HUNTER'S RIDGE

DEVELOPMENT OF REGIONAL IMPACT

APPLICATION FOR DEVELOPMENT APPROVAL

SUBSTANTIAL DEVIATION

SUFFICIENCY RESPONSE #1
November 05, 2009

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Tab 1

CITY OF ORMOND BEACH

Planning Department • 22 South Beach Street • Ormond Beach, FL 32174 • (386) 676-3238 • Fax (386) 676-3242

RECEIVED
2009 SEP 23 AM 11:19
Northeast Florida
Regional Council

September 22, 2009

Mr. Edward Lehman
Northeast Florida Regional Council
6850 Belfort Oaks Place
Suite 350
Jacksonville, Florida 32216

RE: Ormond Beach response to Hunter's Ridge ADA

Dear Mr. Lehman:

Thank you for the opportunity to respond to Hunter's Ridge Application for Development Approval. Our responses are limited to Hunter's Ridge initial responses to questions #17 (water); #18 (wastewater); # 21 (transportation); #25 (Fire/Police); and # 26 (recreation).

Question 17 – Water

Paragraph A: The water demand computations contained in the Table appear reasonable. The growth projections contained in the 10 year projected build-out table appear aggressive and offer water supply challenges which are discussed later in this letter.

Paragraph B: There are no non-potable water supplies referenced. Will there be any in the DRI area?

Paragraph C: The City did not see Map H included in the information provided. Assuming the City's public supply well fields are proposed for potable water use, does the developer propose any alternate supply for irrigation purposes?

Paragraph F: The letter referenced in the information provided is not included. Our question is this: Will a capacity letter from the City be required for this ADA? If so, the development build-out schedule illustrated in the water and sewer demand projects may exceed the City's current SJRWMD CUP water supply allocations when considering normal growth of other city service area sectors. Regarding subparagraph (2), it appears the purpose of this section is to identify, describe and schedule appropriate capital improvement projects (with developer contributing in part or whole) for insertion into future city master plans for offsetting increased demands on water supply and distribution system capabilities. None are mentioned in this response but the City will require capital improvement contributions.

SCANNED

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Paragraph G. The answer provided by HR in response to the original question offers no progressive commitments.

Paragraph I. The City is unfamiliar with Waterstorm conservation as it relates to water utilities.

Question # 18 - Wastewater

Paragraph A. The flow computations contained in the demand table once again appear reasonable. The growth projections contained in the 10 year projected build out table appear aggressive and offer wastewater treatment challenges until the City completes the upcoming WWTP expansion project.

Paragraph B. The City is requested that a general description of the wastewater characteristics anticipated for the DRI area be provided. An additional statement referencing the City's Code of Ordinances (Reference: Chapter 2, Article II) be provided regarding the developer's requirements.

Paragraph C. The letter referenced in this question is not included. Again, is a capacity letter from the City required for this ADA? If so, as indicated previously the water and sewer demand projections may exceed the City's current WWTP capacity, considering normal growth of other city area service sectors. Regarding subparagraph (2), it appears the purpose of this section is to identify, describe and schedule appropriate capital improvement projects (with developer contributing in part or whole) for insertion into future city master plans for offsetting increased demands on wastewater treatment and collection system capabilities. None are mentioned in this response but the City will require capital improvement contributions.

Paragraph D. The response to this question is incorrect. A statement should be provided that specifically refers to septic tanks not being permitted. The area subject to this ADA will be served by central sewer.

Question 21 – Transportation

Paragraphs A – E. Overall, the analysis presented follows the approved Transportation Methodology letter dated August 14, 2009 and the questions posed in Transportation Question 21 appear to be addressed.

Paragraph F. It is true that the City has prepared a Multi-Modal Strategy in response to its EAR and SB 360, however it should be noted that this strategy has not been thoroughly vetted in public nor has the financial feasibility of the strategy been evaluated since discussions and studies by CUTR and UF continue on the Statewide Mobility Fee. It contains controversial land use elements, transit contributions, and selective placement of TCEA's along transit corridors with significant increases in densities and intensities that may change either through the public hearing process or through objections by FDOT or DCA. It is premature to consider the City's multi-modal strategy as a substantial relief to traffic congestion for phase 1 (2015) and possibly phase II (2020). Hunter's Ridge by virtue of its isolated location to Flagler County will be an outlying neighborhood of Ormond Beach. While the City is a Dense Urban Land Area (DULA),

staff is recommending that except for the selective placement of concurrency exceptions areas on SR 40 (A1A through Downtown to east of I95 Interchange in the Williamson area); A1A south of SR40 to Daytona Beach; and US 1 from Wilmette south to Holly Hill, all other areas shall be subject to concurrency as it is today to include the area's roadways where Hunter's Ridge transportation impacts will occur.

Access to and from Hunter's Ridge will principally be from three directions. Westbound, access will be from Airport Road Extension to SR 40. Southbound, access will be Shadow Crossings to SR 40. Eastbound, access will be Airport Road to southbound Tymber Creek Road to SR 40 or Airport Road to US 1. In all cases, the roadway links and intersections to be impacted the most will be SR 40; Tymber Creek Road; and Airport Road. On September 2, 2009 the applicant met jointly with Ormond Beach, Flagler County, and Volusia County. Discussion centered mostly on transportation and how best to mitigate rather than just continue to build wider roads. However, it was generally agreed upon by most in attendance that based upon the lack of interconnectivity west of I95, much of the improvement should be to roadways rather than towards strategies that would reduce Vehicle Miles Traveled (VMT). While Ormond Beach desires to reduce VMT and would like to participate with Hunter's Ridge to accomplish this goal, because of the lack connectivity west of I95 the majority of contributions should be targeted towards roadway improvements to mitigate Phase 1, 2, and 3. Based upon the significance and adversity test, Ormond Beach is recommending that contributions towards improving one or more of the following corridors within Ormond Beach (including impacted intersections) be considered based upon the projected timeframe when the improvement is needed to mitigate the development's impact.

Hand Avenue Extension from Williamson to Tymber Creek Road (TCR) Extension (2LUD) as a parallel road reliever to SR40 (Contribution to a PD& E Study)	2015
TCR from Peruvian to Airport Road (2LUD to 4LD)	2015
Hand Avenue from Shangri La to Clyde Morris Road (2LUD to 4LD)	2015
Hand Avenue from Clyde Morris Road to Williamson (2LUD to 4LD)	2020
TCR from Airport Road to Durrance (2LUD to 4LD)	2020
Williamson Boulevard from SR40 to Hand Avenue (2LUD to 4LD)	2020
Airport Road from TCR to Ocean Pines (reconstruct with sidewalks)	2025

Paragraph H. There are three governmental jurisdictions responsible for Airport Road. Volusia County is responsible for that portion of Airport Road from Tymber Creek Road to US 1. Ormond Beach is responsible for that portion of Airport Road from Tymber Creek Road to the Flagler/Volusia County line. A portion of Airport Road then proceeds through Flagler County before re-entering Volusia County. Please correct the statement that Airport Road will be dedicated to Volusia County. The portion of Airport Road from Flagler County to SR 40 which is currently under construction is to be dedicated to the City of Ormond Beach. We would also suggest that Flagler County contract with the City to maintain that portion of Airport Road which traverses Flagler County from a governmental efficiency perspective.

Paragraph I. Hunter's Ridge along with Breakaway Trails provides no interconnectivity. Students who live in Breakaway must travel to the elementary school via car because there is no connection from the school to the subdivision. Likewise, there is no connectivity between Breakaway and Hunter's Ridge. If a movement towards travel other than by car is truly desired, connectivity between and among the subdivisions must be obtained. The viability of the Hunter's Ridge commercial component depends on better connectivity between the developments north of SR 40.

Question 25 – Police and Fire

The City of Ormond Beach has previously held discussions with Flagler County regarding the provision of Fire and Emergency Medical Services for the Flagler County portion of Hunter's Ridge Subdivision dating back to 2006. The City would offer three (3) options to be considered for the provision of Fire and Emergency Services to the initial phase of this development:

1. The City of Ormond Beach Fire Department currently has the capacity to provide services to the initial phase within Flagler County. A cost for the City of Ormond Beach to provide the service would need to be established. As the demand for service increases, there would be a need to look at adding an additional fire station further west in Flagler County.

2. The City of Ormond Beach and Flagler County could develop an agreement to share staffing in the current Fire Station 94 located at 2301 Airport Road. This would allow for Fire and EMS response into the Flagler County portion of Hunter's Ridge. Once again, as demand for service increases, there would be a need to look at adding an additional fire station further west in Flagler County.

3. The developer could build and equip a new fire station within Flagler County as proposed in Fire Chief Don Petito's letter dated July 6, 2009.

While the provision of police and fire service is the province of Flagler County, the most efficient and effective approach for Ormond Beach and Flagler County initially would be Option 1 or 2 with a new Fire Station as Hunter Ridge is built-out.

Question 26 – Recreation

Paragraph A: Per our Parks & Recreation Master Plan study for Level of Service Standard (LOSS) recommendations, the two greatest LOSS deficiencies for Ormond Beach are natural resource parks and community parks. Under the current proposal the Conservation Area proposed to be within the City limits of Ormond Beach will eliminate the City's deficiency. It is unclear however the depth of management and or maintenance that will be required of Ormond Beach, if any. A maintenance impact statement should be provided if Ormond Beach is expected to maintain and manage this conservation area. Hunter's Ridge is to be congratulated for proposing a passive conservation area that eliminates a LOSS deficiency for the City and providing 22 acres of active recreation

area for residents of HR, however based upon past experience of development in Ormond Beach even when facilities are provided on site, there is a substantial impact on public recreational programming and field facilities provided by the city.

The above represents the comments of Ormond Beach on Hunter's Ridge ADA. Thank you for the opportunity to review and comment.

Sincerely,

Richard P. Goss, AICP
Planning Director

Sam Merrill
Hunter's Ridge Residential Golf Properties, Inc.
1275 W. Granada Blvd, STE 5A
Ormond Beach, Florida 32174

Adam Mengele
Planning Manager
1769 E. Moody Blvd.,
Building 2, STE. 302
Bunnell, FL 32110

CITY OF ORMOND BEACH

Response to Question 17 - Water

Paragraph A - The water demand tables have been revised and attached to this response.

Paragraph B - Stormwater will be used as a nonpotable water source where practical.

Paragraph C - Stormwater will be used as an alternate source for irrigation where practical.

Paragraph F - The Interlocal Agreement between the City of Ormond Beach and Flagler County has recently undergone minor revision and is scheduled for consideration by both jurisdictions to obtain final approval. The Build-Out Table has been revised as well to show a less aggressive 15 year projection with commensurate changes in consumption and capacity requirements. Any capital improvement requirements will be a part of the continuing dialogue between the applicant and the City particularly as they relate to impact fee issues.

Paragraph G - The applicant is prepared to incorporate conservation methods into the development after consultation with the appropriate local and state representatives. Prior to any firm commitment, Hunter's Ridge wants to gain a complete understanding of the local and state measures contemplated and the protocol required to implement same.

Paragraph I - The correct name is Water Star.

Response to Question 18 - Wastewater

Paragraph A - The wastewater demand tables have been revised and attached to this response.

Paragraph B - Both domestic and industrial wastewater are anticipated. The requirements of Chapter 2, Article II of the City of Ormond Beach Code of Ordinances will be met.

Paragraph C - The Interlocal Agreement between the City of Ormond Beach and Flagler County has recently undergone minor revision and is scheduled for consideration by both jurisdictions to obtain final approval. The Build-Out Table has been revised as well to show a less aggressive 15 year projection with commensurate changes in consumption and capacity requirements. Any capital improvement requirements will be a part of the continuing dialogue between the applicant and the City particularly as they relate to impact fee issues.

Paragraph D - No septic tanks will be used within the development as the project will be served by the City of Ormond Beach central sewer system.

Response to Question 21 - Transportation

Paragraph A thru E - Noted

Paragraph F - Noted

Paragraph H - The segment of Airport Road from Flagler County to SR 40 (currently under construction) will be dedicated to the City of Ormond Beach. Discussions are ongoing regarding the maintenance of that portion of Airport Road that traverses Flagler County. The applicant supports the suggestion that the City maintain this segment of road under a contract Agreement and will be working diligently toward that end.

Response to Question 25 - Police and Fire

Discussions are ongoing as to the appropriate Interlocal Agreement that may be necessary to provide law enforcement, fire protection and emergency medical services to the project. Currently, the Development Order stipulates certain concurrency obligations must be met to ensure these services and associated costs are accommodated. We support your recommendation as to a "mutual aid" arrangement between Ormond Beach and Flagler County described in the options outlined particularly during the early phases SD property development.

Response to Question 26 - Recreation

Flagler County has indicated a willingness to oversee and maintain the regionally significant passive park proposed in the Conservation Area. These ongoing discussions also include the St. Johns River Water Management District as we continue to use the area for mitigation for any wetland impacts within our development envelope. Conceptual plans for the park are being prepared by Flagler County for our collective (including Ormond Beach) review that will lead to a mutually acceptable arrangement.

WASTE WATER DEMAND

HUNTER'S RIDGE TOTAL PROJECTED WASTEWATER DEMAND AT BUILDOUT

Name	QUANTITY UNITS	FLOW RATE [GPD]	AVG. DAILY FLOW [GPD]	AVG. DAILY FLOW [GPM]	MAX DAILY FLOW [GPM] PF = 2.0	PEAK HOUR FLOW [GPM] PF = 4.0
Existing Development (Ormond Beach)						
Shadow Crossings	288	300	86,400	60.00	120.00	240.00
Chelsford Heights	78	300	23,400	16.25	32.50	65.00
Forest Quest	50	300	15,000	10.42	20.83	41.67
Briargate	70	300	21,000	14.58	29.17	58.33
Deer Creek	346	300	103,800	72.08	144.17	288.33
Westland Village	48	300	14,400	10.00	20.00	40.00
Future Development (DRI Approved Units)	102	300	30,600	21.25	42.50	85.00
Totals	982	300	294,600	204.58	409.17	818.33
Approved Projects (Flagler County)						
Ashford Lakes	77	196.8	15,154	10.52	21.05	42.09
Huntington Woods	70	196.8	13,776	9.57	19.13	38.27
Huntington Lakes	77	196.8	15,154	10.52	21.05	42.09
Huntington Townhomes	183	196.8	36,014	25.01	50.02	100.04
Deerfield Estates	14	196.8	2,755	1.91	3.83	7.65
Totals	421	196.8	82,853	57.54	115.07	230.15
Future Development						
Residential (Flagler County)	2562	196.8	504,202	350.14	700.28	1400.56
Commercial (In Thousand Square Feet)	709	100	70,850	49.20	98.40	196.81
School on Airport Road (In Students)	1500	20	30,000	20.83	41.67	83.33

TOTAL AVERAGE DAILY FLOW = **982,504** **GPD**
TOTAL MAXIMUM DAILY FLOW = **1,364.59** **GPM**
TOTAL PEAK HOURLY FLOW = **2,729.18** **GPM**

HUNTER'S RIDGE PROJECTED WASTEWATER DEMAND

15-YEAR PROJECTED BUILDOUT

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Flagler Residential (Approved/ In Review)	0	84	84	84	84	85	0	0	0	0	0	0	0	0	0	0
Flagler Residential (Total Units)	0	133	133	134	134	134	225	226	226	226	226	153	153	153	153	153
Commercial (Square Feet)	0	73,782	73,782	73,783	73,783	73,783	54,953	54954	54954	54,954	54,954	12,964	12,964	12964	12964	12,965

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Waste Water Demand ADF Increase per Yea (Based on 196.8 gpd for each single family unit located in Flagler County; and 10 gpd per 100 square feet of commercial space)	0	50,084	50,084	50,281	50,281	50,478	49,775	49,972	49,972	49,972	49,972	31,407	31,407	31,407	31,407	31,407
Max Day Increase (PF = 2)	0	100,168	100,168	100,561	100,561	100,955	99,551	99,944	99,944	99,944	99,944	62,814	62,814	62,814	62,814	62,814

HUNTER'S RIDGE TOTAL PROJECTED POTABLE WATER DEMAND AT BUILDOUT

Name	QUANTITY UNITS	FLOW RATE [GPD]	AVG. DAILY FLOW [GPD]	AVG. DAILY FLOW [GPM]	MAX DAILY FLOW [GPM] PF = 2.0	PEAK HOUR FLOW [GPM] PF = 4.0
Existing Development (Ormond Beach)						
Shadow Crossings	288	300	86,400	60.00	120.00	240.00
Chelsford Heights	78	300	23,400	16.25	32.50	65.00
Forest Quest	50	300	15,000	10.42	20.83	41.67
Briargate	70	300	21,000	14.58	29.17	58.33
Deer Creek	346	300	103,800	72.08	144.17	288.33
Westland Village	48	300	14,400	10.00	20.00	40.00
Future Development (DRI Approved Units)	102	300	30,600	21.25	42.50	85.00
Totals	982	300	294,600	204.58	409.17	818.33
Approved & Under Review Projects (Flagler County)						
Ashford Lakes	77	300	23,100	16.04	32.08	64.17
Huntington Woods	70	300	21,000	14.58	29.17	58.33
Huntington Lakes	77	300	23,100	16.04	32.08	64.17
Huntington Townhomes	183	300	54,900	38.13	76.25	152.50
Deerfield Estates	14	300	4,200	2.92	5.83	11.67
Totals	421	300	126,300	87.71	175.42	350.83
Future Development						
Residential (Flagler County)	2562	300	768,600	533.75	1067.50	2135.00
Commercial (In Thousand Square Feet)	708.5	170	120,445	83.64	167.28	334.57
School on Airport Road (In Students)	1500	25	37,500	26.04	52.08	104.17

TOTAL AVERAGE DAILY FLOW = **1,347,445** **GPD**
TOTAL MAXIMUM DAILY FLOW = **1,871.45** **GPM**
TOTAL PEAK HOURLY FLOW = **3,742.90** **GPM**

HUNTER'S RIDGE PROJECTED POTABLE WATER DEMAND

15-YEAR PROJECTED BUILDOUT

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Flagler Residential (Approved/ In Review)	0	84	84	84	84	85	0	0	0	0	0	0	0	0	0	0
Flagler Residential (Phases 1 - 3)	0	133	133	134	134	134	225	226	226	226	226	153	153	153	153	153
Commercial (Square Feet)	0	73,782	73,782	73,783	73,783	73,783	54,953	54954	54954	54,954	54,954	12,964	12,964	12964	12964	12,965

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Water Demand ADF Increase per Year (gpd) (Based on 300 gpd for each single family unit and 17 gpd per 100 square feet of commercial space)	0	77,643	77,643	77,943	77,943	78,243	76,842	77,142	77,142	77,142	77,142	48,104	48,104	48,104	48,104	48,104
Max Day Increase (PF = 2)	0	155,286	155,286	155,886	155,886	156,486	153,684	154,284	154,284	154,284	154,284	96,208	96,208	96,208	96,208	96,208

Tab 2

STATE OF FLORIDA
DEPARTMENT OF COMMUNITY AFFAIRS
"Dedicated to making Florida a better place to call home"

CHARLIE CRIST
Governor

THOMAS G. PELHAM
Secretary

September 30, 2009

Edward Lehman
Director of Growth Management
Northeast Florida Regional Council
6850 Belfort Oaks Place
Jacksonville, Florida 32216

Re: Hunter's Ridge DRI; Substantial Deviation – Flagler County (DCA Project No. ADA-04-1989-013): Substantial Deviation First Sufficiency Review

Dear Mr. Lehman:

The Department has completed its First Sufficiency review of the Substantial Deviation for the Hunter's Ridge Development of Regional Impact (DRI) located in Flagler County. To assist us to adequately assess the impact of the proposed Substantial Deviation, we are requesting additional information as stated in this letter.

General Comments

The Substantial Deviation document states that a comprehensive plan amendment is not needed, that the Flagler County Comprehensive Plan "has been incorrectly depicted on the Plan since the Development Order effective date." The document further states the plan should be "administratively corrected as part of the SD process." (Part 2 consistency with the comprehensive plans) After reviewing the Flagler County Board of Commissioners minutes and the Amended Final Order regarding the Hunter's Ridge DRI and reviewing a Flagler County Future Land Use Map from December of 1992, the Department has learned the substantial deviation area was designated Agriculture and Timberlands Future Land Use Category. Thus, a comprehensive plan amendment is needed to redesignate the Future Land Use Map designation to a category that would allow the proposed development plan for the site.

The development is proposed for a location that raises concerns regarding environmental suitability regarding the wetlands and habitat for listed and endangered species and urban sprawl. Also, since the Substantial Deviation application proposes more development than set forth in the originally adopted DRI development order for this area, it raises concerns about whether this amount of development is needed in the County. Prior to moving forward with the comprehensive plan amendment, the applicant should consider whether they will be able to demonstrate (1) that there is a need for the additional residential and non-residential development

being proposed, (2) whether the development will discourage urban sprawl (based on the indicators in Rule 9J-5.006(5)(g), Florida Administrative Code), (3) that the land is suitable for the intensive urban uses proposed, and (4) that the proposed development is consistent with the natural resources protection policies of the County's comprehensive plan.

Thank you for the opportunity to comment on the Application for Development Approval. If you have further questions, please contact Jeannette Hallock-Solomon, Senior Planner, at 850-922-1809 or Brenda Winningham, Regional Planning Administrator, at 850-922-1800.

Sincerely,

Mike McDaniel, Chief
Office of Comprehensive Planning

MM/jhs

cc: Adam Mengel, AICP, Planning Director, Flagler County

DEPARTMENT OF COMMUNITY AFFAIRS

General Comments

The applicant has determined, in collaboration with Flagler County representatives, that the Future Land Use Map is in error. We are working with the Flagler County Board of County Commissioners to correct the administrative error and will be providing the Department with the appropriate response after the protocol is completed.

Tab 3

Questions from the East Central Florida Regional Planning Council for the Hunters Ridge DRI SD

1. Maps need to include the county line and local jurisdiction boundaries. Please revise.
2. The current development and the proposed plan is characterized by a disconnected street network and a lack of mix of land use types and represents urban sprawl very well. Please describe precisely how the new plan design will foster the following:
   a. Bicycling and walking to shopping, work and schools.
   b. Traditional neighborhood development.
   c. Integration of land uses.
   d. Connectivity of streets both on site and off site.
   e. Conservation of open space.
3. The response to question 17 F 1 regarding the letter from the provider of water is not adequately answered. There is not a letter attached from the City of Ormond Beach. There are several unsigned agreements. Please provide a letter from the water provider stating that capacity is available to serve the project and state when the agreements are to be signed.
4. Please confirm that no septic tanks will be used on the project.
5. The response to question 17 C 1 regarding the letter from the provider of wastewater treatment is not adequately answered. There is not a letter attached from the City of Ormond Beach. There are several unsigned agreements. Please provide a letter from the wastewater provider stating that treatment capacity is available to serve the project.
6. Table 21.D.2 has "Blvd)" as an entry. Please correct. We assume this is SR 40 Granada Blvd.
7. For Table 21.A.3, explain which improvements were considered as completed for the analysis. If developer funded, explain the circumstances of the improvements.
8. The following recommendations were endorsed by the East Central Florida Regional Planning Council on June 20, 2007. The items below should be included in the Northeast Florida Regional Council's recommended conditions for approval for Developments of Regional Impact. Please commit to these recommendations.

Recommendation #1

Construction shall be certified by the United States Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) program, the Florida Green Building Coalition, the Green Building Initiative's Green Globes program, or any other nationally-recognized, green building system that is approved by the Department of Management Services DMS (DMS).

Recommendation #2

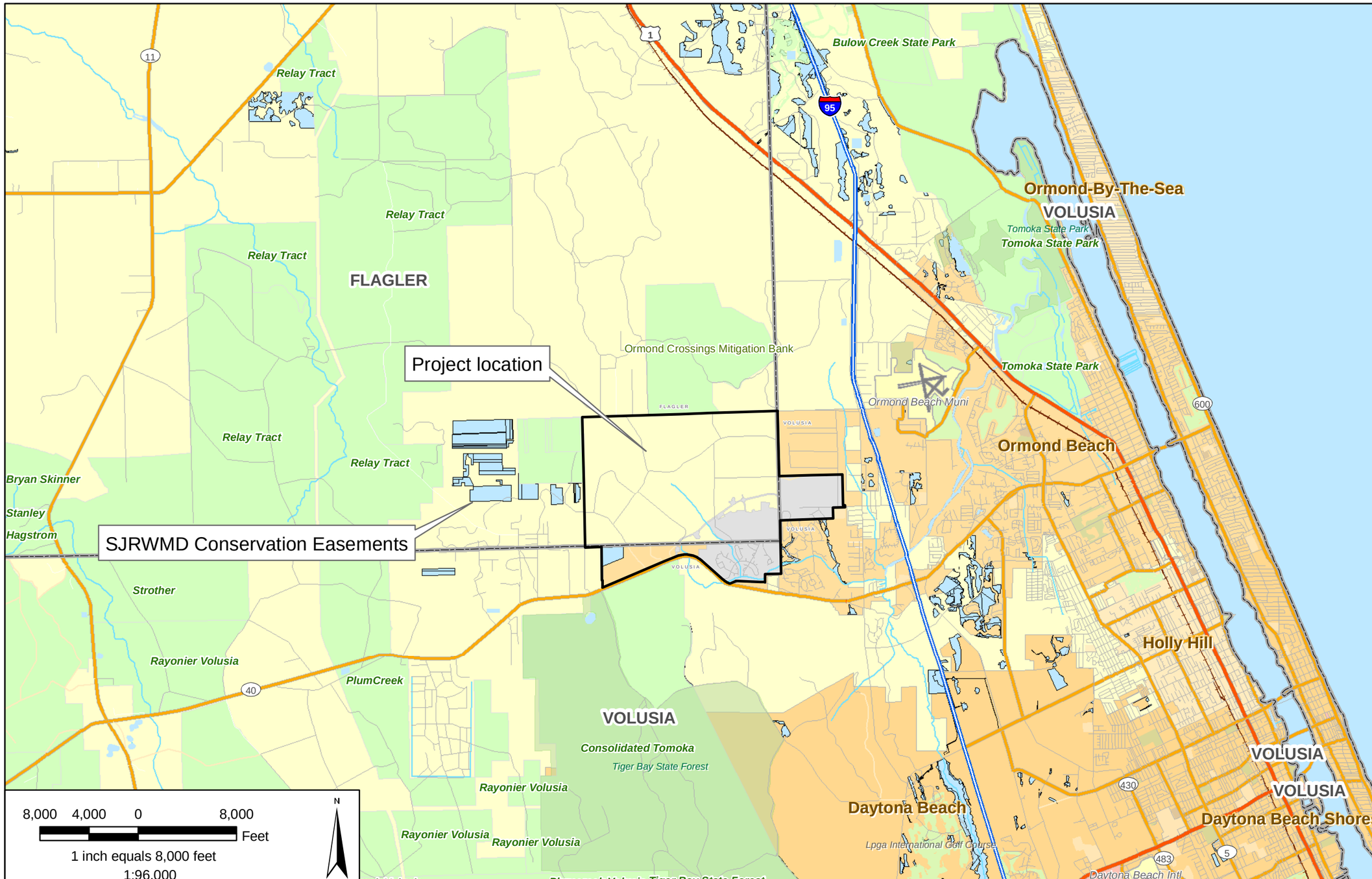
Equipment and appliances shall, at a minimum, be ENERGY STAR certified.

Recommendation #3

Construction shall be, at a minimum, Water Star certified. (Developed by the SJRWMD)

Recommendation #4

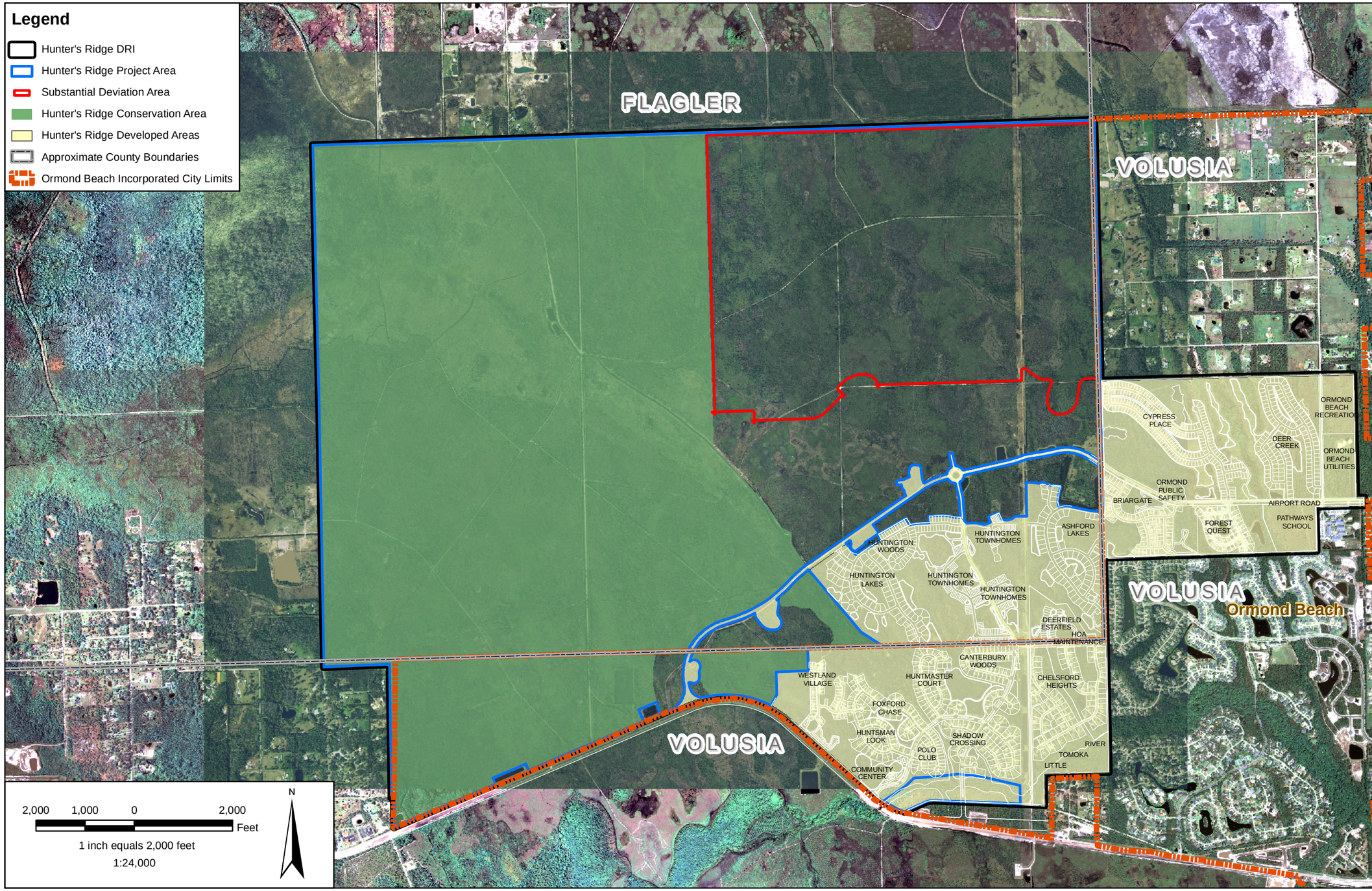
"Dark skies" measures shall be implemented.



