefore in the vicinity of the Crystal River site. The Federally listed species are identified in the table below. .

| Scientific Name | Common Name | Federal Status |
|---|---|---|
| *Haliaeetus leucocephalus* | Bald Eagle | T |
| *Rostrhamus sociabilis plumbeus* | Everglade Snail Kite | E (critical habitat) |
| *Aphelocoma coeruluscens* | Florida Scrub-jay | T |
| *Mycteria Americana* | Wood Stork | E |
| *Picoides borealis* | Red-cockaded Woodpecker | E |
| *Dymarchon corais couperi* | Eastern Indigo Snake | T |

*Dixie*

Five Federally listed terrestrial species, including four bird and one reptile species, have the potential to occur in Dixie County and therefore in the vicinity of the proposed site. The Federally listed species are identified in the table below.

| Scientific Name | Common Name | Federal Status |
|---|---|---|
| *Haliaeetus leucocephalus* | Bald Eagle | T |
| *Aphelocoma coeruluscens* | Florida Scrub-jay | T |
| *Mycteria Americana* | Wood Stork | E |
| *Picoides borealis* | Red-cockaded Woodpecker | E |
| *Dymarchon corais couperi* | Eastern Indigo Snake | T |

*Highlands*

Over 30 Federally listed terrestrial species, including two mammal, six bird, five reptile, one insect, and 20 plant species, have the potential to occur in Highlands County and therefore in the vicinity of the proposed site. The Federally listed species are identified in the table below.

| Scientific Name | Common Name | Federal Status |
|---|---|---|
| *Puma (=Felis) concolor* | Puma (=Mountain lion) | T (S/A) |
| *Puma (=Felis) concolor coryi* | Florida panther | E |
| *Haliaeetus leucocephalus* | Bald Eagle | T |
| *Rostrhamus sociabilis plumbeus* | Everglade Snail Kite | E/CH |
| *Aphelocoma coeruluscens* | Florida Scrub-jay | T |
| *Mycteria Americana* | Wood Stork | E |
| *Picoides borealis* | Red-cockaded Woodpecker | E |
| *Ammodramus savannarum floridanus* | Florida grasshopper sparrow | E |
| *Polyborus plancus audubonii* | Audubon's crested caracara | T |
| *Neoseps reynoldsi* | Sand skink | T |
| *Dymarchon corais couperi* | Eastern Indigo Snake | T |
| *Eumeces egregius lividus* | Bluetail (=blue-tailed) mole skink | T |
| *Alligator mississippiensis* | American alligator | T (S/A) |
| *Polygonella basiramia (=ciliata var. b.)* | Wireweed | E |
| *Eryngium cuneifolium* | Snakeroot | E |
| *Conradina brevifolia* | Short-leaved rosemary | E |
| *Prunus geniculata* | Scrub plum | E |
| *Dicerandra frutescens* | Scrub mint | E |
| *Eriogonum longifolium var. gnaphalifolium* | Scrub buckwheat | T |

| Scientific Name | Common Name | Federal Status |
|---|---|---|
| *Liatris ohlingerae* | Scrub blazing star | E |
| *Polygonella myriophylla* | Sandlace | E |
| *Chionanthus pygmaeus* | Pygmy fringe-tree | E |
| *Clitoria fragrans* | Pigeon wings | T |
| *Paronychia chartacea (=Nyachia pulvinata)* | Papery whitlow-wort | T |
| *Polygala lewtonii* | Lewton's polygala | E |
| *Hypericum cumulicola* | Highlands scrub hypericum | E |
| *Ziziphus celata* | Florida ziziphus | E |
| *Cladonia perforate* | Florida perforate cladonia | E |
| *Bonamia grandiflora* | Florida bonamia | T |
| *Warea carteri* | Carter's mustard | E |
| *Nolina brittoniana* | Britton's beargrass | E |
| *Crotalaria avonensis* | Avon Park harebells | E |

*Lafayette*

Three Federally listed terrestrial species, including two bird and one reptile species, have the potential to occur in Lafayette County and therefore in the vicinity of the proposed site. The Federally listed species are identified in the table below.

| Scientific Name | Common Name | Federal Status |
|---|---|---|
| *Mycteria Americana* | Wood Stork | E |
| *Picoides borealis* | Red-cockaded Woodpecker | E |
| *Dymarchon corais couperi* | Eastern Indigo Snake | T |

*Levy 2 and 3*

Six Federally listed terrestrial species, including one mammal, four bird, and one reptile species, have the potential to occur in Levy County and therefore in the vicinity of the proposed Levy 2 and 3 site. The Federally listed species are identified in the table below.

| Scientific Name | Common Name | Federal Status |
|---|---|---|
| *Microtus pennsylvanicus dukecampbelli* | Florida Salt Marsh Vole | E |
| *Haliaeetus leucocephalus* | Bald Eagle | T |
| *Aphelocoma coeruluscens* | Florida Scrub-jay | T |
| *Mycteria Americana* | Wood Stork | E |
| *Picoides borealis* | Red-cockaded Woodpecker | E |
| *Dymarchon corais couperi* | Eastern Indigo Snake | T |

*Putnam 3*

Six Federally listed terrestrial species, including four bird, one reptile, and one plant species, have the potential to occur in Putnam County and therefore in the vicinity of the proposed site. The Federally listed species are identified in the table below.

| Scientific Name | Common Name | Federal Status |
|---|---|---|
| *Haliaeetus leucocephalus* | Bald Eagle | T |
| *Aphelocoma coeruluscens* | Florida Scrub-jay | T |
| *Mycteria Americana* | Wood Stork | E |
| *Picoides borealis* | Red-cockaded Woodpecker | E |
| *Dymarchon corais couperi* | Eastern Indigo Snake | T |
| *Conradina etonia* | Etonia Rosemary (plant) | E |

*Taylor*

Five Federally listed terrestrial species, including four birds and one reptile species, have the potential to occur in Taylor County and therefore in the vicinity of the proposed site. The Federally listed species are identified in the table below.

| Scientific Name | Common Name | Federal Status |
|---|---|---|
| *Haliaeetus leucocephalus* | Bald Eagle | T |
| *Charadrius melodus* | Piping Plover | T |
| *Mycteria Americana* | Wood Stork | E |
| *Picoides borealis* | Red-cockaded Woodpecker | E |
| *Dymarchon corais couperi* | Eastern Indigo Snake | T |

**Site ratings based on Important Terrestrial Species/Habitat**

| Site | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **T&E species** | 3 | 3 | 1 | 4 | 3 | 3 | 3 | 3 |
| **Habitat** | 3 | 3 | 3 | 4 | 3 | 2 | 3 | 2 |
| **Flexibility** | 3 | 4 | 3 | 4 | 4 | 2 | 4 | 2 |
| **Overall Rating** | **3** | **3** | **2** | **4** | **3** | **2** | **3** | **2** |

The flexibility associated with the final location of the plant area and the presence of higher quality wetlands such as forested wetlands were considered in addition to the overall acreage of mapped wetlands indicated by NWI.

**Site wetland information**

| Site | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **% of wetland polygons mapped over 6000 acre area** | 2% | 1% | 1% | 2% | 1% | 4%++ | 5% | 1% |
| **Number of acres of high quality wetlands* within site area** | 82 acres | 11 acres | 34 acres | 127 acres | 51 acres | 138 acres | 273 acres | 36 acres |

++ = map indicates substantially more wetland area.
* = # acres forested/scrub-shrub wetland polygons mapped

Taking into account the above terrestrial species and wetland ratings, the sites were given the following composite ratings:

**Site ratings based on Wetlands**

| Site | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Total Acres** | 4 | 5 | 5 | 4 | 5 | 3 | 3 | 5 |
| **Acres of High quality wetlands** | 3 | 4 | 4 | 2 | 4 | 2 | 2 | 4 |
| **Flexibility** (based on % wetland polygons mapped over 6000 acres) | 4 | 5 | 5 | 4 | 4 | 3 | 3 | 3 |
| **Overall Rating** | **4** | **5** | **5** | **3** | **4** | **2** | **3** | **4** |

Taking into account the above terrestrial species and wetland ratings, the sites were given the following composite ratings:

**Composite Site Ratings**

| Site | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Species** | **3** | **3** | **2** | **4** | **3** | **2** | **3** | **2** |
| **Wetlands** | **4** | **5** | **5** | **3** | **4** | **2** | **3** | **4** |
| **Avg. Score** | **3** | **4** | **3** | **3** | **3** | **2** | **3** | **3** |

### 2.2.2 Dewatering Effects on Adjacent Wetlands

2.2.2.1 Depth to Water Table
2.2.2.2 Proximal Wetlands

Objective – The objective of this criterion is to evaluate the sites with respect to potential impacts from construction related dewatering activities on area wetlands.

Evaluation approach – The evaluation included a review of information related to the depth of the water table and the distance to nearby wetlands. A determination of the extent of wetland acreage within the study area was limited. National Wetland Inventory maps were used for some sites as the basis for determining wetland acreage. Those maps include numerous areas that do not represent jurisdictional wetlands under Section 404 of the Clean Water Act, which contributed to the difficulty in making an estimate of wetland acreage. Moreover, those maps were based primarily on interpretation of aerial photography, and the amount of field validation that was performed varies according to region of the country and local terrain. Overall site elevation is being used as an indicator of depth to groundwater.

Discussion/Results – Wetlands have been evaluated previously (Section 2.2.1 of this appendix); depth to groundwater for each site is being evaluated by proxy using site elevation as an indicator. Potential hydraulic connections among wetlands via groundwater are not known.

In light of the previous ratings and groundwater information, the site ratings are as follows:

| Site | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| Total wetland acreage | 4 | 5 | 5 | 4 | 5 | 3 | 3 | 5 |
| Acreage of Forested wetlands | 3 | 4 | 4 | 2 | 4 | 2 | 3 | 4 |
| Depth to Groundwater | 3 | 3 | 3 | 4 | 3 | 2 | 4 | 2 |
| **Overall Rating** | **3** | **4** | **4** | **3** | **4** | **2** | **3** | **4** |

## 2.3 OPERATIONAL-RELATED EFFECTS ON AQUATIC ECOLOGY

### 2.3.1 Thermal Discharge Effects

2.3.1.1 Migratory Species Effects
2.3.1.2 Disruption of Important Species/Habitats
2.3.1.3 Water Quality

Objective – No exclusionary or avoidance criteria apply to condenser cooling water system thermal discharges on receiving water bodies (EPRI 2001, Section 3.2.3.1). The objective of this criterion is to address the relative suitability of the eight candidate sites with respect to potential thermal impacts. Two specific thermal impact issues were considered:

- disruption of important species and habitats, and
- impact on water quality of the receiving water body.

Information on migratory species (also identified in EPRI criteria) was not collected at each site and therefore is not evaluated as part of this criterion.

Evaluation approach – In December 2001, the EPA published a final regulation, which affects the location, design, construction, and capacity of intake structures for new power plants (EPA 2001). The EPA rule will strongly encourage the use of closed-cycle designs to reduce adverse cooling water system impacts, and it is assumed that new nuclear reactors at the eight candidate sites would include closed-cycle cooling water systems.

Discussion/Results – No additional site specific data are available for the sites except for the existing plant at Crystal River. Ratings are therefore based on limited flow and water quality data for the cooling water sources and on site ratings for disruption of aquatic species/habitat. In addition, ratings were based on the use of the source waterbody as the receiving water for this evaluation.

In summary, the final set of ratings consisted of two composite ratings: the disruption of important species (based on number of Federally protected aquatic species), as brought forward from Section 2.1.1 of this appendix; and existing water quality of the receiving water, based primarily on cooling water supply information, as it relates to flow and volume, where the size of the receiving water body (heat sink) was the primary factor in assigning ratings (highest rating given to the largest heat sink). The presence of an existing nuclear plant in the immediate site area (Crystal River) also was taken into account, although given the heat sink at Crystal River (Gulf of Mexico), this location is not expected to be a problem for locating a second plant. The resulting ratings are provided below.

| **Thermal Discharge Effects** | **Crystal River** | **Dixie** | **High-lands** | **Lafay-ette** | **Levy 2** | **Levy 3** | **Putnam 3** | **Taylor** |
|---|---|---|---|---|---|---|---|---|
| Presence of important aquatic species | 2 | 2 | 5 | 3 | 2 | 1 | 3 | 1 |
| Cooling water source | 5 | 3 | 2 | 3 | 3 | 5 | 3 | 5 |
| **Overall rating** | **3** | **2** | **3** | **3** | **2** | **3** | **3** | **3** |

**2.3.2 Entrainment/Impingement Effects**

2.3.2.1 Entrainable Organisms

2.3.2.2 Impingable Organisms

Objective – No exclusionary or avoidance criteria apply to entrainment and impingement impacts from the operation of condenser cooling water systems (EPRI 2001, Section 3.2.3.1). The objective of this criterion is to address the relative suitability of the candidate sites with respect to potential entrainment and impingement impacts.

When cooling water is pumped from water bodies, several environmental impacts can occur. Entrainment refers to the removal of small, drifting organisms with the cooling water. Small fish, fish eggs, phytoplankton, zooplankton, and other aquatic/marine organisms experience high mortality rates as they pass through cooling water pumps and heat exchangers. Impingement refers to larger organisms that are screened out of the cooling water at the intake structure. Impinged organisms can include large fish, crustaceans, turtles, and other aquatic/marine organisms that can not avoid high intake velocities near the intake structure and are trapped on the intake screens.

Evaluation approach – Concerns about entrainment and impingement losses are resource dependent and vary on a site-to-site basis. Typically, power plants with once-through cooling water systems have higher entrainment and impingement impacts than power plants with closed-cycle cooling water systems. The EPA issued a final rule in December 2001 affecting the design of intake structures for new power plants (EPA 2001). These rules encourage the use of closed-cycle systems, which is the type of system assumed to be used by Progress at these sites. Developers of new power plants who choose certainty and faster permitting over greater design flexibility, will be encouraged to limit intake water capacities and velocities and incorporate specific intake screen designs to reduce entrainment and impingement losses.

Discussion/Results – The eight candidate sites were evaluated with respect to relative potential for entrainment and impingement impacts for the closed-cycle cooling water system. Proposed facilities at each site will include cooling towers that will reduce the amount of cooling water withdrawal required for plant operation. In addition, proper design of the water intake structure would minimize the potential adverse impacts. In NUREG 1437, NRC concludes that, with cooling towers and appropriate intake design, potential adverse impacts due to entrainment or impingement of aquatic organism are minor and do not significantly disrupt existing populations. Assuming a two unit closed-cycle plant at the site, and 100 percent of the local plankton passing through the plant, it appears that there would be no discernible effect on the plankton population in existing rivers and reservoirs at each site. This is due to the very small volume of water used by the plant relative to the total volume in the river or reservoir at the site. Because of the low flow velocities of a closed cycle plant at the site, impingement of adult fish would be expected to be minimal. Use of a deep water intake would have a minimal effect on entrainment of larval fish.

Results – Given the above information, all sites are given the same conservative rating of 3, except for Highlands which is given a slightly higher rating since it has no federally protected species (i.e., sturgeon).

| Entrainment/Impingement Potential Impact (Closed cycle cooling system design) | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| Rating | 3 | 3 | 4 | 3 | 3 | 3 | 3 | 3 |

**2.3.3 Dredging/Disposal Effects**

2.3.3.1 Upstream Contamination Sources

2.3.3.2 Sedimentation Rates

Objective – The purpose of the section is to evaluate the sites for potential environmental impacts related to maintenance dredging at the intake structure. No specific exclusionary or avoidance criteria apply to this issue. The following evaluation, therefore, is a summary of available information related to the relative suitability of the sites.

Evaluation approach – Sites with high levels of contaminated sediment deposition at the intake structure will experience higher maintenance costs for the removal and disposal of the dredged material. Two factors were considered in performing the evaluation:

- The level of upstream contamination, and
- The rate of sedimentation at the site.

As addressed in Section 2.1.2 (Contaminated Sediments), no site-specific information about the level of sediment contamination at the sites was identified. Results in Section 2.1.2 were based on EPA data, which addressed general trends in levels of contamination in the water bodies at the candidate sites, and general water quality information for the major water bodies on which the candidate sites are located. All sites are assumed to have relatively low fine sediment deposition rates (which are preferred), and the coastal sites are expected to have even better deposition rates given their proximity to the sandy beaches.

Based on available information, the sites were rated according to the expected levels of contamination and sedimentation rates for the general area of the eight sites. Sites with the lowest concentration of heavy metals and toxic organic compounds and the lowest sediment rates are the most suitable and were assigned a score of 5.

Discussion/Results – The results are summarized in the table below.

| Dredging/Disposal Effects | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| Upstream Contamination Sources | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 3 |
| Sedimentation Rates | 4 | 3 | 3 | 3 | 3 | 4 | 3 | 4 |
| **Rating** | **3** | **2** | **2** | **2** | **2** | **3** | **2** | **3** |

## 2.4 OPERATIONAL-RELATED EFFECTS ON TERRESTRIAL ECOLOGY

### 2.4.1 Drift Effects on Surrounding Areas

2.4.1.1 Important Species/Habitat Areas

2.4.1.2 Source Water Suitability

Objective – The objective of this criterion is to evaluate the relative suitability of the candidate sites with respect to potential concerns with cooling tower drift effects. This evaluation considered the potential effects on surrounding areas and the suitability of the cooling water source (EPRI 2001). This issue does not apply to sites for which once-through cooling water systems are selected.

**Cooling Tower Drift**

In every cooling tower, there is a loss of water to the environment in the form of pure water, which results from the evaporative cooling process. This evaporated water leaves the tower in a pure vapor state, and thus presents no threat to the environment. Drift, however, is the undesirable loss of liquid water to the environment, via small unevaporated droplets that become entrained in the exhaust air stream of a cooling tower. These water droplets carry with them minerals, debris and microorganisms and water treatment chemicals from the circulating water, thus potentially impacting the environment. High drift losses are typically caused by fouled, inefficient or damaged drift eliminators, excessive exit velocities or imbalances in water chemistry.

Minimizing drift losses in a cooling tower reduces the risk of impacting the environment. The principle environmental concern with cooling tower drift impacts are related to the emission and downwind deposition of cooling water salts (EPA 1987). Salt deposition can adversely affect sensitive plant and animal communities through changes in water and soil chemistry.

Evaluation approach – Sites considered with the most sensitive environments were assigned lower rating values. Sites with highest concentrations of dissolved solids and other potential contaminants in cooling tower makeup were also assigned lower rating values.

Discussion/Results – Information regarding important terrestrial and aquatic plant and animal communities, habitats, and wetlands in the vicinity of the candidate sites were previously addressed in Section 2.1.1 (Disruption of Important Species/Habitats) and Section 2.2.1 (Disruption of Important Species/Habitats and Wetlands). Cooling water makeup water quality is also taken into account. The coastal sites were given lower ratings due to their proximity to the ocean and greater likelihood of their cooling water being brackish and containing more salt.

Given all the above information, the following ratings were assigned:

| **Drift Effects on Surrounding Area** | **Crystal River** | **Dixie** | **High-lands** | **Lafay-ette** | **Levy 2** | **Levy 3** | **Putnam 3** | **Taylor** |
|---|---|---|---|---|---|---|---|---|
| Important Species Habitat Areas – aquatic | 2 | 2 | 5 | 3 | 2 | 1 | 3 | 1 |
| Important Species Habitat Areas – terrestrial | 3 | 3 | 2 | 4 | 3 | 2 | 3 | 2 |
| Source water suitability | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 2 |
| **Rating** | **2** | **3** | **3** | **3** | **2** | **2** | **3** | **2** |

## SOCIOECONOMICS CRITERIA

### 3.1. SOCIOECONOMICS - CONSTRUCTION RELATED EFFECTS

Objective – The objective of this criterion is to evaluate the relative suitability of the site with respect to the number of construction workers who will move into the plant site vicinity with their families; and the capacity of the communities surrounding the plant site to absorb this new temporary (in-migrant) population.