Project: J07071 HRD
Date: November 2009
Base map from Streetmap USA 2006 provided by ESRI. Project boundaries based on surveys provided by Hunter's Ridge.

Map A
Location Map

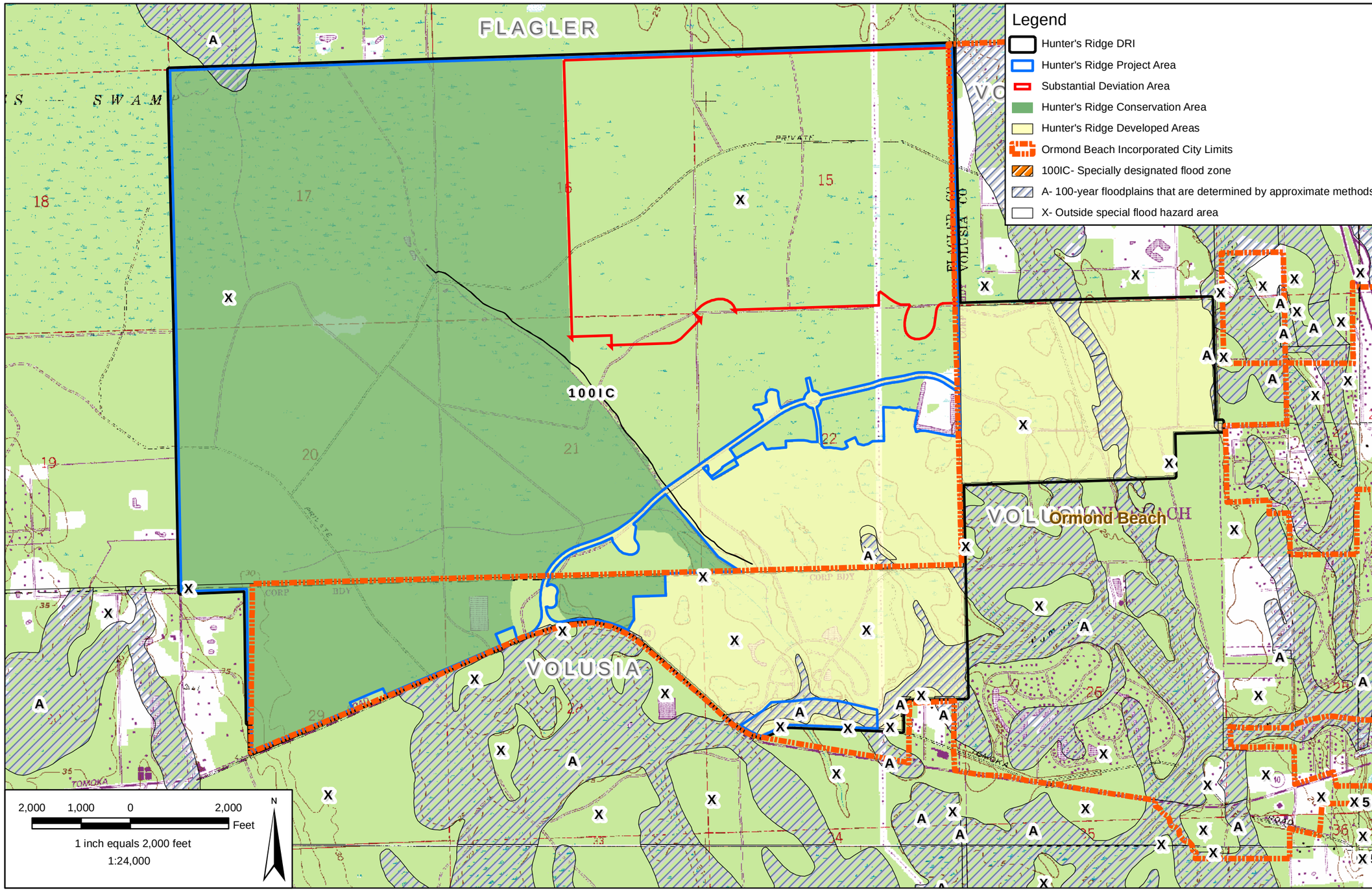
HUNTER'S RIDGE RESIDENTIAL GOLF PROPERTIES, INC.



Project: J07071 HRD
Date: November 2009
Color imagery provided by Florida DOT, 2006 and 2008. Project boundaries based on surveys provided by Hunter's Ridge.

Map B
2008 and 2006 True Color Aerials

HUNTER'S RIDGE RESIDENTIAL GOLF PROPERTIES, INC.



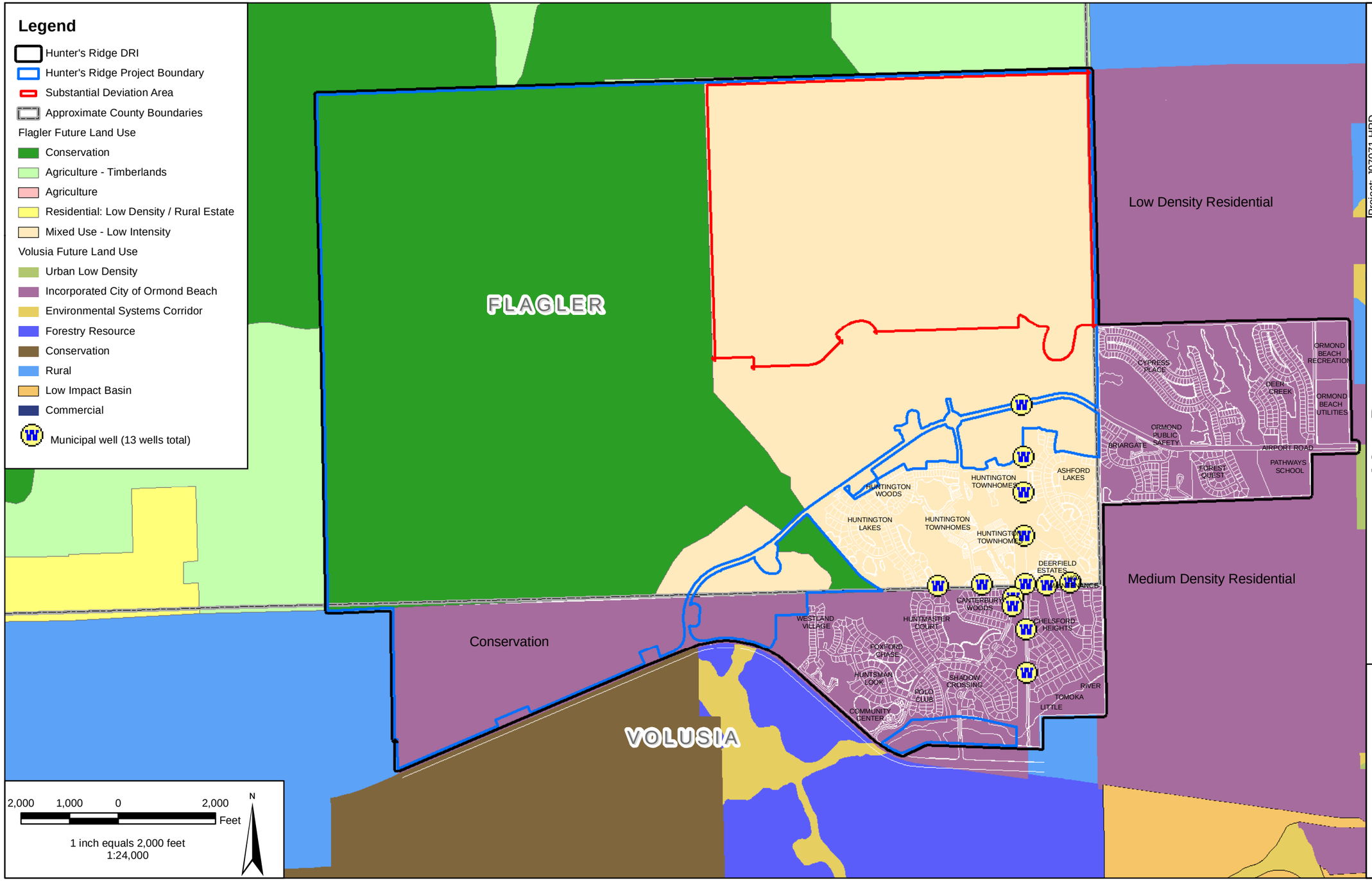
Legend

- Hunter's Ridge DRI
- Hunter's Ridge Project Area
- Substantial Deviation Area
- Hunter's Ridge Conservation Area
- Hunter's Ridge Developed Areas
- Ormond Beach Incorporated City Limits
- 100IC- Specially designated flood zone
- A- 100-year floodplains that are determined by approximate methods
- X- Outside special flood hazard area

Project: J07071 HRD
Date: November 2009
USGS 7.5-minute quadrangle for Favoretta, FL. FEMA 1996 FIRM provided by FGDL. Project boundaries based on surveys provided by Hunter's Ridge.

Map C
Topographic Map with FEMA Flood Zones

HUNTER'S RIDGE RESIDENTIAL GOLF PROPERTIES, INC.



Project: J07071 HRD
Date: November 2009
Future land use data for Volusia and Flagler Counties provided by Volusia County and Flagler County. Project boundaries based on CAD drawings provided by Hunter's Ridge.

Map D
Existing and Approved Land Uses

HUNTER'S RIDGE RESIDENTIAL GOLF PROPERTIES, INC.

Legend

- Hunter's Ridge DRI
- Hunter's Ridge Project Boundary
- Substantial Deviation Area
- Hunter's Ridge Conservation Area
- Hunter's Ridge Developed Areas
- Approximate County Boundaries
- Ormond Beach Incorporated City Limits

Volusia soils

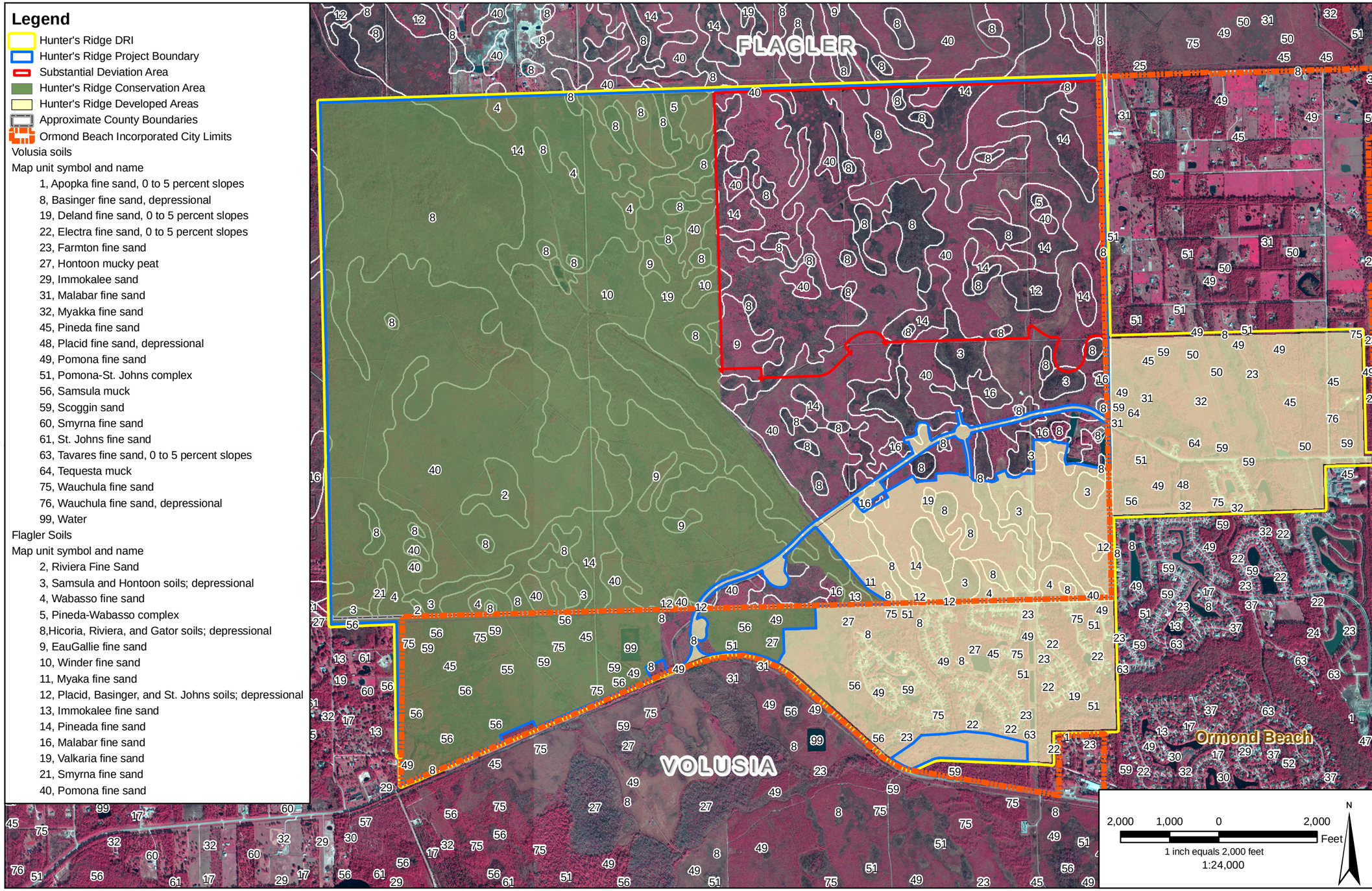
Map unit symbol and name

- 1, Apopka fine sand, 0 to 5 percent slopes
- 8, Basinger fine sand, depressional
- 19, Deland fine sand, 0 to 5 percent slopes
- 22, Electra fine sand, 0 to 5 percent slopes
- 23, Farmton fine sand
- 27, Hontoon mucky peat
- 29, Immokalee sand
- 31, Malabar fine sand
- 32, Myakka fine sand
- 45, Pineda fine sand
- 48, Placid fine sand, depressional
- 49, Pomona fine sand
- 51, Pomona-St. Johns complex
- 56, Samsula muck
- 59, Scoggin sand
- 60, Smyrna fine sand
- 61, St. Johns fine sand
- 63, Tavares fine sand, 0 to 5 percent slopes
- 64, Tequesta muck
- 75, Wauchula fine sand
- 76, Wauchula fine sand, depressional
- 99, Water

Flagler Soils

Map unit symbol and name

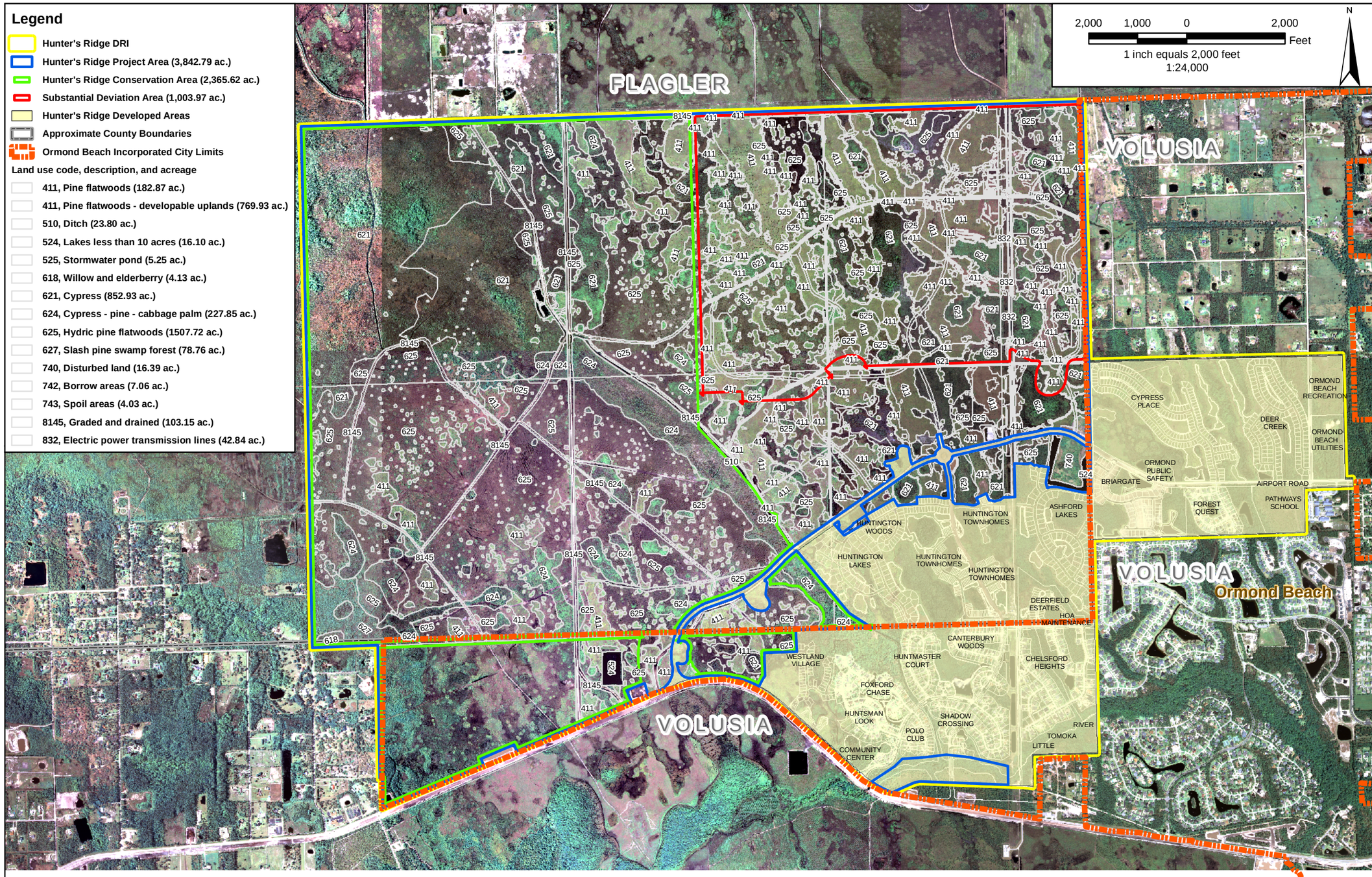
- 2, Riviera Fine Sand
- 3, Samsula and Hontoon soils; depressional
- 4, Wabasso fine sand
- 5, Pineda-Wabasso complex
- 8,Hicoria, Riviera, and Gator soils; depressional
- 9, EauGallie fine sand
- 10, Winder fine sand
- 11, Myaka fine sand
- 12, Placid, Basinger, and St. Johns soils; depressional
- 13, Immokalee fine sand
- 14, Pineada fine sand
- 16, Malabar fine sand
- 19, Valkaria fine sand
- 21, Smyrna fine sand
- 40, Pomona fine sand



Project: J07071 HRD
Date: November 2009
NRCS Soil data for Flagler and Volusia Counties provided by FGDL and NRCS respectively. Color infrared imagery circa 2004 provided by LABINS. Project boundaries based on CAD drawings provided by Hunter's Ridge.

Map E
NRCS Soils Map

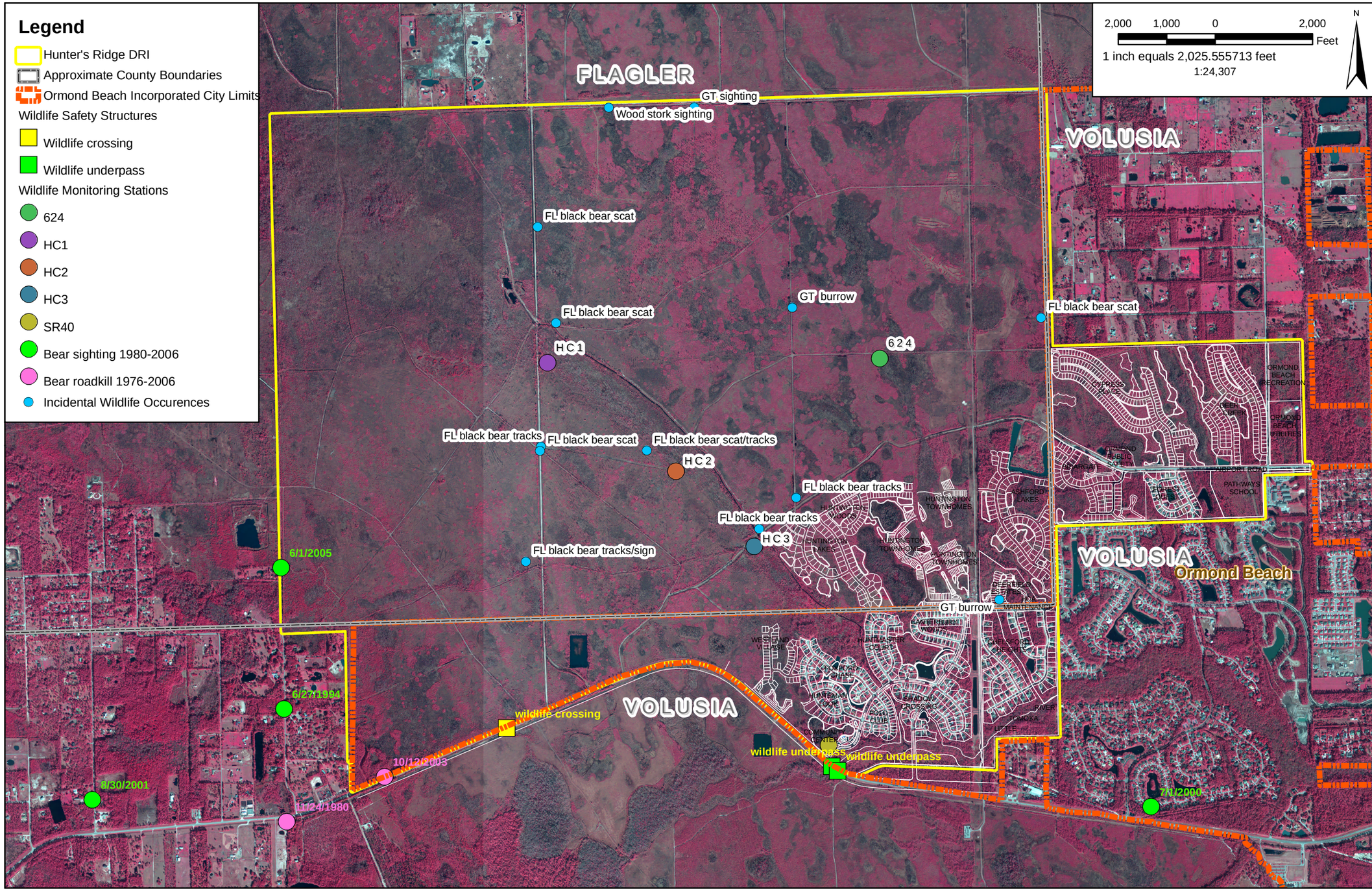
HUNTER'S RIDGE RESIDENTIAL GOLF PROPERTIES, INC.



Project: J07071 HRD
Date: November 2009
Color imagery Jan 2008 provided by FDOT.
Habitat information based on wetland surveys and field inspections. Project boundaries based on CAD drawings provided by Hunter's Ridge.

Map F
Vegetation Map
FLUCCS

HUNTER'S RIDGE RESIDENTIAL GOLF PROPERTIES, INC.



Project: J07071 HRD
Date: November 2009
Color infrared imagery circa 2004 provided by LABINS. Monitoring stations provided by Hunter's Ridge. Bear sighting and roadkill data provided by FWS, 2008. Project boundaries based on CAD drawings provided by Hunter's Ridge.

Map G
Wildlife Monitoring / Occurrence Map

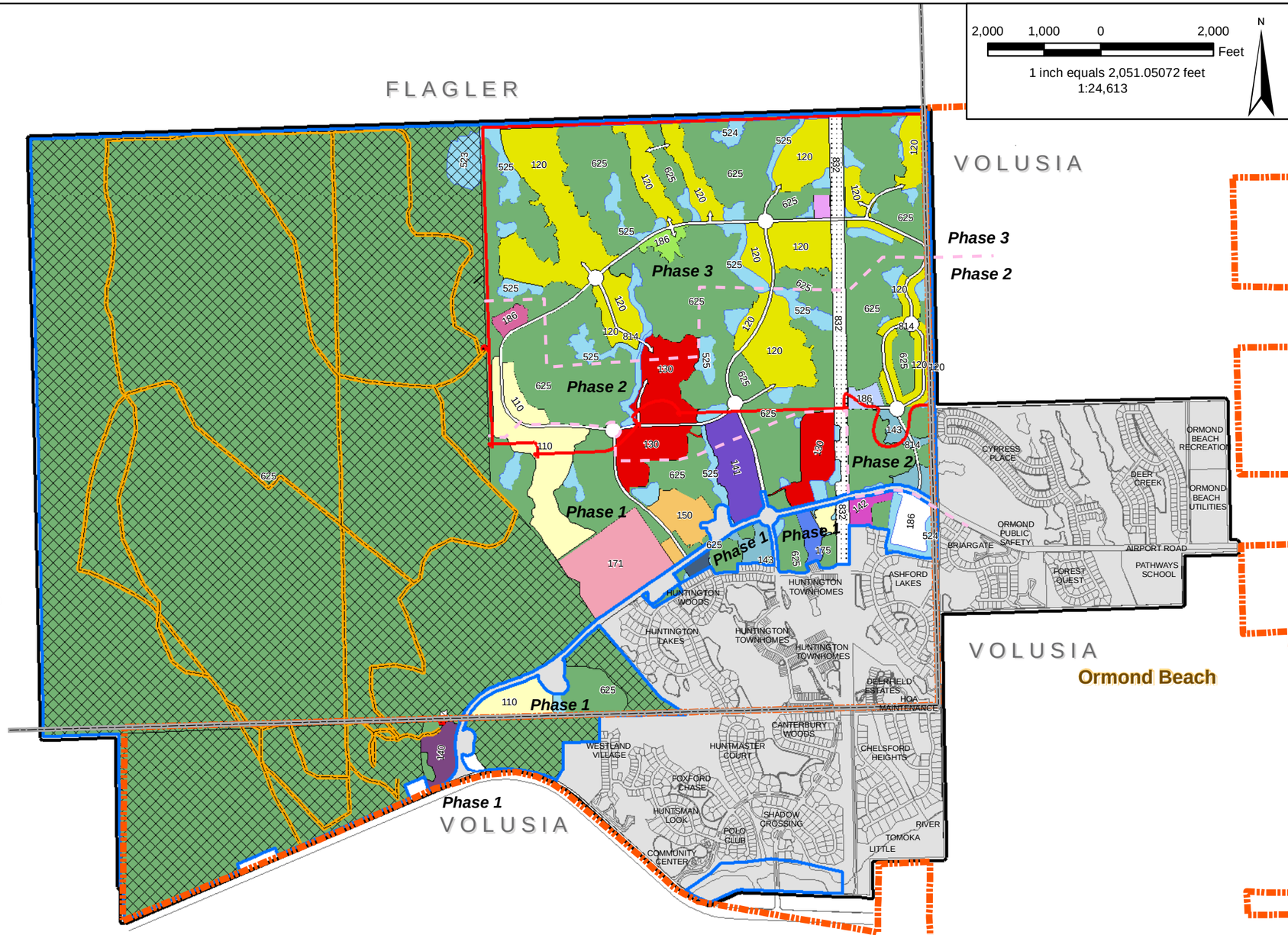
HUNTER'S RIDGE RESIDENTIAL GOLF PROPERTIES, INC.

Legend

- Hunter's Ridge Project Area (3842.79 ac.)
- Substantial Deviation Area (1,003.97 ac.)
- Approximate County Boundaries
- Ormond Beach Incorporated City Limits
- Hunter's Ridge Conservation Area (2,365.62 ac.)
- Hunter's Ridge Developed Areas
- Phase boundaries
  - Phase 1 (414.44 ac.)
  - Phase 2 (434.52 ac.)
  - Phase 3 (628.24 ac.)
- trails
- Trailhead

Land use code, desciption, and acreage

- 110, Low density residential (74.29 ac.)
- 120, Medium density residential (249.13 ac.)
- 130, High density residential (75.33 ac.)
- 140, Commercial and services (14.00 ac.)
- 141, Retail - convenience store (2.91 ac.)
- 141, Town center (27.54 ac.)
- 142, Warehouse (6.15 ac.)
- 143, Office park - professional services (19.70 ac.)
- 150, Industrial (18.62 ac.)
- 171, Elementary - Middle School (48.00 ac.)
- 175, Governmental - Flagler Public Safety (6.21 ac.)
- 186, Community center 1 (6.30 ac.)
- 186, Community center 2 (5.08 ac.)
- 186, Recreation 1 (2.78 ac.)
- 186, Recreation 2 (5.11 ac.)
- 186, Recreation area (13.07 ac.)
- 523, Lakes larger than 10 acres (11.85 ac.)
- 524, Lakes less than 10 acres (11.36 ac.)
- 525, Stormwater pond (109.83 ac.)
- 625, Preservation (3,046.50 ac.)
- 814, Residential road (46.50 ac.)
- 832, Electric power transmission lines (42.52 ac.)