Evaluation approach – The number of in-migrant workers is dependent on labor availability within commuting distance of the plant site. If an adequate supply of workers is available within reasonable commuting distance, few, if any workers, would choose to relocate to the site. The capacity of communities to absorb an increase in population depends on the availability of sufficient resources, such as adequate housing and community services to support the influx.

Steps 1 and 2 (Exclusionary and Avoidance criteria) are not applicable to this criterion. The plant construction workforce is likely to be available at any of the sites under consideration. The issue in siting, therefore, is the potential socioeconomic impact associated with any temporary influx of construction workers who live too far away to commute daily from their residence. With respect to suitability of the sites under consideration by Progress, socioeconomic impacts of nuclear power plant construction are directly related to two factors:

- number of construction workers who will move into the plant site vicinity with their families; and
- capacity of the communities surrounding the plant site to absorb this new temporary (in-migrant) population.

The number of in-migrant workers is dependent on labor availability within commuting distance of the plant site. If an adequate supply of workers is available within reasonable commuting distance, few (if any) workers would choose to relocate to the site vicinity. The capacity of communities to absorb an increase in population depends on the availability of sufficient resources, such as adequate housing and community services (e.g., schools, hospitals, police, transportation systems, and fire protection) to support the influx without straining existing services. Impacts to a small community located along the commuter route(s) (e.g., food, lodging, gas, and congestion) can also be significant and should be considered. The information that should be considered in rating sites from the perspective of construction impacts includes labor requirements, location of labor pool, number of immigrants, and the economic structure of affected communities.

Before the data could be compared between sites and the sites rated, certain assumptions were made regarding the construction labor requirements and construction schedule, labor pool, and affected area. Many of these assumptions were made without the benefit of site-specific information and may warrant future revision when site-specific data become available (i.e., full NEPA documentation for original plant construction and operation can be reviewed, and/or site-specific plant personnel can be interviewed regarding actual impacts from original plant construction). For purposes of this report, assumptions are based on professional judgment, the AP 1000 Siting Guide, and information contained in the U.S. Nuclear Regulatory Commission's

*Generic Environmental Impact Statement for License Renewal for Nuclear Plants* (NUREG 1437) (May 1996).

ASSUMPTIONS

According to the AP 1000 Siting Guide, the plant workforce (construction) includes a monthly maximum construction workforce requirement of 1000 persons per unit. Construction of a nuclear power plant is very labor-intensive and for the AP 1000, skilled and unskilled construction workers would likely be needed over a 4 to 5 year period. The following assumptions were used in this analysis.

- Ratings are based on the assumption that two units would be constructed at a given site.
- Construction would require a peak construction work force of 2000 workers (1000 per unit); this estimate is not necessarily the "worst-case" but assumed to be a "realistic" estimate for purposes of site comparison.
- Analysis assumes that no other major construction project would occur in the site vicinity concurrently with the plant construction and operation. Thus, sites were rated without consideration of potential cumulative impacts of other potential demands for labor.

Available population and economic data were obtained from the US Census Bureau for each site. The data were collected by county to determine availability of an adequate labor force within commuting distance (based on an assumed location of the labor pool). Data relating to population and labor force (primarily construction industry) were compared with the construction labor requirement to determine availability of labor.

The study of economic structure examines employment because of its pre-eminent role in determining economic well-being of an area. Specifically, impacts are determined by comparing the number of direct and indirect jobs created by plant's construction with total employment of the local study area at the time of construction. Sites were rated according to economic impacts based on the following criteria: economic effects were considered small if peak construction related employment accounted for less than 5 percent of total study area employment; moderate if it accounted for 5 to 10 percent of total study area employment; and large if it accounted for more than 10 percent of total study area employment.

Note that the study area for evaluating socioeconomic impacts from construction included the host county, adjacent counties and any other nearby counties with a major population center within a reasonable commuting distance from the site.

Discussion.- The available population and work force data are presented in the following tables. Projected growth rates from 2000-2010 are assumed to be the same as growth rates found between 1990 and 2000, based on U.S. Census data.

**Crystal River 2 Site Population and Work Force**

| County (Projected Growth 2000-2010) | Total Pop (2000) | Total Pop (2010) | Total Employed Work Force (2000) | Total Construction Workforce (2000) |
|---|---|---|---|---|
| Citrus | 118,085 (26.3%) | 149,141 | 38,827 | 4,441 |
| Levy | 34,450 (32.9%) | 45,784 | 12,935 | 1,397 |
| Marion (Ocala) | 258,916 (32.9) | 344,099 | 98,248 | 8,803 |
| Hernando | 130,802 (29.4) | 169,374 | 44,071 | 4,858 |
| Sumter | 53,345(68.9) | 90,099 | 15,109 | 1,354 |
| Pasco | 344,765 (22.6) | 422,682 | 134,184 | 12,780 |
| **Total** | **940,363** | **1,221,179** | **343,374** | **33,633** |

Source: U.S.Census Bureau, http://quickfacts.census.gov/qfd/ for FL

**Dixie Site Population and Work Force**

| County (Projected Growth 2000-2010) | Total Pop (2000) | Total Pop (2010) | Total Employed Work Force (2000) | Total Construction Workforce (2000) |
|---|---|---|---|---|
| Gilchrist | 14,437 (49.3) | 21,554 | 5,756 | 682 |
| Lafayette | 7,022 (25.9) | 8,840 | 2,540 | 184 |
| Suwannee | 34,844 (30.1) | 45,332 | 13,902 | 1,392 |
| Levy | 34,450 (32.9%) | 45,784 | 12,935 | 1,397 |
| Dixie | 13,827 (30.6) | 18,058 | 4,612 | 492 |
| Alachua (Gainesville) | 217,955 (20%) | 261,546 | 105,293 | 5,234 |
| **Total** | **322,535** | **407,114** | **145,038** | **9,381** |

Source: U.S.Census Bureau, http://quickfacts.census.gov/qfd/ for FL

**Highlands Site Population and Work Force**

| County (Projected Growth 2000-2010) | Total Pop (2000) | Total Pop (2010) | Total Employed Work Force (2000) | Total Construction Workforce (2000) |
|---|---|---|---|---|
| Highlands 85 psm | 87,366 (27.7) | 111,566 | 30,051 | 2,139 |
| Hardee 42.3 psm | 26,938 (38.2) | 37,228 | 9,901 | 794 |
| De Soto 50.5 psm | 32,209 (35) | 43,482 | 12,742 | 976 |
| Glades 13.7 psm) | 10,576 (39.3) | 14,732 | 3,677 | 368 |
| Okeechobee 46.4 psm | 35,910 (21.2) | 43,523 | 14,169 | 1,352 |
| Martin (228.1 psm) | 126,731 (25.6) | 159,174 | 51,054 | 5,357 |
| St. Lucie (336.6 psm) [Ft Pierce Port St Lucie] | 192,695 (28.3) | 247,228 | 77,842 | 8,476 |
| Palm Beach | 1,131,184 (31%) | 1,481,851 | 484,760 | 40,152 |
| **Total** | **1,643,609** | **2,138,744** | **684,196** | **59,514** |

Source: U.S.Census Bureau, http://quickfacts.census.gov/qfd/ for FL

**Lafayette Site Population and Work Force**

| County (Projected Growth 2000-2010) | Total Pop (2000) | Total Pop (2010) | Total Employed Work Force (2000) | Total Construction Workforce (2000) |
|---|---|---|---|---|
| Lafayette | 7,022 (25.9) | 8,840 | 2,540 | 184 |
| Taylor 18.5 psm | 19,256 (12.5) | 22,664 | 7,413 | 654 |
| Madison 27.1 psm | 18,733 (13.1) | 21,187 | 6,943 | 474 |
| Suwannee | 34,844 (30.1) | 45,332 | 13,902 | 1,392 |
| Columbia 70.9 psm | 56,513 (32.6) | 74,936 | 23,006 | 2,096 |
| Gilchrist | 14,437 (49.3) | 21,554 | 5,756 | 682 |
| Levy | 34,450 (32.9%) | 45,784 | 12,935 | 1,397 |
| Alachua | 217,955 (20%) | 261,546 | 105,293 | 5,234 |
| Leon | 239,452 (24.4) | 297,878 | 122,840 | 6,036 |
| **Total** | **642,662** | **799,721** | **300,628** | **18,149** |

Source: U.S.Census Bureau, http://quickfacts.census.gov/qfd/ for FL

**Levy 2 Site Population and Work Force**

| County (Projected Growth 2000-2010) | Total Pop (2000) | Total Pop (2010) | Total Employed Work Force (2000) | Total Construction Workforce (2000) |
|---|---|---|---|---|
| Levy | 34,450 (32.9%) | 45,784 | 12,935 | 1,397 |
| Citrus | 118,085 (26.3%) | 149,141 | 38,827 | 4,441 |
| Marion | 25,8916 (32.9) | 344,099 | 98,248 | 8,803 |
| Gilchrist | 14,437 (49.3) | 21,554 | 5,756 | 682 |
| Dixie | 13,827 (30.6) | 18,058 | 4,612 | 492 |
| Alachua | 217,955 (20%) | 261,546 | 105,293 | 5,234 |
| **Total** | **657,670** | **840,182** | **265,671** | **21,049** |

Source: U.S.Census Bureau, http://quickfacts.census.gov/qfd/ for FL

**Levy 3 Site Population and Work Force**

| County (Projected Growth 2000-2010) | Total Pop (2000) | Total Pop (2010) | Total Employed Work Force (2000) | Total Construction Workforce (2000) |
|---|---|---|---|---|
| Levy | 34,450 (32.9%) | 45,784 | 12,935 | 1,397 |
| Citrus | 118,085 (26.3%) | 149,141 | 38,827 | 4,441 |
| Marion | 25,8916 (32.9) | 344,099 | 98,248 | 8,803 |
| Gilchrist | 14,437 (49.3) | 21,554 | 5,756 | 682 |
| Dixie | 13,827 (30.6) | 18,058 | 4,612 | 492 |
| Alachua | 217,955 (20%) | 261,546 | 105,293 | 5,234 |
| **Total** | **657,670** | **840,182** | **265,671** | **21,049** |