2,000 1,000 0 2,000 Feet

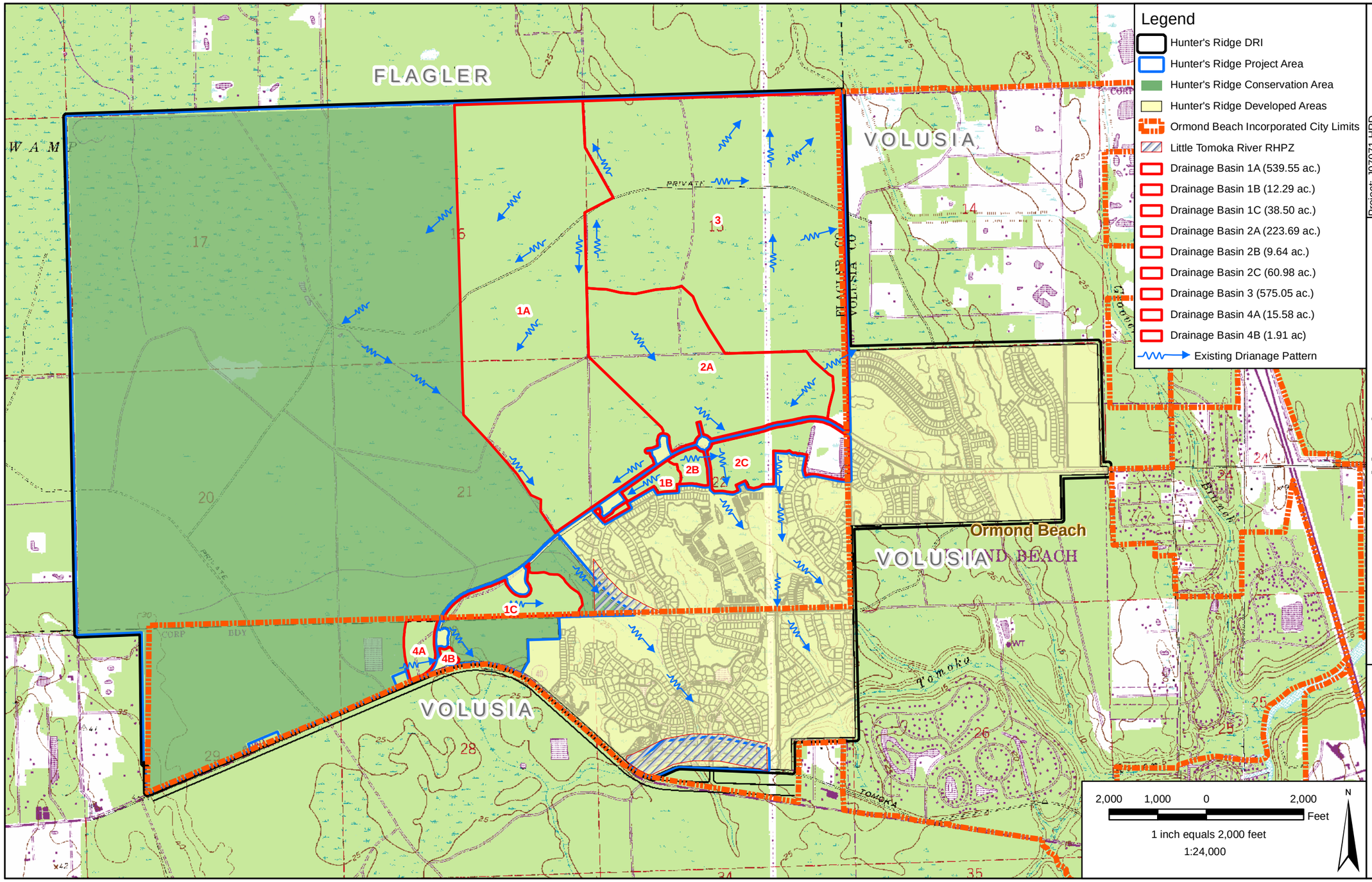
1 inch equals 2,051.05072 feet
1:24,613

N

Project: J07071 HRD
Date: November 2009
Project boundaries and site plans based on CAD drawings provided by Hunter's Ridge.

Map H
Master Development Plan

HUNTER'S RIDGE RESIDENTIAL GOLF PROPERTIES, INC.



Project: J07071 HRD
Date: November 2009
USGS 7.5-minute quadrangle for Favoretta, FL. Drainage information provided by Hunter's Ridge. Project boundaries based on surveys provided by Hunter's Ridge.

Map Ia
Existing Master Drainage Map

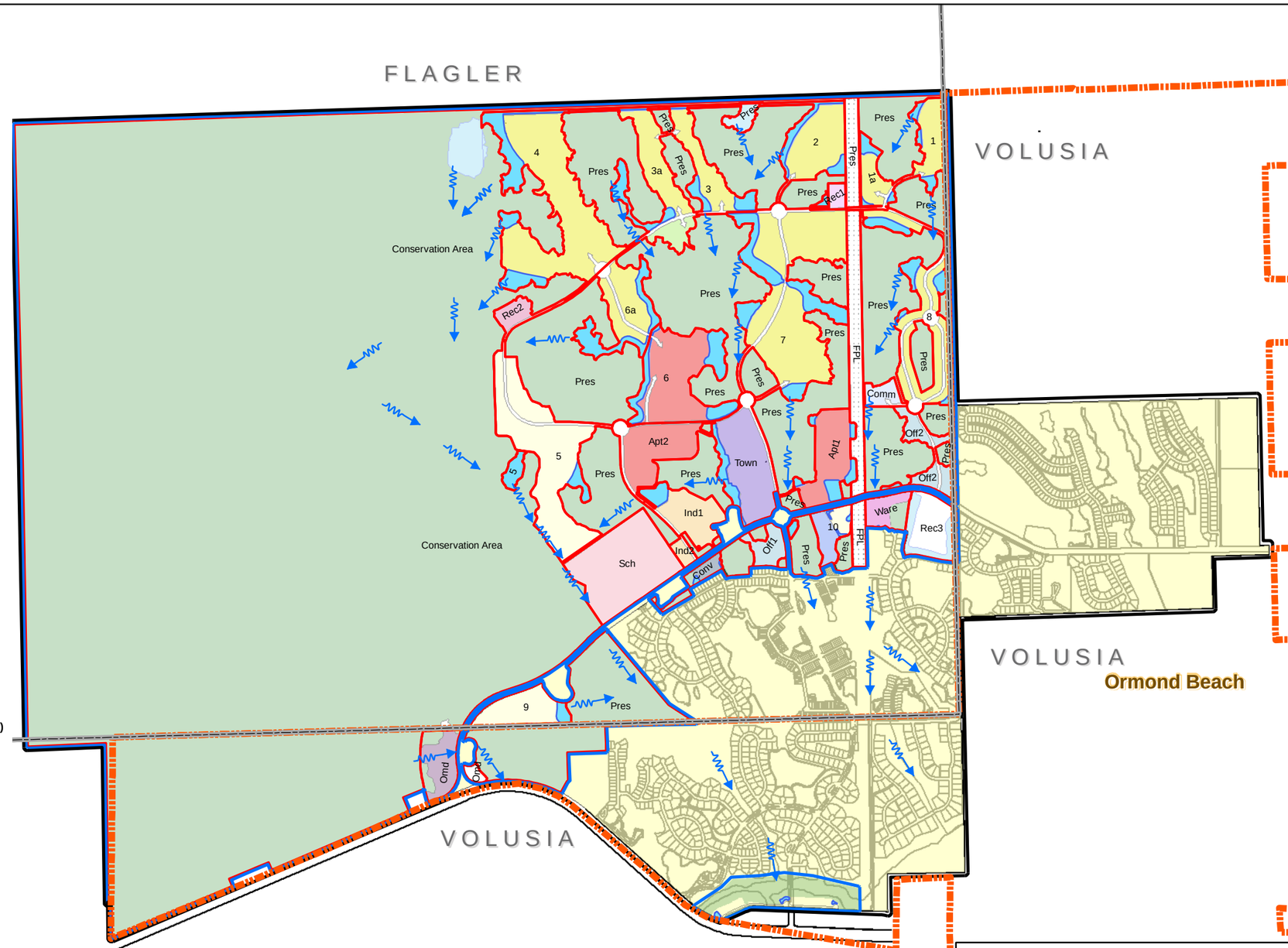
HUNTER'S RIDGE RESIDENTIAL GOLF PROPERTIES, INC.

Legend

- Hunter's Ridge DRI
- Hunter's Ridge Project Area
- Hunter's Ridge Developed Areas
- Approximate County Boundaries
- Ormond Beach Incorporated City Limits

Basin label, description and acreage

- 1, Parcel 1 (16.54 ac.)
- 10, Parcel 10 (10.24 ac.)
- 1a, Parcel 1a (11.70 ac.)
- 2, Parcel 2 (28.57 ac.)
- 3, Parcel 3 (22.02 ac.)
- 3a, Parcel 3a (33.64 ac.)
- 4, Parcel 4 (82.64 ac.)
- 5, Parcel 5 (64.40 ac.)
- 6, Parcel 6 (45.99 ac.)
- 6a, Parcel 6a (30.04 ac.)
- 7, Parcel 7 (92.78 ac.)
- 8, Parcel 8 (43.62 ac.)
- 9, Parcel 9 (17.54 ac.)
- Apt1, Apartment Site 1 (25.94 ac.)
- Apt2, Apartment Site 2 (26.81 ac.)
- Comm, Community Center (5.59 ac.)
- Conv, Convenience Store (5.73 ac.)
- FPL, Electric power transmission lines (41.04 ac.)
- Ind1, Commercial / Light Industrial 1 (20.17 ac.)
- Ind2, Commercial / Light Indistrial 2 (3.01 ac.)
- Off1, Office Park 1 (7.68 ac.)
- Off2, Office Park 2 (13.63 ac.)
- Omd, Commercial Sites - Ormond Beach (17.49 ac.)
- Pres, Preservation areas outside of basins (3,050.51 ac.)
- Rec1, Recreation / Community Centers (3.87 ac.)
- Rec2, Recreation / Community Centers (6.58 ac.)
- Rec3, Recreation / Community Centers (20.47 ac.)
- Sch, School site (49.56 ac.)
- Town, Town Center (35.89 ac.)
- Ware, Warehouse (9.38 ac.)
- out, Existing stormwater pond (1.29 ac.)
- Proposed Drainage Pattern



2,000 1,000 0 2,000 Feet

1 inch equals 2,000 feet

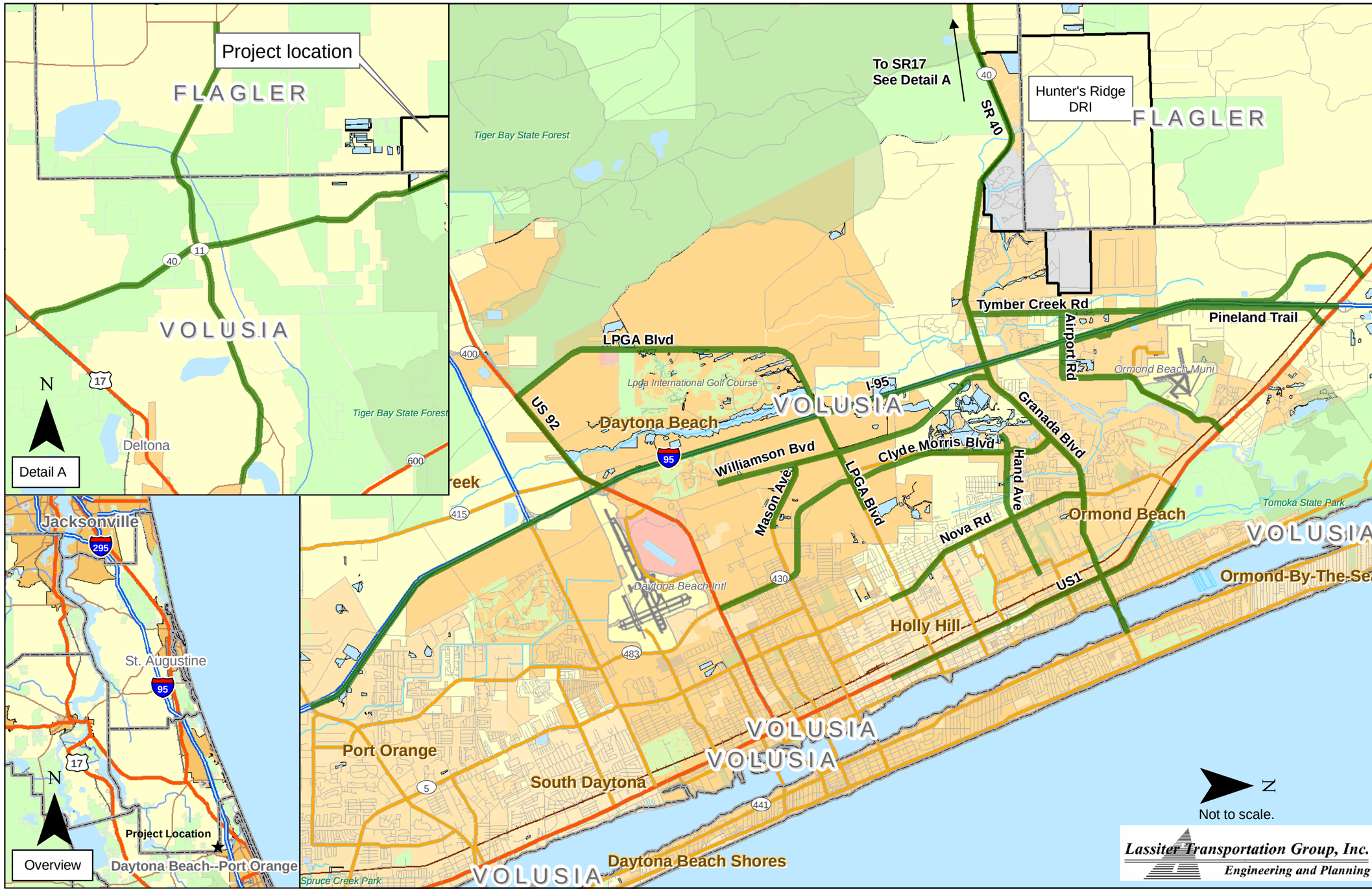
1:24,000

N

Project: J07071 HRD
Date: November 2009
Drainage information provided by Hunter's Ridge. Project boundaries based on surveys provided by Hunter's Ridge.

Map Ib
Proposed Master Drainage Map

HUNTER'S RIDGE RESIDENTIAL GOLF PROPERTIES, INC.



Project: J07071 HRD
Date: November 2009
Base map from Streetmap USA 2006 provided by ESRI. Project boundaries based on surveys provided by Hunter's Ridge. Study area roads provided by Lassiter Transportation Group.

Map J
Study Area Roadways

HUNTER'S RIDGE RESIDENTIAL GOLF PROPERTIES, INC.

Tab 4

Florida Department of Environmental Protection

Northeast District Office
7825 Baymeadows Way, Suite 200B
Jacksonville, Florida 32256-7590

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

September 28, 2009

Mr. Ed Lehman
Northeast Florida Regional Council
6850 Belfort Oaks Place
Jacksonville, FL 32216

RE: Hunter's Ridge First Sufficiency Review

Dear Mr. Lehman,

The Northeast District Office of the Department of Environmental Protection (DEP) has reviewed the Hunter's Ridge Development of Regional Impact First Sufficiency Report. This project is located within the Northeast District (NED) and Central District (CD) boundaries of the DEP. Based on the information provided, the following comments and recommendations are offered on this project from both the Department's NED and CD offices.

Potable Water

The DRI indicates that the City of Ormond Beach and the County of Flagler Beach entered into an Inter-local Interim Agreement in 1996, in which the City of Ormond Beach agreed to provide bulk water to Flagler County, which in turn, would supply potable water to this project. However, the three (3) parties involved (Flagler County, the City of Ormond Beach and the developer) are proposing changes to this agreement. The details of the agreement included in the DRI are not very clear.

The City of Ormond Beach Water System (owned by City of Ormond Beach) has adequate capacity (12 million gallons per day [MGD] plant capacity and 6.4 MGD maximum daily demand) to supply the potable water for this development. However, the referenced agreement is not final and it appears they are proposing changes to it. The parties involved must finalize the agreement and the commitment to guarantee good potable water to supply this project. If an agreement is not finalized, other alternatives must be considered by the developer (i.e., the construction of an on-site water plant) to serve the proposed development.

This fax was received by GFI FAXmaker fax server. For more information, visit: http://www.gfi.com

The required permits to construct the water distribution system inside the development and to connect to the Ormond Beach Water Treatment Plant must be obtained from the Volusia County Health Department (an approved County Health Department by DEP) per Chapter 62-555, F.A.C. The construction of an on-site plant by the developer, if considered, must be permitted by the Volusia County Health Department, or by NED, depending on the location of the water treatment plant. The permits required for the water plants located in Flagler County must be obtained from NED; and the water plants located in Volusia County must be obtained from the Volusia County Health Department. The necessary construction permit(s) to supply potable water to the proposed development must be obtained prior to the construction of the project.

The county where the supplying utility is located is responsible for permitting the water treatment plant (WTP) expansion if needed. Therefore, any expansion of the Ormond Beach WTP needed to supply a subdivision in Flagler County, must be approved by the Volusia County Health Department. Any new water mains in Volusia County would be permitted by DEP's Central District office while any new water main extensions in Flagler County would be permitted by NED. The utility supplying water (either in Volusia or Flagler County) is responsible for enforcing the cross-connection plan as well as distribution system maintenance.

<u>Wastewater</u>

Flagler County, the developer and Ormond Beach have a proposed agreement where Ormond Beach (located in Volusia County) would provide wastewater service. The applicant would need to obtain a permit for providing wastewater service from DEP's Central District, with the NED office serving as co-reviewer. It is expected that the wastewater treatment would be handled in Volusia County, but the reuse of reclaimed water may be in Flagler County.

A peak hour factor (PHF) for wastewater treatment is 2.78, but a typical PHF of 3.5 or higher is generally used. The applicant and their engineer should provide justification as to why a lower factor is appropriate for their development and the utility must approve the justified PHF factor.

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Surface Water

Industrial Wastewater:
If the developer discharges produced groundwater, they must first review and comply with the requirements of Rule 62-621.300(2).

Water Quality Monitoring:
Monitoring for the storm water discharges is recommended by the Department. Parameters recommended for monitoring include: flow, BOD5, Nitrogen series, TP and ortho P, chlorophyll A, turbidity, fecal coliform as well as the physical parameters (pH, specific conductivity, temperature, secchi and dissolved oxygen). Monitoring of the receiving waters should be in place prior to construction, continuing through build out and remain in place until the Department has reasonable assurance that Hunter's Ridge discharges are not degrading water quality. Monitoring of the biological communities is suggested, if applicable.

Ground Water

The proposed project should follow all applicable best management practices when applying fertilizers and pesticides on both the commercial and residential properties to lower any associated risk of these impacts to ground water aquifers.

The DRI report includes reference to connecting all wastewater discharges to the City of Ormond Beach's sewer system; therefore, this will satisfy the ground water monitoring requirements of Rule 62-520, F.A.C.

Waste Management

Hazardous Waste:
In response to Question 20, items B 2-4, the developer does not address the construction of the development itself. The construction of the homes, offices and commercial/retail space will generate hazardous waste that must be properly managed by the developer, property owner, and construction companies operating on the site. Construction operations are known generators or hazardous wastes such as: waste paints, varnish, solvents, sealers, thinners, resins, roofing cement, adhesives, machinery lubricants, caulk, lead flashing or solder, and products containing mercury.

This fax was received by GFI FAXmaker fax server. For more information, visit: http://www.gfi.com

A guidance document for this industry, "RCRA in Focus: Construction, Demolition, and Renovation" has been prepared by the U.S. EPA and is available via the following link: www.epa.gov/osw/inforesources/pubs/infocus/rif-c&d.pdf.

Upon completion of the development, operation of retail stores, school(s) and possibly a golf course proposed for this site will also generate hazardous waste.

Please modify the response to reflect that all hazardous wastes generated, either during or following construction, will be managed by the generator in accordance with all state (62-730, F.A.C.) and federal (40 CFR Parts 262 and 268) rules.

Storage Tanks:
The DRI document's table of contents did not appear to mention storage tanks, therefore the only review conducted was a comparison of the DRI property map footprint with Webpoint to determine if there appeared to be any registered storage tank systems within this area.

Based on the information provided, Webpoint did not show any facilities within the proposed boundary. If the applicant is aware of any storage tanks in the area, please report these findings to Department staff.

Trails

The Florida Department of Environmental Protection's Office of Greenways & Trails notes the importance of including bicycle/pedestrian facilities within the design plans of this project/ community. Specifically, dedicated shared-use paths/trails provide the optimum setting for the safe and efficient use of non-motorized modes of transportation through master-planned residential communities and commercial centers. Trails are in high demand among homebuyers. According to the National Association of Homebuilders, trails are now the number one community amenity desired by prospective homeowners nationwide. Large-scale development projects continue to represent one of the most promising opportunities for public-private partnerships aimed at furthering Florida's expansion of an interconnected statewide system of trails.

Multi-use trails may enhance alternate forms of transportation and provide for recreation. Map H depicts multiple trails and two trailheads through the conservation area (almost 50% of the site area). One of the trailheads appears to be at the south edge of the property which would provide public access.

The south section of the property follows an identified High Multi-Use Trail Priority Corridor along State Road 40. If a multi-use trail along this corridor accompanies the design of project the statewide system of greenways and trails would be enhanced.

Ecological Greenways

The Office of Greenways & Trails sees tremendous potential in partnering with developers of large scale projects to ensure true environmental integrity through the retention or creation of valuable ecological corridors (greenways). In a rapidly growing state such as Florida, the private sector is an essential component in efforts to avoid not only habitat loss, but habitat fragmentation as well. While open-space natural areas are indeed important, greenway corridors connecting such open spaces are equally important for ensuring the continued availability of many critical ecosystem services from flood protection to stormwater management and treatment. In addition to these services, greenways have the potential to positively impact the economic value of the project. Specifically, studies indicate that closer proximity to greenways and conservation corridors increases property values (National Recreation and Park Association).

Please contact Lisa Galocy at the DEP Office of Greenways and Trails at (850) 245-2049 with any questions regarding greenways.

Thank you for the opportunity to comment on this project. If you have any questions or need further assistance, please feel free to contact Beth Weatherford in the Northeast District office at (904) 807-3209, or by email at beth.weatherford@dep.state.fl.us.

Sincerely,

Gregory J. Strong
District Director

GS/BW/vic

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Potable Water - Noted

Wastewater - Noted

The wastewater demand for each single family unit is projected to be 196.8 gallon per day. A peaking factor of 4.0 was used to calculate peak hour flow. Demand flows and peaking factors will be reviewed and approved by the City of Ormond Beach Utility Department. Revised Wastewater Demand Tables have been attached.

Surface Water

Industrial Wastewater - Should the project discharge produced groundwater, although none is proposed, the requirements of Rule 62-621.300 (2) will be met.

Water Quality Monitoring - Hunter's Ridge is committed to developing in accordance with all applicable local and state requirements, particularly as they relate to monitoring requirements. As part of the current Development Order, an Annual Report with various monitoring requirements is required.

Groundwater - Noted

Waste Management

Hazardous Waste - All hazardous wastes generated, either during or following construction, will be managed by the generator in accordance with all state (62-730, F.A.C.) and federal (40 CFR Parts 262 and 268) rules.

Storage Tanks - The applicant is unaware of any storage tanks in the area.

Trails - Noted

Ecological Greenways - Noted

WASTE WATER DEMAND

HUNTER'S RIDGE TOTAL PROJECTED WASTEWATER DEMAND AT BUILDOUT

Name	QUANTITY UNITS	FLOW RATE [GPD]	AVG. DAILY FLOW [GPD]	AVG. DAILY FLOW [GPM]	MAX DAILY FLOW [GPM] PF = 2.0	PEAK HOUR FLOW [GPM] PF = 4.0
Existing Development (Ormond Beach)						
Shadow Crossings	288	300	86,400	60.00	120.00	240.00
Chelsford Heights	78	300	23,400	16.25	32.50	65.00
Forest Quest	50	300	15,000	10.42	20.83	41.67
Briargate	70	300	21,000	14.58	29.17	58.33
Deer Creek	346	300	103,800	72.08	144.17	288.33
Westland Village	48	300	14,400	10.00	20.00	40.00
Future Development (DRI Approved Units)	102	300	30,600	21.25	42.50	85. .0
Totals	982	300	294,600	204.58	409.17	818.33
Approved Projects (Flagler County)						
Ashford Lakes	77	196.8	15,154	10.52	21.05	42.09
Huntington Woods	70	196.8	13,776	9.57	19.13	38.27
Huntington Lakes	77	196.8	15,154	10.52	21.05	42.09
Huntington Townhomes	183	196.8	36,014	25.01	50.02	100.04
Deerfield Estates	14	196.8	2,755	1.91	3.83	7.65
Totals	421	196.8	82,853	57.54	115.07	230.15
Future Development						
Residential (Flagler County)	2562	196.8	504,202	350.14	700.28	1400.56
Commercial (In Thousand Square Feet)	709	100	70,850	49.20	98.40	196.81
School on Airport Road (In Students)	1500	20	30,000	20.83	41.67	83.33

TOTAL AVERAGE DAILY FLOW = **982,504** **GPD**
TOTAL MAXIMUM DAILY FLOW = **1,364.59** **GPM**
TOTAL PEAK HOURLY FLOW = **2,729.18** **GPM**

HUNTER'S RIDGE PROJECTED WASTEWATER DEMAND

15-YEAR PROJECTED BUILDOUT

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Flagler Residential (Approved/ In Review)	0	84	84	84	84	85	0	0	0	0	0	0	0	0	0	0
Flagler Residential (Total Units)	0	133	133	134	134	134	225	226	226	226	226	153	153	153	153	153
Commercial (Square Feet)	0	73,782	73,782	73,783	73,783	73,783	54,953	54954	54954	54,954	54,954	12,964	12,964	12964	12964	12,965

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Waste Water Demand ADF Increase per Yea (Based on 196.8 gpd for each single family unit located in Flagler County; and 10 gpd per 100 square feet of commercial space)	0	50,084	50,084	50,281	50,281	50,478	49,775	49,972	49,972	49,972	49,972	31,407	31,407	31,407	31,407	31,407
Max Day Increase (PF = 2)	0	100,168	100,168	100,561	100,561	100,955	99,551	99,944	99,944	99,944	99,944	62,814	62,814	62,814	62,814	62,814

Tab 5

Northeast Florida Regional Council

Bringing Communities Together

Baker • Clay • Duval • Flagler • Nassau • Putnam • St. Johns

September 30, 2009

Mr. Samuel Merrill, Jr.
Hunter's Ridge Residential Golf Properties, Inc.
1275 W. Granada Blvd., Suite 5A
Ormond Beach, Florida 32174

Re: Request for Additional Information: Hunter's Ridge Substantial Deviation Development of Regional Impact

Dear Mr. Merrill:

The Northeast Florida Regional Council (NEFRC) has completed its review of the Hunter's Ridge Substantial Deviation DRI Application for Development Approval (ADA). Based on our review and that of the other reviewing agencies, the Council staff and a number of the reviewing agencies are requesting additional information that is needed before an adequate assessment of the project can be made. Please respond to the following questions from the NEFRC staff. Also, respond to the requests by each of the reviewing agencies, which are hereby incorporated as part of the Council's request for additional information (attached). Please note that Flagler County was granted an extension; the County's comments will be forwarded to you upon receipt. A complete copy of all sufficiency responses must be forwarded to all reviewing agencies in the same quantity as was requested for the original ADA.

Sincerely,

Edward Lehman
Director of Transportation and Community Development

RECEIVED
OCT 5 2009
BY:

cc: Ms. Jeannette Hallock-Solomon
Mr. Adam Mengel

6850 Belfort Oaks Place • Jacksonville, FL 32216 • (904) 279-0880 • Fax (904) 279-0881
WEB SITE: www.nefrc.org • EMAIL: nefrc@nefrc.org
EQUAL OPPORTUNITY EMPLOYER

Question 10 – General Project Description

Please provide a development phasing table that shows approved development and proposed substantial deviation development by phase. It is difficult to understand the phasing schedule, approved and built development, and proposed development in the ADA.

Question 11 – Revenue Generation

Please provide additional information on the methodology used to calculate local government taxes.

Question 17 – Water Supply

Please provide a signed copy of Resolution 2009-104, and a signed signature page for each of the agreements.

Provide more specific information on the location of water wells on-site.

The ADA provides no data and analysis on the City of Ormond Beach's ability to provide potable water to the site. Is Ormond Beach within a Primary Water Caution Area? What steps will be taken to promote water conservation? Please note that Council policy is that Florida WaterStar standards must be met with this development. Staff is not knowledgeable of Ormond Beach standards and is not aware that they meet WaterStar standards.

Question 18 – Wastewater Management

Please provide a signed copy of Resolution 2009-104, and a signed signature page for each of the agreements.

Provide information on the potential for reuse water to be provided to the site.

Question 21 – Transportation

Several of the programmed improvements shown on Table 21.A.3 do not appear to be committed improvements. Please provide the appropriate documentation (FDOT Five-Year Work Program, TIP, City or County Capital Improvement Plan, etc.) to verify classification of the improvements listed in the table as programmed improvements.

Provide a map that shows TAZ structure for the Hunter's Ridge project and clearly delineate between proposed development and approved development in both Flagler County and Ormond Beach. The document is confusing, in that it is difficult to track residential

development in the project description with that proposed in the transportation analysis.

All trip generation calculations should be estimated using the trip generation rates and equations from the 8th Edition of ITE. Please verify.

Staff has questions about the interpretation of Sec. 163.3180(12), F.S. and anticipates additional dialogue between the agencies and the applicant.

Staff recognizes that the City of Ormond Beach is a Dense Urban Land Area (DULA) and is therefore subject to the provisions of Transportation Concurrency Exception Area (TCEA) included in SB 360. What is the status of the City's mobility element? Staff will work with the developer and the City to coordinate the mitigation plan for Hunter's Ridge in light of the DULA designation, however, staff sees nothing in SB 360 that specifically exempts a DRI that load trips into a specified DULA from the requirements of DRI traffic mitigation specified in Rule 9J-2.045, Florida Administrative Code.

Question 22 – Air

The pre-application summary specifically requires information to be provided. While detailed modeling may not be required, additional information on air quality and construction dust suppression efforts should be included.

Question 25 – Police and Fire Protection

No information on police protection is provided within the ADA.

NORTHEAST FLORIDA REGIONAL COUNCIL

Response to Question 10 - General Project Description

Although the development plan and phasing has changed since its original adoption in 1991, none of the changes have amounted to a Substantial Deviation. The most recent change in the plan/phasing schedule was approved in 2003 and is included herein. The pertinent information from the 2003 revision approved by Flagler County is an excerpt (Exhibit D & F) from the recorded document.

The following Table compares the 2003 revision and the changes proposed as part of this SD application. Map H, in the ADA, illustrates the Phasing information while this Table identifies the dwelling unit and square footages both "below" and "above" the SD line.

***Note: Figures do not include land areas outside of the delineated SD project area.

	Original (Amended 09/05/2003)			Proposed		
Phase 1	**Below SD**	**Above SD**	**Original Total**	**Below SD**	**Above SD**	**Proposed Total**
SF	156	150	306	368	0	368
MF	50	100	150	300	0	300
Office	15,000 sf	20,000 sf	35,000 sf	140,000 sf	0	140,000 sf
Retail	15,000 sf	0	15,000 sf	123,512 sf	0	123,512 sf
Light Industrial	75,000 sf	30,000 sf	105,000 sf	104,732 sf	0	104,732 sf
Phase 2	**Below SD**	**Above SD**	**Original Total**	**Below SD**	**Above SD**	**Proposed Total**
SF	65	250	315	407	406	813
MF	0	0	0	211	105	316
Office	20,000 sf	29,960 sf	49,960 sf	134,900 sf	0	134,900 sf
Retail	0	52,580 sf	52,580 sf	64,008 sf	0	64,008 sf
Light Industrial	25,000 sf	28,520 sf	53,520 sf	74,732 sf	0	74,732 sf
Phase 3	**Below SD**	**Above SD**	**Original Total**	**Below SD**	**Above SD**	**Proposed Total**
SF	0	449	449	0	664	664
MF	122	0	122	0	100	100
Office	40,000 sf	19,940 sf	59,940 sf	0	0	0 sf
Retail	30,000 sf	0	30,000 sf	0	0	0 sf
Light Industrial	75,000 sf	0	75,000 sf	64,056 sf	0	64,056 sf
Total	**Below SD**	**Above SD**	**Original Total**	**Below SD**	**Above SD**	**Proposed Total**
SF	221	849	1,070	775	1,070	1,845
MF	172	100	272	511	205	716
Office	75,000 sf	69,900 sf	144,900 sf	274,900 sf	0	274,900 sf
Retail	45,000 sf	52,580 sf	97,580 sf	187,520 sf	0	187,520 sf
Light Industrial	175,000 sf	58,520 sf	233,520 sf	243,520 sf	0	243,520 sf

Response to Question 11 - Revenue Generation

Assumptions were made regarding the values of residential and nonresidential products that are anticipated through project build-out. These values are based on comparable products found in similar developments in both Ormond Beach and Palm Coast and are based on 2009 dollars. A 2% growth rate is assumed for the real estate values during the development period.

Millage rates were identified for Flagler County based on current figures, and calculated against the appropriate values. Taxes are shown to be collected one year after development.

Impact fees were determined based upon current rate structures for the appropriate land use within the development.

Response to Question 17 - Water Supply

The Interlocal Agreement between the City of Ormond Beach and Flagler County has been revised recently and is being considered by both jurisdictions for final approval. A signed copy of the Interlocal Agreement establishing the Flagler County portion of Hunter's Ridge as part of the Ormond Beach Service Area will be provided as part of the next iteration of Sufficiency Responses.

The thirteen (13) water well sites are located on Map D of the ADA. These sites and water wells thereon are provided to the City of Ormond Beach by way of easements from the developer. The developer provided these sites in anticipation of obtaining water for the Hunter's Ridge community.

Potable water is already provided to the site as part of service infrastructure along Airport Road and elsewhere. The Flagler subdivisions (Ashford Lakes and Huntington Woods, Lakes and Townhomes) already under development outside of the SD area are served with potable water from the City of Ormond Beach.

Ormond Beach is not in a Primary Water Caution Area. Local and State conservation measures, including WaterStar, are anticipated to be undertaken as part of the Hunter's Ridge development in the SD area.

Response to Question 18 - Wastewater Management

The Interlocal Agreement between the City of Ormond Beach and Flagler County has been revised recently and is being considered by both jurisdictions for final approval. A signed copy of the Interlocal Agreement establishing the Flagler County portion of Hunter's Ridge as part of the Ormond Beach Service Area will be provided as part of the next iteration of Sufficiency Responses.

Ormond Beach has an active reuse program but is not certain of its ability to provide reuse water to Hunter's Ridge. Development in Hunter's Ridge, up to this point, has included "dry" reuse lines to accommodate reuse water should it become available.

Response to Question 21 - Transportation

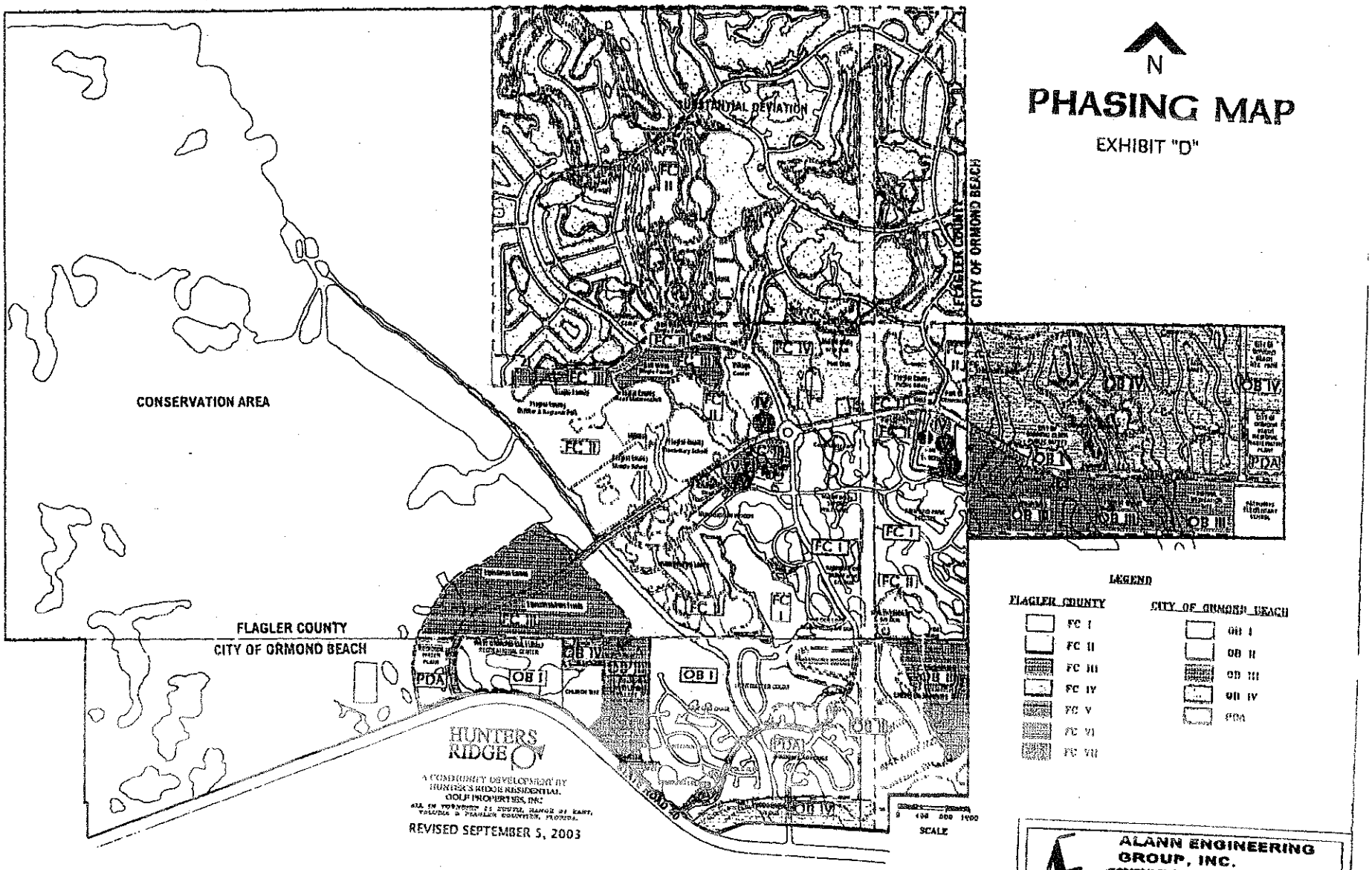
Response to be addressed under separate cover.

Response to Question 22 - Air

The provisions for Air Quality currently required in the Development Order stipulate that air modeling be accomplished for indirect sources by using guidelines adopted by local and state agencies. It also requires additional monitoring if the traffic modeling is underpredicted by 15% or more. The applicant proposes to adhere to the same standards and guidelines as all other development that has occurred outside the SD property.

Response to Question 25 - Police and Fire Protection

Correspondence from the Flagler County Sheriff is now included herein. It should be noted, as well, that discussions are underway between the City of Ormond Beach and Flagler County to facilitate an Agreement that would provide "First Response" mutual aid service by the City until Flagler resources arrive on the scene.


N
PHASING MAP
EXHIBIT "D"
SUBSTANTIAL DEVIATION
CITY OF ORMOND BEACH
FLAGLER COUNTY
CONSERVATION AREA
FLAGLER COUNTY
CITY OF ORMOND BEACH
FC I
FC II
FC III
FC IV
OB I
OB II
OB III
OB IV
PDA
HUNTERS RIDGE
A COMMUNITY DEVELOPMENT BY
HUNTER'S RIDGE RESIDENTIAL
GOLF PROPERTIES, INC
REVISED SEPTEMBER 5, 2003
SCALE
LEGEND
FLAGLER COUNTY
FC I
FC II
FC III
FC IV
FC V
FC VI
FC VII
CITY OF ORMOND BEACH
OB I
OB II
OB III
OB IV
PDA
ALANN ENGINEERING GROUP, INC.
CONSULTING ENGINEERS

Book: 5212
Page: 2603
Diane M. Matousek
Volusia County, Clerk of Cour

EXHIBIT "F"

Revised Development Schedule September 5, 2003

ORMOND BEACH			FLAGLER COUNTY		
Year	Phase	Description	Year	Phase	Description
Completed	PDA PDA	Deed: Easement (Rima Ridge Well Field) 108 Single Family Dwelling Units Deed: Airport Rd. R.O.W. Deed: Regional Water & Sewer Plant Sites Deed: Easement (Hudson Well Field)	Completed	PDA	Deed Airport Rd. R.O.W.
Completed	OB-I	129 Single Family Dwelling Units Deed: Public Safety Site Deed: Church Site SR 40	Present Thru 3	FC-I	167 Single Family Dwelling Units 193 Multi Family Dwelling Units Construction HR Blvd. To Airport Rd. Construction Airport Rd. from HR Blvd. To City Limits E. Deed Public Safety Site Deed Community Recreation Park Day Care Facility
Completed	OB-II	98 Single Family Dwelling Units Construct Airport Rd. from East to West City Limits	4 Thru 7	FC-II	Light Industry 50,000 Square Feet Deed Library Site Village Center Retail 15,000 Square Feet Light Industry 25,000 Square Feet Construct Airport Rd. west to School Sites Deed Middle School Site Deed Elementary School Site Deed Church Site Deed Maintenance Yard Site Deed Regional Park Site Village Center Office 15,000 Square Feet 156 Single Family Dwelling Units 50 Multi Family Dwelling Units Complete Golf Course
Present	OB-III	204 Single Family Dwelling Units Deed Middle School Site	8	FC-III	Complete Airport Road to SR 40 Village Office 20,000 Square Feet Light Industry 25,000 Square Feet Start Equestrian Center 65 Single Family Dwelling Units
1 Thru 3	OB-IV	392 Single Family Dwelling Units 50 Multi Family Units Deed City Recreational Park @ Airport Rd.	9 & 10	FC-IV	Light Industry 25,000 Square Feet 50 Multi-Family Dwelling Units Village Center Retail 30,000 Square Feet Village Center Office 20,000 Square Feet Light Industry 50,000 Square Feet Village Office 20,000 Square Feet 72 Multi-Family Dwelling Units
SUBSTANTIAL DEVIATION REQUEST IS REQUIRED FOR FUTURE PHASES					
			11	FC-V	Light Industry 30,000 Square Feet 100 Multi-Family Dwelling Units Village Office 20,000 Square Feet 150 Single Family Dwelling Units
			12	FC-VI	Village Center Retail 52,580 Square Feet Light Industry 28,520 Square Feet Village Center Office 29,960 Square Feet 250 Single Family Dwelling Units
			13	FC-VII	250 Single Family Dwelling Units Village Office 19,940 Square Feet
			14	FC-VIII	199 Single Family Dwelling Units

Flagler County Sheriff's Office

Donald W. Fleming, Sheriff
1001 Justice Lane • Bunnell, Florida 32110
386.586.4800 www.myfcso.us

August 18, 2009

Sent via fax and U.S. Mail
386/672-6282

Hunter's Ridge Properties
Mr. Sam Merrill
1275 W. Granada Blvd, Ste 5A
Ormond Beach, FL 32174

Operations Center
1001 Justice Ln
Bunnell, FL 32110
Ph: 386.586.4800
Fax: 386.586.4820

Palm Coast Substation
236 Palm Coast Parkway N.E.
Palm Coast, FL 32137
Ph: 386.445.5525
Fax: 386.445.2394

Hammock Substation
67 Malacompra Rd
Palm Coast, FL 32137
Ph: 386.246.9487
Fax: 386.246.5987

Westside Substation
6108 Mahogany Blvd.
Bunnell, FL 32110
Ph: 386.437.8287

Dear Mr. Merrill:

Upon review of the development plans for Hunter's Ridge located in southern Flagler County, the Flagler County Sheriff Office is unable to provide any services to this development absent a direct route into the area from Flagler County. As it is currently designed, this development does not afford direct access which raises concerns regarding not only response times to emergency calls for service, but also the quality of services provided. While there is access via State Road 40 in Volusia County, we are unable to commit resources that are required to travel out of the county to serve Flagler County residents.

However, if direct access from Flagler County were to be included in this development plan, the following would be required for our Agency to provide law enforcement services to residents of Hunter's Ridge:

- 11 deputies
  - Patrol (7), Detective (1), Supervisor (1), Corrections Deputy (2)
  - Phased in as development progresses
- 2 Communications Specialist
  - One—Phase 1
  - One—Phase 2
- 1 E-911 Call Taker
- 1 Civilian—Records/Evidence
- 1 School Resource Deputy (upon completion of K-12 School)
- Purchase 9 vehicles (one additional vehicle upon completion of K-12 School)
- Site and building for substation

RECEIVED
AUG 26 2009
BY:

If you need additional information or have any questions or concerns please, do not hesitate to contact our Agency. Any requests should be directed to Captain Lynne Catoggio, Patrol Section Commander, at 386/586-4805.

Sincerely,

Donald W. Fleming
Sheriff

DWF/jlc

Cc: Captain Lynne Catoggio
File

Tab 6

St. Johns River
Water Management District
Kirby B. Green III, Executive Director • David W. Fisk, Assistant Executive Director

4049 Reid Street • P.O. Box 1429 • Palatka, FL 32178-1429 • (386) 329-4500
On the Internet at www.sjrwmd.com.

September 29, 2009

Mr. Ed Lehman
Director of Transportation and Community Development
Northeast Florida Regional Council
6850 Belfort Oaks Place
Jacksonville, FL 32216

Subject: Hunter's Ridge Development of Regional Impact (DRI) Substantial Deviation Application for Development Approval (ADA)

Dear Mr. Lehman:

St. Johns River Water Management District (District) staff have reviewed the above-referenced ADA for a substantial deviation to the Hunter's Ridge DRI. The District offers the following comments and requests for information:

Question 9: Maps

Action Comment

1. Map H, Master Development Plan, shows two water features within the power line easement. These water features appear to be proposed within wetlands. The Proposed Impact Map should be revised to show the boundaries of wetland impacts within the power line easement and be consistent with Map H.

Advisory Comments

2. Map H shows a lake (FLUCCS 523) located in the northeast corner of the proposed 2.366-acre conservation area. Map F, Vegetation Map, does not show that this is an existing lake. Therefore, a District permit will be required for the construction of the proposed lake.

3. Map G, Wildlife Monitoring/Occurrence Map, does not show any occurrence of listed wildlife within the site. However, the entire remaining development area is within the secondary habitat range of the Florida black bear. In addition, bears are known to utilize the site based on evidence found during District staff site visits.

Question 10: General Project Description

Action Comments

1. The project description in Part 1.A indicates that: (1) the remaining portion of the project will consist of three, five-year phases containing residential and nonresidential development; and (2) a table was provided showing the amounts of residential and nonresidential development in each phase. However, the ADA did not contain the referenced table or information relative to the amounts of residential and nonresidential development in each phase. Therefore, the applicant should: (1) completely address parts 1.A and 1.B; (2) provide the referenced table for review; and (3) provide the amounts of residential and nonresidential development in each phase.

GOVERNING BOARD
Susan N. Hughes, CHAIRMAN, PONTE VEDRA
W. Leonard Wood, VICE CHAIRMAN, FERNANDINA BEACH
Hersey "Herky" Huffman, SECRETARY, ENTERPRISE
Hans G. Tanzler III, TREASURER, JACKSONVILLE
Douglas C. Bourrique, VERO BEACH
Michael Ertel, OVIEDO
Maryam H. Ghyabi, ORMOND BEACH
Richard G. Hamann, GAINESVILLE
Arlen N. Juniper, FORT McCOY

Advisory Comments

2. Part 4.A indicates that: (1) a wetlands jurisdictional study of the entire project area has been completed using current criteria for wetland determinations; and (2) the wetlands throughout the site have been surveyed and are being reviewed by the District as part of a conceptual permit application.

   a. The District is reviewing an application (#16-035-22838-26) for a formal wetland jurisdictional determination (FWJD). However, the FWJD application review and related fieldwork are not complete. Additional fieldwork is needed.

   b. The District received a conceptual permit (CP) application on March 21, 2006, and sent a request for additional information (RAI) to the applicant on April 18, 2006. However, the District has not received any response to that RAI.

   c. The project boundary identified in the CP application is inconsistent with the FWJD application, although the applicant previously informed District staff of the intent to revise the CP application to be consistent with the FWJD application. The proposed development area identified in the substantial deviation ADA is larger than the project boundaries identified in the FWJD and CP applications. Therefore, the FWJD and CP application do not include review for the limits of wetlands within the entire proposed development area identified in the ADA. For example, an area north of the Huntington Townhomes and Huntington Woods projects south of Airport Road is not included in the project boundaries identified in the FWJD and CP applications.

Question 12: Vegetation and Wildlife

Action Comment

1. Sections B and C refer to a Florida Natural Areas Inventory (FNAI) Biodiversity Matrix Query, but do not indicate if a wildlife survey has been conducted. The applicant should clarify whether a wildlife survey has been conducted for the entire project area in coordination with the Florida Fish and Wildlife Conservation Commission (FFWCC).

Question 13: Wetlands

Action Comment

1. Section A indicates that approximately 2,556 acres of on-site wetlands will be enhanced through preservation under a conservation easement. District environmental resource permitting (ERP) staff previously recommended to the applicant that the amount of wetland impacts be reduced because, based on information received during meetings with the applicant, the proposed development does not currently have sufficient mitigation opportunity within the proposed preservation area to offset adverse wetland impacts. The applicant should clarify whether wetland impacts will be further reduced as recommended by District ERP staff.

2. Section A.5 indicates that existing hydroperiods will be maintained by appropriate surface water management system design. However, Map Ia (Existing Master Drainage Map) and Ib (Proposed Master Drainage Map) show that sheetflow will be altered by changing drainage patterns and routing water away from wetlands that currently receive the water. District ERP staff indicate that the proposed alteration may result in adverse hydrologic impacts to wetlands on- and off-site. The applicant should clarify the specific action that will be taken to maintain the existing hydroperiods and avoid adverse hydrologic impacts to wetlands on- and off-site.

3. The applicant should clarify whether the Proposed Impact Map is proposed for inclusion in the DRI development order. Until a FWJD and CP are approved, the District does not recommend such inclusion.

Advisory Comment

4. All ERP criteria will need to be addressed during the ERP process, including elimination and reduction of wetland impacts and coordination with the FFWCC relative to listed species.

Question 14: Water

Action Comments

1. The subject DRI is located within the Tomoka River Hydrologic Basin (RHB), and a portion of the DRI is located within the Tomoka River Riparian Habitat Protection Zone (RHPZ).

   a. Sections 14 and 19 should be revised to address how the design of the project will meet the Tomoka RHB and RHPZ criteria contained in Rule 40C-41.063(6), *Florida Administrative Code (F.A.C.)*.

   b. Map Ia, Map Ib, and the Proposed Impact Map should be revised to show the location of the Tomoka RHPZ within the DRI.

Advisory Comment

2. Any ERP applications for properties in the Tomoka RHB and RHPZ must meet the District's additional surface water management basin criteria in Rule 40C-41, *F.A.C.*, in addition to the basic ERP criteria found in other rules.

Question 15: Soils

Action Comment

1. Sections 15.C and 15.D refer to "attached detailed engineering drawings." However, the ADA did not include these drawings. The applicant should provide the drawings or clarify its responses.

Question 17: Water Supply

Action Comments

1. Section 17 indicates the City of Ormond Beach will be the potable water supplier.

   a. Section 17.F.1 indicates that a letter from the City of Ormond Beach is contained in the ADA. However, the ADA did not contain the referenced letter. The applicant should provide the letter and ensure that it addresses sections 17.F.1(a), (b), and (c).

   b. Section 17 should be revised to indicate how the potable and nonpotable water supplies and facilities needed to serve the subject development, including the proposed increase in residential and nonresidential development from the DRI's original approval, are addressed in the City of Ormond Beach's adopted water supply facilities work plan and consumptive use permit (CUP).

2. The project description in Question 10, Part 1.A, indicates that the development will contain 3,965 dwelling units and consist of three, five-year phases covering a period of 15 years. ADA sections 17.A and 17.B require potable water demand and source projections for each phase of development. However, the ADA only contained potable water demand projections for a 10-year period and no water source projections.

   a. The potable water demand projections should be revised to address the same period as the DRI's phasing schedule and to be consistent with the project description (Question 10, Part 1.A).

   b. The two potable water demand projection tables indicate that the development consists of 3,863 (existing development, approved development, future development) and 3,414 (10-year projected buildout) dwelling units, respectively. The potable water demand projections should be revised to

address the same amount of residential development as the DRI's phasing schedule and to be consistent with the project description (Question 10, Part 1.A).

c. The potable water analysis provided to address sections 17.A, 17.B, and 17.F does not address the impact to the City of Ormond Beach's potable water supply and facilities. The responses to sections 17.A, 17.B, and 17.F 7 should be revised to demonstrate the impact on the water supply and facilties and include the following information:
   1. Existing District-issued CUP allocations
   2. Current year's water withdrawal figures
   3. Existing facility capacity
   4. Any reserved or committed water supply
   5. Any reserved or committed water supply facility capacity
   6. Available water supply, if any
   7. Available water supply facility capacity, if any
   8. Net cumulative impact on available water supply
   9. Net cumulative impact on water supply facility capacity
   10. Schedule of any new CUP or CUP modification to accommodate projected water demand
   11. The size and timing of any potable water infrastructure improvements

3. The ADA did not address nonpotable water demand or sources. The applicant should fully address sections 17.A and 17.B relative to nonpotable water, including the following:
   a. Projected nonpotable water demands and sources for each phase
   b. Whether stormwater or surface water will be used as a nonpotable water source for irrigation
   c. Whether reclaimed water is or will be available to serve the project
   d. Impacts to reclamation and distribution facilities associated with the nonpotable water demand

4. The ADA did not address Section 17.G relative to water conservation. The applicant should fully respond to Section 17.G. In addition, the responses to Section 17.G should indicate whether:
   a. Only water-conserving devices, fixtures, and appliances will be installed in all residential and nonresidential buildings and structures
   b. The remaining DRI development will meet the minimum requirements of the Florida Water Star^{SM} program. (At the two DRI pre-application meetings, regional planning council and District staff recommended that the applicant incorporate the District's Florida Water Star^{SM} program into the development.)

Question 19: Stormwater

Action Comment

1. Map Ia and Section 19.A indicate that pre-development Drainage Basin 3 is 575 acres in size and drains north to Lake Swamp and then to Groover Branch. However, Section 19.D and Map Ib indicate that the proposed post-development drainage systems in Drainage Basin 3 will divert stormwater runoff so that it drains to the south. The proposed post-development drainage condition may cause adverse hydrologic impacts to Lake Swamp and exacerbate the existing flooding condition downstream of the proposed DRI. Section 19.A should be revised to clarify the intent of the drainage system in Drainage Basin 3.

2. Section 19 should be revised to address District comments 1 and 2 relative to the Tomoka RHB and RHPZ that are provided under Question 14.

Question 26: Recreation and Open Space

Action Comment

1. Section A indicates that the developer now has the option to build a golf course subject to development permitting. If a golf course is proposed as part of the ADA, then the applicant should:
   a. Revise the project description (Question 10) to include this land use.
   b. Revise Map H to show the proposed golf course location.
   c. Revise the response to Question 17 and the water projections to address the proposed golf course's potable and nonpotable water demand.

This letter does not substitute for or constitute permit review. We appreciate the opportunity to comment. If the applicant or you have any questions, please contact District Policy Analyst Steven Fitzgibbons at (386) 312-2369 or *sfitzgib@sjrwmd.com*.

Sincerely,

Jeff Cole, Director
Office of Communications and Governmental Affairs

JC/SF/ETM

cc: Allan Feker, Hunter's Ridge Residential Golf Properties, Inc.
Adam Mengel, Flagler County
Richard Goss, City of Ormond Beach
Jeannette Hallock-Solomon, DCA
Kraig McLane, St. Johns River Water Management District
Geoff Sample, St. Johns River Water Management District
Janet Nunley, St. Johns River Water Management District
Chou Fang, St. Johns River Water Management District

SAINT JOHNS RIVER WATER MANAGEMENT DISTRICT

Response to Question 9 - Maps

1. Map H - The Proposed Impact Map will be revised and provided to St. Johns River Water Management (SJRWMD) to show any wetland impacts within the powerline easement upon approval of the formal wetland determination.

2. Map F and Map H - Acknowledged.

3. Map G - Map G has been revised to show incidental sightings of utilization of the project site by State and Federally-listed Threatened and Endangered Species including, but not limited to, the Florida black bear. To date, species specific surveys have not been formally conducted for the site or officially coordinated with Florida Fish and Wildlife Conservation Commission (FFWCC) and U.S. Fish and Wildlife Service (FWS). As previously stated, species-specific surveys and consultation with FFWCC and/or FWS will be conducted 90-days prior to land clearing activities of each development phase.

Response to Question 10 - General Project Description

1. The requested Table is provided herein. The breakdown within the Table includes what was originally anticipated (as amended by Flagler County (9/5/2003) and the proposed as outlined in the SD application. Map H of the SD document illustrates the land uses and phase line data. Both the residential and nonresidential development data in each phase is included in the Table.

***Note: Figures do not include land areas outside of the delineated SD project area.

	Original (Amended 09/05/2003)			Proposed		
Phase 1	**Below SD**	**Above SD**	**Original Total**	**Below SD**	**Above SD**	**Proposed Total**
SF	156	150	306	368	0	368
MF	50	100	150	300	0	300
Office	15,000 sf	20,000 sf	35,000 sf	140,000 sf	0	140,000 sf
Retail	15,000 sf	0	15,000 sf	123,512 sf	0	123,512 sf
Light Industrial	75,000 sf	30,000 sf	105,000 sf	104,732 sf	0	104,732 sf
Phase 2	**Below SD**	**Above SD**	**Original Total**	**Below SD**	**Above SD**	**Proposed Total**
SF	65	250	315	407	406	813
MF	0	0	0	211	105	316
Office	20,000 sf	29,960 sf	49,960 sf	134,900 sf	0	134,900 sf
Retail	0	52,580 sf	52,580 sf	64,008 sf	0	64,008 sf
Light Industrial	25,000 sf	28,520 sf	53,520 sf	74,732 sf	0	74,732 sf
Phase 3	**Below SD**	**Above SD**	**Original Total**	**Below SD**	**Above SD**	**Proposed Total**
SF	0	449	449	0	664	664
MF	122	0	122	0	100	100
Office	40,000 sf	19,940 sf	59,940 sf	0	0	0 sf
Retail	30,000 sf	0	30,000 sf	0	0	0 sf
Light Industrial	75,000 sf	0	75,000 sf	64,056 sf	0	64,056 sf
Total	**Below SD**	**Above SD**	**Original Total**	**Below SD**	**Above SD**	**Proposed Total**
SF	221	849	1,070	775	1,070	1,845
MF	172	100	272	511	205	716
Office	75,000 sf	69,900 sf	144,900 sf	274,900 sf	0	274,900 sf
Retail	45,000 sf	52,580 sf	97,580 sf	187,520 sf	0	187,520 sf
Light Industrial	175,000 sf	58,520 sf	233,520 sf	243,520 sf	0	243,520 sf

2. a. Acknowledged.

   b. A response to SJRWMD's April 18, 2006 request for additional information (RAI) was submitted to and received by SJRWMD on September 25, 2009.

   c. Proposed development areas within the boundaries of the Application for Development Approval (ADA) that are not included within the site boundaries of the formal wetland determination and conceptual permit area(s) will be reviewed informally with submittal of construction permits for each development phase.

Response to Question 12 - Vegetation and Wildlife

1. To date, species specific surveys have not been formally conducted for the site or officially coordinated with FFWCC and/or FWS. As previously stated, species-specific surveys and consultation with FFWCC and/or FWS will be conducted 90-days prior to land clearing activities of each development/construction phase.

   As previously stated, formal monitoring for wildlife is currently being conducted within the two SR-40 wildlife underpasses as funded and managed by the Florida Department of Transportation (FDOT). Specifically, FDOT is monitoring Florida black bear and other wildlife use of the underpass structures. They are also studying roadkill along the SR-40 corridor using transects both within the SR-40 travel lanes and sandy strips near the underpasses. Cameras have been installed within the underpasses, and are being periodically checked. Copies of recent FDOT quarterly and annual monitoring reports are attached.

Response to Question 13 - Wetlands

1. There are 2,713.60 acres wetlands within the proposed project site. This comprises approximately 71% of the 3,842.79 acres of the proposed project site. All jurisdictional wetland areas and respective acreages are shown in Map F, Vegetation Associations.

2. An Environmental Resource Permit (ERP) application will be required for each parcel of development. The post-development drainage patterns and design calculations included with each ERP application will show no hydrologic impacts to either on-site or off-site wetlands. This will be accomplished with the use of stormwater ponds located adjacent to the existing wetlands. The stormwater ponds will each have control structures or overflow weirs designed to provide the required water quality treatment volume prior to stormwater runoff being released to any wetland. The treated stormwater discharge will be used to maintain the existing hydroperiod of both on-site and off-site wetlands that receive water from Hunter's Ridge. The control elevation of any stormwater pond adjacent to a wetland will be set at or slightly higher than the season high water elevation of that wetland.