Source: U.S.Census Bureau, http://quickfacts.census.gov/qfd/ for FL

**Putnam 3 Site Population and Work Force**

| County (Projected Growth 2000-2010) | Total Pop (2000) | Total Pop (2010) | Total Employed Work Force (2000) | Total Construction Workforce (2000) |
|---|---|---|---|---|
| Putnam 97.6 psm | 70,423 (8.2) | 76,198 | 26,326 | 2,669 |
| Clay 234.4 psm | 140,814 (32.9) | 187,142 | 66,268 | 5,987 |
| Alachua | 217,955 (20%) | 261,546 | 105,293 | 5,234 |
| Marion | 25,8916 (32.9) | 344,099 | 98,248 | 8,803 |
| Volusia 401.9 psm | 443,343 (19.6) | 530,238 | 189,035 | 16,827 |
| Flagler 102.7 psm | 49,832 (73.6) | 86,508 | 18,815 | 1,873 |
| St. Johns (St. Augustine) | 123,135 (46.9%) | 180,885 | 59,394 | 4,491 |
| Duval (Jacksonville metro area) | 778,879 (15.7%) | 901,163 | 367,065 | 26,110 |
| **Total** | **2,083,297** | **2,567,779** | **930,444** | **71,994** |

Source: U.S.Census Bureau, http://quickfacts.census.gov/qfd/ for FL

**Taylor Site Population and Work Force**

| County (Projected Growth 2000-2010) | Total Pop (2000) | Total Pop (2010) | Total Employed Work Force (2000) | Total Construction Workforce (2000) |
|---|---|---|---|---|
| Taylor | 19,256 (12.5) | 22,664 | 7,413 | 654 |
| Dixie | 13,827 (30.6) | 18,058 | 4,612 | 492 |
| Lafayette | 7,022 (25.9) | 8,840 | 2,540 | 184 |
| Madison | 18,733 (13.1) | 21,187 | 6,943 | 474 |
| Jefferson 21.6 psm | 12,902 (14.2) | 14,734 | 5,495 | 469 |
| Wakulla 37.7 psm | 22,863 (61) | 37,266 | 10,602 | 1,257 |
| Leon (Tallahassee) 359.1 psm | 239,452 (24.4) | 297,878 | 122,840 | 6,036 |
| **Total** | **334,055** | **420,627** | **160,445** | **9,566** |

Source: U.S.Census Bureau, http://quickfacts.census.gov/qfd/ for FL

Results

Although the results show higher population and workforce numbers available at Highlands and Putnam 3, the overall population levels for all eight sites in 2010 when construction is anticipated to start, are sufficiently large that the impact on study area employment from construction of two new units would be low at each site. This is based on conservative workforce levels using 2000 Census Bureau data (without expected increases in 2010), although such increases might be used to support other large (non-nuclear) construction projects at that time). All sites show a percentage increase less than 5% when compared to **total study area workforce** (less than 1% for all but Dixie and Taylor sites); and all but three of the sites show a percentage increase less than 10% when compared to the **total construction workforce**; Dixie, Lafayette and Taylor show a 21.3%, 11%, and 21% increase, respectively.

Because of the large population projections and available workforce at Highlands and Putnam 3, it was assumed that 100% of the workforce at each site would commute from within the area and there would be no in-migrant workforce population. As such, there would be no demands on housing and community services. Based on this information alone, Highlands and Putnam 3 would receive a rating of 5.

| Site | Major population centers within commuting distance of site | Percent increase in total workforce | Percent increase in total construction workforce |
|---|---|---|---|
| Crystal River | Ocala, Tampa suburbs in Pasco County | 0.5% | 5.9% |
| Dixie | { } | 1.4% | 21.3% |
| Highlands | { } | 0.3% | 3.4% |
| Lafayette | { } | 0.7% | 11% |
| Levy 2 | { } | 0.7% | 9.5% |
| Levy 3 | { } | 0.7% | 9.5% |
| Putnam 3 | { } | 0.2% | 2.7% |
| Taylor | { } | 1.2% | 21% |

Given the lower general population estimates and the lower (existing) construction workforce to draw from at the Dixie, Lafayette, and Taylor sites, an additional analysis was conducted for these three sites to consider the impacts of workers in-migrating to these two areas. We have identified the following assumptions to help address potential impacts on local community services and housing:

- 50% of workers will in-migrate (1000 workers)
- 50% of these workers bring their families (2.5 additional persons per family) (1250 family members)
- Influx of direct workers also brings in influx of indirect workers (0.4 ratio of direct to indirect workers – in absence of site-specific information - pertaining to the Regional Industrial Multiplier System direct/indirect ratios calculated for each plant (as found in NUREG/CR-2749) (400 indirect workers)
- 50% of these indirect workers bring their families (2.5 additional persons per family) (500 family members)

Thus an influx of 1000 workers is predicted to results in a total population influx of 3150 persons.

When this population influx is compared to the total population projections in 2010 for the Dixie, Lafayette, and Taylor site areas, the increase is less than 1%. Therefore, the impact on housing and community services would be expected to be negligible.

In general, all eight sites are within reasonable commuting distance from at least one large city or metropolitan area. Each study area appears to have sufficient population centers within commuting distance and/or has experienced tremendous growth since 1990 such that its public services sector would be able to absorb the population in-migration associated with plant construction with minimal impact.

Finally, this evaluation also incorporates more recent findings from a study conducted by Dominion Energy Inc., Bechtel Power Corporation, TLG, Inc., and MPR Associates for the US Department of Energy (2004) entitled: *Study of Construction Technologies and Schedules, O&M Staffing and Cost, Decommissioning Costs and Funding Requirements for Advanced Reactor Designs*. This report includes a more accurate and up-to-date assessment of labor availability that takes into account a U.S. labor pool that is aging and diminishing in number and skill level (with retirement of the baby boom generation that constructed the first set of nuclear power plants). It recognizes that attracting craft with the high skill levels and regulatory employment criteria for new nuclear plant construction is expected to be difficult given that the group of craft currently doing nuclear work is significantly smaller than the total construction craft population, and is in higher demand because of the higher skill levels and greater capability to meet strict employment standards (e.g., scrutiny of NRC background check). However, in an effort to reduce or minimize the labor supply concerns associated with new nuclear plant construction projects, a new strategy has been identified that would shift portions of the work force to areas of the country where skills and craft are available in sufficient quantity (national workforce). This would most effectively be done through modularizing portions of the plants to be built, and providing aggressive training of craftsmen before and during the construction phase of the project. Modularization is anticipated to become an important aspect of new nuclear construction.

Although based on the results above, this latest information and using best professional judgment, a comparison of socioeconomic conditions between the eight candidate sites reveals minimal differences, a set of more conservative ratings has been assigned based on the primary differentiator between sites: total population (host county), percent increase in existing workforce and percent increase in existing construction workforce at each site. As such, the ratings are assigned as follows:

| Socioeconomic Construction | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| Rating | 4 | 3 | 5 | 3 | 4 | 4 | 5 | 3 |

## 3.2 SOCIOECONOMICS – OPERATION

Socioeconomic impacts of operation relate primarily to the benefits afforded to local communities as a result of the plant's presence (e.g., tax plans, local emergency planning support, educational program support). These benefits tend to be a function of negotiations between the plant owner and local government; they are not indicative of inherent site conditions that affect relative suitability between sites. In addition, three of the eight sites have previously demonstrated that their local economies can support existing plant operations, and an additional unit will not adversely affect an area that has already shown its ability to support existing units. This criterion is not applicable to a comparison of the eight candidate sites, and in accordance with guidance in the Siting Guide, suitability scores were not developed.

## 3.3 ENVIRONMENTAL JUSTICE

Objective – The objective of this criterion is to ensure that the effects of proposed actions do not result in disproportionate adverse impacts to minority and low-income communities. In comparing sites, this principle is evaluated on the basis of whether any disproportionate impacts to these communities are significantly different when comparing one site to another.

Evaluation approach – The first step in this evaluation is to collect and compare population data for minorities and low-income populations across sites.

However, two additional questions comprising this evaluation also are relevant:

1. Does the proposed action result in significant adverse impacts?
2. Are impacts to minority or low-income populations significantly different between sites?

If the answer to the first question is "no" for all sites (i.e., no significant health and safety impacts are identified), then there would be no environmental justice concerns, regardless of the percentage of minority or low-income populations found within the surrounding communities of a site(s). If the answer to the first question is "yes" (i.e., significant health and safety impacts are expected), environmental justice concerns are relevant to site selection only if the answer to the second question is also "yes" (i.e., disproportionate adverse impacts on minority or low-income populations are identified at one or more sites, thereby resulting in significant differences between sites).

Note that the study area for evaluating environmental justice concerns included the host county and immediately surrounding counties.