3. It is acknowledged that the formal wetland determination is pending approval. Upon approval of the formal wetland determination, the Proposed Impact Map will be revised and provided prior to final approval of the ADA to show the approved jurisdictional wetland boundaries and associated wetland impacts.

4. Acknowledged.

Response to Question 14 - Water

1. a. An Environmental Resource Permit (ERP) will be required for each parcel of development. Each ERP application will show the rules criteria for the Tomoka River Hydrologic Basin have been adhered to. The Saint Johns River Water Management District letter dated February 12, 1997 addressing the RHPZ has been attached.

b. Revised Maps Ia, Ib, and Proposed Impact Map are attached.

2. Please refer to SJRWMD agreement letter dated February 12, 1997 (attached). Based on the agreement, once the conservation easement is recorded for the on-site conservation area, as proposed in the development order, sufficient mitigation will be provided to account for potential impacts to the Tomoka River Riparian Habitat Protection Zone (RHPZ).

Response to Question 15 - Soils

1. Erosion control fencing and staked hay bales will be used during construction and site preparation to prevent erosion. Additional technologies may be used where appropriate. Fill material will be obtained using on-site sources such as the proposed stormwater ponds and several borrow pits. Overburden will be rough screened and used as stabilization material for side slopes where the fill will not be required to support structures.

Response to Question 17 - Water Supply

1. The Interlocal Agreement between the City of Ormond Beach and Flagler County has undergone a minor revision and is being considered for final approval by both jurisdictions. A copy of the approved document will be provided upon receipt.

2. a. and b. Both potable water demand tables have been revised and are included with this response.

   c. The items requested will be provided upon receipt from the City of Ormond Beach.

3. a. Projected irrigation demand (in million gallons per day) for each Phase are:

   Phase 1 - 0.34 mgd
   Phase 2 - 0.25 mgd
   Phase 3 - 0.26 mgd

   Irrigation demand was calculated by using one (1) inch of water per week in landscape areas.

   b. Stormwater will be used as a nonpotable water source.

   c. Reclaimed water is not available at this time, however, reuse lines will be installed for future availability.

   d. There are no impacts to reclamation and distribution facilities.

4. a. Hunter's Ridge will work with local and state agencies to determine the appropriate water conserving devices, fixtures and appliances for installation in residential and nonresidential buildings and structures.

   b. Hunter's Ridge is receptive to the incorporation of Florida's Water Star program into the development. Discussion with local representatives as to this requirement and adoption of these minimum requirements is anticipated.

Response to Question 19 - Stormwater

1. Pre-development Drainage Basin 3 does generally flow to the north, but stormwater runoff is intercepted by the ditch running along the dirt road on the south side of Durrance Lane. This ditch conveys the drainage flow to the east to a canal system that flows south and east, eventually connecting to Groover Branch. There is no stormwater runoff from the Hunter's Ridge Project to Lake Swamp. This drainage contributes to the occasional

flooding that occurs on Leeway Trail. The post-development drainage design may alter the direction of this runoff to the south if there are no adverse impacts to on-site and off-site wetlands that may receive this flow and if there is no increase in downstream flooding. If these two conditions cannot be met, the post-development drainage patterns will not deviate from the pre-development patterns.

2. An Environmental Resource Permit will be required for each parcel of development. Each ERP application will show the rules criteria for the Tomoka River Hydrologic Basin have been adhered to. The SJRWMD letter dated February 12, 1997 addressing the RHPZ has been attached.

Response to Question 26 - Recreation and Open Space

The ADA does not include a proposal for a golf course.

HUNTER'S RIDGE TOTAL PROJECTED POTABLE WATER DEMAND AT BUILDOUT

Name	QUANTITY UNITS	FLOW RATE [GPD]	AVG. DAILY FLOW [GPD]	AVG. DAILY FLOW [GPM]	MAX DAILY FLOW [GPM] PF = 2.0	PEAK HOUR FLOW [GPM] PF = 4.0
Existing Development (Ormond Beach)						
Shadow Crossings	288	300	86,400	60.00	120.00	240.00
Chelsford Heights	78	300	23,400	16.25	32.50	65.00
Forest Quest	50	300	15,000	10.42	20.83	41.67
Briargate	70	300	21,000	14.58	29.17	58.33
Deer Creek	346	300	103,800	72.08	144.17	288.33
Westland Village	48	300	14,400	10.00	20.00	40.00
Future Development (DRI Approved Units)	102	300	30,600	21.25	42.50	85.00
Totals	982	300	294,600	204.58	409.17	818.33
Approved & Under Review Projects (Flagler County)						
Ashford Lakes	77	300	23,100	16.04	32.08	64.17
Huntington Woods	70	300	21,000	14.58	29.17	58.33
Huntington Lakes	77	300	23,100	16.04	32.08	64.17
Huntington Townhomes	183	300	54,900	38.13	76.25	152.50
Deerfield Estates	14	300	4,200	2.92	5.83	11.67
Totals	421	300	126,300	87.71	175.42	350.83
Future Development						
Residential (Flagler County)	2562	300	768,600	533.75	1067.50	2135.00
Commercial (In Thousand Square Feet)	708.5	170	120,445	83.64	167.28	334.57
School on Airport Road (In Students)	1500	25	37,500	26.04	52.08	104.17

TOTAL AVERAGE DAILY FLOW = **1,347,445** **GPD**
TOTAL MAXIMUM DAILY FLOW = **1,871.45** **GPM**
TOTAL PEAK HOURLY FLOW = **3,742.90** **GPM**

HUNTER'S RIDGE PROJECTED POTABLE WATER DEMAND

15-YEAR PROJECTED BUILDOUT

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Flagler Residential (Approved/ In Review)	0	84	84	84	84	85	0	0	0	0	0	0	0	0	0	0
Flagler Residential (Phases 1 - 3)	0	133	133	134	134	134	225	226	226	226	226	153	153	153	153	153
Commercial (Square Feet)	0	73,782	73,782	73,783	73,783	73,783	54,953	54954	54954	54,954	54,954	12,964	12,964	12964	12964	12,965

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Water Demand ADF Increase per Year (gpd) (Based on 300 gpd for each single family unit and 17 gpd per 100 square feet of commercial space)	0	77,643	77,643	77,943	77,943	78,243	76,842	77,142	77,142	77,142	77,142	48,104	48,104	48,104	48,104	48,104
Max Day Increase (PF = 2)	0	155,286	155,286	155,886	155,886	156,486	153,684	154,284	154,284	154,284	154,284	96,208	96,208	96,208	96,208	96,208

WATER MANAGEMENT DISTRICT

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February 12, 1997

Gerald E. Upsom, Project Manager
Hunter's Ridge Development
1 Beagles Rest
Ormond Beach, Fl 32714

Dear Mr. Upsom:

This letter is a follow up to our recent meeting with you and Coleman Holt. As we discussed, based upon your proposed plans as shown on the approved development order, it appears that some development will be within the RHPZ of the District's proposed Tomoka River Hydrologic Basin rule. Based upon our familiarity with the Hunter's Ridge project and the development order, we agree that the mitigation proposed in the development order sufficiently mitigates impacts within the proposed RHPZ. In addition, the remainder of the identified impacts caused by the development are similarly mitigated within the development order.

As you know, this mitigation plan includes the preservation, by deeding to the District, of a large (over 2000 acres) and ecologically important piece of land that contains both wetlands and uplands. The plan also includes some significant restoration/ enhancement of degraded communities. This mitigation plan will significantly benefit the proposed RHPZ and the fish and wildlife found in this community.

In summary, District staff have concluded that, to some extent, the Hunter's Ridge Development will be affected by the proposed Tomoka River Hydrologic Basin rule, if they are adopted and implemented as currently proposed. However, the RHPZ provision of the proposed rule will not adversely affect your development plans, since no additional mitigation (over what was proposed in the development order) or reduction in development will be needed to conform with the proposed new rule.

If this is not clear, or if you have questions, please give me a call.

Sincerely,

Glenn Lowe, Director
Division of Environmental Resource Management

cc: Coleman Holt
Jeff Elledge
Pat Frost

William Segal, CHAIRMAN MAITLAND
Dan Roach, VICE CHAIRMAN FERNANDINA BEACH
James T. Swann, TREASURER COCOA
Otis Mason, SECRETARY ST. AUGUSTINE
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UCF

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September 1, 2009

Stephen Tonjes
Florida Department of Transportation
719 S. Woodland Boulevard
DeLand, FL 32720

Re: Quarterly Report on "A Reconnaissance Study of Actual and Potential Wildlife Crossing Structures in Central Florida" for the period May, June and July 2009.

Personnel

Field technicians for this time period have not changed. They are Heather Chasez, Courtney Knickerbocker, Erin Janovsky, Kurt Larsen and Jesse Ableson. Myra Noss continues to work with and supervise the field technicians. We had three undergraduate interns, Clay Noss, University of Florida, and Gregory Taylor and Jennifer Polanco, University of Central Florida; and two high school interns, Edmund Quigley and Max Noss, working for us.

SR40, SR46 and US17

Monitoring of roadkill and tracks beneath the wildlife underpasses on SR 40 and SR 46 has continued, along with small animal trapping at the controls. SR 40 had a significant amount of roadkill, especially several snake species; over thirty Florida cottonmouths, several eastern diamondback rattlesnakes, eastern mud snakes, black racers, corn snakes, rat snakes, water snakes, and an eastern coachwhip. Turtle species included gopher tortoises, Florida snapping turtles, Florida softshell turtles, eastern box turtles, redbelly turtle, and yellow-bellied slider. Bird species were American kestrel, American crows, barred owls and wild turkeys. Other species include American alligators, domestic cats, white-tailed deer, raccoons, Virginia opossum, nine-banded armadillos, Florida cottontails and a coyote. There were multiple anuran species kills. Roadkill on US 17 were Florida cottonmouths, mud snakes, corn snakes, rat snakes, black racers, eastern hognose snakes, eastern garter snakes, gopher tortoises, yellow-bellied sliders, barred owls, wild turkeys, Virginia opossums, nine-banded armadillos, and raccoons. The roadkill for SR 46 included multiple anuran species kills, Florida cottonmouths, black racers, eastern diamondback rattlesnakes, rat snakes, corn snakes, water snakes, Florida softshell turtle, chicken turtle, gopher tortoises, yellow-bellied slider, nine-banded

armadillos, raccoons, Virginia opossums, a red-shouldered hawk, barred owls, and wild turkeys.

The crossings were flooded at times during this quarter, compromising assessments. At SR 40 the tracks recorded underpasses were nine-banded armadillos, river otters, wild turkeys, rodents, snakes, Virginia opossums, rabbits, raccoons, and humans. SR 46 east had snakes, nine-banded armadillos, Virginia opossums, wild turkeys, Florida bobcats, white-tailed deer, raccoons, rabbits, Florida black bears, coyotes, and human tracks.

The perimeter track assessment on SR 40 had canid species, white-tailed deer, wild turkeys, and horses.

The traps on SR 40 and SR 46 were flooded for many days and were closed to insure no animals drowned. At SR 40 species captured and released were green anoles, oak and southern toads, eastern narrowmouth frogs, pinewoods tree frogs, cricket frogs, southern leopard frogs, spadefoot toads, eastern glass lizards, six-lined racerunners, black racers, ring-necked snakes, corn snakes, ground skinks, and least shrews. At SR 46 we had green anoles, oak and southern toads, eastern narrowmouth frogs, greenhouse frogs, pinewoods treefrogs, barking treefrogs, squirrel treefrogs, cricket frogs, southern leopard frogs, a gopher frog, spadefoot toads, six-lined racerunners, ground skinks, ring-neckrf snakes, eastern hognose snakes, water snakes, eastern garter snakes, dusky pigmy rattlesnakes, least shrews, golden mice, Florida mice, and cotton rats.

North (SR 520 and SR 415) and South (US 192) Loops

As with SR 40 and SR 46 rain inundated the study areas on these roads for roadkill, track assessment under crossings, and live animal capture at controls.

SR 415 Mud Creek

We monitored Mud Creek by camera until the last week of July. With the expansion of SR 415 our cameras shots were mostly workers and very few animals.

2nd Creek Site

Roadkill at 2nd Creek included American Alligators, nine-banded armadillos, raccoons, corn snakes, mud snakes, black races, water snakes, gopher tortoises, American robins, barred owls, and large numbers of anurans. Flood conditions limited our monitoring. Those tracks recorded under the crossing were coyotes, Florida bobcats, white-tailed deer, feral hogs, raccoons, Virginia opossums, nine-banded armadillos, snakes, and humans.

Jim Creek Site

Roadkill also included large numbers anurans. There were Florida softshelled turtles, black racers, yellow rat snakes, corn snakes, eastern garter snakes, nine-banded

armadillos, and cotton rats. Track assessments were limited because of flooding. There were raccoons, Virginia opossums, Florida bobcats, river otters, nine-banded armadillos, and humans.

St. Johns Site

Large numbers of roadkilled anurans were recorded. There were dusky pygmy rattlesnakes, eastern garter snakes, corn snakes, yellow rat snakes, black racers, river otters, and barred owls. Under the crossing, tracks beds included snakes, turtles, coyotes, river otters, Florida bobcat, raccoon, marsh rabbits, Virginia opossums, nine-banded armadillos, and humans. Human interference in our track beds has been a serious issue multiple times, including fecal remains and paper associated with the feces.

Crabgrass Site

Roadkill at Crabgrass included large frog and toad kills, northern mockingbirds, a northern cardinal, black racers, ring-necked snakes, corn snakes, yellow rat snakes, mud snakes, a scarlet kingsnake, eastern garter snakes, water snakes, eastern diamondback rattlesnake, gopher tortoises, and a striped skunk.

Harmony

Four gopher tortoises and four barred owls were roadkill, along with several American alligators. Other roadkill included black racers, corn snakes, garter snakes, water snakes, nine-banded armadillo, raccoons, and a northern mockingbird. High water levels prevented monitoring of tracks, but we have had a higher diversity of coyotes, Virginia opossums, nine-banded armadillos, and raccoons.

SR 192 and SR 520 live animal assessment

Live animal trapping at controls on SR 192 (Crabgrass) and SR 520 (St. Johns) has continued. Regular rain showers have made it apparent that these sites are prone to flooding. Some fences at SR 192 were removed due to continual flooding, while others remain half flooded and partially operational. Within the last part of July, SR 520 has been flooded as well. The species diversity has not changed much since the last report, but the numbers of individuals captured decreased in July. Many staff hours have been spent on the maintenance of the silt fences. The use of the interns and volunteers has been a benefit to this part of the research.

The species that were captured in control traps at Crabgrass include southern toads, oak toads, pinewoods treefrogs, squirrel treefrogs, eastern narrowmouth frogs, ground skinks, southeastern five-lined skinks, southeastern short-tailed shrews, southern leopard frogs, six-lined racerunners, black racers, brown anoles, green anoles, southern cricket frogs, greenhouse frogs, green treefrogs, house mice, old field mice. At St. Johns several species were trapped or encountered, including southern toads, eastern narrowmouth frogs, southern leopard frogs, southeastern five-lined skinks, brown anoles, green anoles,

eastern garter snakes, eastern ribbon snakes, striped mud turtles, squirrel treefrogs, Virginia opossum, corn snakes, greenhouse frogs, green treefrogs, scarlet kingsnakes, ring-necked snakes, golden mice, and cottonmouth snakes.

Arenas on UCF Campus

Research and the fence experiment on campus continued with our trapping of small animals. We increased the number of Sherman traps and were able to increase our number of small rodents captured. We are expanding our efforts to another nearby conservation area (the McKay Tract) maintained by UCF, which may yield more species in greater numbers.

A Reconnaissance Study of Actual and Potential Wildlife Crossing Structures in Central Florida

Summary Report (January-December 2006)

Written and Prepared by:

Daniel J. Smith, Ph.D., Research Associate

Reed F. Noss, Ph.D., Davis-Shine Professor of Conservation Biology and Principal Investigator

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This report is provided as partial fulfillment of contract no. contract no. BDB10, FIN 417707-1

ACKNOWLEDGEMENTS

Special thanks are extended to field assistants Kristine Schad, Lisa McCauley, Day McClanahan, Melanie Brodhead, Christina Trexler, Chris Fabyanski, Sandor Kelly, Diane Pepe, Ian Pfingsten, Terry Williamson, and Jennifer Elliott. Also, the work of program assistant, Sumi Singh was critical to the organization and management of the field assistants and assimilation of the data collected. Lastly, the cooperation, assistance and financial support of Florida DOT, specifically Stephen Tonjes enabled us to conduct field monitoring activities to produce an objective, scientific study that should benefit future transportation planning and conservation efforts.

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INTRODUCTION

It is widely recognized by biologists that crossing structures are needed in many cases to allow wildlife to successfully cross highways and maintain connectivity and gene flow within and among populations (Forman et al. 2003, Smith 2003a). However, the construction of large-scale crossing structures can be expensive, costing over one million dollars. Based on initial site surveys, existing or modified drainage structures have been substituted in several locations at considerably less cost; however, the effectiveness of these measures is unknown. Previous site surveys were only preliminary in terms of the species, types of crossings, and surrounding habitats studied. As noted in the literature (see brief review in the 2005 summary report, entitled "1st Year Interim Final Report"), knowledge of the effectiveness of various designs for wildlife-crossing structures is extremely limited (Transportation Research Board 2002).

Monitoring of crossings needs to be drastically upgraded in order to provide reliable guidance to transportation planners (Forman et al. 2003). Site surveys should include existing and proposed structures in the design or construction phase, and should include structures designed as wildlife crossings as well as culverts, enhanced culverts and other pathways under or over highways that various species may use (Smith 2003b). We need baseline data on movement and mortality of wildlife before the structures are located and installed. Importantly, monitoring of crossing structures, roadkills, and successful crossings of highways must encompass multiple species (e.g., amphibians and reptiles as well as mammals), because different structures and landscape/habitat conditions promote movement of different taxa (Clevenger et al. 2003, Smith and Voigt 2005).

The thirteen project sites examined in this study offer a unique opportunity to collect such baseline data by monitoring locations at which structures have not yet been installed and which have not yet been disturbed by construction; for monitoring sites during construction; and for uninterrupted pre-, during, and post-construction monitoring of new wildlife crossings. The intended product of the research is a published set of guidelines for decisions about and design of effective wildlife crossing structures that are more generally applicable than those derived from the isolated studies now available. These guidelines and a final report will be presented following the final year of data collection. We present here an annual report that summarizes the data gathered in the 2nd year of the study.

Research Objective

The goal of this project was to meet the research needs stated above. Specifically the objectives are:

1) to provide more comprehensive guidance for mitigation of habitat fragmentation by determining the kinds of species using several different types of culverts and wildlife crossing structures in central Florida,
2) to determine the amount and spatiotemporal pattern of use of structures vs. direct crossings of the highway, and
3) to determine the overall effectiveness of each crossing for facilitating movement and reducing wildlife-vehicle collisions.

STUDY AREA AND METHODS

The study area (Fig. 1) includes thirteen sites in east-central Florida (FDOT District Five). These include three sites in Volusia County (two on SR 40 at the headwaters of Little Tomoka Creek and one on SR 415 at Mud Creek), two sites in Lake County (two wildlife crossings on SR 46 at Wekiva Springs/Rock Springs Run State Park), four sites in Orange County (on SR 520 in the western St. John's River Basin, and Jim, Second, and Little Tootoosahatchee Creeks), and four sites in Osceola County (on US 192 at Sawgrass, Crabgrass, and Big Jug [Harmony] Creeks, and the C-57 canal). Structural attributes and construction status at each site are listed in Table 1.

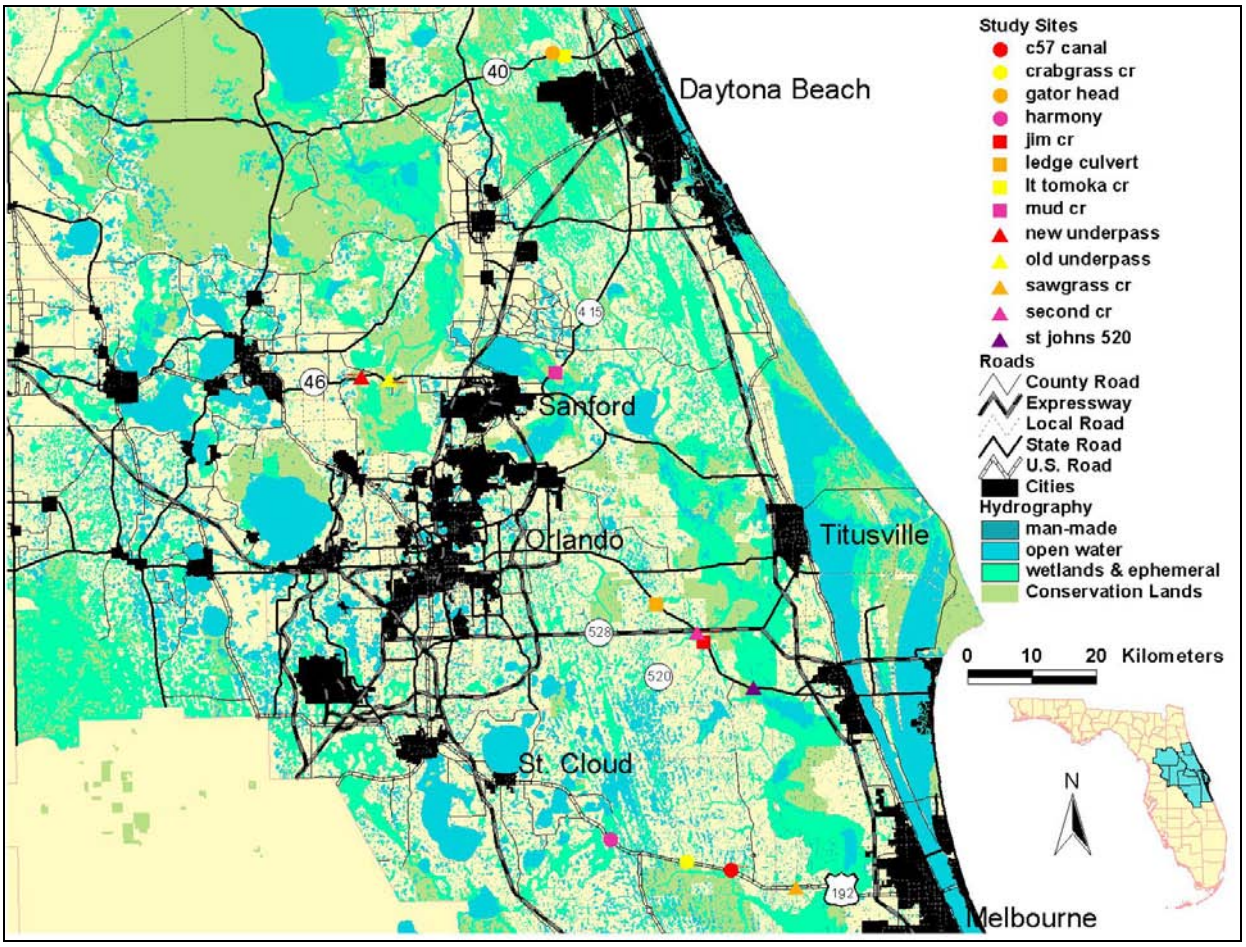

Figure 1. Location of Study Sites.

Site Evaluation

Environmental features at each study site, including land cover (vegetation and land use), topography, hydrology, and distance to human structures (homes, etc.), were evaluated to determine the appropriate monitoring methodology. Following Smith (1999), each crossing site was evaluated in terms of its context and relationship to important wildlife conservation areas identified in Florida, particularly Strategic Habitat Conservation Areas (Cox et al. 1994, Cox and Kautz 2000) and the Florida Ecological Network (Hoctor et al. 2000).

Table 1. Study Site Structural Attributes (also see Fig. 1 for site locations).

Site Location	Road	Monitoring	Structure	Height (m)	Width (m)	Length (m)
Old Underpass (Wekiva Sp)	SR 46	post-construction	culvert	2.7	7.5	14.4
New Underpass (Wekiva Sp)	SR 46	post-construction	bridge	2.6	18.2	15.3
Little Tomoka River*	SR 40	none in 2006	culvert x 3	1.4	3	27.7
Gator Head (west of LTR)*	SR 40	none in 2006	pipe x 2	0.62	0.62	20
Mud Creek	SR 415	post-construction	bridge	2.3	37	14.3
St. John's Basin crossing	SR 520	post-construction	bridge	2.5	8.1	33.8
Jim Creek*	SR 520	pre-construction	bridge	2.5	83.1	14.8
Second Creek*	SR 520	pre-construction	bridge	2.2	49.9	14.8
Tootoosahatchee Cr. (ledge culv.)	SR 520	post-construction	culvert	2	3.8	50
Harmony (Jug Creek)*	US 192	pre- and during construction	culvert x 3	2	2.17	14.7
Crabgrass Creek*	US 192	pre- and during construction	bridge	3.1	47.8	11.7
Canal C-57	US 192	during construction	bridge	4.3	42.8	33.5
Sawgrass Creek	US 192	during construction	bridge	1.9	18.5	34.2

* reflects dimensions of previous structures, not the new crossing structures

Site Monitoring

We determined successful and unsuccessful wildlife crossing locations by performing roadkill, track, and camera surveys. Roadkill and/or track monitoring was performed at the SR 40, SR 46, SR 415, SR 520, and US 192 sites. Remote infra-red photographic monitors were used at the two wildlife crossings on SR 46 and at Mud Creek; construction activities required removal of cameras from Second and Crabgrass Creeks. Monitoring of crossings and adjacent stretches of highway was conducted twice weekly in 2006 from January through December (duration varied at each site depending on the scheduling of construction activities and access to each site).

Roadkill Surveys

The road surface and immediate shoulder were checked 500 m in either direction from each crossing structure for roadkills. The only exceptions were the Jim and Second Creek sites on SR 520 and Wekiva sites on SR 46. The Jim/Second Creek sites were in close proximity, so roadkills were recorded between the two sites beyond the 500 m distance. The Wekiva sites were part of a long-term ongoing roadkill monitoring effort that extended a total distance of 13 km (included the greater Wekiva River ecosystem). The SR 40 sites were not monitored in 2006 due to construction activities. Specimens were identified to the lowest taxonomic level possible depending on condition of the carcass. Recorded roadkills were then marked with orange paint to avoid double counting. Roadkill data collected included date, GPS location, species, sex (if discernable), traffic lane, and direction of travel (if discernable). We recorded roadkill locations in a spatial database.

Right-of-Way (ROW) Track Stations

We did not monitor track paths (sand transects) adjacent and parallel to the highways (SR 40 and US 192) for tracks (of wildlife crossing the road) in 2006 because of disturbance from intensive construction activities.

Culvert/Bridge Track Stations

For structural crossings beneath roads (culverts and bridges), sand-tracking stations were placed within or under each structure in dry areas. Tracking stations were 1-m wide, with tracking material consisting of a native substrate/builder's sand mix approximately 3-4-cm deep. The mix was adjusted based on ability to read tracks clearly. For culverts, through-passages were recorded for individuals if tracks in the same direction were present in tracking stations at either end of the structure. Aborted crossing attempts were recorded if individual tracks were only found at one end of the structure. For bridges, a single track path was placed parallel to the centerline of the structure extending from the ends of the bridge to the creek banks at the middle. Animal tracks found within these track stations were assumed to be successful crossings. Track data collected included date, species type, and direction of travel. All species detected were recorded. Tracking stations were raked smooth after each visit.

Camera Stations

At strategic locations, e.g., by culverts or other road-crossing structures, infra-red triggered 35mm cameras (Camtrakker™) were placed to supplement tracking stations. Sites were selected to minimize the probability of theft or vandalism (however, two cameras were stolen from one of the wildlife crossings on SR46 just as this report was being finalized). The cameras use an invisible cone-shaped infra-red beam that detects motion and heat. Maximum range of the lens is approximately 20 m; the maximum range of the night flash is approximately 8 m. This influenced placement of the cameras within each structure. Generally, cameras were mounted parallel to the ground approximately 18-24" high (or at strategic angles to target specific crossing paths) to capture animals as small as a rabbit to as large as a black bear. Film and batteries from remote cameras were checked every one to two weeks depending on volume of animal traffic.

Data Analysis

Statistical tests will be used to identify patterns in the data and the probability that observed relationships differ significantly from what might be expected by chance. Because this is a multi-year study (this report presenting the 2nd year's data) statistical analyses will be completed in the final year following collection of additional data. Basic clustering techniques such as Chi-square and Ripley's K-statistic will be used on roadkill and ROW track data to evaluate factors such as distance to crossings and environmental variables (e.g., flooding). Following Clevenger and Waltho (2005), we will develop species performance indices (i.e., ratio of observed through-passage use to expected through-passage use), and regress these indices against attributes of crossing structures, using techniques such as curvilinear regression analyses.

RESULTS AND DISCUSSION

Results are presented in three sections: site evaluations, combined site results, and individual site summaries.

Site Evaluations

The sites on SR 40, SR 415, SR 46, SR 520 (Jim, Second, and Tootoosahatchee Creeks) and US 192 were previously characterized in the 2005 summary report (entitled: 1st Year Interim Final Report). The St. John's River Basin crossing site was added this year (Fig. 2). Construction on SR 520 to expand the road to four lanes was completed at this site in 2006. With expansion of this Orlando to Cocoa Beach connector to four lanes, the potential for increased traffic and urban sprawl is significant, especially given the amount of undeveloped private land west of this site.