Discussion – With regard to the sites under consideration, related environmental justice information is summarized for each candidate site below:

**Crystal River Site Minority and Low Income Population/Percentages**

| County | Population (2000) | White | Black (%) | Hispanic (%) | Low Income (population) |
|---|---|---|---|---|---|
| Citrus | 118,085 | 95% (112236 ) | 2.4 (2791) | 2.7 (3141) | 11.7% (13,820) |
| Levy | 34,450 | 85.9 (29,586) | 11 (3778) | 3.9 (1339) | 18.6 (6410) |
| Marion (Ocala) | 258,916 | 84.2 (217909) | 11.5 (29900) | 6.0 (15616) | 13.1 (33,920) |
| Hernando | 130,802 | 92.9 (121453) | 4.1 (5330) | 5.0 (6587) | 10.3 (13,470) |
| Sumter | 53,345 | 82.6 (44061) | 13.8 (7351) | 6.3 (3356) | 13.7 (7310) |
| **Total** | **595,598** | **88.2 (525,245)** | **11.8%** | | **12.6 (74,930)** |

Source: U.S.Census Bureau, http://quickfacts.census.gov/qfd/ for FL

**Dixie Site Minority and Low Income Population/Percentages**

| County | Population (2000) | White | Black (%) | Hispanic (%) | Low Income |
|---|---|---|---|---|---|
| Gilchrist | 14,437 | 90.5 (13068) | 7.0 (1010) | 2.8 (404) | 14.1 (2040) |
| Lafayette | 7,022 | 79.3 (5566) | 14.4 (1009) | 9.1 (642) | 17.5 (1230) |
| Suwannee | 34,844 | 85.4 (29455) | 12.1 (4221) | 4.9 (1703) | 18.5 (6450) |
| Levy | 34,450 | 85.9 (29,586) | 11 (3778) | 3.9 (1339) | 18.6 (6410) |
| Dixie | 13,827 | 88.8 (12279) | 9.0 (1241) | 1.7 (249) | 19.1 (2640) |
| Alachua (Gainesville) | 217,955 | 73.5 (160,128) | 19.3 (42,062) | 5.7% (12,493) | 22.8 (49,690) |
| Columbia | 56,513 | 79.7 (45,053) | 17 (9623) | 2.7 (1546) | 15 (8480) |
| Taylor | 19,256 | 77.8 (14988) | 19 (3666) | 1.5 (295) | 18 (3570) |
| **Total** | **398,304** | **77.9 (310,123)** | **22.1%** | | **20.2 (80,510)** |

Source: U.S.Census Bureau, http://quickfacts.census.gov/qfd/ for FL

**Highlands Site Minority and Low Income Population/Percentages**

| County | Population (2000) | White | Black (%) | Hispanic (%) | Low Income |
|---|---|---|---|---|---|
| Highlands | 87,366 | 83.5 (72,926) | 9.3 (8155) | 12.1 (10,542) | 15.2 (13,280) |
| Hardee | 26,938 | 70.7 (19,035) | 8.3 (2244) | 35.7 (9611) | 24.6 (6630) |
| De Soto | 32,209 | 73.3 (23619) | 12.7 (4098) | 24.9 (8019) | 23.6 (7600) |
| Glades | 10,576 | 77 (8142) | 10.5 (1114) Am Indian 4.9% [521] | 15.1(1594) | 15.2 (1610) |
| Okeechobee | 35,910 | 79.3 (28,468) | 7.9 (2844) | 18.6 (6684) | 16 (5740) |
| Martin | 126,731 | 89.9 (113912) | 5.3 (6673) | 7.5 (9506) | 8.8 (11,150) |
| St. Lucie | 192,695 | 79.1 (152,504) | 15.4 (29,714) | 8.2 (15,733) | 13.4 (25,820) |
| **Total** | **512,425** | **81.7 (418,606)** | **18.3%** | | **12.1 (61,830)** |

Includes some whites of Hispanic or Latino origin.
Source: U.S.Census Bureau, http://quickfacts.census.gov/qfd/ for FL

**Lafayette Site Minority and Low Income Population/Percentages**

| County | Population (2000) | White | Black (%) | Hispanic (%) | Low Income |
|---|---|---|---|---|---|
| Lafayette | 7,022 | 79.3 (5566) | 14.4 (1009) | 9.1 (642) | 17.5 (1230) |
| Taylor | 19,256 | 77.8 (14,988) | 19 (3666) | 1.5 (295) | 18 (3470) |
| Madison | 18,733 | 57.5 (10917) | 40.3 (7549) | 3.2 (600) | 23.1 (4330) |
| Suwannee | 34,844 | 85.4 (29455) | 12.1 (4221) | 4.9 (1703) | 18.5 (6450) |
| Columbia | 56,513 | 79.7 (45,053) | 17 (9623) | 2.7 (1546) | 15 (8480) |
| Gilchrist | 14,437 | 90.5 (13068) | 7.0 (1010) | 2.8 (404) | 14.1 (2030) |
| Levy | 34,450 | 85.9 (29,586) | 11 (3778) | 3.9 (1339) | 18.6 (6410) |
| Alachua | 217,955 | 73.5 (160,128) | 19.3 (42,062) | 5.7% (12,493) | 22.8 (49,690) |
| **Total** | **403,210** | **76.6% (308,761)** | **23.4%** | | **20% (82,090)** |

Source: U.S.Census Bureau, http://quickfacts.census.gov/qfd/ for FL

**Levy 2 Site Minority and Low Income Population/Percentages**

| County | Population (2000) | White | Black (%) | Hispanic (%) | Low Income |
|---|---|---|---|---|---|
| Levy | 34,450 | 85.9 (29,586) | 11 (3778) | 3.9 (1339) | 18.6 |
| Citrus | 118,085 | 95% (112236 ) | 2.4 (2791) | 2.7 (3141) | 11.7% ( ) |
| Marion | 258,916 | 84.2 (217909) | 11.5 (29900) | 6.0 (15616) | 13.1 |
| Gilchrist | 14,437 | 90.5 (13068) | 7.0 (1010) | 2.8 (404) | 14.1 |
| Dixie | 13,827 | 88.8 (12279) | 9.0 (1241) | 1.7 (249) | 19.1 |
| Alachua | 217,955 | 73.5 (160,128) | 19.3 (42,062) | 5.7% (12,493) | 22.8 |
| **Total** | **657,670** | **82.9% (545,206)** | **17.1%** | | **16.5% 108,520** |

Source: U.S.Census Bureau, http://quickfacts.census.gov/qfd/ for FL

**Levy 3 Site Minority and Low Income Population/Percentages**

| County | Population (2000) | White | Black (%) | Hispanic (%) | Low Income |
|---|---|---|---|---|---|
| Levy | 34,450 | 85.9 (29,586) | 11 (3778) | 3.9 (1339) | 18.6 (6410) |
| Citrus | 118,085 | 95% (112236 ) | 2.4 (2791) | 2.7 (3141) | 11.7% (13,820) |
| Marion | 258,916 | 84.2 (217909) | 11.5 (29900) | 6.0 (15616) | 13.1 (33,920) |
| Gilchrist | 14,437 | 90.5 (13068) | 7.0 (1010) | 2.8 (404) | 14.1 (2040) |
| Dixie | 138,27 | 88.8 (12279) | 9.0 (1241) | 1.7 (249) | 19.1 (2640) |
| Alachua | 217,955 | 73.5 (160,128) | 19.3 (42,062) | 5.7% (12,493) | 22.8 (49,690) |
| **Total** | **657,670** | **82.9% (545,206)** | **17.1%** | | **16.5% 108,520** |

Source: U.S.Census Bureau, http://quickfacts.census.gov/qfd/ for FL

**Putnam 3 Site Minority and Low Income Population/Percentages**

| County | Population (2000) | White | Black (%) | Hispanic (%) | Low Income |
|---|---|---|---|---|---|
| Putnam | 70,423 | 77.9 (54868) | 17 (12003) | 5.9 (4168) | 20.9 (14720) |
| Clay | 140,814 | 87.4 (123,128) | 6.7 (9439) | 4.3 (6059) | 6.8 (9,580) |
| Alachua | 217,955 | 73.5 (160,128) | 19.3 (42,062) | 5.7% (12,493) | 22.8 (49,700) |
| Marion | 258,916 | 84.2 (217909) | 11.5 (29900) | 6.0 (15616) | 13.1 (33,920) |
| Volusia | 443,343 | 86.1 (381760) | 9.3 (41198) | 6.6 (29111) | 11.6 (51,430) |
| Flagler | 49,832 | 87.3 (43,490) | 8.8 (4401) | 5.1 (2537) | 8.7 (4,340) |
| St. Johns (St. Augustine) | 123,135 | 90.9 (111955) | 6.3 (7744) | 2.6 (3244) | 8.0 (9,850) |
| **Total** | **1,304,418** | **83.8% (1,093,238)** | **16.2%** | | **13.3 (173,540)** |

Source: U.S.Census Bureau, http://quickfacts.census.gov/qfd/ for FL

**Taylor Site Minority and Low Income Population/Percentages**

| County | Population (2000) | White | Black (%) | Hispanic (%) | Low Income |
|---|---|---|---|---|---|
| Taylor | 19,256 | 77.8 (14988) | 19 (3666) | 1.5 (295) | 18 (3570) |
| Dixie | 13,827 | 88.8 (12279) | 9.0 (1241) | 1.7 (249) | 19.1 (2640) |
| Lafayette | 7,022 | 79.3 (5566) | 14.4 (1009) | 9.1 (642) | 17.5 (1230) |
| Madison | 18,733 | 57.5 (10769) | 40.3 (7549) | 3.2 (600) | 23.1 (4330) |
| Jefferson | 12,902 | 59.3 (7647) | 38.3 (4947) | 2.2 (290) | 17.1 (2210) |
| Wakulla | 22,863 | 86.1 (19684) | 11.5 (2631) | 1.9 (443) | 11.3 (2580) |
| Leon (Tallahassee) | 239,452 | 66.4 (158893) | 29.1 (69704) | 3.5 (8407) | 18.2 (43,580) |
| **Total** | **334,055** | **68.8 % (229,826)** | **31.2%** | | **18 (60,140)** |

Source: U.S.Census Bureau, http://quickfacts.census.gov/qfd/ for FL

Results

Environmental justice data for the eight sites are summarized below.

| Site | Population (2000) | White (%) | Minority (%) | Low Income (%) |
|---|---|---|---|---|
| Crystal River | 595,598 | 88.2 (525,245) | 11.8% | 12.6 (74,930) |
| Dixie | 398,304 | 77.9 (310,123) | 22.1% | 20.2 (80,510) |
| Highlands | 512,425 | 81.7 (418,606) | 18.3% | 12.1 (61,830) |
| Lafayette | 403,210 | 76.6% (308,761) | 23.4% | 20% (82,090) |
| Levy 2 | 657,670 | 82.9% (545,206) | 17.1% | 16.5% 108,520 |
| Levy 3 | 657,670 | 82.9% (545,206) | 17.1% | 16.5% 108,520 |
| Putnam 3 | 1,304,418 | 83.8% (1,093,238) | 16.2% | 13.3 (173,540) |
| Taylor | 334,055 | 68.8 % (229,826) | 31.2% | 18 (60,140) |

*State Average for FL is 78% white (22% minority) and 12.5% below poverty line.