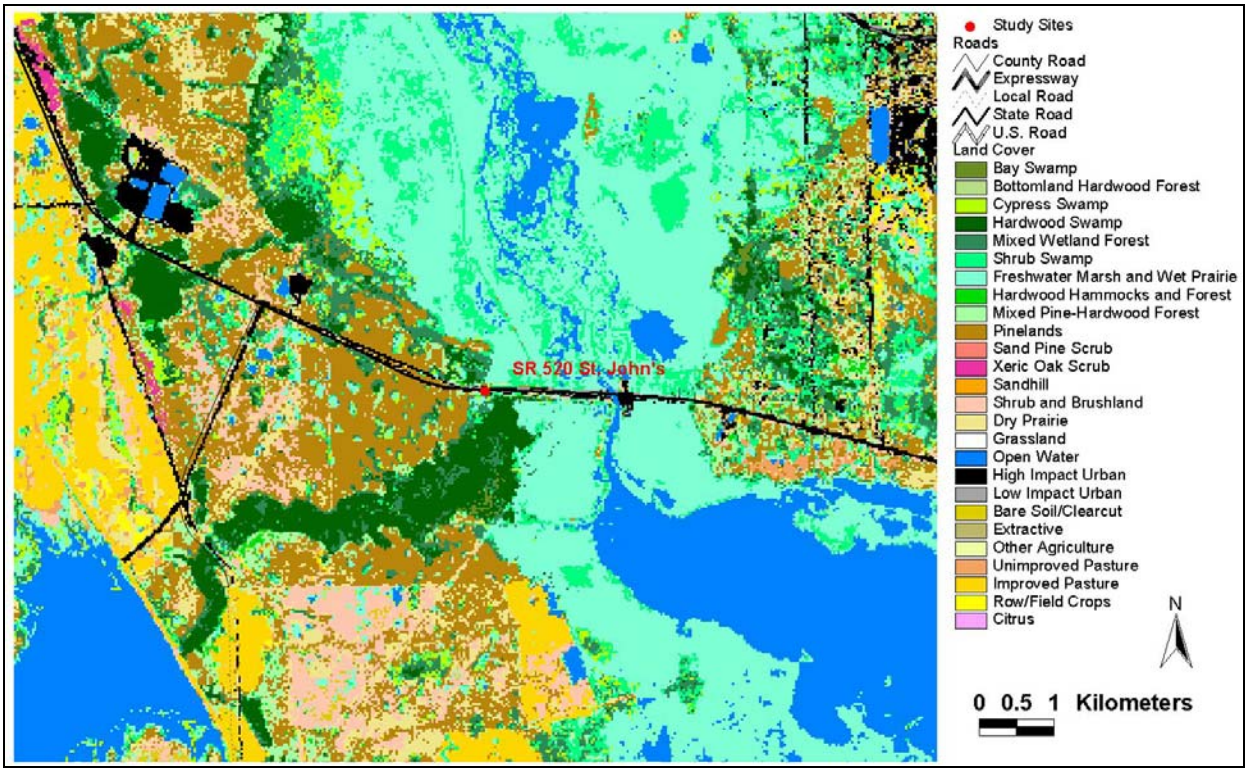

Figure 2. Surrounding Land Cover (2003) for the SR 520 St. John's Basin Crossing Site. Source: FFWCC.

The crossing site is situated within the St. John's River floodplain and is subject to inundation during wet years. The wildlife crossing is located within the protected Canaveral Marshes Conservation Area and the Tosahatchee State Preserve (over 15,000 ha combined). As a result the threat of development in the immediate area is minimal; there is only a small marina and restaurant approximately 2 km east on SR 520 at the St. John's River. About 5-6 km west is a municipal water treatment facility. To the southwest is the expansive Deseret Ranch.

Plant communities in the floodplain are relatively open and include freshwater marsh and wet prairie, and shrub swamp. Along the western fringe of the floodplain and adjacent to Taylor

Creek are mixed wetland forests and flatwoods, hardwood swamps, and hardwood hammocks and forest; further upland are tracts of natural and planted pinelands. West of this band of pinelands is a mosaic of sand pine and xeric oak scrub, ephemeral wetlands, shrub and brushlands, and pastures. Adjacent areas should be acquired as additions to the Canaveral Marshes Conservation Area and Tosohatchee State Preserve to expand the north-south St. John's conservation corridor. Also, the Taylor Creek corridor should be protected to establish a connection to conservation lands along the Econlockhatchee River to the west.

Wildlife Crossing Use and Roadkills

We monitored existing and new structures for tracks of all groups. This included the two SR 46 wildlife crossings, the SR 415 bridge at Mud Creek, the four SR 520 sites including the ledge culvert at the Tootoosahatchee Creek tributary, the bridges at the St. John's River floodplain and Second and Jim Creeks, and the Crabgrass and Sawgrass Creek bridges on US 192. Camera monitors were maintained at the two SR 46 wildlife crossings and the SR 415 Bridge at Mud Creek. Structural attributes were shown in Table 1. Roadkill monitoring was performed at all sites.

Combined Site Results

For all 2006 study locations (n=11) we recorded 102 different species (Table 2). These were categorized by faunal groups that included American alligator, meso-mammals (n=5), carnivores (n=3), birds (n=35), ungulates (n=3), domestic animals (n=2), herptiles (n=44), humans, small mammals (n=6), bats, river otter, and other mammals.

Table 2. Species Recorded at all 2006 Study Sites.

Group name	Common name	Scientific name	Roadkill	Track/ Photo	Live Observation
Crocodilian	American alligator	*Alligator mississippiensis*	x	x	x
Meso-mammals	Armadillo	*Dasypus novemcinctus*	x	x	x
	E. spotted skunk	*Spilogale sp.*		x	
	Raccoon	*Procyon lotor*	x	x	
	Striped skunk	*Mephitis mephitis*		x	
	Virginia opossum	*Didelphis virginiana*	x	x	
Carnivores	Bear	*Ursus americanus*	x	x	
	Bobcat	*Lynx rufus*	x	x	
	Coyote	*Canis latrans*	x	x	
Bats	Bats	Chiroptera	x		
Birds	Birds	Aves	x	x	
	American Robin	*Turdis migratorius*	x		
	Barred Owl	*Strix varia*	x		
	Belted Kingfisher	*Ceryle alcyon*	x		
	Black Vulture	*Coragyps atratus*	x		
	Bobwhite Quail	*Colinus virginianus*	x		
	Great Blue Heron	*Ardea herodias*	x		x
	Crested Caracara	*Caracara plancus*	x		
	Carolina Wren	*Thyrothorus ludovicianus*	x		

Table 2. (continued)

Group name	Common name	Scientific name	Roadkill	Track/ Photo	Live Observation
	Cattle Egret	*Bubulcus ibis*	x		
	Common Yellowthroat	*Geothlypis trichas*	x		
	ducks	*Anas sp.*	x		
	Eastern Screech Owl	*Otus asio*	x		
	Gray Cat Bird	*Dumetella carolinensis*	x		
	Great Egret	*Casmerodius albus*	x		x
	Green Heron	*Butorides virescens*	x		
	House Wren	*Troglodutes aedon*	x		
	Little Blue Heron	*Egretta caerulea*	x		x
	Mallard Duck	*Anas platyrhynchos*	x		x
	Northern Cardinal	*Cardinalis cardinalis*	x		
	Northern Mockingbird	*Mimus polyglottus*	x		
	owls	*Strigidae*	x		
	Painted Bunting	*Passerina ciris*	x		
	Palm Warbler	*Dendroica palmarum*	x		
	Red Shouldered Hawk	*Buteo lineatus*	x		
	Red-tailed Hawk	*Buteo jamaicensis*	x		
	Rock Dove	*Columba livia*	x		
	Sandhill Crane	*Grus canadensis*		x	
	songbirds	Passeriformes	x		
	tanagers	Emberezidae	x		
	Tricolor Heron	*Egretta tricolor*			x
	Turkey Vulture	*Cathartes aura*			x
	wading bird	Ardeidae		x	
	Wild Turkey	*Meleagris gallopavo*		x	
	Wood Stork	*Mycteria americana*			x
	Yellow-billed Cuckoo	*Coccyzus americanus*	x		
Ungulates	White-tailed deer	*Odocoileus virginianus*	x	x	
	Wild pig / hog	*Sus scrofa*	x	x	
	Feral horse	*Equus caballus*		x	
Domestics	Domestic cat	*Felis catus*	x	x	
	Domestic dog	*Canis familiaris*	x	x	
Herpetofauna	**Frog/Toad**	Anura	x	x	
	Bullfrog	*Rana catesbeiana*	x		
	Barking treefrog	*Hyla gratiosa*	x		
	Cuban treefrog	*Osteopilus septentrionalis*	x		
	Pig frog	*Rana grylio*	x		x
	Green treefrog	*Hyla cinerea*	x		
	Southern chorus frog	*Pseudicris nigrita*			x
	Florida gopher frog	*Rana capito aesopus*	x		
	Southern leopard frog	*Rana sphenocephala*	x		x
	Southern toad	*Bufo terrestris*	x	x	x
	Lizards	Squamata: Lacertilia		x	
	Brown anole	*Anolis sagrei*	x		x
	Eastern glass lizard	*Ophisaurus ventralis*	x		

Table 2. (continued)

Group name	Common name	Scientific name	Roadkill	Track/ Photo	Live Observation
	Green anole	*Anolis carolinensis*	x	x	x
	SE 5-lined skink	*Eumeces inexpectatus*	x		
	Snakes	Squamata: Serpentes		x	
	Banded watersnake	*Nerodia fasciata*	x	x	
	Black racer	*Coluber constrictor*	x	x	x
	Black rat snake	*Elaphe obsoleta*	x		
	Black swamp snake	*Seminatrix pygea*	x		
	Brown snake	*Storeria dekayi*	x		
	Brown watersnake	*Nerodia taxispilota*	x		
	Coral snake	*Micrurus fulvius*	x		
	Corn snake	*Elaphe guttata*	x		
	Crayfish snake	*Regina rigida*	x		
	Eastern coachwhip	*Masticophis flagellum*		x	
	E. diamondback	*Crotalus adamanteus*	x		
	E. indigo snake	*Drymarchon corais*	x		
	Eastern garter snake	*Thamnophis sirtalis*	x		
	Eastern ribbon snake	*Thamnophis sauritus*	x		
	Eastern milk snake	*Lampropreltis triangulum*	x		
	Florida cottonmouth	*Agkistrodon piscivorous*	x		
	Florida green watersnake	*Nerodia floridana*	x	x	
	Mud snake	*Farancia abacura*	x		
	Plain belly watersnake	*Nerodia erythrogaster*	x		
	Pygmy rattlesnake	*Sistrurus miliarius*	x		
	Ring-necked snake	*Diadophis punctatus*	x		
	Scarlet snake	*Cemophora coccinea*	x		
	Striped crayfish snake	*Regina alleni*	x		
	Turtles/tortoises	Testudines		x	
	cooters/redbelly turtles	*Pseudemys spp.*	x		
	Eastern musk turtle	*Sternotherus minor*	x		
	Florida softshell turtle	*Apalone ferox*	x		
	Gopher tortoise	*Gopherus poylphemus*	x		x
	Peninsular cooter	*Pseudemys floridana*	x	x	x
	Snapping turtle	*Chelydra serpentina*	x		
	Stinkpot	*Sternotherus odoratus*	x		
	Striped mud turtle	*Kinosternon baurii*	x		
Human	Human	*Homo sapiens*		x	
Small mammal	Eastern cottontail	*Sylvilagus floridana*	x	x	
	Fox squirrel	*Sciurus niger*	x		
	Grey squirrel	*Sciurus carolinensis*	x		x
	Marsh rabbit	*Slyvilagus palustris*	x		
	mice and rats	Muridae	x	x	
	shrews	*Sorex sp.*	x		
Aquatic mammal	River otter	*Lutra canadensis*	x	x	x
Other mammal	Unknown mammal	Mammalia	x	x	

Figure 3 displays the total tracks and roadkills recorded by taxa from all sites. A total of 2,533 roadkills and 4,453 tracks were recorded. Small mammals were found most frequently (347 roadkills and 3,556 tracks), followed by frogs (1,231 roadkills and 277 tracks), snakes (708 roadkills and 103 tracks), lizards (17 roadkills and 230 tracks), and song or perching birds (112 roadkills and 83 tracks). Other mammal (tracks) included 107 occurrences of river otter. Carnivore track occurrences included bobcat (50) and black bear (1). Roadkill raptors (included in the song/perching bird category in Fig. 3) included Black Vulture (19), owls (9), hawks (7), and Crested Caracara (1).

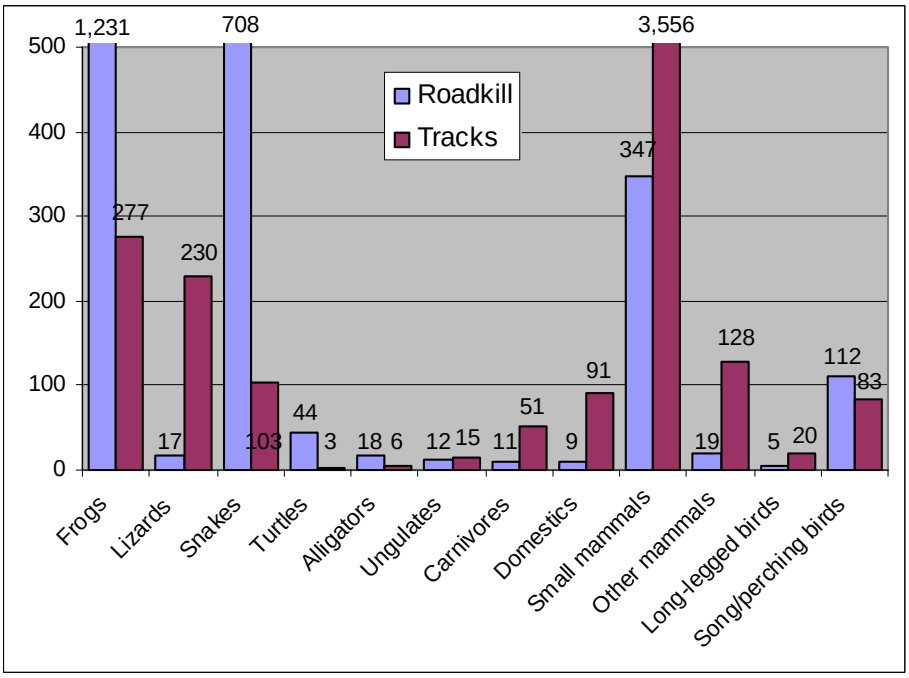

Figure 3. Roadkills and Tracks by Taxa Recorded from all Study Sites.

Consistently, seasonal peaks for herpetofauna roadkill and track observations occurred in June and October (Fig. 4). For mammals, peaks in roadkills and tracks occurred in different seasons, February and June/December, respectively (Fig. 4). It was quite dry in central Florida in 2006, especially from Jan – May, when average monthly rainfall was 1.4 in. One peak rainfall period (June-July, 13.61 in.) occurred simultaneous with peak activity of herpetofauna.

We did not compare data recorded in 2006 with that of 2005. Overall comparisons between these study periods was inappropriate given that two study sites (Gatorhead and Little Tomoka Cr.) from 2005 were not monitored in 2006, a new site (SR 520 – St. John's River) was monitored in 2006 that was not monitored in 2005, two study sites (Harmony and Crabgrass Creek) included track monitoring in 2005, but not in 2006, and one site (C-57 canal) included track monitoring in 2006, but not in 2005. The changes in monitoring were due to intensive construction activities. Consult the "1st Year Interim Final Report" for a review of data collected in 2005.

SR 40 Study Site

Intensive road construction prohibited any wildlife monitoring in 2006.

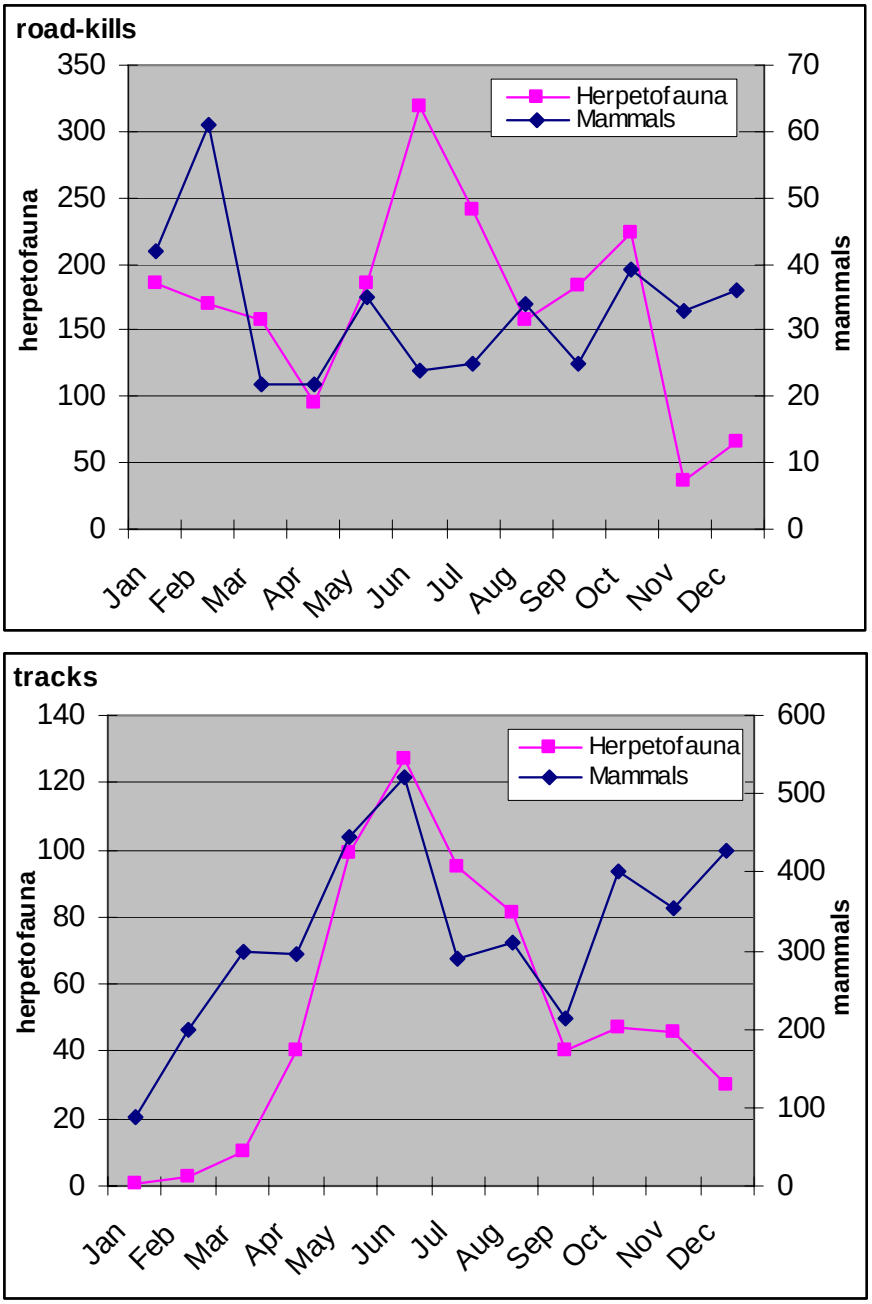

Figure 4. Seasonal Change in Roadkill and Track Records from all Study Sites.

SR 415 Study Site

On SR 415 track and roadkill monitoring was conducted throughout 2006 at the Mud Creek bridge. To monitor wildlife movement under the bridge, we constructed a sand transect on the northside of the creek for tracks and placed a camera on the southside of the creek. Figure 5 displays the roadkill survey area for the study site including 100-m wide partitions overlaid for analysis.

Figure 5. Location of SR 415 Study Site and Partitions Used for Analysis of Roadkill Data. Numbered highway sections are 100-m wide.

At Mud Creek, track and photograph data revealed passage under the bridge by 631 mammals (448 meso-mammals, 39 small mammals, 3 river otter, 7 carnivores, and 129 ungulates), 98 herptiles (39 snakes, 29 frogs, 28 lizards, and 2 turtles), and 11 birds (5 wading or other long-legged birds) (Fig. 6). Significant tracks include 2 black bears, 3 bobcats, 1 wood stork, and 1 wild turkey. Roadkill locations were recorded for 36 mammals (mostly meso-mammals and small mammals), 110 snakes/lizards (mostly water snakes), 38 frogs (mostly ranids), 5 turtles/alligators (mostly aquatic turtles), and 20 birds (mostly perching birds). Figure 7 displays roadkills found in each road section at Mud Creek (see Fig. 5 for location). An additional 43 roadkills were recorded beyond the road partition grid. Significant individual roadkills include two owls, one Red-shouldered Hawk, one white-tail deer, and one alligator. Considerable wetlands occur adjacent to this site accounting for the large amount of roadkilled water snakes.

Significant numbers of roadkilled herptiles were found within the fenced area. Certain wildlife can penetrate the fence through gaps/breaks or circumvent it by climbing over the top (herp barrier is only 1' above ground) or around the ends becoming trapped within the enclosure.

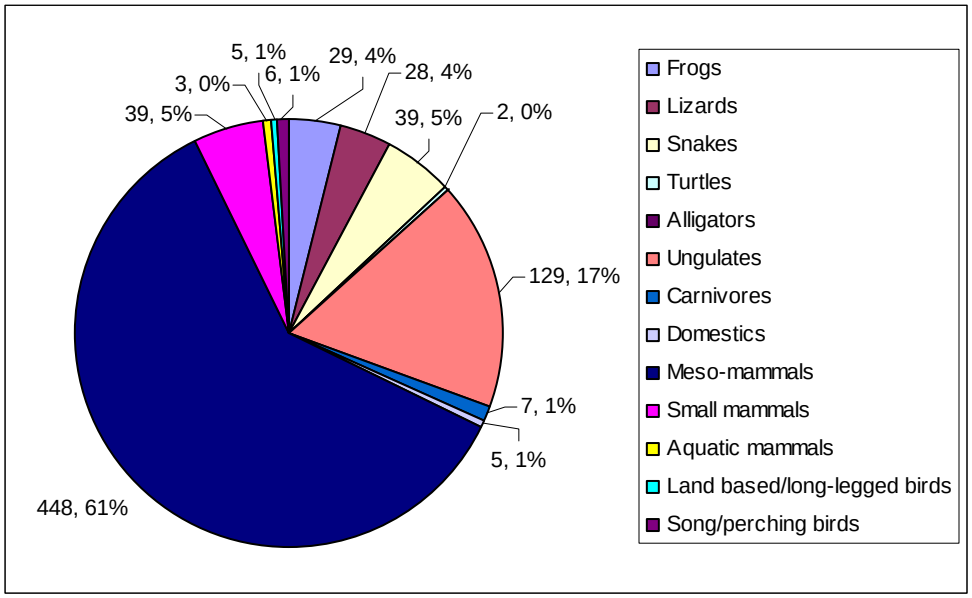

Figure 6. Percent of Tracks/Photos Recorded by Faunal Groups at Mud Creek.

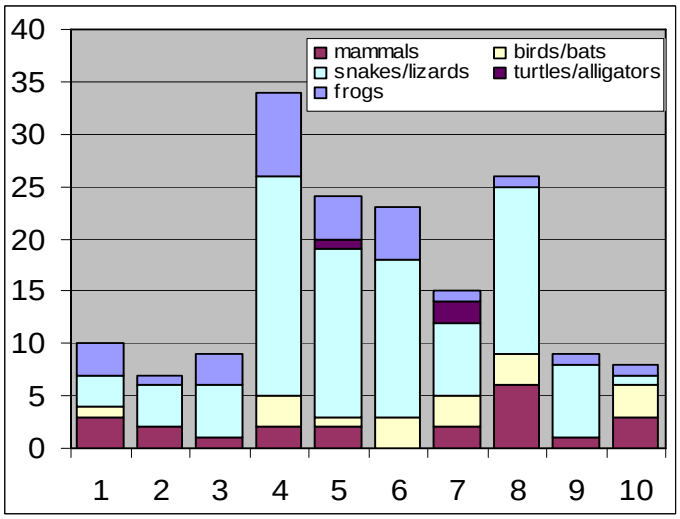

Figure 7. Number of Roadkills Recorded by Road Section (100-m wide) at Mud Creek. The Mud Creek bridge (wildlife crossing) is located between road sections 5 and 6.

SR 46 Study Sites

On SR 46 monitoring for roadkills was conducted throughout 2006. The roadkill survey area (13 km) for SR 46 is much greater than other study sites because of the significant impacts on Florida black bear (Figs. 8a and 8b). Camera monitors were set up in the two upland wildlife crossings adjacent to the Wekiva Springs/Rock Springs Run State Park (Fig. 8a). These were operated throughout 2006.

Figure 8a. Location of SR 46 Study Sites: Western Partitions Used for Analysis of Roadkill Data. Numbered highway sections are 100-m wide.

At the western underpass, photographic records of wildlife use included 12 mammals (2 black bears and 10 whitetail deer). Malfunctions of the camera sensors continually result in poor performance (few records) at this site. These cameras need to be repaired or replaced. Groundcover and shrub vegetation growing adjacent to the entrances has increased the percent cover for animals approaching this crossing and should improve frequency of use.

At the eastern underpass, photographic records of wildlife use included 202 mammals (13 black bears, 2 coyotes, 186 whitetail deer, and 1 feral horse) and 7 wild turkeys. Figure 9 displays percent of tracks/photos by taxa.

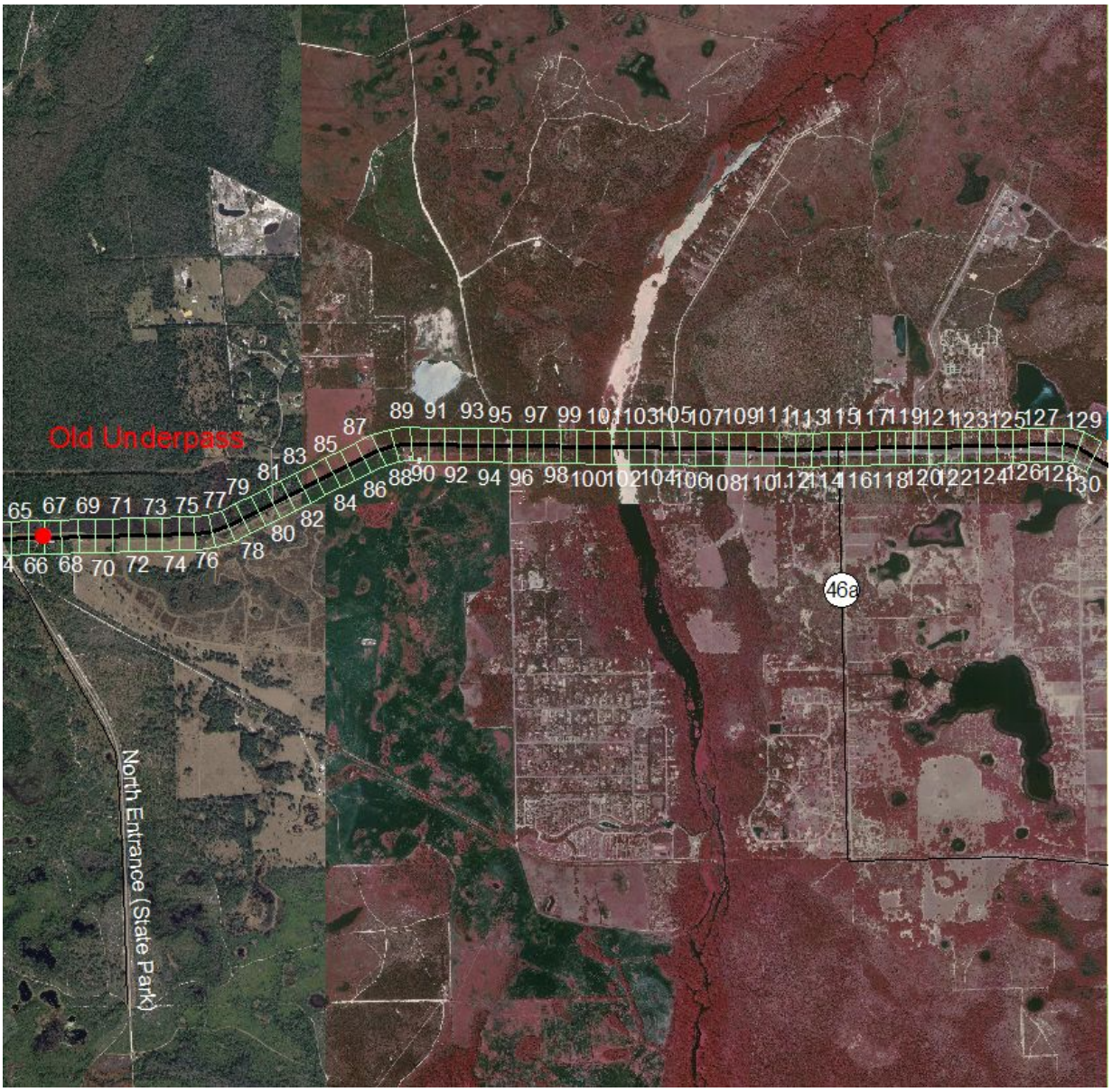

Figure 8b. Location of SR 46 Study Sites: Eastern Partitions Used for Analysis of Roadkill Data. Numbered highway sections are 100-m wide.

Roadkill on SR 46 included 116 mammals (notables include 7 black bears, 1 bobcat, 2 fox squirrels, and 6 whitetail deer), 11 snakes/lizards, 14 frogs (pig frogs and southern toads), 10 turtles (including 6 gopher tortoises), and 5 birds (including 3 Black Vultures and 1 Barred Owl). Figure 10 displays locations of those roadkills west of the old underpass (see Fig. 8a for location). Figure 11 displays roadkills found east of the old underpass (see Fig. 8b for location). Black bear roadkills occurred in road section nos. 5, 79, 87, 90, 94, and 95 (Figs. 8a and 8b). Road section nos. 78 and 79 coincide with the end of the barrier fence. Both fox squirrel roadkills were found in road section no. 116 (Fig. 8b). Gopher tortoise roadkills were recorded in road section nos. 8, 14, 28, 109, 115, and 116 (Figs. 8a and 8b). Most roadkills found within the fenced enclosure were small mammals and herpetofauna that can readily penetrate the chain-link barrier.

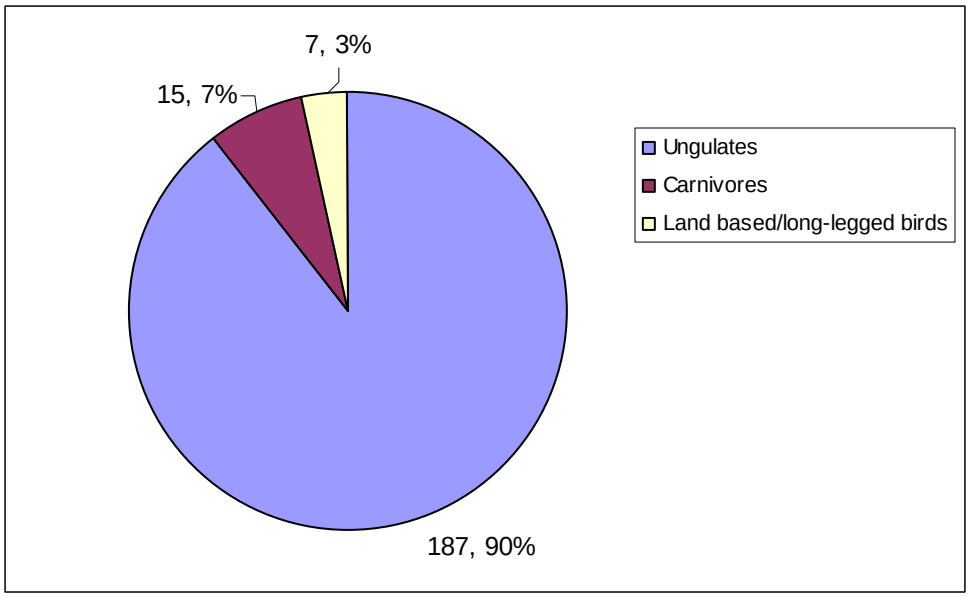

Figure 9. Number of Photographs Recorded at the Eastern SR 46 underpass.

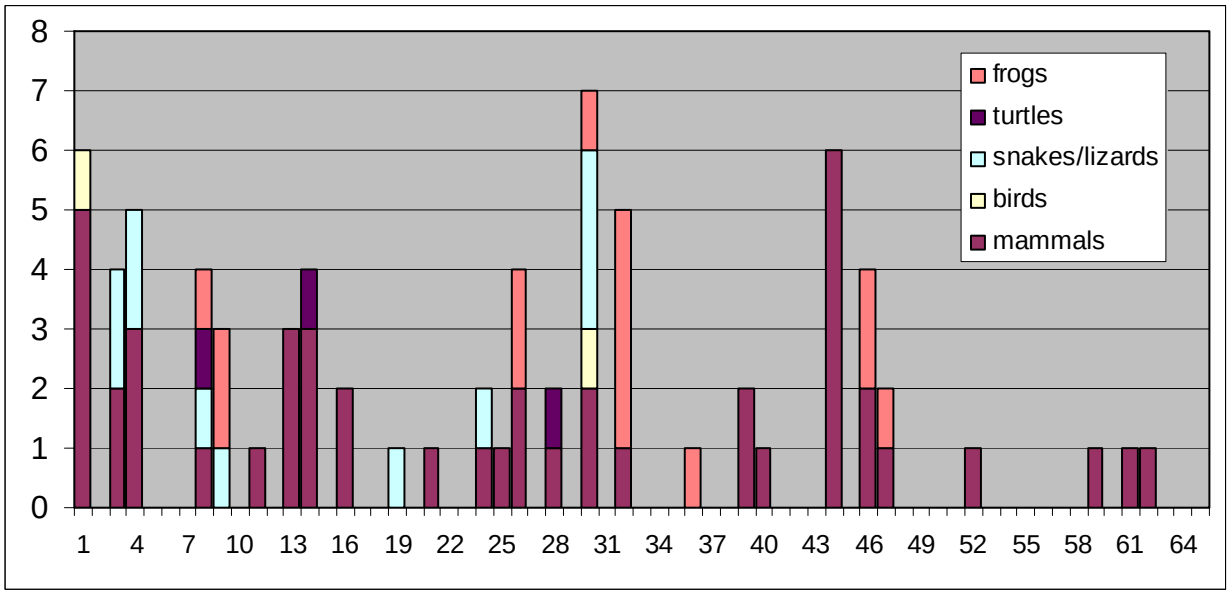

Figure 10. Number of Roadkills Recorded by Road Section (100-m wide) on SR 46 west. The new and old underpasses are located at partition nos. 20 and 66, respectively.

SR 520 Study Sites

Four sites were monitored on SR 520. Post-construction monitoring for tracks and roadkill was conducted at the Tootoosahatchee Creek tributary enhanced ledge culvert throughout 2006 (Fig. 12). During construction monitoring for roadkills was conducted at Jim and Second Creek bridges throughout 2006; track monitoring was conducted under the bridges from late May through December (Fig. 13). Post-construction monitoring for roadkills and tracks occurred from May through December at the St. John's River floodplain bridge (Fig. 14).

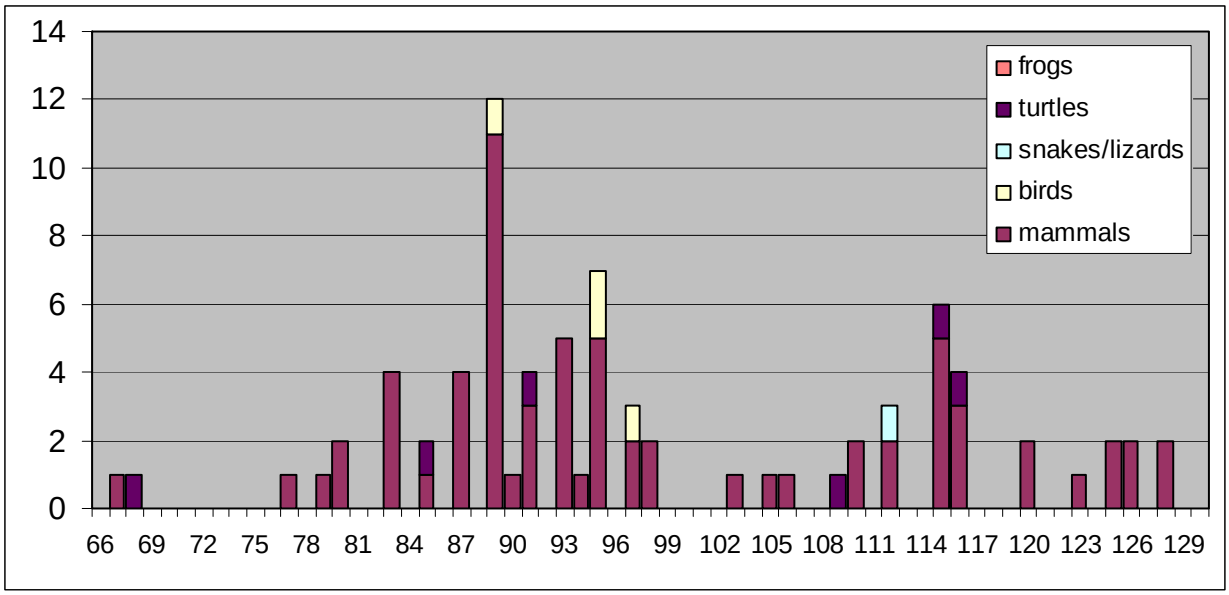

Figure 11. Number of Roadkills Recorded by Road Section (100-m wide) on SR 46 east. The new and old underpasses are located at partition nos. 20 and 66, respectively.

At the Tootoosahatchee Creek tributary, we recorded tracks of 647 mammals (269 meso-mammals, 373 small mammals, 2 other mammals, 2 domestics, and one ungulate), 58 herptiles (37 lizards, 17 frogs, and 4 snakes), and 15 birds (including 5 wading birds) (Fig. 15). Of all tracks observed, only about 60% successfully passed through the crossing (nearly all were meso- and small mammals). The temporary wooden ramps we constructed are in serious disrepair. Potential use of this structure cannot be properly evaluated as yet until the permanent access ramps to the ledges are constructed. Roadkill locations were recorded for 32 mammals (mostly meso-mammals and small mammals), 69 snakes/lizards (mostly colubrids and water snakes), 246 frogs (mostly ranids), 5 turtles (mostly aquatic turtles), and 15 birds (mostly perching birds). Figure 16 displays roadkills found in each road section at Tootoosahatchee Creek (see Fig. 12 for location). Significant individual roadkills include one Great Egret, one gopher tortoise, and one bat. As occurred with many of the other study sites (associated with creeks and other water features) significant numbers of amphibian roadkills were recorded during extended rainfall events. Herpetofauna/small mammal barrier (mesh fencing) would significantly reduce the number of roadkills.

We regained some access (previously restricted due to construction) to the Second Creek bridge for track surveys beginning in May. Track data revealed activity under the bridge involving 281 mammals (158 small mammals, 115 meso-mammals, 5 river otters, 1 coyote, and 2 wild hogs), 38 frogs, 8 lizards/snakes, and 6 birds (includes 1 wading or other long-legged bird) (Fig. 17). With additional monitoring we expect to observe many more herptiles. Roadkill on SR 520 in the vicinity of the bridge (approx. 500 m in each direction) included 10 mammals (mostly meso-mammals), 4 snakes (including one E. diamondback rattlesnake), 33 frogs (mostly ranids), and 3 birds (including one Black Vulture and one Red-shouldered Hawk). Figure 18 displays locations of roadkills with respect to the Second Creek bridge site (see Fig. 13 for location). The low numbers recorded for both tracks and roadkills reflects disturbance to wildlife by construction activities as well as disrupted monitoring activities during 2006.

Figure 12. Location of Tootoosahatchee Creek tributary enhanced ledge culvert on SR 520 and Partitions Used for Analysis of Roadkill Data. Numbered highway sections are 100-m wide.

At the Jim Creek bridge, we resumed track monitoring in May and recorded 206 mammals (147 meso-mammals, 47 small mammals, 6 river otters, 3 bobcats, 2 deer, and 1 coyote), 34 frogs (mostly ranids), 8 lizards, and 12 birds (including 1 wading bird) (Fig. 19). Similar to Second Creek, with additional monitoring we would anticipate presence of large numbers of herptiles. Roadkill on SR 520 in the vicinity of the bridge (approx. 500 m in each direction) included 11 mammals (mostly meso- and small mammals), 4 snakes (mostly water snakes), 22 frogs (mostly ranids), and 3 turtles (including 2 gopher tortoises). Figure 18 displays locations of roadkills with respect to the Jim Creek bridge site (see Fig. 13 for location). Noteworthy were roadkills of gopher tortoise at road partition nos. 21 and 27 and fox squirrel at road partition no. 19. As with Second Creek, the low numbers recorded for both tracks and roadkills reflects disturbance to wildlife by construction activities as well as disrupted monitoring activities during 2006.

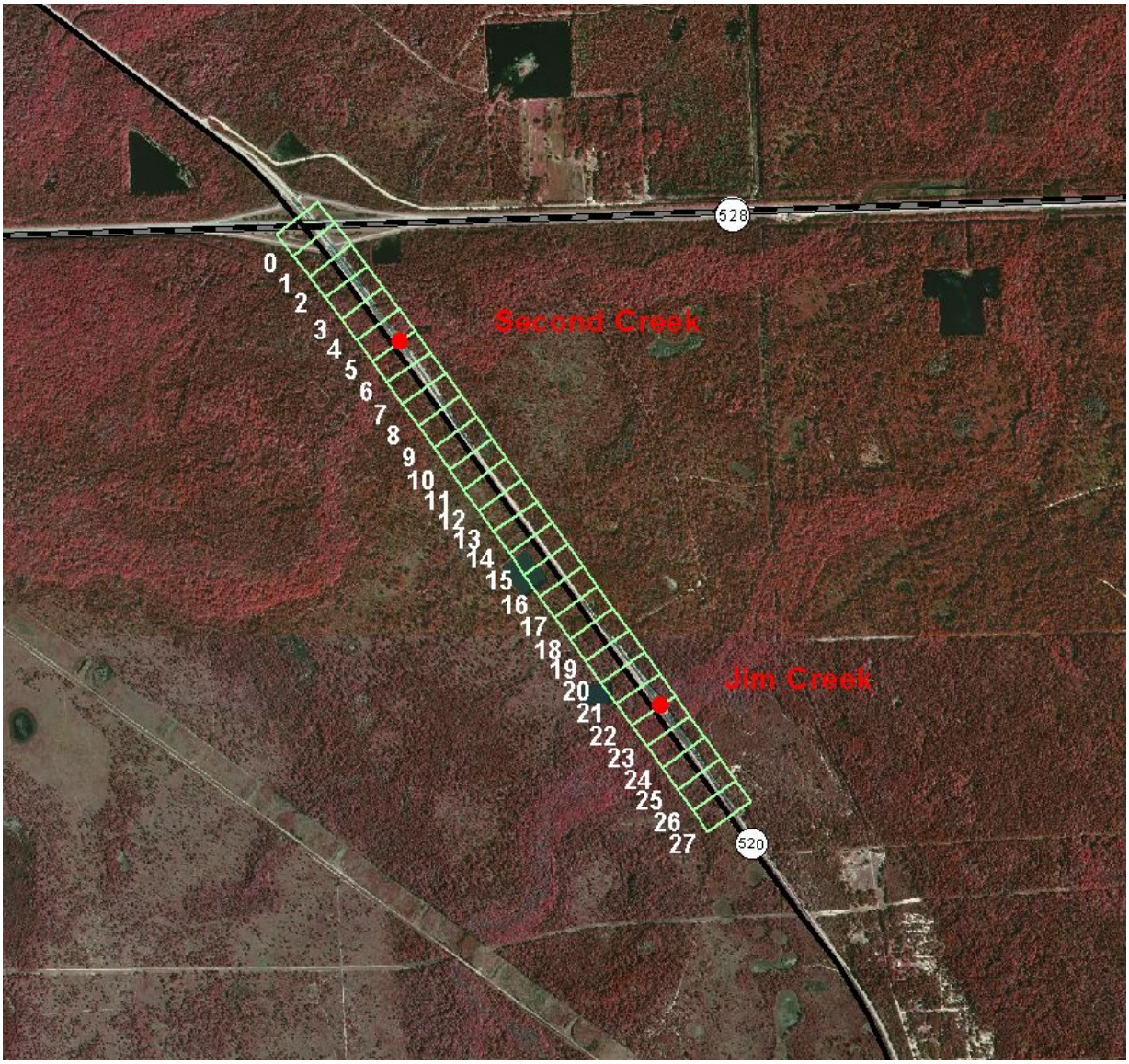

Figure 13. Location of Second and Jim Creek bridges on SR 520 and Partitions Used for Analysis of Roadkill Data. Numbered highway sections are 100-m wide.

At the St. John's River floodplain bridge, we recorded tracks of 474 mammals (327 meso-mammals, 73 small mammals, 64 river otters, 4 bobcats, 1 coyote, 1 domestic, and 4 other mammals), 58 herptiles (65 frogs, 12 lizards, and 10 snakes), 4 alligators, and 23 birds (including 5 wading birds) (Fig. 20). Preliminary indications would suggest that the constructed ledges at this structure function well by facilitating safe crossings by wildlife; however, the monitoring period was unusually dry. During high precipitation years, much of this area will be inundated and the crossing ledges may not function as well, leading to greater rates of roadkill as organisms try to cross in areas of higher ground.

Roadkill locations were recorded for 27 mammals (meso-mammals and small mammals), 250 snakes (mostly water snakes and colubrids), 251 frogs (mostly ranids and hylids), 5 turtles (mostly aquatic turtles), 7 alligators, 3 lizards, and 16 birds (including one Red-shouldered

Hawk). Figure 21 displays roadkills found in each road section near the St. John's floodplain crossing site (see Fig. 14 for location). Located in the floodplain area, this wildlife crossing should continue to demonstrate high occurrences of wetland-dependent species including an abundance of herpetofauna. Installation of wire-mesh barrier fencing should be strongly considered.

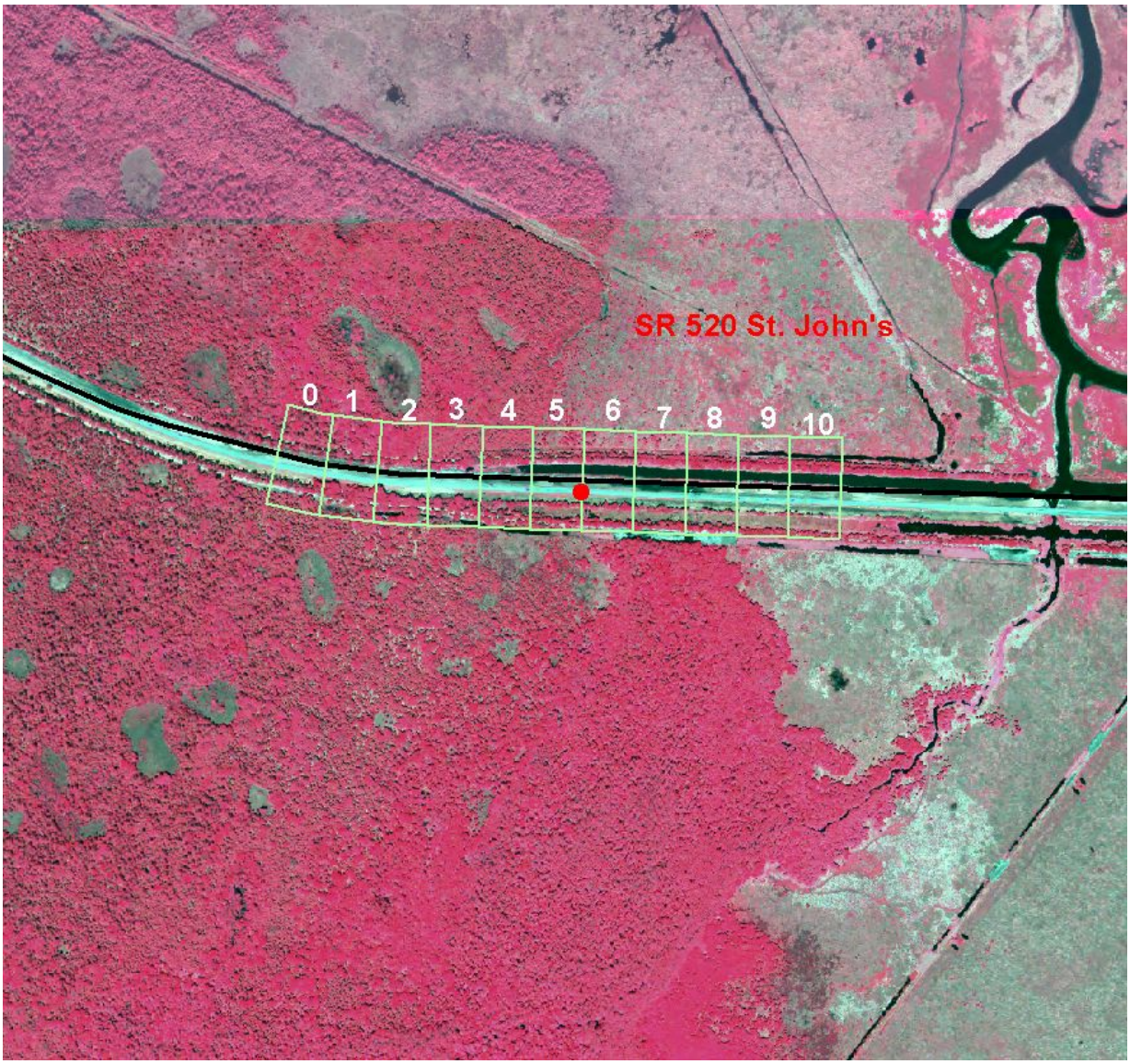

Figure 14. Location of St. John's River floodplain bridge on SR 520 and Partitions Used for Analysis of Roadkill Data. Numbered highway sections are 100-m wide.

US 192 Study Sites

Four study sites are located on US 192 in Osceola County. Post-construction monitoring for tracks and roadkills was conducted in 2006 at Sawgrass Creek and the C-57 canal bridges. To monitor wildlife movement under each bridge, we constructed sand transects on either sides of the channel. During construction (when safe conditions permitted), monitoring for roadkills took

place at Harmony (Jug Creek) and Crabgrass Creek sites over the same period. Ongoing construction precluded our ability to access and safely monitor for tracks near the structures.

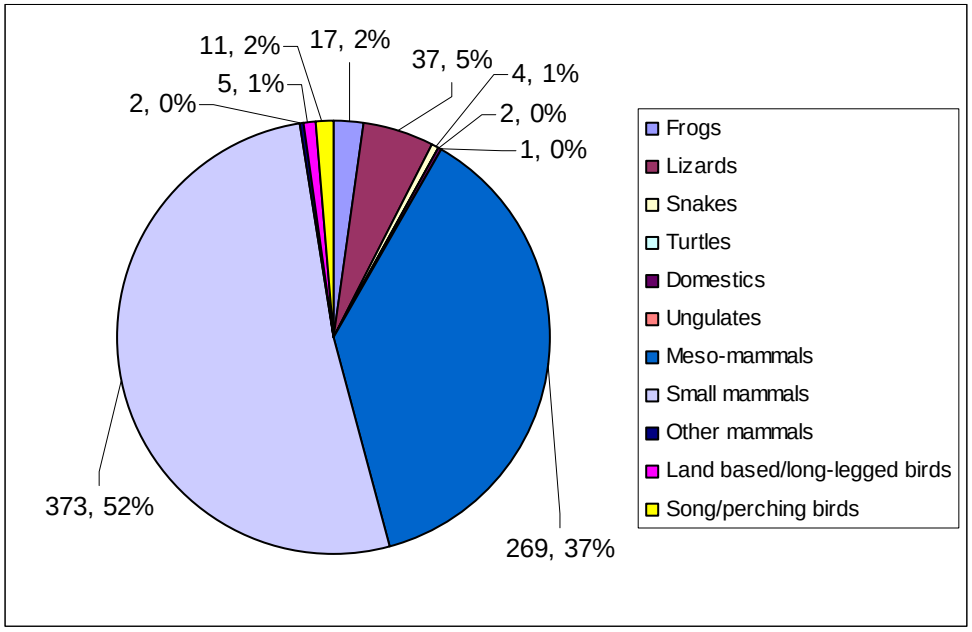

Figure 15. Percent of Tracks by Faunal Groups at Tootoosahatchee Creek tributary.

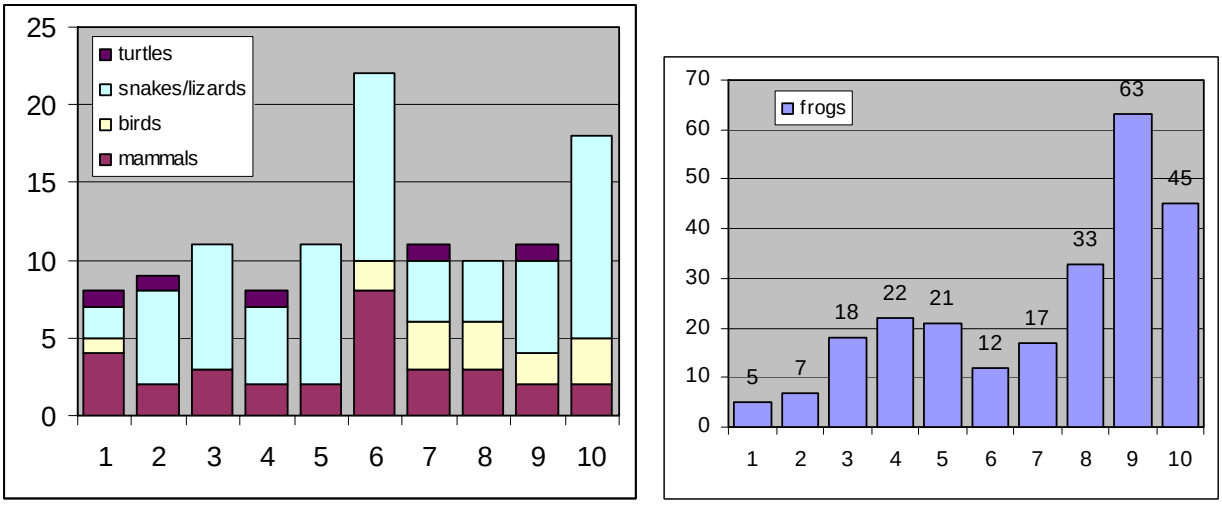

Figure 16. Number of Roadkills Recorded by Road Section (100-m wide) on SR 520 at Tootoosahatchee Creek tributary. The widened bridge with ledges is located between partition nos. 5 and 6.

At Sawgrass Creek, we recorded 1,412 mammals tracks (962 small mammals, 343 meso-mammals, 28 aquatic mammals, 5 other mammals, 28 carnivores, and 46 domestics), 41 herptile tracks (37 snakes, 48 lizards, 74 frogs, 2 alligators, and 2 turtles), and 27 bird tracks (includes 2 wading or other long-legged birds) (Fig. 22). Number of tracks of significant species included 1 Fl. black bear, 28 river otters, and 27 bobcats. Presence by domestic predators (primarily feral

cats) was prevalent at this site and likely disrupts or possibly prevents use by many native species due to risk of predation.

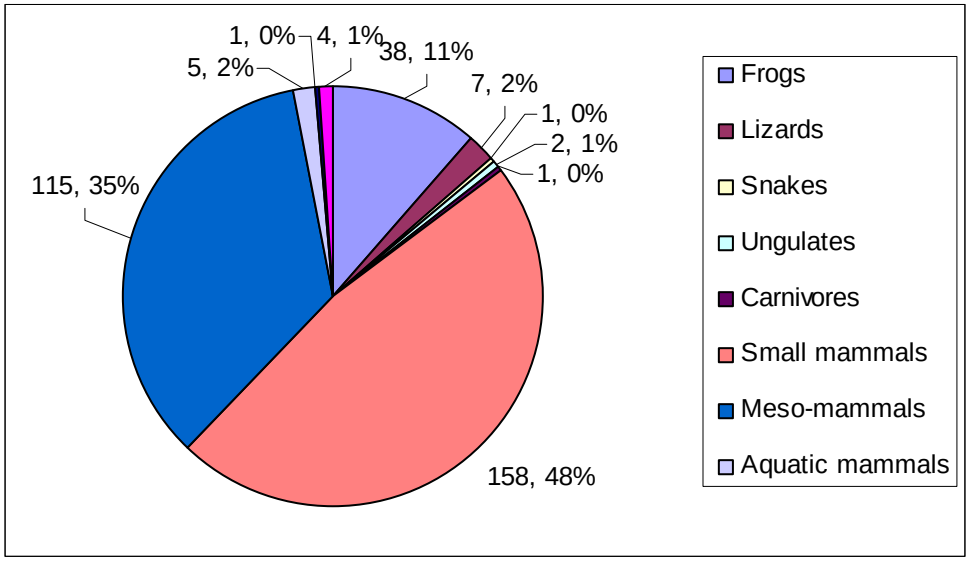

Figure 17. Percent of Tracks Recorded by Faunal Groups at Second Creek.

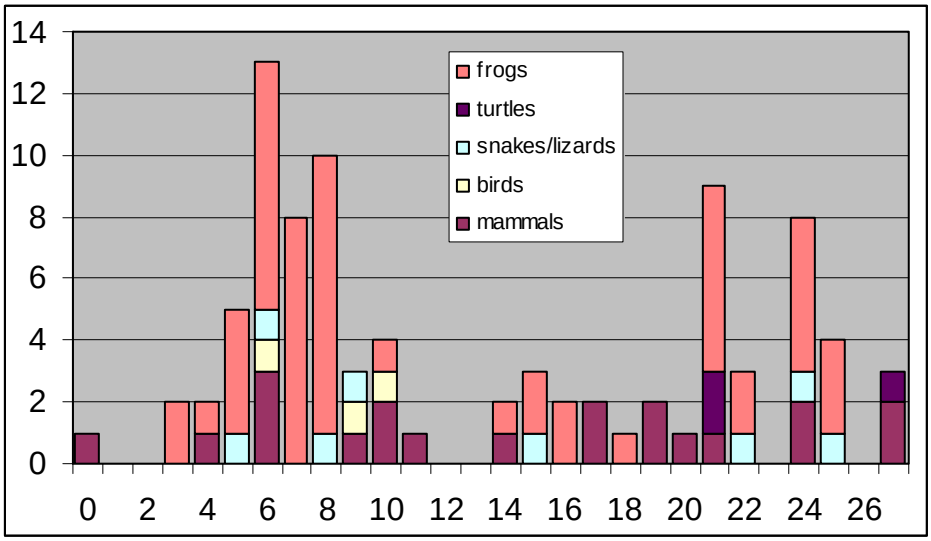

Figure 18. Number of Roadkills Recorded by Road Section (100-m wide) at Second and Jim Creeks. Second and Jim Creek bridges are located at partition nos. 5-6 and 22-23, respectively.

Roadkill locations were recorded for 60 mammals (mostly meso-mammals), 154 snakes/lizards (mostly water snakes and Colubrids), 196 frogs (mostly ranids and hylids), 4 turtles (mostly aquatic turtles), 2 alligators, and 28 birds (mostly perching birds). Figure 23 displays roadkills found in each road section at Sawgrass Creek (see Fig. 24 for aerial location). Another 122 roadkills (including 93 herpetofauna) were documented beyond the road section grid. Significant roadkills include one river otter (road section no. 7), one alligator (road section no. 2), one eastern coachwhip (road section no. 9), one Little Blue Heron (road section no. 1), one Great

Blue Heron (road section no. 9), one Caracara (found 275 m east of road section grid), and two Barred Owls (road section no. 1 and 210 m west of road section grid). Significant wetlands and canals adjacent to this site account for the large number of roadkilled frogs and snakes.

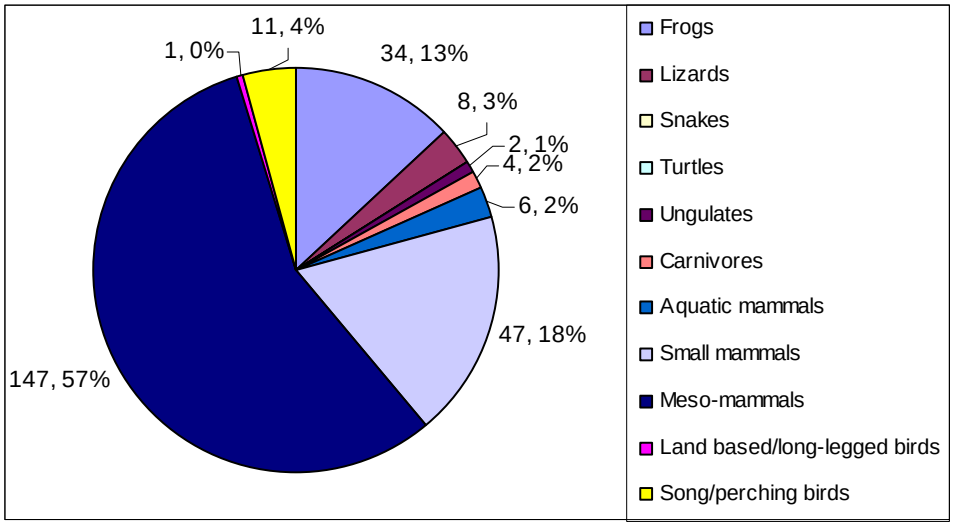

Figure 19. Percent of Tracks Recorded by Faunal Groups at Jim Creek.