- Large minority populations (20% or higher) are found at three sites: Dixie, Lafayette, and Taylor, although note that the state average minority population for Florida is 22%. Large minority populations (20% or higher) are also found at Dixie and Lafayette.
- Low income populations higher than the state average are found at all but one site, Highlands.
- No significant health impacts to human populations were identified at any of the sites under consideration.
- Low-income population in Citrus County has directly benefited from economic impacts of the existing plant at Crystal River. Similar beneficial economic impacts are expected to occur for additional units at Crystal River and at the other sites with large minority populations as well.

Based on professional judgment in factoring in the above percentages alone, the initial site ratings are as follows:

| Environmental Justice | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Provisional Rating** | **4** | **2** | **3** | **2** | **3** | **3** | **3** | **1** |

However, given that no significant impacts to any human populations are expected to occur at any of the sites under consideration, there cannot be significant disproportionate impacts to minority or low-income populations; and based on actual employment experience, positive economic benefits have been shown to be available to all members of the population, without regard to income or ethnicity.

While disproportionate adverse impacts could be expected to occur to minority or low-income populations at both sites, if significant health and safety impacts were expected from a new nuclear reactor, no significant health and safety impacts are expected to human populations from reactor operations. Therefore, if no significant health and safety impacts are identified from reactor construction and operation, then there would be no environmental justice concerns, regardless of the percentage of minority or low-income populations found within the surrounding communities. Therefore, no significant differences in environmental justice impacts are expected between the candidate sites and both should receive a final comparative rating of 5.

Based on this analysis, there is no basis for differentiation between sites from an environmental justice perspective, despite differences in the percentages of minority and low-income populations found within the surrounding communities of each site. All sites are found to be equally and highly suitable. Therefore, the site ratings are as follows:

| Environmental Justice | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Rating** | **5** | **5** | **5** | **5** | **5** | **5** | **5** | **5** |

## 3.4 LAND USE

### 3.4.1 Construction- and Operation-Related Effects

Objective - The objective of this criterion is to evaluate the suitability of the eight candidate sites with respect to potential conflicts in existing land uses at each site. No exclusionary or avoidance criteria apply to this issue.

Evaluation Approach – The evaluation is based on the compatibility of a new nuclear station with existing land uses, including existing and future land uses and zoning ordinances, as well as any significant historic resources. Historic resources include those currently listed on the National Register of Historic Places (NRHP), or known (active) archaeological sites or Native American lands.

This analysis is based on publicly available data, been updated with more site-specific information from site flyovers and land analysis conducted by Progress Real Estate.

Discussion/Results – Relevant land use data are provided in the table below. All sites have similar land use currently and ratings based primarily on perceived difficulties in changing current rural and agricultural land use to industrial zoning – with less issues expected at Highlands and Putnam 3 sites (Putnam 3 most favorable since industrial activities occurring on-site).

| Site | Special Land Use Features in Vicinity of Site |
|---|---|
| Crystal River | Existing nuclear unit at Crystal is already owned by Progress and is zoned for uses compatible with development of a new unit; existing units are integrated into the surrounding land use patterns. However, there are many special public ownership features around the site, including:<br>Withlacoochee State Forest<br>Crystal River and Chassahowitchka National Wildlife Refuges<br>Fort Cooper State Park<br>Homosassa Springs State Park<br>Withlacoochee State Trail<br>Historic Sites (NRHP): Citrus County Courthouse, Old Building, and the Fort Cooper site in Inverness; the Yulee Sugar mill Historic Site in Homosassa; Mullet Key Sit, and the Crystal River State Archaeological Site/Indian Mounds (2 mi NW of Crystal River on US 19-98), a paved interpretive trail around a ceremonial mount complex built more than 2,500 years ago, encompassing four cultural periods in Florida's History. |

| Site | Special Land Use Features in Vicinity of Site |
|---|---|
| Dixie | Remote and rural agrarian; characterized by planted timberland and/or scrub vegetation Land uses in the Lower Suwannee River Basin generally include agriculture, commercial forestry, and low-density residential development. Several subdivisions are located along the river. The more intensive residential developments on the river are found along higher areas and natural river levees.<br>Agricultural land use not consistent for nuclear power plant site. Both land use change and zoning change would be required. {<br>}<br>This region is an abundantly visited recreational area, and much of the economy is dependant on ecotourism.<br>Large public ownerships in Dixie County include the Lower Suwannee National Wildlife Refuge and Nature Coast State Trail.<br>Large tracts of federal and state owned lands along the Suwannee River (specific tracts not identified, however).<br>NRHP Sites: {<br>} |
| Highlands | Remote and rural; land use is mostly agricultural (e.g., orchards, cattle)<br>Future land use is agricultural although County eager to identify and embrace industry if result in more jobs.<br>Both land use change and zoning change would be required.<br>Brighton Indian Reservation<br>Highlands Hammock & Lake June Scrub State Parks (plus 18 county parks and 95 lakes)<br>NRPH Sites: { } |
| Lafayette | Remote and rural; environmentally sensitive area. Change in land use would be required and could be problematic.<br>Land use in site area is mainly agricultural; some farming and associated housing and outbuildings in the Lafayette area.<br>{<br>}<br>Land uses in the Lower Suwannee River Basin generally include agriculture, commercial forestry, and low-density residential development. Several subdivisions are located along the river. The more intensive residential developments on the river are found along higher areas and natural river levees.<br>Large tracts of federal and state owned lands along the Suwannee River (specific tracts not identified, however).<br>{ } |
| Levy 2 | Remote and rural; characterized by planted timberland and/or scrub vegetation Some farming and associated housing and outbuildings in the area. Current land use is agricultural and forestry; also would allow for rural residential. However, siting of nuclear plant would likely require significant land use change and amendment to comprehensive plan.<br>Development along the Withlacoochee River below Lake Rousseau. The Marjorie Harris Carr Cross Florida Greenway, previously known as the Cross Florida Barge Canal, is a protected green belt corridor surrounded by a public park system. There are a number of boat launches, public and private parks and resorts in the vicinity.<br>Lightly populated agrarian county<br>Large public ownerships in Levy County include Cedar Keys NWR; Goethe State Forest; Manatee Springs State Park; Cedar Key Scrub State Preserve (Cedar Key closer to Levy 3 site)<br>NRHP Sites: { } |

| Site | Special Land Use Features in Vicinity of Site |
|---|---|
| Levy 3 | Remote and rural; characterized by planted timberland and/or scrub vegetation<br>Ecologically sensitive estuarine environment along the coast<br>Lightly populated agrarian county<br>Large public ownerships in Levy County include Cedar Keys NWR; Goethe State Forest; Manatee Springs State Park; Cedar Key Scrub State Preserve [Cedar Keys NWR is closer to Levy 3 than to Levy 2 site].<br>NRHP Sites: { } |
| Putnam 3 | Mostly rural and agricultural land – open fields and extensive timberland. While located within agricultural land use designation, industrial sites found nearby, which gives slight advantage from land use standpoint. {<br>}<br>County is agrarian (e.g., ferns potatoes, cabbage) and warm-water fish production (there is a fish hatchery downstream from site)<br>Large public ownerships in Putnam County include the Ocala National Forest (portions) and the Ravines Garden State Park. St. Johns River is one of only 14 rivers designated an American Heritage River (top fishing spots cover 70 square miles or river and lakes).<br>NRHP sites {<br>} |
| Taylor | Remote and rural<br>Land use includes agricultural<br>Ecologically sensitive estuarine environment along the coast<br>Agricultural/ecological land uses not consistent for nuclear power plant site. Both land use change and zoning change would likely be required and could be problematic.<br>Also characterized (by flyovers) as planted timberland and/or scrub vegetation.<br>No large public ownership lands in Taylor County<br>NRHP Sites: { } |

| Land Use | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Rating** | **2** | **2** | **3** | **2** | **2** | **2** | **4** | **2** |

**References**

Florida County Profile websites [Enterprise Florida - click on appropriate county]
[http://www.eflorida.com/profiles/CountyReport.asp?CountyID=9&Display=all]

National Register of Historic Places, State Listings by County
[http://www.nationalregisterofhistoricplaces.com/FL/state.html [click on county of interest]

The Duncan Company 2006

## ENGINEERING AND COST-RELATED CRITERIA

## 4.1 HEALTH AND SAFETY RELATED CRITERIA

### 4.1.1 Water Supply

Objective – The purpose of this criterion is to evaluate relative differences in the design and construction cost of developing water supply facilities.

Evaluation approach – Sites with local conditions that would require additional engineering costs to develop water supply capability (e.g., reservoirs to address water supply limitations or reliability issues (e.g., low flow constraints)) are rated lower than sites with no such requirements. Because topography in the vicinity of the candidate sites does not provide natural drainages that can easily be developed for reservoirs, actual construction of reservoirs would likely be very expensive, if feasible at all. Sites are characterized below in terms of the likelihood that a reservoir would be required to augment water from the source during low-flow periods; this reflects the relative difficulty and expense of dealing with low-flow conditions at the sites, regardless of whether a reservoir or some other means of addressing drought conditions is adopted.