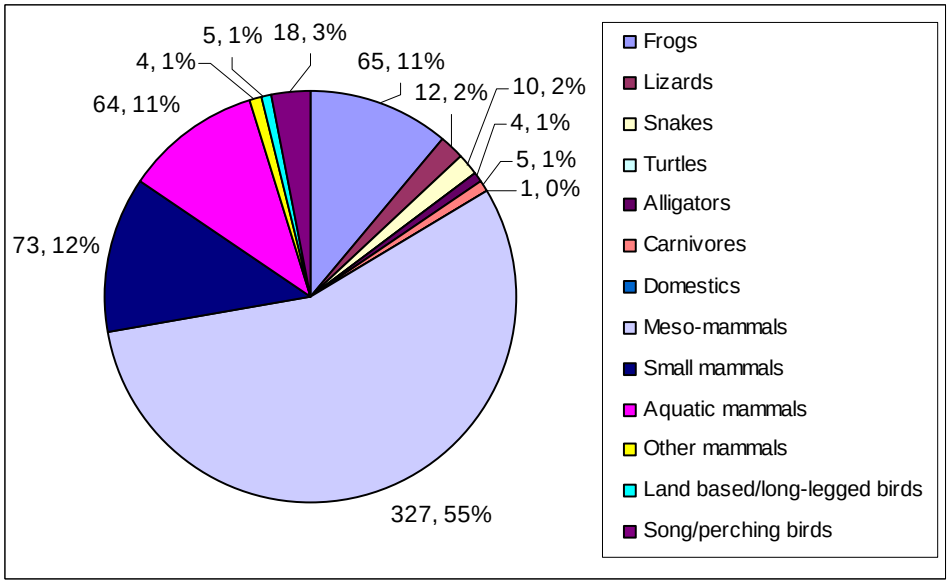

Figure 20. Percent of Tracks Recorded by Faunal Groups at St. John's River floodplain wildlife crossing.

We checked for tracks at the C-57 canal site for the first time in 2006 because construction of the earthen ledges wasn't completed the previous year. We recorded 290 mammals tracks (148 small mammals, 97 meso-mammals, 1 river otter, 10 bobcats, and 33 domestics), 119 herptile tracks (10 snakes, 88 lizards, 20 frogs, and 1 turtles), and 9 bird tracks (Fig. 25). This site contains a large open water reservoir and it is evident that local people use this area for fishing. As such, the presence of humans results in disturbance to native wildlife, and the scattered debris and trash left at the site by people may attract domestic predators.

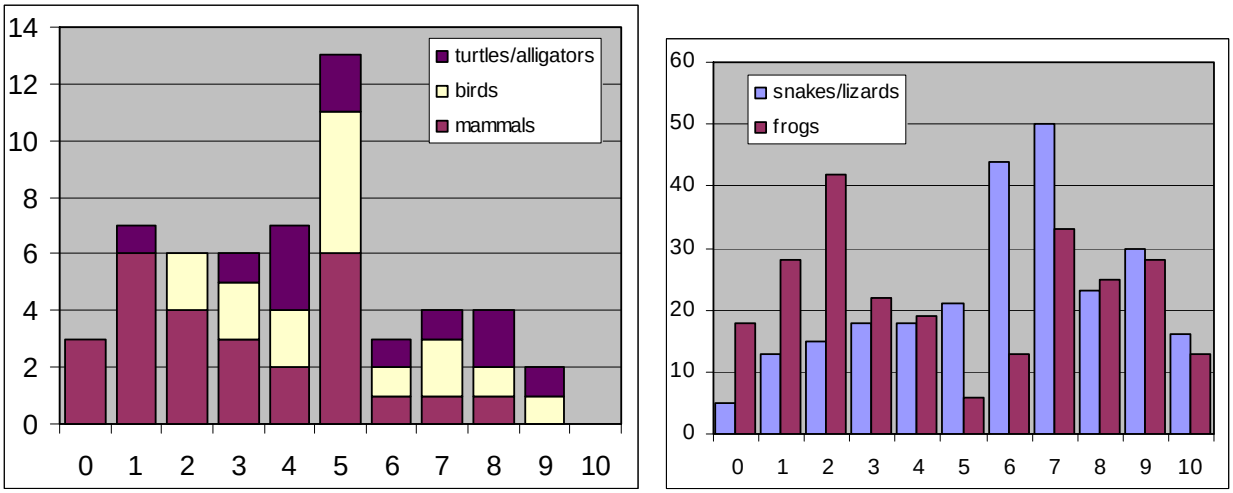

Figure 21. Number of Roadkills Recorded by Road Section (100-m wide) at St. John's River floodplain wildlife crossing. The crossing is located between partition nos. 5 and 6.

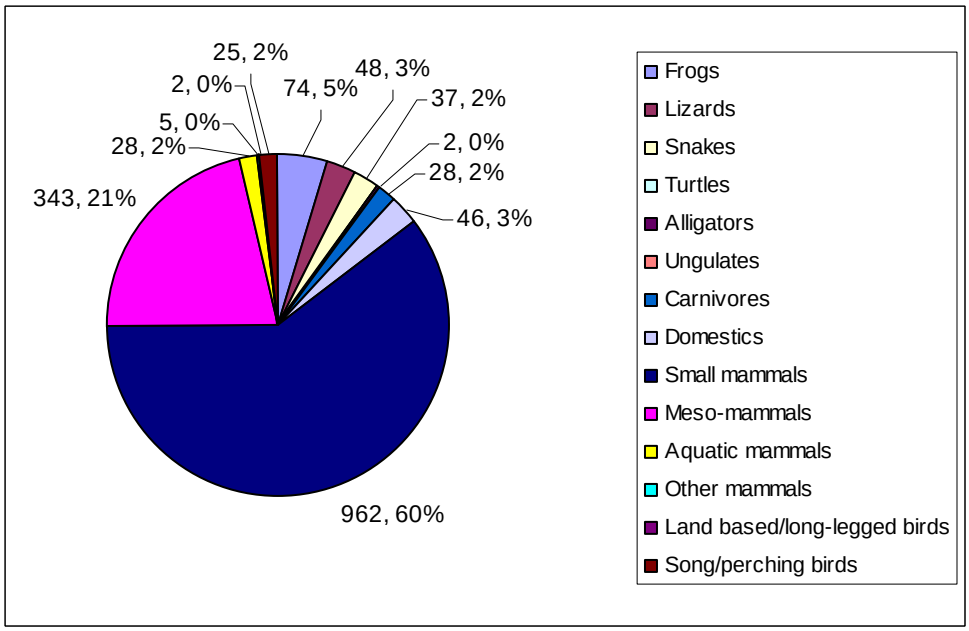

Figure 22. Percent of Tracks Recorded by Faunal Groups at Sawgrass Creek.

Roadkill locations were recorded for 48 mammals (mostly meso- and small mammals), 69 snakes/lizards (mostly water snakes and Colubrids), 241 frogs (mostly ranids and hylids), 2 turtles (mostly aquatic turtles), 4 alligators, and 27 birds (mostly perching birds). Figure 26 displays roadkills found in each road section at C-57 canal (see Fig. 27 for aerial location). Significant roadkills included four alligators (road section nos. 5, 7 and 10), two whitetail deer (road section no. 8, and 125 m east of the road section grid), one river otter (road section no. 4), one bobcat (300 m east of road section grid), three hawks (road section no. 6, and approx. 150 m east of the road section grid), one Great Egret (215 m west of the road section grid), and one eastern indigo snake (95 m east of the road section grid). Presence of wetlands and canals adjacent to this site account for the large number of roadkilled frogs and snakes.

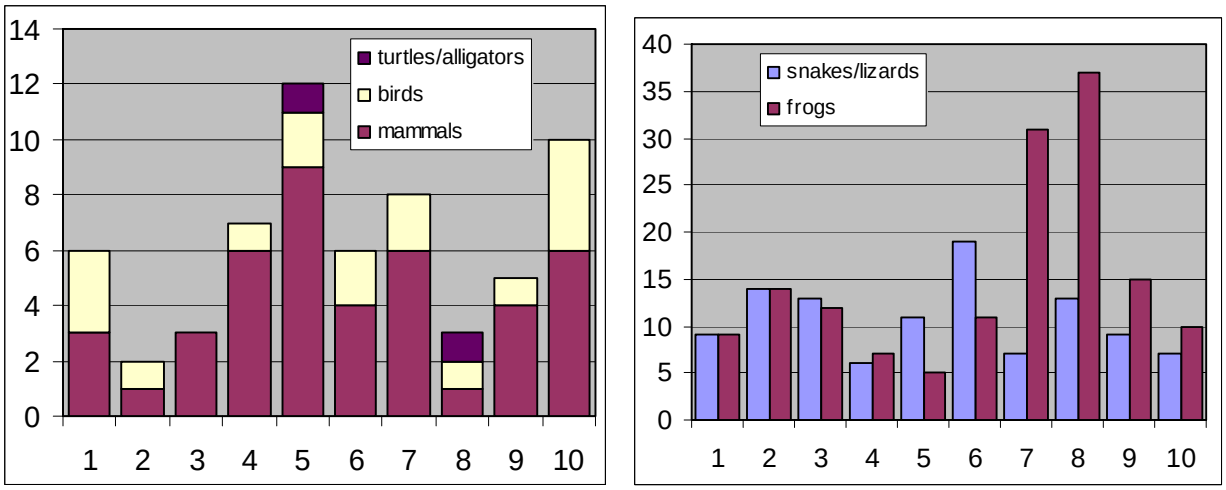

Figure 23. Number of Roadkills Recorded by Road Section (100-m wide) at Sawgrass Creek. The widened bridge with ledges is located between partition nos. 5 and 6.

Figure 24. Location of US 192, Sawgrass Creek Study-Site and Partitions Used for Analysis of Roadkill Data. Numbered highway sections are 100-m wide.

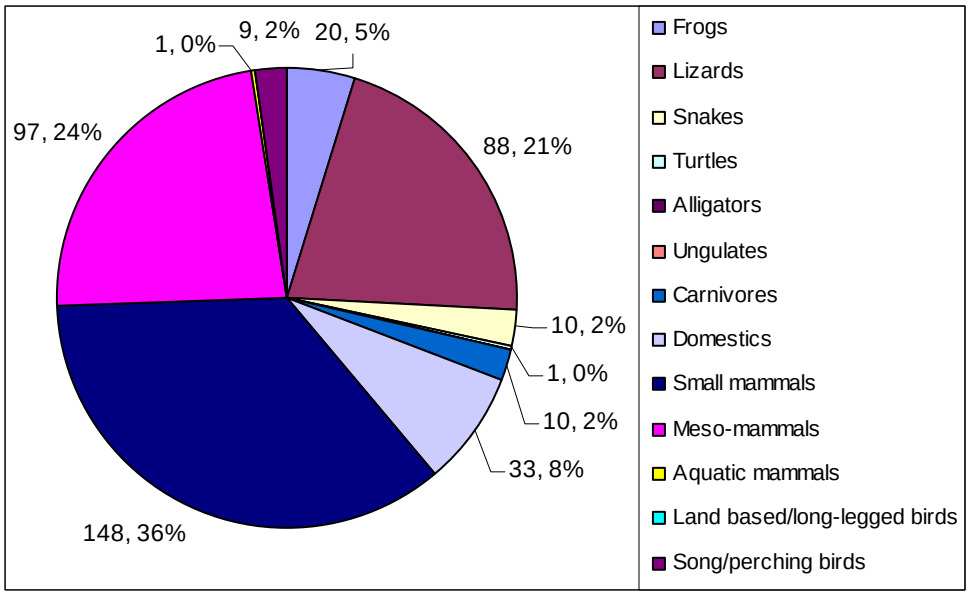

Figure 25. Percent of Tracks Recorded by Faunal Groups at C-57 Canal.

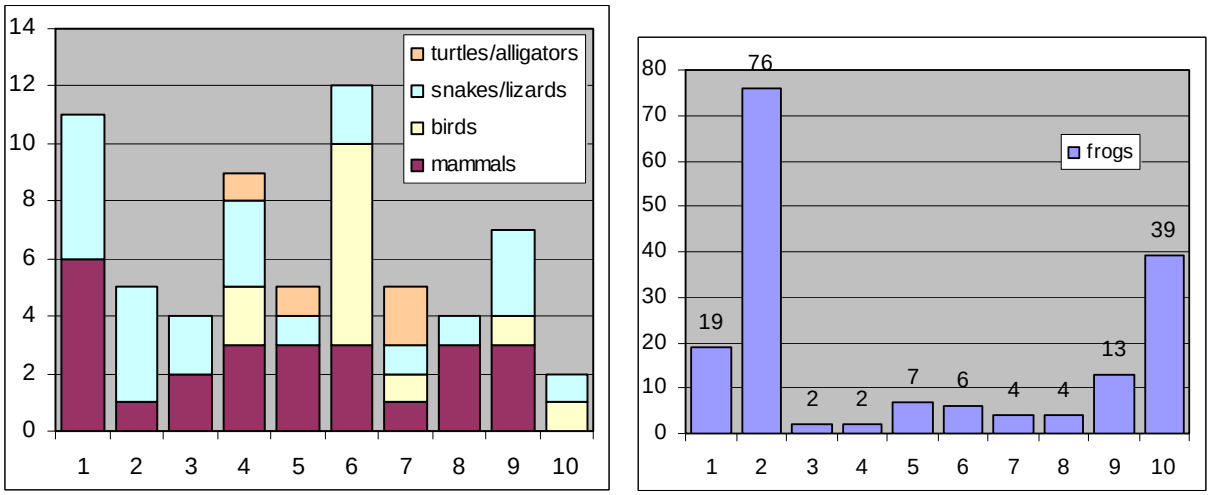

Figure 26. Number of Roadkills Recorded by Road Section (100-m wide) at C-57 Canal. The widened bridge with ledges is located between partition nos. 5 and 6. Note: an additional 163 roadkills (including 115 frogs and snakes) were documented beyond the road section grid.

At Crabgrass Creek, construction activities disrupted and in many cases prohibited collection of data. As such the following figures reflect inconsistent monitoring. Roadkill locations were recorded for 25 mammals (mostly meso-mammals), 3 snakes (common Colubrids), 3 turtles, 11 frogs, and one alligator. Figure 28 displays roadkills found in each road section at Crabgrass Creek (see Fig. 29 for aerial location). The most significant roadkills observed were two gopher tortoises (located at road section no. 6 and 340 m west of the road section grid), one gopher frog (road section no. 8), and one alligator (280 m west of the road section grid).

The Harmony site (Jug Creek) was also under construction during 2006. Therefore, we did not collect track data and roadkill monitoring was only performed when safe conditions existed.

Under these circumstances, we recorded roadkill locations for 28 mammals (meso- and small mammals), 54 snakes/lizards (mostly water snakes and Colubrids), 180 frogs (mostly hylids and ranids), 8 aquatic turtles, 3 alligators, and one bird. Significant species of roadkills include 1 bat (road section no. 8), 3 alligators (road section no. 5 and 320 m west of the road section grid), 2 common snapping turtles (road section no. 9 and 280 m east of the road section grid), and 2 gopher tortoises (275 m east/west of the road section grid). Figure 30 displays roadkills found in each road section at Crabgrass Creek (see Fig. 31 for aerial location). An additional 95 roadkills (mostly herpetofauna) were documented beyond the road section grid.

Figure 27. Location of US 192, C-57 Canal Study-Site and Partitions Used for Analysis of Roadkill Data. Numbered highway sections are 100-m wide.

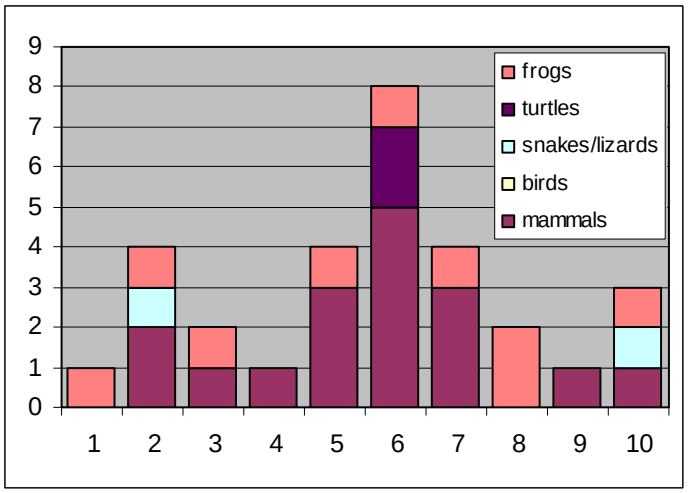

Figure 28. Number of Roadkills Recorded by Road Section (100-m wide) at Crabgrass Creek. The widened bridge with ledges is located between partition nos. 5 and 6.

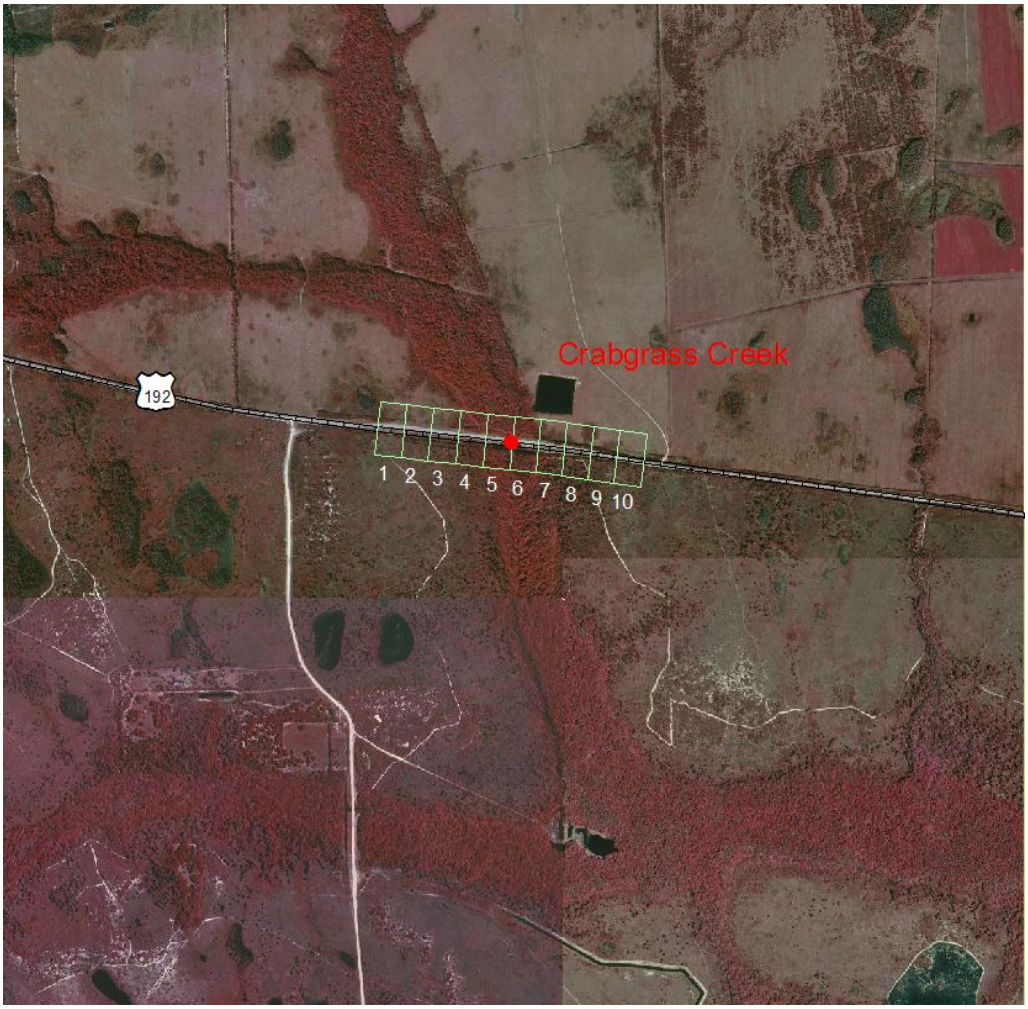

Figure 29. Location of US 192, Crabgrass Creek Study-Site and Partitions Used for Analysis of Roadkill Data. Numbered highway sections are 100-m wide.

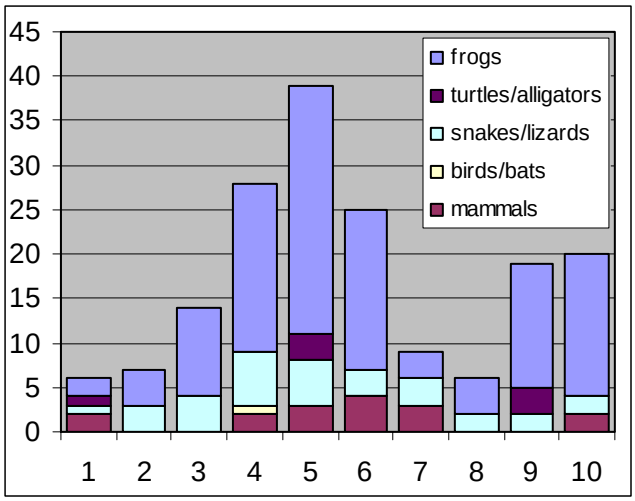

Figure 30. Number of Roadkills Recorded by Road Section (100-m wide) at Harmony (Jug Creek). The original standard culvert was located between partition nos. 5 and 6.

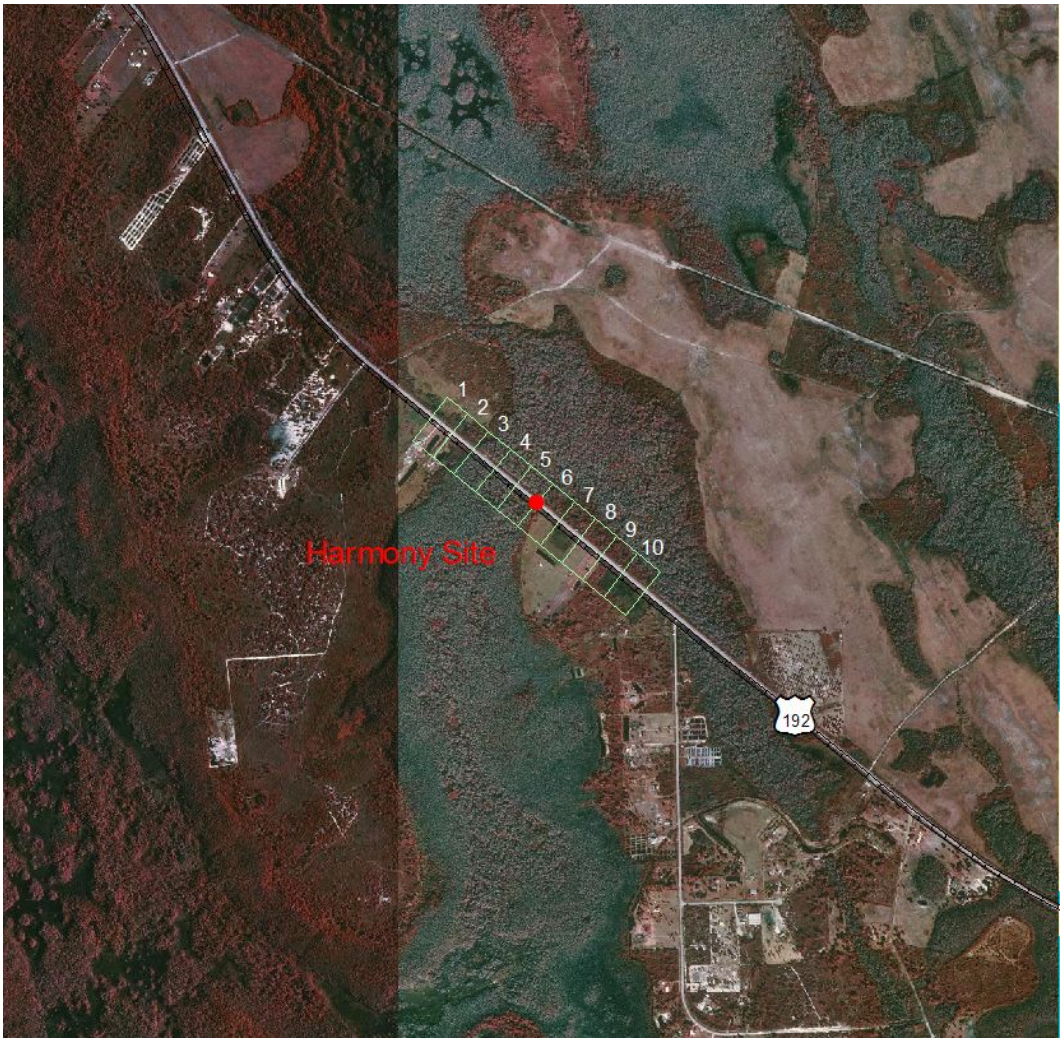

Figure 31. Location of US 192, Harmony (Jug Creek) Study-Site and Partitions Used for Analysis of Roadkill Data. Numbered highway sections are 100-m wide.

Lessons Learned and Implications for Continued Monitoring

Data collection periods for this study continue to (unavoidably) vary, thus hampering our ability to conduct standard statistical tests. For example, construction prevented us from monitoring tracks in 2006 at Harmony and Crabgrass Creek sites and delayed track monitoring until May at Second and Jim Creeks. In addition, roadkill monitoring effort at these sites was disrupted as well. We expect construction to be completed at all sites in 2007; following this all study sites will receive the same monitoring effort.

Table 3 displays the months and length of roadway for which roadkill data were collected for any given site for 2006. Translated to roadkills recorded per month and km, the data reveal high levels of variation among sites. Three sites (Crabgrass Creek, Harmony, and Second/Jim Creeks) produced lower amounts than in 2005 due to disrupted monitoring effort from construction activities. Whereas these sites are characteristically wet and generally are associated with high numbers of amphibians, Wekiva (SR 46 adjacent to the wildlife crossings) is a dry upland site with few wetlands and doesn't exhibit as high a density of amphibians. Also, a different monitoring protocol (driving surveys only) has been applied to Wekiva (given the much longer distance of 13 km). More intensive surveys will be applied in 2007 within 500 m of each crossing on SR 46, consistent with efforts being employed at other sites.

Table 3. Roadkill Rates as Determined by Recorded Data (2006).

Site	Months	Rdkills/mo	Distance	Rdkills	Rdkills/km	Rdkills/mo/km
C57 Canal	12	33	1.8	398*	221	18
Crabgrass Cr**	12	4	1.8	44	24	2
Harmony**	12	22	1.7	267*	157	13
Mud Cr	12	17	1	208	208	17
N 520, T Cr	12	31	1.1	368	335	28
Sawgrass Cr	12	37	1.7	443	261	22
2nd/Jim Cr**	12	8	2.7	92	34	3
St. Johns	11	50	1.2	559	466	42
Wekiva	12	13	13	154	12	1

*excludes one outlier. ** inconsistent data collection due to construction.

Two sites (N 520 and St. Johns) exhibited about one or more roadkills/km/day (Table 3). Three sites (C-57 canal, Mud Creek, and Sawgrass) produced slightly less, on average 0.63 roadkills/km/day. All of these sites are associated with wetlands or other aquatic features. We expected that Mud Creek and the SR 520 sites would produce significantly lower values; because of a mesh-screen barrier fence that was installed to prevent smaller wildlife from accessing the pavement. These results would indicate that the barrier fence is not performing as well as needed.

It is evident from the data collected so far that existing fencing (or lack thereof) at each site is inadequate in preventing roadkills. For many organisms of small body size, penetrating a chain-link fence is not difficult and often results in collisions with vehicles. Also, several larger animals are circumventing the fence and entering the roadway at the ends of the fence. In both cases, remedies are available: First, existing fences can be extended. Second, based on data we collected in the second year, alternative materials (e.g., ¼" mesh hardware cloth, 4' high, buried

1’ below ground) can be used at the base of the chain-link fence that are more impermeable to smaller organisms and more durable than previously used mesh screens. The primary reason that the mesh screens perform poorly is that the height is only about a foot above ground; most organisms have the ability to climb over. Lastly, one-way gates/earthen ramps may be needed to allow escape for larger wildlife trapped in the fenced enclosure within the right-of-way (see Bank et al. 2002).

Not reflected in the totals given in this report are single roadkill events where large numbers (100s to 1,000s) of frogs were documented on a few occasions at several sites (C-57 canal on 5/30, 6/12, and 6/30, N 520 on 10/25, Sawgrass on 6/19, and 520 SJ on 5/31). These were left out because they would overwhelmingly skew general comparisons. We are applying a standardized protocol to track these unique occurrences to determine locations and timing (i.e., seasonal trends associated with breeding, high rainfall events, or other conditions that trigger mass movement) of movement by various anuran species for all study sites. These events highlight the need for appropriate barrier fencing associated with wildlife crossings at or near wetland sites.

Recently constructed crossings on SR 520 (N 520 “ledge culvert”, Second and Jim Creeks) include rip-rap (large rocks) to prevent erosion and scouring. The placement of the rip-rap across the approaches to the crossings renders them almost impassable to many larger wildlife (e.g., whitetail deer). Applying the rip-rap to areas outside the bridge structure is unnecessary. This is especially troublesome given that we recorded many deer moving under the original Second and Jim Creek bridges (that contained rip-rap also, but only around the pilings and bridge abutments, leaving natural smooth-surface travel-paths for wildlife intact. Deer trying to move through the rip-rap risk broken limbs from getting legs caught between the rocks. Their alternative is to now cross over the highway and dodge traffic to avoid traveling through these large rock-fields. We strongly suggest that these be removed in favor of alternative materials (e.g., filled sandbags, as used at Sawgrass Creek and C-57 canal) that are more user-friendly for wildlife.

Environmental variability continues to play a strong role in our ability to collect crossing data. Specifically, flooding (during high rainfall periods) at six sites (N 520, Second Creek, Jim Creek, Mud Creek, Crabgrass Creek, and Sawgrass Creek) made monitoring difficult or impossible. It is during these times that wildlife is diverted to crossing the road surface because the crossing structure is impassable. As such, we feel it necessary to point out a significant flaw in wildlife crossing design that requires resolution. At these kinds of sites, multiple structures are needed and the roadway approaches to the main structure (flow-way bridge or culvert) needs to be breached with installation of upland culverts. This new design would mimic natural processes in river floodplains; as water rises, terrestrial animal travel paths will shift outward to follow the water’s edge (this would direct them to the proposed upland culverts). As part of this overall design, sufficiently wide protected-area buffers adjacent to creek corridors are required.

Even with these measures the long-term effects of road widening may be detrimental and can take decades to determine (Findlay and Bourdages 2000). Continued post-construction monitoring of crossing structures will permit us to evaluate the performance and population stability of focal species in and around each study site.

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