Discussion/Results – Because water flows vary between the sites, particularly during periods of low flow, reservoir requirements also will differ. Site ratings are based on professional judgment – taking into account major river body flows (average annual and low flow/drought conditions) (see section 1.1.2), as well as the size and extent of on-site tributaries. Sites with no anticipated low-flow constraints received a 5; other ratings relate to the likelihood that a reservoir or other means to address low-flow conditions would be required.

| Site | Evaluation |
|---|---|
| Crystal River | Due to the proximity of the Gulf of Mexico, an abundant water supply is available, and reservoir construction is not anticipated. |
| Dixie | The water supply for the site is the Suwannee River. Reservoir construction may be necessary. |
| Highlands | The water supply for the site is the Kissimmee River. { } Reservoir construction will be necessary. |
| Lafayette | The water supply for the site is the Suwannee River { } Reservoir construction may be necessary. |
| Levy 2 | Due to the proximity of the Cross Florida Barge Canal, an abundant water supply is available, and reservoir construction is not anticipated; however still much uncertainty with storage volume requirements as well as plant connections to the water supply. Additionally, hydrological monitoring may be required to demonstrate effects of water withdrawals/discharges. |
| Levy 3 | Due to the proximity of the Gulf of Mexico, abundant water supply is available, and reservoir construction is not anticipated. |
| Putnam 3 | The water supply for the site is the St. Johns River. Although the river is relatively large, reservoir construction may be necessary. |

| Site | Evaluation |
|---|---|
| Taylor | Due to the proximity of the Gulf of Mexico, an abundant water supply is available, and reservoir construction is not anticipated. |

| Water Supply | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Rating** | **5** | **3** | **2** | **3** | **4** | **5** | **4** | **5** |

**References**

USGS Topographic Maps

### 4.1.2 Pumping Distance

Objective – The purpose of this criterion is to evaluate relative differences in the operational costs associated with pumping makeup water from the source water body to the plant.

Evaluation approach – Sites located large distances from their makeup water supply source are rated lower than those located adjacent to the source. In general, the cost differential is expected to be a linear function of distance from the water source. Site-specific information based on site flyovers was also considered.

Discussion/Results – Precise intake and discharge locations have not yet been determined for candidate sites as final plant locations and reservoir requirements/locations have yet to be determined. It is assumed that cooling facilities will be located as close to the water supply as possible; sites are given a rating between 1 and 5 based on the estimated distance between the site location and the water supply.

The Taylor and Levy 3 sites were further downgraded based on additional study and findings from site flyovers. For Taylor and Levy 3, installation of cooling water intake and discharge pipelines (canals would likely not be feasible) at these sites would require lengthy traverse of estuarine areas and of the shallow seabed (up to several miles) offshore from the sites. {

} A similar situation is found at the Crystal River site plant, but it is assumed that the new plant discharge would be mixed with the existing once-through stream and would use the existing pipeline and discharge. Therefore, the line would be short and not require new construction through the estuarine areas.

At Levy 2, it was determined that Lake Rousseau is too shallow to provide an adequate cooling lake or dilution basin for plant blowdown. Because of isolation from the Cross Florida Barge Canal by the locks, it is also a fresh water lake, and would not likely be permitted as a receiving body for brackish water taken from the canal. Use of the barge canal (as cooling water supply)

and the Withlacoochee River (below the locks) as a receiving body is currently under investigation; this configuration was the basis for site ratings at Levy 2.

| Site | Evaluation |
|---|---|
| Crystal River | The site is located ~ 3 miles east of the Gulf of Mexico and ~ 1.5 miles northeast of an inlet channel near the Crystal River Energy Complex. |
| Dixie | { } |
| Highlands | { } |
| Lafayette | { } |
| Levy 2 | { } |
| Levy 3 | { } |
| Putnam 3 | { } |
| Taylor | { } |

| Pumping Distance | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Rating** | **5** | **4** | **3** | **5** | **3** | **1** | **3** | **1** |

**References**

USGS Topographic Maps

### 4.1.3 Flooding

Objective – The purpose of this criterion is to rate sites with respect to differential costs associated with construction of flood protection structures necessary to address probable maximum floods at the sites under consideration.

Evaluation approach – Sites with the largest differences between site grade elevation and likely flood elevations are rated highest; sites with plant grade at or near flood level are rated lowest.

Discussion/Results – Although final plant layout locations have not been set for candidate sites, an initial comparison of potential site locations with floodplain information indicate that some proposed plant facilities may require protection from flooding.

| Site | Evaluation |
|---|---|
| Crystal River | The site is located in the 100-year floodplain ~ 4 feet below flood elevation. Therefore, construction of flood protection structures is likely to be necessary. |

| Site | Evaluation |
|---|---|
| Dixie | The site is located on the border of the 100-year floodplain. This portion of the county is considered to be low lying and flood prone. Therefore, construction of flood protection structures is likely to be necessary. |
| Highlands | The site is located in the 100-year floodplain. Therefore, construction of flood protection structures is likely to be necessary. |
| Lafayette | The site is located in the 100-year floodplain ~ 3 feet below flood elevation. Therefore, construction of flood protection structures is likely to be necessary. |
| Levy 2 | The site is not located in the 100-year floodplain. Therefore, construction of flood protection structures is not likely to be necessary. |
| Levy 3 | The site is located on the border of the 100-year floodplain (site elevation ~ 1 foot below flood elevation). Therefore, construction of flood protection structures is likely to be necessary. |
| Putnam 3 | The site is not located in the 100-year floodplain. Therefore, construction of flood protection structures is not likely to be necessary. Site is located in an upland area. . |
| Taylor | The site is not located in the 100-year floodplain; isolated areas within the 100-year floodplain are in the vicinity of the site. Therefore, construction of flood protection structures may be necessary pending precise location of the plant. |

| Flooding | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Rating** | **2** | **3** | **2** | **2** | **5** | **3** | **5** | **3** |

**References**

FEMA Digital Flood Insurance Rate Maps, http://www.fema.gov/fhm/.

USGS Topographic Maps.

### 4.1.4 Vibratory Ground Motion – *Deleted from evaluation*

The objective of this criterion is to provide a relative measure of cost associated with designing to different seismic requirements at different sites. Because all of the sites under consideration are expected to meet the site parameters for seismic design of the standardized designs under consideration, this criterion is not applicable to the Progress Florida service territory site selection process.

### 4.1.5 Civil Works

Objective – The objective of this criterion (formerly titled "soil stability") is to rate sites according to differences in the cost of civil works (e.g., non-flood related berms, stabilizing of graded slopes and banks) necessary to prepare the site for nuclear plant development.

Evaluation approach – Sites are rated highest to lowest according to the estimated level of cost of civil works required at each site.

Discussion/Results

The existing candidate site (Crystal River) is located at an operating plant that has been previously developed and has been shown to be capable of supporting conventional foundation designs. Accordingly, the existing site is assigned a median rating of 3.

Given the general lack of site specific geotechnical information on the seven remaining sites, consideration was allotted to the overall elevation above sea level as a potential indicator of dewatering needs and overall site relief as an indicator of potential grading and excavation. All sites except Levy 2, Lafayette, and Putnam 3 will require excavation below MSL to accommodate reactor construction because of their lower elevations. Therefore these five sites receive conservative ratings of 3 in consideration of the potential dewatering and stability concerns, along with the general lack of site specific geotechnical information. Lafayette, Levy 2, and Putnam 3, and Levy 2 receive an initial rating of 4, however, because Levy 2 and Putnam 3 are located in an area of greater relief (greater than 10 feet) than the other sites, which would lead to greater excavation costs, their ratings are further reduced to a 3. Finally, all sites except Highlands and Putnam are considered to be within areas where karst terrain will be a factor in foundation design. Due to the regional nature of the karst data available at this stage of the evaluation, no adjustment is reflected in the ratings for Highlands and Putnam.

| Civil Works | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| Rating | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 3 |

## 4.2 TRANSPORTATION OR TRANSMISSION-RELATED CRITERIA

### 4.2.1 Railroad Access

Objective – The purpose of this criterion is to rate sites according to the relative costs associated with providing rail access.

Evaluation approach – Sites are rated from highest to lowest in accordance with the length of additional or new rail spur construction required to provide rail access, scaled from those discussed in the screening criteria report, Criterion P7. Sites having rail access within 3 miles or less receive a rating of 5; sites with rail access between 3 and 10 miles away receive a rating of 4, and sites with rail access greater than 5 miles away receive a rating of 3.

Some sites are located near abandoned rail lines. The site-specific condition of abandoned rail lines is unknown and could range from removed/revegetated to present and operable with minimal upgrade. Therefore, distances used in this analysis are to the nearest rail line in service. Specific conditions of abandoned rail lines are included when available. Should rail access

become a sensitive criterion for site selection, site-specific conditions of abandoned rail lines should be more fully evaluated and field verified.

Discussion/Results – Distances to rail service at each of the sites were measured in the Preliminary Screening Evaluation (based on USGS topographic maps and summarized in the screening criteria report). Assuming that (1) passenger lines may be used for a one-time delivery of plant equipment to the site, (2) abandoned lines status is as noted below, and (3) costs are based on a straight linear scale of costs for construction of rail spurs to the sites from these lines, ratings for the sites are assigned in the table below.

| Site | Evaluation |
|---|---|
| Crystal River | Local rail is located ~ 1.1 miles south of the site (co-located with Crystal River Energy Complex).<br>Local rail connects to Seaboard Coast RR ~ 7.8 miles east of site (Citronelle, FL). |
| Dixie | { } |
| Highlands | { }<br>Railroad construction will require construction of a bridge crossing the Kissimmee River. |
| Lafayette | { } |

| Site | Evaluation |
|---|---|
| Levy 2 | { } |
| Levy 3 | { } |
| Putnam 3 | { } |
| Taylor | { } |

| Railroad Access | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Rating** | **5** | **3** | **4** | **3** | **4** | **3** | **5** | **3** |

**References**

Environmental Resource Analysis Online, http://eraonline.dep.state.fl.us.

North American Railroad Map, version 2.14, http://www.RailroadMap.com.

Status of North Florida Rights-of-Way,
http://www.greenspun.com/bboard/q-and-a-fetch-msg.tcl?msg_id=008NWG

USGS Topographic Maps.

### 4.2.2 Highway Access

Objective – The purpose of this criterion is to rate sites according to the relative costs associated with providing highway access.

Evaluation approach – Sites are rated from highest to lowest in accordance with the length of additional or new highway construction required to provide car and truck access.

Discussion/Results – The following table evaluates the existing roads serving the site areas. All sites are located near existing roads, and construction of site access is predicted to be minimal. Therefore, each site has been assigned a rating of 5.

| Site | Evaluation |
|---|---|
| Crystal River | U.S. Highway 19 is located ~ 3 miles east of the site and provides the main access to the area. Local roads provide access to the Crystal River Energy Complex, co-located with the proposed site. New road construction is expected to be minimal. |
| Dixie | { } |
| Highlands | { } |
| Lafayette | { } |
| Levy 2 | { } |
| Levy 3 | { } |
| Putnam 3 | { } |
| Taylor | { } |

| Highway Access | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Rating** | **5** | **5** | **5** | **5** | **5** | **5** | **5** | **5** |

**References**

Rand McNally Road Atlas.

USGS Topographic Maps.

### 4.2.3 Barge Access

Objective – The purpose of this criterion is to rate sites according to the relative costs associated with providing barge access.

Evaluation approach – Sites are rated from highest to lowest in accordance with estimated cost of facilities construction required to provide barge access.

Discussion/Results – The following table evaluates the area geography permitting barge access to the candidate sites.

| Site | Evaluation |
|---|---|
| Crystal River | The site is located ~ 3 miles east of the Gulf of Mexico and ~ 1.5 miles northeast of an inlet channel near the Crystal River Energy Complex. Barge access is available in the immediate vicinity. |
| Dixie | {<br>}<br>Possible (low) potential to construct barge offloading facilities on Gulf of Mexico and rail infrastructure to proposed site.<br>{<br>} |
| Highlands | {<br>} |
| Lafayette | {<br>} |
| Levy 2 | {<br>} |

| Site | Evaluation |
|---|---|
| Levy 3 | { } |
| Putnam 3 | { } |
| Taylor | { } |

| Barge Access | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Rating** | **5** | **2** | **2** | **2** | **2** | **3** | **4** | **3** |

**References**

Florida Intracoastal and Inland Waterway Study, Final Report, May 2003.

USGS Topographic Maps.

Waterborne Commerce of the United States, Calendar Year 2003.

### 4.2.4 Transmission Cost Differentials

4.2.4.1 Transmission-Construction

4.2.4.2 Electricity Market Price Differentials

Objective – The purpose of this criterion is to rate sites according to the relative costs associated with construction of power transmission systems and issues related to market price differentials.

Evaluation approach – Ratings for this criterion are based on the straight line distances from each site to the closest transmission line, scaled from those discussed in the screening criteria report, Criterion P8. Additional transmission information from Progress, including an overall assessment of suitability with respect to transmission connections, was also considered. Because all eight sites are located within the Progress Florida service area, no electricity market price differentials are expected between the sites, and this sub-criterion was not evaluated.

Discussion/Results – Transmission access is evaluated in terms of distance to the load centers in the Orlando and Tampa – St. Petersburg areas. Measurements were taken from each potential site to each area, as well as a point midway between the two. The shortest distance of the three was used in the rating determination. In addition, any site-specific conditions that may present reliability concerns are noted and reflected in the rating determination.

| Site | Evaluation |
|---|---|
| Crystal River | { } |
| Dixie | { } |
| Highlands | { } |
| Lafayette | { } |
| Levy 2 | { } |
| Levy 3 | { } |
| Putnam 3 | { } |
| Taylor | { } |

| Transmission | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| Rating | 3 | 3 | 4 | 3 | 5 | 4 | 4 | 2 |

**References**

Google Earth, http://earth.google.com.

USGS Topographic Maps

## 4.3 CRITERIA RELATED TO LAND USE AND SITE PREPARATION

### 4.3.1 Topography

Objective – The purpose of this criterion is to rate sites according to the relative costs associated with site grading and earth-moving necessary to prepare the site for construction of a nuclear power plant.

Evaluation approach – Ratings are based on the amount of topographic relief currently found at the site, with the most severe relief resulting in the highest estimated grading costs and therefore the poorest rating. Sites are rated from highest to lowest in accordance with estimated grading costs.

Discussion/Results – Ratings are based on the amount of topographic relief currently found at the site, with the most severe relief resulting in the poorest rating. Given the general flat topography found in central Florida, ratings were favorable across all sites.

| Site | Evaluation |
|---|---|
| Crystal River | The proposed site is located in a relatively flat area, with a general slope to the west (toward the Gulf of Mexico). Costs associated with site grading are expected to be relatively low. |
| Dixie | { } |
| Highlands | { } |
| Lafayette | { } |
| Levy 2 | { } |
| Levy 3 | { } |
| Putnam 3 | { } |
| Taylor | { } |

| Topography | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| Rating | 5 | 5 | 5 | 4 | 5 | 5 | 3 | 4 |

**References**

USGS Topographic Maps.

### 4.3.2 Land Rights

Objective – The purpose of this criterion is to rate sites according to the relative costs associated with purchasing land required to construct and operate a nuclear station on the site.

Evaluation approach –Sites are rated from highest to lowest in accordance with estimated local land costs.

Discussion/Results – This criterion was evaluated previously in the screening criteria report (Criterion P9). Results are provided below. New information from a recent land analysis conducted by The Duncan Companies, Inc. (TDC) for Progress was also evaluated and incorporated into the analysis; new information included the average assessment cost per acre and the number of parcels/owners for a 2000+ tract of land within the site area. It is assumed that Progress already owns all the land required for a new plant at Crystal River since it is an existing plant. As such it is rated higher than the other sites, at which land for a new plant would have to be purchased.

Assessed land values for each site were averaged among alternate locations within a given site areas, where appropriate, and multiplied by ten to derive an estimate of the market value. In the case of the more heavily forested Levy 2 and Levy 3 sites, land costs per acre were further increased by $1000 per acre to account for the value of timber crops currently planted. Note that the value of timber can be $3000 to $5000 per acre, however, Levy 2 and 3 land values were increased by the factor of $1000 per acre, assuming that the balance would be offset by the sale price of the timber.

| Site | Comments and Discussion |
|---|---|
| Crystal River | Nominal cost since Crystal River Plant site{ } |
| Dixie | { } |
| Highlands | { } |
| Lafayette | { } |

| Site | Comments and Discussion |
|---|---|
| Levy 2 | { } |
| Levy 3 | { } |
| Putnam 3 | { } |
| Taylor | { } |

| Land Rights | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| **Rating** | **5** | **4** | **3** | **1** | **2** | **1** | **3** | **4** |

**Reference**

Census of Agriculture – 2002 average farm value by county

The Duncan Company 2006

### 4.3.3 Labor Rates

Objective – The purpose of this criterion is to rate sites according to the relative costs associated with local labor costs that would be incurred during plant construction.

Evaluation approach – Sites are rated from highest to lowest in accordance with estimated local labor costs, with the lower cost resulting in higher ratings.

Discussion/Results – Economic data are typically available by county, but were found to be provided in a variety of forms (e.g., by hour, by week, by year; by job type) that were not necessarily consistent between counties. For purposes of consistency, this evaluation relied on data from U.S. Department of Labor, Bureau of Labor Statistics – November 2004 Metropolitan Area Occupational Employment and Wage Estimates. Average hourly rates were provided for construction and extraction workers (e.g., structural iron and steel workers; sheet metal workers; and plumbers, pipefitters and steamfitters) for the following representative MSAs:

Ocala, FL (for Crystal River, Levy 2 and Levy 3): average construction overall (mean hourly) $13.53; and of plumber/pipefitter, sheet metal worker and an electrician (mean hourly – average between the three categories): $13.12

Gainesville, FL (for Dixie): average construction overall (mean hourly) $13.42; and of plumber/pipefitter, sheet metal worker and an electrician (mean hourly – average between the three categories): $14.09

Ft. Pierce/Port St. Lucie (Highlands): average construction overall (mean hourly) $14.62; and of plumber/pipefitter, sheet metal worker and an electrician (mean hourly – average between the three categories): $14.11

Jacksonville (for Putnam 3): average construction overall (mean hourly) $15.17; and of plumber/pipefitter, sheet metal worker and an electrician (mean hourly – average between the three categories): $17.56

Tallahassee (Taylor and Lafayette): average construction overall (mean hourly) $14.02; and of plumber/pipefitter, sheet metal worker and an electrician (mean hourly – average between the three categories): $15.09

Comparisons of the above construction labor category rates, including the average construction worker roll up rate (across all construction labor categories), reveals the highest rates in the Jacksonville area (Putnam 3), the lowest rates in the Ocala area (Crystal River, Levy 2 and 3), and the rest of the sites falling somewhere in between. The slight differences are noted in the rankings. Finally, it should be noted that a significant portion of the construction workforce is expected to come from a national workforce of journeymen, whose rates will be set based on supply and demand within the overall nuclear industry, rather than by local workforce rates or skill sets. While the ratings below are based solely on current and local wage differentials, this additional factor could mitigate differences in labor costs between the sites

| Labor Rates | Crystal River | Dixie | High-lands | Lafay-ette | Levy 2 | Levy 3 | Putnam 3 | Taylor |
|---|---|---|---|---|---|---|---|---|
| Rating | 5 | 4 | 3 | 3 | 5 | 5 | 2 | 3 |

# Attachment V – Navigant Transmission Impact Study

REDACTED VERSION

NAVIGANT CONSULTING

# TRANSMISSION SYSTEM IMPACT STUDY IN SUPPORT OF SITE SELECTION FOR A FLORIDA NUCLEAR PLANT

**Prepared for**


**June 30, 2006**

**DRAFT**

**{Navigant Transmission System Impact Study has been redacted in its entirety.}**

Prepared by

Navigant Consulting, Inc.
1400 Old Country Road, Suite 402
Westbury, New York 11590
516.876.0066

www.navigantconsulting.com

**{Navigant Transmission System Impact Study has been redacted in its entirety.}**

# Appendix A
# Aerial Photographs of the 20 Potential Sites

{Appendix A- 20 Potential Site Aerial Views has been redacted in its entirety.}

**Appendix B**
**Land Plat Maps of the 5 Alternative Sites**

{Appendix B- 5 Alternative Site Land Maps has been redacted in its entirety}